U.S. Army. Signal Corps.

# ANNUAL REPORT, 1877/78

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## THE YEAR 1878.

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WASHINGTON, D. C.,
*May* 28, 1879.

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1878.

# National Oceanic and Atmospheric Administration

## Annual Report of the Chief Signal Officer, U.S. Army Signal Corps

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# ANNUAL REPORT

OF THE

# CHIEF SIGNAL-OFFICER.

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# REPORT

OF THE

# CHIEF SIGNAL-OFFICER OF THE ARMY.

WAR DEPARTMENT,
OFFICE OF THE CHIEF SIGNAL-OFFICER,
*Washington, D. C., November* 10, 1878.

SIR: The established course of drill and instruction in military signaling and telegraphy, meteorology, and the Signal Service duties of stations of observation and report, embracing those of the service both on the sea-coast and in the interior, together with those of the construction, maintenance, and operation of the telegraphic lines upon the frontier, has been continued, as in preceding years, at the school of instruction and practice at Fort Whipple, Va.

The drills of the Signal Corps with arms, with Gatling guns, in the maneuvering of field telegraphic trains; the procedures for the rapid erection of telegraphic lines; the management of the signal and other apparatus habitually used by the corps in the field or in times of war, have been regular and thorough. The character of these duties has been so often described, it is not necessary to refer to them here at length.

The apparatus at the post for the study and practice with instruments for the meteorological duties of the service has been improved.

The equipment for the drill with arms, the drill with field telegraphic trains, the construction drills and for practice in the duties required on signal and at telegraphic stations, is sufficient. Particular attention has been given in the year just passed to the drill of the force with arms and to such armed maneuvers as would be necessary for the corps in time of war. A rigorous practice of this kind is necessary for a force organized to act, if need be, independently of other organizations, and to be capable of protecting with its own guard its own material and works.

Experiments in signaling and telegraphy are made at Fort Whipple under proper supervision. It is endeavored to keep abreast in all improvements, with the progress made by scientific ingenuity in the special duties of the service in the use of improved war material and in the different modes of rapid communication now necessary and expected to be used as of course in war. Such apparatus are here tested as may have received the notice of this office or to which the attention of the office is directed by higher authority.

A practice-line forty miles in length—a portable field-line being used—has, during the past year, been erected and maintained on the military reservation of the post for the experimental testing of the uses of the telephone. An iron line—the supports and insulator branches being both of that metal, fitted to carry and carrying two wires—has been here tested. It has not been disabled at any time by any failure of the supports. The telegraphic line connecting Fort Whipple with this office—a field-line eight miles in length—has been in constant use, different forms of telephones being employed upon it.

Telephonic communication is adopted as the usual mode for all communication between this office and Fort Whipple. The wires are so arranged and fitted with instruments that the ordinary modes of telegraphing may be used for any matters requiring to be of record. A number of experiments have been made over the wires connecting Baltimore and Washington. As a result of these experiments, telephonic communication has been established at points upon the sea-coast lines where, at repair and minor stations, it gives promise of usefulness.

A series of experiments has been made with sun-flashes, with the view of improving upon the forms of heliograph to be adopted for the general uses of the Army.

Experiments have been made with shells charged with gun-cotton to be exploded and causing a heavy report at a great elevation above the earth's surface, and with shells charged with colored fires to be used as signals—the shells being thrown from Signal-Service mortars.

There have been other and necessary experiments, for which the post and force stationed at it furnish, as they are intended to do, good facilities.

The duties at this post are conducted under strict military rule. The post is controlled as connected with and as forming part of this office. The officers of the Signal Corps pass a course of drill and instruction and serve regularly at this post before being put upon any other duty of the Signal Service. It is recommended that all officers of the Army intended to be instructed as acting signal-officers, or to be temporarily instructors in geographical military departments for the field duties of the Signal Service, be here instructed before being put upon detached duty. Instructors, not themselves thoroughly instructed, are worse than useless. It is aimed to furnish through the thorough course of study and practice at Fort Whipple a force of enlisted men, enlisted after examination, thoroughly disciplined as soldiers and fitted by careful special instruction for the special duties of the Signal Service.

The importance of the field duties of the Signal Service, and of the modes of communication such services make possible, are now recognized throughout the world. The modes of instruction in field or outdoor signaling, now nearly similar in the Army and Navy of the United States, ought to be made so absolutely, and a course so complete established that any force of either arm will be surely competent at any time to put itself in signal communication with any force either of its own or of the other arm, within signal distance. It is not necessary now to represent at length to any who have served in or read of recent wars the propriety and the need that any armed force of any army should be able to wire or to communicate by other signals with any other of the same nationality or obeying the same general command.

The course of instruction at Fort Whipple, for officers, to be acting signal officers, and that for enlisted men, candidates for promotion to the grade of sergeant in the Signal Corps, or to the grades of first-class privates and corporals, are given herewith. (Paper 1.) They embrace such branches of study as experience has shown best suited to fit the pupil for the different positions of duty in which he may be placed. The number of officers now under instruction at Fort Whipple is three. Eighteen enlisted men have been instructed for promotion to the grade of sergeant during the year, terminating June 30, 1878. Of these, thirteen successfully passing the examination, for that grade, have been promoted and assigned to stations. One was dropped from instruction for misconduct, and four are still under instruction. (Paper 2.) Ninety-six enlisted men have been under instruction for the positions of first-class

privates, assistants to observers. Of this number, sixty-three completed the course of instruction, drill and practice, passed the necessary examination, and have been ordered to duty at stations as assistants. Two were discharged the service at their own request, and thirty-one are still under instruction. (Paper 3.)

The action of Congress permanently organizing the enlisted force of the Signal Corps and increasing its number, has imposed unusual labor upon the instructors. The habitual drills with arms of all the enlisted force stationed at the office of the Chief Signal-Officer in Washington, in connection with those of the enlisted force at Fort Whipple, has rendered possible during the past year practice more complete than in former years. Drills of the telegraphic train complete, embracing four sections, have been practicable for the first time in the history of the service. The drill of one or at most two sections has been the most extensive maneuver which could be before attempted.

During the year ending June 30, 1878, First-Lieut. R. P. Strong, acting signal officer, has continued in charge of the post.

First-Lieut. J. McClellan, acting signal-officer, was succeeded in charge of the instruction department of the post by First-Lieut. F. C. Grugan, acting signal-officer, June 17, 1878.

Lieut. F. S. Rice, acting signal-officer, was relieved from duty as A. A. Q. M., and A. C. S., November 3, 1877, by Lieut. F. C. Grugan, who is now in charge of these duties.

Acting Assistant Surgeon L. W. Ritchie has remained in charge of the hospital.

The post of Fort Whipple is in commendable good order. The buildings are sufficient in number, commodious, and comfortable.

An ordnance shed for the protection of the Gatling guns, arms, and other ordnance property, and a brick magazine for the safe storage of ammunition, signal shells, pyrotechnics, and other explosives, have been erected since the date of the last annual report. The health of the post has continued excellent. A fire-engine is needed for the proper protection of the buildings and valuable property stored at the post.

The number of men for duty at the post has varied from thirty-nine to sixty, and the number of officers from two to seven. The average number of men for duty during the year was fifty.

The morning report of Fort Whipple, Va., for June 30, 1878, exhibits sixty-three enlisted men present for duty, of whom four were sergeants of the Signal Corps, two were corporals, fifty-five privates, one commissary sergeant, and one hospital steward. One corporal and four privates were candidates for promotion to the grade of sergeant, and under special instruction.

In the last annual report the Chief Signal-Officer expressed his conviction that the economy assured to the United States by the duties practiced at this post far exceeded the annual cost of maintaining it. Longer experience confirms this view.

As stated in that report this post alone has made it practicable to put on station duty and in charge of stations those non-commissioned officers and men only who have been drilled, taught, tried, and so known to be fit for the labors and responsibilities to be required of them. There is no one of its varied duties but to which the force of the Signal Corps can be here habituated in practice before being brought to face the difficulties of its actual discharge. The benefits resulting from the school as one of practice, in which men are trained to be at once soldiers and students, have been evidenced throughout the United States.

The enlisted men of the Signal Corps are engaged on duty as constant

in time of peace as in the presence of actual war. The uses of the post at Fort Whipple for the discipline and instruction of the officers and enlisted men of the corps do not cease while either remain in the service. The force, made useful in time of peace by employment through which it is now admitted they return to the United States more than the cost of the service, is kept in readiness for any emergency of armed duty by regular drills, in which the officers and men stationed at this office and those whose changes of station bring them even temporarily within reach of Fort Whipple are there practiced and maneuvered as a part of accustomed duty. Men thus practiced are trained in discipline, and look upon events transpiring in their vicinity with soldierlike views.

The advantages of having distributed in the different cities of the United States a force of men with such training, habituated to acting in concert by order, and promptly; capable of reporting simultaneously by telegraph and in cipher, as a duty, upon matters of military interest to which their attention may be directed, aside from the routine duties of their station, have been sufficiently evidenced in emergencies yet recent. The self-possession of the non-commissioned officers in charge of stations, their prompt, concise, and reliable reports, rapidly collected, in emergencies which have occurred, over great extents of territory, for the information of superior authorities have received the warm commendation of high executive officials. The rapid making of reports of this character and the collection of them over the telegraphic wires; by aerial signals or by any of the most rapid methods of communication, is the especial duty required in the service of the corps in time of war.

It is considered that the movements of the Army of the United States, made possible by this agency, can be made as rapid on occasions of need as any of which there is a previous record.

It is difficult to compute in money value the power of attaining such results. The advantages resulting to the War Department and to those especially charged with the management of the duties so varied and extensive as those of the Signal Service have become, from the knowledge that of all the force of the Signal Corps the course pursued leaves no man who, called upon for any duty of the service, would fail to be found fitted for it by careful instruction, are evident.

Meager reports only have been received of the instruction for the field duties of the Signal Service had elsewhere than at Fort Whipple. No reports have been received from the officer designated as the instructor in military signaling and telegraphy at the United States Military Academy at West Point, N. Y.

In the Department of the Missouri, Lieut. W. J. Volkmar, Fifth Cavalry, A. D. C., has remained on duty connected with the service in that department, and has forwarded regularly monthly reports of the instruction of officers and enlisted men.

The Chief Signal-Officer is confirmed in the view hitherto expressed, that the general instruction of the Army, to be successfully carried on, should be confided to officers first carefully instructed themselves and responsible to the Chief Signal-Officer for the discharge of their duties as instructors.

It is recommended that provision be made that a force of six subaltern officers may be constantly under instruction at Fort Whipple in the duties of field-signaling and telegraphy; it being understood that as each shall have completed the course and passed the necessary examinations he shall join his company and regiment as instructor. The number under tuition at the school of instruction to be kept constant by details to be

made from companies and regiments, not before instructed, as vacancies occur.

The wise legislation of the act approved June 20, 1878, permanently organizing the enlisted force of the Signal Corps, providing 150 sergeants, 30 corporals, and 270 privates, has been and will be productive of good results. It has done away with annoyances and embarrassments inevitable without it. It has fixed the service on an honorable footing, and opened a career, of which they are proud, to the best class of young American citizens. The office files are crowded with applications for enlistment. The severe examinations are successfully undergone. The clause providing "that two sergeants may in each year be appointed to be second lieutenants," gives that stimulus of permanent service and promised reward so long and earnestly sought for. Until the results of this organization, up to this time so satisfactory, have been more fully tested, it is not advisable that changes be attempted. To the steady and strong support of the Secretary of War the successful attainment of this desired legislation is largely attributable. (Paper 24.) Already, however, since the passage of the act, additional duties, not at the time contemplated, have been imposed by Congress upon the corps. In the present status of the service, employment can well be furnished to an additional force of enlisted men and be of such a nature as to certainly repay more than the money value of the expenditures incident to maintaining it. A plan of details from regiments may provide temporarily for this increase of force.

The candidates for enlistment in the Signal Corps become year by year, as the service progresses and is approved, more numerously representative of the better educated classes of citizens.

The men to be enlisted are first required to pass a preliminary physical and educational examination before they are accepted for enlistment. After enlistment they are sent to Fort Whipple to be drilled and instructed. They are then tested by practice and further taught by a year of duty and of study in the positions of assistants at stations. They are instructed later in higher branches at the school of instruction at Fort Whipple, and again examined and again tested by practice before being intrusted with the management of stations. They are held to a rigid observance of duty and with careful discipline at their several stations. The plan has furnished a force of soldiers of superior education and good character at the many stations throughout the United States. Their work is in evidence.

The work aggregating at this office has become each year more extensive. It covers now a field of operations actually co-extensive with the Northern Hemisphere.

The details are many and complicated, each requiring to be elaborated for each day with the many checks necessary for accuracy, and each limited for its discharge to fixed and brief periods of time.

The steadily improving experience and organization of the service have permitted each branch of duty to be carried on with regularity. The force on duty at this office, small in view of the onerous and extensive duties devolved upon it, has been at times, and of necessity, overworked.

The staff of the office since the date of the last annual report has been constituted as follows: First Lieuts. H. H. C. Dunwoody, C. E. Kilbourne, and H. W. Howgate, acting signal-officers and assistants, remain in charge, respectively, of records, general correspondence, orders, and enlistments; of the general charge of instruction, and general supervision of non-com-

missioned officers and assistants on station duty; the receipt, record, and publication of daily weather reports, and of the property division.

Assistants, First Lieuts. J. P. Story, H. H. C. Dunwoody, and Robert Craig, acting signal-officers, and Cleveland Abbe, A. M., have alternated, under the direction of the Chief Signal-Officer, in immediate charge of the issue of cautionary signals, synopses and indications, and the preparation of the publications of the office.

First Lieuts. A. W. Greely, J. McClellan, and J. A. Buchanan, and Second Lieut. James Allen, acting signal-officers, have been attached to the office as inspectors.

The Chief Signal-Officer is pleased to refer to another year of faithful attention to duty on the part of these officers, as also on the part of those serving at Fort Whipple and on detached duty elsewhere. The intelligent zeal and interest in the service manifested by the acting signal-officers, as a class, have won success in the duties with which they have been charged.

The aggregate of office correspondence has become very large, embracing many thousands of communications, exclusive of telegrams sent and received. The record is herewith. (Paper 4.) While the office work has increased in magnitude, it has not changed markedly in character since the date of the last annual report. As then stated, the office is in communication with numerous foreign correspondents, having now official relations with the scientific men and the chiefs of meteorological service of nearly every prominent power in the Northern Hemisphere. It has become the acknowledged center for meteorological information on the continent; it has succeeded in connecting itself with the meteorological work of the world. It maintains a system of exchanges valuable and interesting at once to those who send and who receive, more extensive, prompt, and regular than would have been possible for the service without the aid of military organization for its members and the incident power of regulation and control which accompanies it. Co-operation wherever sought has been cordial and courteous.

The preparation of statistics and reports upon especial requests for the uses of individuals or institutions and journals which wish to publish data has become a work of magnitude. The numerous applications for information on various subjects, many of them only indirectly connected with the duties of the office, have required of themselves much attention. Requests for consolidated data or the discussion of meteorological facts, which require in compliance days of labor, are made at times apparently without thought of how much has been asked for. It has been the rule of the office to furnish whatever has been in its power whenever it has been considered to be for the public benefit, or to aid in the work of a recognized scholar. (Paper 5.)

The work in the property division of the office has been carefully systematized. It has become extensive with the increasing duties of the service. To meet, as it was hoped, the views of Congress, an economy has been practiced which has reached the verge of parsimony. The shrinkage of values everywhere has permitted a reduction of expenditures, without which the continuation of the work of the office in its present scope, with the appropriations now available, would have been impracticable. The management and the accounting for the sums appropriated for the official telegraphic lines of the United States, the uses of which are, by law, in part for commercial purposes, as well as for the especial duties of this office, and for the conduct of military affairs, has become a work involving time, care, and responsibility.

A number of useful maps and charts have been prepared in the map-

room of the office. The work of this room, offering, as it does, in synoptic view, and at a glance, the results had from thousands of observations extended over years of labor, and condensed, after careful consideration, into the lines of the charting, becomes yearly more valuable for the studies daily necessary. A glance at a chart exhibits to the student what else could be known only by the personal experience of years. It is in contemplation to increase the force employed and the work of the room, systematizing, in this way, the series of generalizations established by the work of the service. On the success of this duty will rest much of the permanent advance to be hoped for.

Eighty-six dollars and ninety-three cents have been received during the year ending June 30, 1878, from the sale of maps and other office publications, in accordance with the act of Congress approved March 3, 1874, authorizing such sale.

The many inquiries received at the office as to the manner in which the publications of the office may be procured indicate the want of a general knowledge of the fact that the sale of copies of any or all of its publications, or of any maps or papers regularly issued by it, is authorized by law to be made to any applicant upon the payment of the actual cost to the United States of the paper or publication sought for. Valuable data of the office are always procurable in this way, for the minute investigation and careful study of any sufficiently interested in the subjects to which they have reference, by paying the very moderate cost of paper and printing.

Five hundred and eighty-four meteorological instruments have been purchased for station use, and five hundred and forty-two have been issued during the year ending June 30, 1878.

The artisans' work in the instrument and repair shop of the office has steadily increased in amount with the increased distribution of instruments and the number of stations. A number of meteorological instruments, made after original designs, have been here manufactured, to be tested in the office as to their value for practical use or for the purposes of distribution.

The practice of sending instruments by mail, in the charge of postal agents, under the special arrangement for this purpose made with the Postmaster-General, has continued to be successful, and is of material benefit to the office. The superintendent of the railway mail service and his assistants of the Post-Office Department, as well as the agents of that department generally, have rendered careful and energetic aid in this transportation. Such aid is important to a service now ramifying into every portion of the United States.

It is by the aid of the postal agents and the facilities had through them for the conveyance of instruments over their routes that the wide distribution of meteorological apparatus, rendered necessary on seas and continents by the plans of observation and study now adopted, has become possible, and will be maintained.

A very considerable number of instruments, anemometers, hygrometers, water-thermometers, rain-gauges, &c., have been issued to the Chief of the Bureau of Navigation of the Navy Department for use on vessels of the United States Navy in making, in co-operation with this office, the naval series of simultaneous observations directed by the honorable Secretary of the Navy in G. O. No. 220, dated December 25, 1876. This office supplies, upon proper application and receipt, any instruments required for this purpose. Reports of naval observations transmitted to this office are entered on the international bulletin and are charted upon the international weather chart.

A number of instruments have been furnished for temporary use on vessels of the commercial marine engaged in similar co-operation upon the marine series of observations.

The library of the office now contains three thousand eight hundred and twenty-one bound volumes and seven hundred and forty pamphlets, being an increase since the date of the last annual report of one hundred and eighty-nine bound volumes and sixty-six pamphlets.

These works have been carefully catalogued, and are filed for ready reference. The list comprises a useful and extensive collection for meteorological research, with other works relating to the several duties of the service. Copies of some of the volumes are not to be found elsewhere, and are especially valuable. A number of important works have been obtained, without cost to the United States, from foreign societies and associations, in courteous exchange for the publications of the office. (Paper 6.)

A summary of the office duties is given herewith. (Paper 25.)

The total number of stations of observation in operation and communicating with the office on the date June 30, 1878, was two hundred and three, comprised within the territory of the United States and maintained for the Signal Service. There are included in this number the stations upon the United States telegraph-lines in the charge of this office, and the special river stations, from which reports are regularly received. Reports have been received also from eighteen stations established by the authorities of the Dominion of Canada and from three stations located in the West India and Bermuda Islands. The number of stations from which full telegraphic reports are received at this office tri-daily is one hundred and thirteen; the number rfom which one full telegraphic report only is received daily is thirty. There is one station from which two full telegraphic reports are received daily. The total number of stations of all classes from which telegraphic reports are received daily is one hundred and forty-four.

The sums expended for the service secure for the United States not only the reports from the officially-established stations, but incidentally those had from the additional stations, to which reference is made elsewhere.

The following is the record of regular stations for the year ending June 30, 1878:

## ALBANY, NEW YORK.

[*Official number*, 16.]

| | |
|---|---|
| Latitude | 42° 40′ |
| Longitude | 73° 45′ |
| Elevation of barometer above mean sea-level | 209 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.967 |
| Mean temperature for the year ending June 30, 1878 | 49°.1 |
| Amount of rain-fall for the year ending June 30, 1878 | 44.59 inches. |

The office is located in the Dudley Observatory building.

No change has been made in location of office, or in the exposure or location of instruments. Sergeant Alois Dunhauser was relieved from charge of this station November 6, 1877, and ordered to take charge of station at New York, and Sergeant S. W. Beall was ordered to this station. Private C. W. Roby was relieved by Private Mixer, November 17, 1877, and ordered to Punta Rassa, Fla.

The work of the office has been satisfactorily performed, and the conduct of the men has been excellent.

Canal navigation closed December 7, 1877. On March 9, 1878, the

river was free from ice from Albany to New York, and navigation resumed.

The records of the office have been used as evidence in the courts on several occasions during the year.

During the year two hundred and sixty-six post-offices and forty-seven persons have been regularly supplied with the Farmers' Bulletin.

The station was not inspected during the year.

PUBLICATIONS.

| | |
|---|---|
| Number of Farmers' Bulletins issued during the year ending June 30, 1878... | 109,999 |
| Number of Bulletins (manifold) issued during the year ending June 30, 1878.. | 8,585 |
| Number of Local Reports issued during the year ending June 30, 1878..... | 208 |
| Number of Forms 15 (manifold) issued during the year ending June 30, 1878.. | 622 |
| Number of Forms 22 issued during the year ending June 30, 1878 ..... | 103 |
| Total ..... | 119,517 |

## ALPENA, MICHIGAN.

[*Official number*, 85.]

| | |
|---|---|
| Latitude ..... | 45° 5′ |
| Longitude ..... | 83° 28′ |
| Elevation of barometer above mean sea-level ..... | 609 feet 6 inches. |
| Mean barometer for the year ending June 30, 1878..... | *29.935 |
| Mean temperature for the year ending June 30, 1878 ..... | *45°.7 |
| Amount of rain-fall for the year ending June 30, 1878 ..... | 47.82 inches. |

The office is located at the corner of Fletcher and Dock streets.

Sergeant W. H. Ray remained in charge until June 4, 1878, giving satisfaction in every respect. He was relieved by Sergeant F. J. Papst, and ordered to Washington for discharge.

The station was not inspected during the year ending June 30, 1878.

No change has been made in the location of the office nor any of the instruments, all of which are in good condition. The following extracts are made from the semi-annual reports of the sergeant:

The cautionary-signal displays have been generally regarded by all parties interested in lake navigation, and that the interest and attention paid to the signal warnings has increased during the preceding six months has been shown by the increased number of visits to the signal office by ship-captains and owners of vessels during every cautionary display. All who are directly or indirectly interested in lake navigation regard the display of cautionary signals with confidence, owing to the fact that, in most cases, when the signal was not justified high seas and dangerous winds were reported on the lakes.

The season of navigation closed December 8. The propeller Saint Joseph left for winter quarters on that date, being the last boat of the season. Navigation was opened March 10 by the arrival of the propeller Music.

The bay and river remained clear of ice up to the end of the year, with the exception of thin floating ice in the river from the 3d to the 9th of December, and on the 10th the ice had entirely disappeared. The fact that the bay and river have kept open up to the end of the year is reported by the citizens as being very remarkable.

Twenty-six cautionary signals were ordered for this station during the year, of which number seven were reported justified and nineteen not justified at the station.

The sergeant remarks as follows in reference to some of these displays:

*September* 5 *and* 6, 1877.—Mail-boat arrived this morning (6th instant) six hours behind time; delayed on account of storm on the lake.

*October* 8 *and* 9, 1877.—Schooner Colonel Cook towed into the harbor leaking.

*Thirty days only in June, 1878, one observation taken late and not used in computing the means.

*October* 10, 1877.—Bark Lake Forest and barge Ketchum struck a reef in Thunder Bay. The former sprung a leak and lost one man. Barks Benson and Albatross ashore in Little Thunder Bay. Tug Prenderville is a total wreck near Presque Isle.

*October* 12 *to* 15, 1877.—All sailing-vessels remained in port during the display.

*October* 19 *and* 20, 1877.—Mail-boat did not arrive.

*October* 28 *and* 29, 1877.—Rough weather reported on the lake. Schooner St. Andrews went ashore in Thunder Bay; got off with but little damage.

*November* 5 *and* 6, 1877.—Mail-boat remained in port on the 5th instant. All sailing-vessels remained until the signal was lowered.

*November* 8 to 10, 1877.—Schooners Empire State and Hinkley and bark Sunny Side went ashore in Thunder Bay. The Empire State is a total wreck.

*November* 21 to 22, 1877.—Heavy gale on the lake. Steamer Holland attempted to leave port, but was compelled to put back.

*November* 26 to 28, 1877.—Very rough on the lake. Steamers arrived several hours late and report a severe storm.

*March* 23 to 25, 1878.—Mail-boat lost one trip on account of the storm.

*May* 2 and 3, 1878.—Telegraph-line blown down.

*June* 2 to 4, 1878.—All vessels remained in port. Steamers delayed several hours.

*June* 20 to 22, 1878.—Telegraph-line down. High wind and heavy sea reported on the lake.

## ATLANTIC CITY, NEW JERSEY.

[*Official number*, 116.]

| | |
|---|---|
| Latitude | 39° 22′ |
| Longitude | 74° 25′ |
| Elevation of barometer above mean sea-level | 14 feet 6 inches. |
| Mean barometer for the year ending June 30, 1878 | 30.002 |
| Mean temperature for the year ending June 30, 1878 | 54°.2 |
| Amount of rain-fall for the year ending June 30, 1878 | 42.90 inches. |

The office is located in life-saving station at the north end of the town, and within 100 yards of the light-house.

Sergeant E. Peters was reduced to the rank of private for misconduct, and relieved from duty at this station January 18, 1878, being relieved by Sergeant D. Moore, who remains in charge and has given satisfaction; two assistants were transferred to other stations during the year, and one ordered to Office of Chief Signal Officer for discharge.

The station was inspected in January and June, 1878, and was found to be in fair order. The room used as an office is not at all suitable, and it is the intention to secure a new office as soon as possible.

No change has been made in the location of any of the instruments during the past year. The following extracts are made from the semi-annual reports of the sergeant:

The persons most benefited by the display of signals at this place are owners and captains of fishing-schooners. I have been informed by some of these captains that during the display of signals they will not venture out to sea under any consideration.

Owners and captains of such vessels as belong or have occasion to call at this place under all circumstances remain in harbor during the display of cautionary signals.

A portion of the repair section, sea-coast telegraph-line, under charge of this station, has been swept away on two occasions by high tides during the past half year. The line is now in good working order.

This office is thronged to such an extent daily with visitors that it is almost impossible to perform station duties.

Seventy-four cautionary signals were ordered during the year, of which number forty are reported as having been justified at the station, and thirty-four not justified. Twenty-four cautionary off-shore signals were displayed during the year, eight of which are reported as fully justified, twelve justified as to direction but not justified as to velocity, and four not justified.

The sergeant remarks as follows in refererence to some of these displays:

*July* 1 *and* 2, 1877.—At Tuckerton, N. J., trees were uprooted and buildings destroyed.

*September* 6 *to* 8, 1877.—A severe storm. Considerable damage done by the high sea to property on the beach. The excursion-house of the Philadelphia and Atlantic City Railroad was destroyed. Schooner Brewster put out from New York during the storm, and the captain was swept overboard.

*November* 5 *and* 6, 1877.—One oyster-schooner came in and avoided gale.

*November* 18 *and* 19, 1877.—One sloop grounded on the bar, but got off safely.

*November* 29, 1877.—Several schooners returned to Absecom after observing the signal.

*December* 13 *and* 14, 1877.—One schooner passed the station with mainboom and mainsail carried away.

*January* 4 *and* 5, 1878.—Schooner B. M. Hawkins ran ashore on Brigantine Shoals.

*January* 22 *to* 24, 1878.—Schooner Twilight parted her cable on the morning of the 23d instant, and went to sea, a boy being the only person on board.

*January* 30 *to February* 2, 1878.—Several schooners put into Absecom for shelter. Schooner Annie S. Carrol went ashore in Absecom Inlet, but got off safely. A large cottage, in course of erection, was blown down. The tide was higher than it had been for several years. The signal-office was surrounded; observer wore a swimming-suit when taking observations. A portion of the track of the narrow-gauge railroad was swept away. A number of the sea-coast telegraph-poles were carried away.

*February* 20 *to* 23, 1878.—Vessel supposed to have been lost at sea, as portions of cargo came ashore.

*May* 14 *to* 16, 1878.—Railroad-track badly washed by the high sea.

*May* 19 *to* 22, 1878.—Severe storm outside; heavy sea at this place.

*May* 30 *to June* 3, 1878.—Railroad-track damaged by high tides.

### PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 831 |
| Number of Forms 15 (manifold) issued during the year ending June 30, 1878 | 1,240 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 19 |
| Total | 2,090 |

## AUGUSTA, GEORGIA.

[*Official number*, 23.]

| | |
|---|---|
| Latitude | 33° 28′ |
| Longitude | 81° 54′ |
| Elevation of barometer above mean sea-level | 172 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.028 |
| Mean temperature for the year ending June 30, 1878 | 65°.6 |
| Amount of rain-fall for the year ending June 30, 1878 | 42.04 inches. |

The office is located at the corner of Broad and McIntosh streets.

Sergeant H. R. Stockman relieved Sergeant Bessant September 21, 1877, and remains in charge of the station at the date of this report. Sergeant Bessant was transferred to Duluth.

The station was inspected by Lieutenant McClellan in February, 1878, and was found in bad order. The sergeant and assistant were reprimanded for their neglect of duty.

On February 8, 1878, Augusta and the country in its vicinity were visited by a severe tornado. A full and accurate description (accompanied by drawings) of this storm has been prepared by Sergeant Stockman. (Paper —.)

Private F. L. Pinkham was granted ten days' leave of absence on January 28, 1878.

Sergeant H. R. Stockman was absent from station February 12 to 14, inclusive, tracking the tornado in Richmond and Burke Counties, Georgia.

No change has been made in location of office or instruments since previous report.

Extracts from the semi-annual reports of the sergeant:

Benefited parties and those most interested in the service are, especially, the cotton and other merchants and the fruit growers. These classes of citizens zealously con-

sult the publications of the service as a business incident pertaining to their welfare. They rely strongly on their accuracy, and are warm in praise of the service. The farmers and planters that I have met are urgent in their wish and desire that the Farmers' Bulletin would again be issued and furnished to them.

Highest water in the river, 23 feet 6 inches, occurred on November 23, 1877, and lowest water, 4 feet 3 inches, on August 20, August 21, and September 5, 1877.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 2 969 |
| Number of Local Reports issued during the year ending June 30, 1878 | 1, 163 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 51 |
| Total | 4, 183 |

## BALTIMORE, MARYLAND.

[*Official number*, 18.]

| | |
|---|---|
| Latitude | 39° 18′ |
| Longitude | 76° 38′ |
| Elevation of barometer above mean sea-level | 45.19 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.017 |
| Mean temperature for the year ending June 30, 1878 | 57°.7 |
| Amount of rain-fall for the year ending June 30, 1878 | 51.03 inches. |

Office corner South and Water streets.

Sergeant E. W. McGann has remained in charge during the year, and has attended to the duties of the station in a prompt and satisfactory manner.

Sergeant H. R. Hathaway was on duty as assistant from February 9, 1878, until April 13, when he was assigned to duty in charge of the station at Tybee Island, Georgia.

Two assistants were transferred to the office of the Chief Signal Officer during the year, and one discharged the service for drunkenness.

The station was inspected by Lieutenant Allen, in January, 1878, and found to be in good condition.

On three occasions during the year the office records were used as evidence before the city courts.

No change has been made in location of office or instruments during the year.

The following extracts are made from the semi-annual reports of the sergeant:

Public interest is most gratifying, and the office is daily visited by a large number of the general public, but most especially the oyster-packers, shipmasters, brokers, and members of the Merchants' and Corn and Flour Exchanges. The members of the latter pay great attention to the large weather-map, which is now displayed in their rooms, and many of them delay the sale or purchase of "futures" until the map is completed. It would be difficult for me to determine which of the above class derive the greatest benefit from the reports furnished, as they all state that the benefits they receive are incalculable. The press is also greatly interested, and cheerfully publish all data that are of value to the public.

Cape Henry vessel reports are regularly received every evening, and are posted in the Merchants' Exchange and are furnished to the press.

Twenty-five cautionary signals were displayed during the year, of which number ten were reported as justified and fifteen not justified. Ten cautionary off-shore signals have been displayed, two of which were justified both as to direction and velocity, six were justified as to direction, and two not justified.

The sergeant remarks as follows, in reference to some of these displays:

*September* 6, 1877.—Very heavy weather reported down the bay.
*September* 28 *and* 29, 1877.—A large fleet from this city put into James River on account of a heavy gale. Three men were washed overboard, near the capes, and drowned.
*October* 3 *to* 5, 1877.—In this city the destruction of property was very great. Buildings in course of construction were blown down. In Druid Hill Park the damage will exceed ten thousand dollars. All steamers and trains were delayed. Several minor casualties occurred in the harbor.
*November* 8 *and* 9, 1877.—All the bay steamers were delayed several hours. A coasting schooner was blown ashore at Drum Point.
*November* 24 *and* 25, 1877.—A schooner was capsized in the bay; two lives were lost.
*December* 30 *and* 31, 1877.—Heavy weather reported on the bay; steamers delayed.
*January* 4, 1878.—High winds and heavy snow reported on the bay.
*January* 30 *to February* 1, 1878.—This was the most severe snow-storm of the season. Steamers were greatly delayed. Schooner B. T. Aumack went ashore at Quarantine Wharf. Several roofs were blown off.
*March* 24 *and* 25, 1878.—The spire of one of the churches was blown down. Fences were prostrated.
*March* 28 *and* 29, 1878.—Ship Marlborough blown ashore near marine hospital.
*May* 31, 1878.—Very stormy weather on the bay; steamers detained.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 3,470 |
| Number of Local Reports issued during the year ending June 30, 1878 | 1,689 |
| Number of Forms 15 (manifold) issued during the year ending June 30, 1878 | 3,973 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 123 |
| Total | 9,256 |

## BANGOR, MAINE.

[*Official number*, 111.]

| | |
|---|---|
| Latitude | 44° 49′ |
| Longitude | 68° 46′ |

The office is located at No. 4 Main street.

Private L. N. Jesunofsky, who was promoted to the rank of Corporal October 1, 1877, has remained in charge and attended faithfully to his duty. The work of station is limited to the issue of the Farmers' Bulletin. No change has been made in location of office. The station was not inspected during the year ending June 30, 1878.

During the year, one hundred and sixty post-offices and thirteen persons were regularly supplied with the Farmers' Bulletin.

The following extract is made from the semi-annual report of the corporal in charge:

The Penobscot River at this point closed to navigation on the morning of December 30, 1877, and opened on April 2, 1878, having been closed for 93 days.

PUBLICATIONS.

| | |
|---|---|
| Number of Farmers' Bulletins issued during the year ending June 30, 1878 | 54,294 |

## BISMARCK, DAKOTA TERRITORY.

[*Official number*, 104.]

| | |
|---|---|
| Latitude | 46° 48′ |
| Longitude | 100° 38′ |
| Elevation of barometer above mean sea-level | 1,706 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.856 |
| Mean temperature for the year ending June 30, 1878 | 45°.9 |
| Amount of rain-fall for the year ending June 30, 1878 | 18.37 inches. |

The office is located on Main street.

Sergeant Flannery was reduced to the rank of private May 7, 1878, for misconduct, but has been left in charge of station, as, with the exception of the misconduct for which he was reduced, he has given satisfaction.

The office was moved to its present location July 9, 1877.

The following extracts are made from the semi-annual report from this station:

Visitors to this office include every class, among which are river-men, travelers, agriculturists, and land speculators, as well as engineers, with instruments to be tested. They fully appreciate the efforts of the Signal Service for the public benefit, and are ever on the alert to avail themselves of the advantages it gives, and non-residents have written this office for information.

On November 5, 1877, the steamer Rose Bud departed, and with exception of the ferries, navigation on the Missouri River closed.

On November 27, 1877, the ferry-boat Union made its last trip during the afternoon, and navigation entirely closed.

The steamer Union made her first trip of the season on March 20, 1878, and ferry navigation resumed.

The steamer Big Horn, the first boat from below, arrived on April 9, 1878, at Fort Abraham Lincoln, four miles below city.

PUBLICATIONS.

| | |
|---|---|
| Number of Local Reports issued during the year ending June 30, 1878 | 49 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 23 |
| Total | 72 |

## BARNEGAT, NEW JERSEY.

[*Official number*, 115.]

| | |
|---|---|
| Latitude | 39° 45′ |
| Longitude | 74° 9′ |
| Elevation of barometer above mean sea-level | 20 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.996 |
| Mean temperature for the year ending June 30, 1878 | 53°.4 |
| Amount of rain-fall for the year ending June 30, 1878 | 52.35 inches. |

The office is located in life-saving station No. 17.

No change has been made in position of instruments at station.

Sergeant F. Pierce was in charge of this station until February 1, 1878, when he was ordered to Fort-Whipple for medical treatment. He was again placed in charge of the station April 2, and remained in charge until May 14, when he was reduced to the rank of private, ordered to Fort Whipple, and subsequently discharged the service for rendering false returns of expenditures. Sergeant J. C. Rogers was in charge from February 21 to April 2, 1878, and Sergeant F. Greene from May 14 to date of this report. Sergeant Greene has given satisfaction, and is prompt and attentive to duty.

One assistant was ordered to Fort Whipple for promotion. The station was inspected by Lieutenant Vedder in May, 1878, and found in fair condition.

The following extracts are made from the semi-annual reports of the sergeant:

As stated in a former report, but a small portion of the inhabitants in the neighborhood derive any benefit from the service, chiefly on account of the isolated position of this station. Occasional vessels of light draught enter the bay for shelter. I learn from their captains that it is customary with them to keep a lookout for the storm-signal while passing off the coast, and that they are generally guided by its warnings.

Three marine disasters have occurred within reach of this station, viz, March 26,

schooner Mary Louisa, from Washington, N. C., bound to New York with a cargo of naval stores, grounded on the shoals near this station, but floated after discharging part of her cargo. On May 27, 1878, the British bark Othere from Havre, bound to New York in ballast, grounded on the shoals close to this station, and floated after discharging ballast. The International Code was used effectually in this instance. June 4, the schooner George Kilborn, cargo stone and baled shavings, that had drifted ashore after abandonment, was discovered by the repairman from this station 15 miles south of station. In each instance the first reports to owners, underwriters, and the public at large were made through the Chief Signal Office, and all necessary messages, to those interested, transmitted over the Signal-Service wire.

Sixty-seven cautionary signals were displayed during the year, of which number forty-five are reported as justified at the station, and twenty-two not justified. Twenty-four cautionary off-shore signals were displayed during the year; fourteen were fully justified, and ten justified as to direction but not velocity.

The sergeant remarks as follows, in reference to some of these displays:

*June* 30 *to July* 2, 1877.—Telegraph-line down. The hail which accompanied this storm did severe damage to crops.

*July* 31 *to August* 3, 1877.—This storm was accompanied by a high tide, washing away a number of telegraph-poles.

*September* 6 *to* 8, 1877.—This signal gave timely warning of the approach of a severe storm. A heavy rain-fall and high tides accompanied this gale. Twenty-one poles of the telegraph-line were washed away. Three schooners and a fleet of fishing-boats came into the bay for shelter.

*September* 28 *to* 30, 1877.—Fishing-boats were unable to leave the harbor. Heavy ground-swell.

*October* 3 *to* 6, 1877.—Two schooners detained by the display. Telegraph-line slightly damaged.

*November* 5 *and* 6, 1877.—Vessel reported on her beam-ends three miles off shore.

*January* 20 *and* 21, 1878.—Foggy weather rendered navigation dangerous. An unknown steamer nearly struck on Barnegat Shoals.

*January* 22 *to* 24, 1878.—A number of vessels in the offing were damaged in their rigging. A succession of snow-squalls accompanied this gale.

*January* 30 *to February* 2, 1878.—Very high sea. Coast telegraph badly damaged. One schooner dragged her anchor and brought up on Clam Island. Several schooners put into Egg Harbor for shelter. The instrument-shelter at this station was blown down, and the storm-flag was torn to pieces.

*March* 23 *to* 25, 1878.—Schooner Mary Louisa ran aground on Barnegat Shoals on the 26th instant. After throwing a portion of her cargo overboard she got afloat again.

April 22 to 25, 1878.—Five schooners sought shelter during the display.

## BOISE CITY, IDAHO TERRITORY.

[*Official number*, 145.]

| | |
|---|---|
| Latitude | 43° 40′ |
| Longitude | 116° 6′ |
| Elevation of barometer above mean sea-level | 2,877 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.866 |
| Mean temperature for the year ending June 30, 1878 | 52°.9 |
| Amount of rain-fall for the year ending June 30, 1878 | 11.57 inches. |

The office is located in the Overland Hotel, northwest corner of Main and Eighth streets.

Sergeant Light remains in charge of this station. Telegraph and mail reports have been received regularly during the year.

## BOSTON, MASSACHUSETTS.

[*Official number*, 13.]

| | |
|---|---|
| Latitude | 42° 21′ |
| Longitude | 71° 4′ |
| Elevation of barometer above mean sea-level | 142.19 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.969 |
| Mean temperature for the year ending June 30, 1878 | 50°.1 |
| Amount of rain-fall for the year ending June 30, 1878 | 54.50 inches. |

The office is located in the Equitable Building, corner of Milk and Devonshire streets.

Sergeant Orin Parker has continued in charge of the station, and has proved faithful and efficient in the discharge of his duties. Two assistants were transferred to Office Chief Signal Officer for duty during the year, and one assistant ordered to the station.

No change has been made in location of office.

During the year six hundred and fifty-nine post-offices and thirty-seven persons were regularly supplied with the Farmers' Bulletin.

The following extracts are made from the semi-annual reports of the sergeant:

To farmers, gardeners, fruit and fresh meat dealers, and shippers of perishable goods, the foreknowledge afforded by the indications of coming weather has been of incalculable benefit.

Grain dealers and shippers have found the daily bulletin published in the newspapers, and indications, of value and interest in their operations.

The records of the office have continued to be consulted almost daily by lawyers, scientists, health officers, and others too numerous to mention, and in many cases important actions have been governed by them. It has been very gratifying to me to have them always accepted, as they have been without question, as absolutely correct.

A weekly meteorological report has been furnished the board of health of this city and published with their weekly mortality report.

Numerous special statements of weather have been made out for lawyers, civil engineers, health officers, and others.

Advantages to commercial and other interests from displays of cautionary signals have been great, as proved by the fact that no vessel has been lost or damaged which could have been saved by any display or information made or given from this office, while many vessels have remained in harbor and escaped severe gales and probable damage in consequence of noticing and obeying the warnings.

The introduction and display of cautionary off-shore signals has been highly appreciated and commended by ship-owners and masters, particularly those engaged in coasting and fishing; as these displays, by giving almost absolute certainty that the wind would blow off-shore, even if high, have allowed of their making short, quick runs with safety, that, without the information conveyed by these signals, they would not have dared chance.

From the Farmers' Bulletins evidence has accumulated that farmers, gardeners, and dealers in perishable goods, as well as the general public, have derived much valuable information by which they have been guided, in many instances to their great advantage.

Ice companies, in gathering what promised to be a short crop, found the advance of cold waves heralded, to their great benefit. During the summer in handling ice and providing for probable demands, information of value has been derived from the same source.

The Boston time-ball went into operation May 8, 1878, and has dropped regularly every day (Sundays excepted) since that time. It was established and is maintained by co-operation of the Equitable Life Assurance Society of New York, the Harvard College Observatory, of Cambridge, Mass., and the Signal Service, United States Army.

The relations of this office with the Board of Trade, business men, newspapers, post-office authorities, scientific societies and institutions, schools, and the public generally, have been of the most pleasant character, and I believe the service and this office to be increasing its usefulness, and standing higher with the public continually.

Fifty-one cautionary signals had been displayed during the year, thirty of which are reported justified and twenty-one not justified.

Fourteen cautionary off-shore signals have been ordered, ten of which were fully justified; three were justified by the direction of wind, but not by the velocity, and one not justified.

The sergeant remarks as follows in reference to some of these displays:

*September* 21 *and* 22, 1877.—On 21st instant, the schooner Swallow was driven ashore on Deer Island, and badly damaged.

*October* 3 *to* 6, 1877.—Vessels in harbor and offing secured in consequence of signal display. Five small fishing-vessels were driven ashore in the outer harbor, and two of them sank. Little other damage was done.

*November* 2 *and* 3, 1877.—This warning was of great value to shipping and building interests.

*November* 8 *to* 10, 1877.—Several vessels ready for sailing remained in the harbor during the display. The captain of one of the vessels said he would have undoubtedly been swamped had he ventured out.

*November* 24 *to* 27, 1877.—No serious damage reported. Sailing-vessels delayed departure, and escaped the dangerous gales and fogs that prevailed during the display.

*December* 30, 1877, *to January* 1, 1878.—New "off-shore" signal displayed to-day. Many expressions of commendation in reference to this display.

*January* 3, 1878.—This storm was very severe on the Massachusetts coast. Eight vessels are already reported wrecked, and a number of lives lost. The vessels lost were not within the range of the signal.

*January* 10 *to* 12, 1878.—Numerous disasters are reported, but no loss of life has been heard of. No vessel within reach of the warning was injured.

*January* 30 *to February* 2, 1878.—Gale accompanied by heavy snow. No local warning of storm, barometer being high. Property to the amount of thousands of dollars estimated to have been saved by the display. Great praise has been awarded the service.

*March* 11 *to* 14, 1878.—All vessels remained in port during this display.

*June* 10 *and* 11, 1878.—All vessels remained in port.

### PUBLICATIONS.

| | |
|---|---|
| Number of Farmers' Bulletins issued during the year ending June 30, 1878 | 214,313 |
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 8,946 |
| Number of Local Reports issued during the year ending June 30, 1878 | 1,292 |
| Number of Forms 15 (manifold) issued during the year ending June 30, 1878 | 33 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 264 |
| Total | 224,848 |

## BRECKENRIDGE, MINNESOTA.

[*Official number*, 82.]

| | |
|---|---|
| Latitude | 46° 11′ |
| Longitude | 96° 17′ |
| Elevation of barometer above mean sea-level | 968 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.898 |
| Mean temperature for the year ending June 30, 1878 | 44°.8 |
| Amount of rain-fall for the year ending June 30, 1878 | 38.57 inches. |

The office is located at the corner of Main street and Michigan avenue.

No changes have been made during the year in position of instruments nor in the working force.

The office has not been inspected since date of last report.

## BUFFALO, NEW YORK.

[*Official number*, 33.]

| | |
|---|---|
| Latitude | 42° 53′ |
| Longitude | 78° 55′ |
| Elevation of barometer above mean sea-level | 664.5 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.951 |
| Mean temperature for the year ending June 30, 1878 | 49°.7 |
| Amount of rain-fall for the year ending June 30, 1878 | 42.27 inches. |

The office is located at No. 22 Weed's Block.

Sergeant Purssell continues in charge of the station. He has one enlisted man of the Signal Corps and a civilian printer as assistants. The work of the station has been well attended to.

The station has not been inspected since date of last report.

Two hundred and seventy-nine post-offices and twenty-three individuals have been regularly supplied with the Farmers' Bulletin.

The positions of the instruments remain the same as at the time of last report.

The following extracts are made from the semi-annual reports of the sergeant:

The harbor remained open and free from ice up to the end of the year, but navigation ceased on December 11th at this port, although it might easily have been continued until the 31st. The last arrival was the schooner Monitor, from Green Bay, and the last departure the schooner Lily Hamilton, for some Canadian port. The season was unusually free from severe storms and marine disasters, the gale of November 3d being the most severe; it must have caused great damage to property and loss of life, had not the timely arrival of the storm-signal detained all vessels in port until after the gale had passed. As it was, few disasters were reported, and none of these were serious in their nature.

Navigation was begun on the 16th of March; the schooner Young America being the first vessel to leave port, and also the first to arrive in port, which she did on March 24.

The public interest in the service, as manifested at this place, is very great.

During the four months ending December 31, 1877, nine hundred and seventy-six visits were made to the office by persons seeking information, of more or less importance in each case. Of these visitors the majority were lake men and merchants. But the following professions, trades, and occupations were represented, viz: sailor, vessel-owner, merchant, commission merchant, minister, doctor, lawyer, musician, banker, agent, photographer, salesman, clerk, painter, carpenter and builder, roofer, plasterer, contractor, paper-hanger, farmer, editor, and others.

The local papers take an active interest in the proper publication of reports and data interesting to the public, and are the steadfast friends of the service.

The Meteorological Committee, Board of trade, Tug Association, Capt. E. P. Dorr, Alonzo Richmond, and other prominent individuals and institutions, stand ready to aid in any measure for the benefit of the service, and heartily indorse all its actions and workings.

In conclusion, I would respectfully state that the station begins the eighth year of its existence with an excellent record, both as to the personal characters of the different men who have been on duty here, and also the complete state of the records and data compiled by them, under the guidance and direction of the chief office.

During the half year the Farmers' Bulletin has been issued without interruption. Great benefits are derived from this publication by all classes in the villages where they are displayed, and especially by farmers and market gardeners.

Thirty-one cautionary signals were ordered for this station, of which twelve were reported justified at the station, and nineteen not justified. The sergeant remarks as follows in reference to some of these displays:

*June* 30 *to July* 2, 1877.—Heavy rain and wind squall; no vessels left port.

*October* 2 *to* 5, 1877.—A very heavy gale prevailed in vicinity, accompanied by severe rains.

*October* 7 *to* 9, 1877.—Nearly all vessels remained in port. Very heavy weather reported on the lake. Bark Sweden went ashore near Port Stanley.

*October* 10 *to* 12, 1877.—Gale very violent on the lake; vessels leaving port were driven back. Schooner E. R. Turner was wrecked at Long Point; captain and cook were drowned; loss $70,000. Barge Williams stranded near Leamington; entire crew of five persons drowned. Many other disasters occurred during this gale.

*October* 19 *to* 21, 1877.—A terrible gale is reported at the upper end of the lake. Nearly all vessels remained in port.

*November* 1 *to* 3, 1877.—Numerous disasters occurred in the harbor. Brig Cohen went ashore near Bay View; crew fourteen hours in the rigging, and thirty hours without food. Trees and fences were prostrated and tenements inundated by the tide. Four vessels stranded at Leamington.

*January* 30 *to February* 1, 1878.—Trains and mails delayed on all roads leading into the city.

*April* 24 *and* 25, 1878.—Severe squalls reported on the lake. One vessel arrived much damaged.

## PUBLICATIONS.

| | |
|---|---|
| Number of Farmers' Bulletins issued during the year ending June 30, 1878 .... | 88,685 |
| Number of Bulletins (manifold) issued during the year ending June 30, 1878... | 7,425 |
| Number of Local Reports issued during the year ending June 30, 1878..... | 1,637 |
| Number of Forms 22 issued during the year ending June 30, 1878 ..... | 90 |
| Total ..... | 97,837 |

## BURLINGTON, VERMONT.

[*Official number*, 45.]

| | |
|---|---|
| Latitude | 44° 29′ |
| Longitude | 73° 15′ |
| Elevation of barometer above mean sea-level | 241.12 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.977 |
| Mean temperature for the year ending June 30, 1878 | 48°.6 |
| Amount of rain-fall for the year ending June 30, 1878 | 40.87 inches. |

The office is located in Fisher's Block, southeast corner of Bank and Church streets.

Sergeant J. F. Tenney was reduced to the rank of private, and, on November 3, transferred to another station as assistant. Sergeant Cramer has been in charge since November 3, 1877. No change has been made in position of instruments since date of last report.

The daily newspaper prints the local report in each issue and also a monthly report, and a brief of the annual report. The 1 a. m. indications are also regularly inserted.

### PUBLICATIONS.

| | |
|---|---|
| Number of Local Reports issued during the year ending June 30, 1878 | 312 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 31 |
| Total | 343 |

## BURLINGTON, IOWA.

[*Official number*, 122.]

| | |
|---|---|
| Latitude | 40° 49′ |
| Longitude | 91° 07′ |

The office is located at No. 412 North Main street. Corporal E. D. McKenna continues in charge of this station, which has not been inspected since date of last report. Meteorological reports are not telegraphed from this station. Sunset observations are made daily, and reported in abstract of journal. One hundred and fifty-nine post-offices and six individuals have been regularly supplied with Farmers' Bulletins.

### PUBLICATIONS.

| | |
|---|---|
| Number of Farmers' Bulletins issued during the year ending June 30, 1878 | 52,324 |

## CAIRO, ILLINOIS.

[*Official number*, 53.]

| | |
|---|---|
| Latitude | 37° 0′ |
| Longitude | 87° 12′ |
| Elevation of barometer above mean sea-level | 368.5 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.006 |
| Mean temperature for the year ending June 30, 1878 | 61°.1 |
| Amount of rain-fall for the year ending June 30, 1878 | 45.28 inches. |

The office is located in the United States custom-house, No. 71 Ohio Levee.

Sergeant James M. Watson was in charge of station until June 25, 1878, when he was relieved by Sergeant W. H. Ray and transferred to duty in New Mexico. The station was inspected in May, 1878, by

Lieutenant McClellan, and found in good condition. The standing of sergeant and assistant is excellent.

High water, 37 feet 1 inch, occurred on April 29, 1878. On October 11, 12, and 13, 1877, the river was at its lowest point, 3 feet 5 inches.

The following extracts are made from the semi-annual reports of the sergeant:

The office was moved from No. 70 Ohio Levee to its present location, custom-house, on the morning of July 1st, in compliance with instructions from office of the Chief Signal-Officer, dated April 14, 1877.

From July 6 to 21, inclusive, a message was received in the morning from observer at Chicago, giving a partial report of the weather at Yankton, Omaha, Sully, and Leavenworth. This was at the request of merchants here who offered to pay for the report.

No change has been made in the number of regular reports received at the station. A special morning report was sent from Saint Louis at the request of several merchants here, and at their expense, from January 9 to March 1.

The interest taken in the service continues unabated, and is manifested more especially by the merchants, who are the class most directly benefited.

As an instance of the light in which the service is regarded, I would call your attention to the numerous petitions for reports, and the fact of their offering to pay for them.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878... | 5,243 |
| Number of Local Reports issued during the year ending June 30, 1878..... | 676 |
| Number of Forms 22 issued during the year ending June 30, 1878 ..... | 84 |
| Number of Forms 26 issued during the year ending June 30, 1878..... | 5,243 |
| Total..... | 11,246 |

## CAPE HATTERAS, NORTH CAROLINA.

[*Official number*, 123.]

| | |
|---|---|
| Latitude ..... | 35° 14′ |
| Longitude..... | 75° 30′ |
| Elevation of barometer above mean sea-level ..... | 7¼ feet. |
| Mean barometer for the year ending June 30, 1878..... | 29.997 |
| Mean temperature for the year ending June 30, 1878..... | 62°.5 |
| Amount of rain-fall during the year ending June 30, 1878.. ..... | 93.99 inches. |

The office is situated on the first floor of the light-house keeper's dwelling.

Sergeant Frey remained in charge of this station until April 13, 1878, when he was relieved by Private D. Brooks (since promoted to Corporal), and ordered to Fort Whipple for discharge and re-enlistment. One assistant has been ordered in for promotion, and one has been relieved for misconduct.

The location of office and instruments remains the same as at last report.

This station was not inspected during the year ending June 30, 1878.

The repairs on the coast-line were completed to Oregon Inlet, N. C., August 17, 1877, at which reports were promptly relayed by the signal stations until September 24, 1877, when the cable was laid across the inlet and telegraphic communication re-established with the office of the Chief Signal-Officer, since which date reports have been forwarded regularly to office Chief Signal-Officer, except during temporary interruptions on sea-coast telegraph line.

The following extracts are made from the semi-annual reports of the sergeant:

Sixty-nine cautionary signals were ordered for this station, of which number fifty were reported justified and nineteen not justified.

Sixteen cautionary off-shore signals were displayed; eight being fully justified;

six justified as to direction of the wind; one justified as to velocity, though not as to direction, and one not justified.

It is impossible to ascertain of any direct benefits derived from cautionary-signal displays, for, when observed, vessels are always outside. The only damage which is known to have resulted from the storms in the vicinity of this station, is the wreck of the Mary A. Chase, on December 5. The vessel proved a total loss. Capt. W. H. Law visited the office and communicated with the owners and insurance company by means of the coast-line, and one-half of the cargo, consisting of cocoa-nuts and log-wood, was saved.

The sea-faring men have all taken advantage of the coast-line when in distress or in communicating with owners or underwriters, and it has proved not only a great convenience, but the means of saving valuable property.

The sea-faring community of Hatteras Inlet display considerable interest in the office, and, as the inlet is a harbor for vessels during stormy weather, besides there being quite a number of vessels that trade regularly in there, I am satisfied that this office would be decidedly more beneficial if removed to that place, as vessels would then get the full benefit of the display of cautionary signals, which they do not from present location of office.

The sergeant remarks as follows in reference to some of these displays:

*December 5 to 7, 1877.*—Schooner Mary A. Chase wrecked five miles south of this station on the 5th instant.

*January 30 and 31, 1878.*—Wrecking-steamer Meteor ran aground in Hatteras Inlet. Schooner E. B. Wharton a total loss. Brig C. C. Overton wrecked near Ocracoke Inlet; crew supposed to be lost. Yawl-boat, clothing, and papers, bearing name of James A. Bowen, washed ashore.

*February 20 to 22, 1878.*—Schooner in distress two miles from station. German bark Philip Suppicish sunk on Hatteras Bar on the night of the 21st instant. English bark Henry Pelham wrecked near Portsmouth on the 22d instant.

## CAPE HENRY, VIRGINIA.

[*Official number* 118.]

| | |
|---|---|
| Latitude | 30° 56′ |
| Longitude | 76° 0′ |
| Elevation of barometer above mean sea-level | 23 feet |
| Mean barometer for the year ending June 30, 1878 | 30.005 |
| Mean temperature for the year ending June 30, 1878 | 60°.2 |
| Amount of rain-fall for the year ending June 30, 1878 | 67.71 inches |

The office is located in the dwelling of the light-house keeper.

Sergeant R. J. Bell remains in charge of station. He has at present but one assistant, two having been relieved during the year; one transferred to office Chief Signal-Officer, one transferred to Cape Hatteras, and only one being replaced.

During the stormy season of the year the amount of work at this station is very great. Sergeant Bell and his assistants have been energetic and attentive to duty, and have rendered much valuable assistance to wrecked vessels by communicating with them in the international and general-service code of flag-signals, thus enabling the captains to communicate with their owners or agents and their consuls. On two occasions, when the wrecked vessels were not provided with the international code of signals, the assistant was sent on board so as to communicate by means of the general-service code.

On May 1 and 2 the location of the office was changed from the old building of the light-house to the new dwelling, in order to have the old one moved 150 feet due east, on a line with the two new ones now occupied by the light-keeper and his assistants.

The following extracts are made from the semi-annual reports of the sergeant:

The reporting to the central office of all vessels passing the capes has continued, and the display of international signals has been promptly answered and reported. This duty of watching vessels is very arduous for two men, requiring constant attention.

Every effort has been made to make the reports of vessels as useful and beneficial to the parties interested as possible, and I am convinced the merchants of Baltimore derive a great benefit from them.

It is a remarkable fact, out of the large number of vessels that pass this station daily, not one-tenth of them display a single signal. It is not confined to the smaller vessels, but to large steamships that pass frequently and repeatedly without displaying. The men on duty at this station, and those that have been, are and were familiar with the international code signals, and have taken an interest in order to make these reports as complete as possible; and I must say that unless the captains of vessels passing display more energy no improvement can be made in this branch, which is considered of utmost importance by the merchants of Baltimore.

United States steamer Storm Signal, loaded with supplies for this station, while anchored one and one-half miles north of station, parted her anchor on October 11 and went ashore during a brisk wind. Crew of three men were saved, also part of supplies. She proved a total wreck.

During the wreck of the United States steamer Huron, near Kittyhawk, N. C., this office was kept open during the day and night to relay messages, the line being in bad working order.

On November 28 this office was directed to turn out life-saving crews between Cape Henry and Kittyhawk to patrol the beach for dead bodies from United States steamer Huron.

Seventy-eight cautionary signals were ordered for this station during the year, of which number fifty-one were reported justified and twenty-seven not justified.

Twenty-one cautionary off-shore signals were displayed, eleven being fully justified, seven justified as to direction of wind but not justified as to velocity, one justified as to velocity but not direction, and two not justified.

The sergeant remarks as follows in reference to some of these displays:

*September* 6 *to* 9, 1877.—Signal-flag pole was blown down, and a number of telegraph-poles north of the station were prostrated.

*September* 28 *to* 30, 1877.—Telegraphic communication north and south of station interrupted.

*October* 2 *to* 6, 1877.—Two disabled vessels anchored in the bay.

*November* 20 *to* 25, 1877.—United States steamer Huron passed near station, in sight of the cautionary signal, on the afternoon of the 23d instant. Was wrecked south of Kittyhawk at 1.30 a. m. of the 24th instant. Many lives were lost.

*January* 4 *to* 6, 1878.—Italian bark Francesca Bellagama, from Cardiff, ran ashore south of station, at 2.30 a. m. of January 4th. Crew saved.

*January* 22 *to* 24, 1878.—British bark Southern Belle ran ashore at 1 a. m. of the 23d instant, twenty-eight miles south of this station. Floated off again.

*January* 30 *and* 31, 1878.—Steamship Metropolis, from Philadelphia for Para, Brazil, stranded on Currituck Beach, forty-five miles south of this station. Steamship and large number of lives lost.

*February* 7 *to* 12, 1878.—Bark Guiseppe Masonne, from Belfast to Baltimore, in ballast, reported ashore at 7 a. m.

*March* 23 *to* 25, 1878.—An Austrian bark ran ashore during this display, twenty-five miles south of Cape Henry.

*April* 3 *to* 6, 1878.—German steamship Leipzig passed this station during the display, signaling for a tug and reporting machinery disabled.

*May* 13 *to* 16, 1878.—During the early morning of the 15th instant, an unknown schooner, coal-laden, ran ashore eight miles north of the station. One man drowned.

*May* 19 *to* 22, 1878.—British steamship Antonio, from Liverpool to Baltimore, ran ashore at 2 a. m. of the 22d instant. Floated off at flood tide.

## CAPE LOOKOUT, NORTH CAROLINA.

[*Official number*, 136.]

| | |
|---|---|
| Latitude | 34° 36′ |
| Longitude | 76° 36′ |
| Elevation of barometer above mean sea-level | 17.5 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.024 |
| Mean temperature for the year ending June 30, 1878 | 64°.6 |
| Amount of rain-fall for the year ending June 30, 1878 | 93.51 inches. |

The office is located in light-keeper's house.

The instrument shelter was moved from posts fifty feet away from the building to the middle north window of light-keeper's house, on October 29, 1877.

No other changes have been made either in office or instruments.

Sergt. Penton Belville was assigned to this station June 30, 1877, and is still in charge, although reduced to rank of private May 16, 1878, for neglect of duty. Private T. Jones was relieved April 4, 1878, and ordered to Texas. Private Coughlin, who relieved Private Jones, was in turn relieved May 24, and Private Forman reported as assistant.

The repairs on sea-coast telegraph line were completed to Lookout October 24, 1877, since which date, with few exceptions, the telegraphic reports from this station have been regularly received at Office of Chief Signal-Officer. The station being in such an isolated position, the sergeant reports that but little interest is shown in the service. The office has not been regularly inspected during the year.

Of the thirty-six cautionary signals ordered for this station, thirty-one were justified and five not justified.

Of the fourteen cautionary off-shore signals, eight were fully justified and three justified as to direction, and three not justified.

The sergeant remarks as follows with reference to some of these displays:

*November* 21 *to* 24, 1877.—The large buoy on Lookout Shoals washed ashore. Ship's bowsprit and seaman's chest came ashore. Vessel supposed to have gone to pieces on the shoals during the night of November 23 and 24.

*January* 3 *to* 5, 1878.—Telegraph line down. Schooner Price driven ashore and wrecked.

*June* 5 *to* 11, 1878.—United States steamer Colfax and one schooner saw signal and came in. Special report from office of Chief Signal-Officer signaled to vessels by flags.

## CAPE MAY, NEW JERSEY.

[*Official number*, 54.]

| | |
|---|---|
| Latitude | 38° 56′ |
| Longitude | 74° 58′ |
| Elevation of barometer above mean sea-level | 28 feet 6 inches |
| Mean barometer for the year ending June 30, 1878 | 30.007 |
| Mean temperature for the year ending June 30, 1878 | 56°.9 |
| Amount of rain-fall for the year ending June 30, 1878 | 47.99 inches. |

The office is located at Cape May Point, Beach avenue, block A, lot No. 27.

Sergeant Townsend remains in charge, and has given satisfaction. Sergeant Massey was in charge of station from May 16 to June 11, 1878, during illness of Sergeant Townsend.

One assistant has been ordered in for discharge, and one transferred to duty elsewhere. The present force consists of the sergeant and one assistant. The station was inspected in June, 1878, and was found in good condition.

No changes have taken place in the location of office or instruments during the past year. All wrecks have been promptly reported and every possible assistance rendered.

The following extracts are made from the semi-annual reports of the sergeant:

A growing confidence and interest in the service is very generally manifested.

The display of off-shore signals has greatly enhanced the value of cautionary signals, and are universally appreciated.

The names of a large number of vessels have been reported passing the station, and

the Reading Railroad steamers signal by whistle, enabling us to get their numbers, day or night. The company say the report is valuable to them.

Public interest and confidence in the service has long been a settled fact, and the value of it here to shipping and other interests undisputed.

Eighty cautionary signals have been displayed during the year, fifty-three of which number the sergeant reports justified, and twenty-seven not justified. Twenty-nine cautionary off-shore signals have been displayed; twenty-two were fully justified, and four justified as to direction, but not as to velocity. Three were not justified.

The sergeant remarks as follows in reference to some of these displays:

*September 2 and 3, 1877.*—An unknown schooner was driven ashore about one mile north of the station. Floated off again.

*November 21 to 25, 1877.*—Bark Johann Lang was driven ashore at Hereford Bar.

*March 10 to 14, 1878.*—The frame of a new house was blown down at Sea Grove.

*May 11, 1878.*—A schooner was blown ashore at Cape May Point, but floated off again without damage.

*May 30 to June 3, 1878.*—The schooner O. P. Binns sprung a leak during the gale. Was kept afloat by constant pumping.

### PUBLICATIONS.

Number of Forms 22 issued during the year ending June 30, 1878 ..... 24

## CHARLESTON, SOUTH CAROLINA.

[*Official number*, 21.]

| | |
|---|---|
| Latitude | 32° 45′ |
| Longitude | 79° 55′ |
| Elevation of barometer above mean sea-level | 61.4 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.047 |
| Mean temperature for the year ending June 30, 1878 | 67°.5 |
| Amount of rain-fall for the year ending June 30, 1878 | 68.62 inches. |

The office is located corner of East Bay and Broad streets.

Sergeant M. McGauran remains in charge, and has satisfactorily attended to his duties.

Private Becler was relieved April 24 on account of sickness, and another assistant ordered to duty here.

There has been no change in the location of office during the year. The station was inspected in February, 1878, by Lieutenant McClellan, who found everything in good order, the books well kept and up to date.

The following extracts are made from the semi-annual reports of the sergeant:

The information furnished the public by the distribution of the weather reports is, undoubtedly, considered of the greatest importance, as is well illustrated by the numerous inquiries and comparisons made by those interested, relative to the mean temperature and rain-fall at the close of each month. In addition to other reports, a synopsis of the principal items of interest is furnished the press monthly, published regularly, and read with avidity by the business community, all of whom are fully aware that the prospect for a good crop or an indifferent one depends principally on the temperature and rain-fall. By the publication of these monthly items alone, much valuable information is disseminated over a large section of the country.

A case involving damage to cotton to the extent of several thousand dollars, alleged to have been sustained here during the shipment in wet weather, has been decided by evidence furnished by this office—the complainants, who were in England, being represented by their counsel; the defendants are citizens of this place; the case was decided in favor of the latter, as it was clearly shown by the records that during the time of the shipment no rain had fallen, and consequently that the injury must have been effected by some other cause.

Eighteen cautionary signals were displayed at this station during the past year, of which number ten are reported as justified and eight not

justified. Only two cautionary off-shore signals were displayed, one of which was not justified, and the other only justified as to direction.

The sergeant remarks as follows in reference to some of these displays:

*September* 18 *to* 21, 1877.—Steamer Dictator remained in port on account of signal display. Vessels arriving report severe gales and heavy sea.

*October* 1 *to* 4, 1877.—Owing to the display of the signal, everything in the harbor was secured, and no casualty occurred.

*December* 5 *and* 6, 1877.—During the gale trees were uprooted, fences prostrated, and on the Ashley a boat was capsized and a boy drowned.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 7,058 |
| Number of Local Reports issued during the year ending June 30, 1878 | 312 |
| Number of Forms 15 (manifold) issued during the year ending June 30, 1878 | 1,560 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 100 |
| Total | 9,030 |

## CHEYENNE, WYOMING TERRITORY.

[*Official number*, 68.]

| | |
|---|---|
| Latitude | 41° 12′ |
| Longitude | 104° 42′ |
| Elevation of barometer above mean sea-level | 6,057 feet 3 inches. |
| Mean barometer for the year ending June 30, 1878 | *29.933 |
| Mean temperature for the year ending June 30, 1878 | *44°.8 |
| Amount of rain-fall for the year ending June 30, 1878 | 13.50 inches. |

The office is located on Seventeenth street, between Ransom and Dodge streets.

Sergeant A. C. Dobbins was relieved by Sergeant J. K. P. Purdum, and ordered to Fort Whipple to review course November 6, 1877. Sergeant Purdum was ordered, February 4, 1878, to Fort Whipple for discharge, being relieved by Sergeant J. H. Smith, who remains in charge at date of this report. The office was inspected by Lieutenant Buchanan in March, 1878, and the building found in bad condition. The office records, previous to the time Sergeant Smith took charge, had not been properly kept.

Sergeant Smith reports the local interest in the service as very great. Since Deadwood became a reporting station the reports are eagerly sought for.

No change has been made in the location of office since date of last report.

Observations on ozone are now being made at this station, at 7 a. m., 2 and 9 p. m. (local time), for the benefit of the Colorado State Board of Health.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 1,845 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 22 |
| Total | 1,867 |

## CHICAGO, ILLINOIS.

[*Official number*, 37.]

| | |
|---|---|
| Latitude | 41° 52′ |
| Longitude | 87° 35′ |
| Elevation of barometer above mean sea-level | 657 feet. |
| Mean barometer for the year ending June 30, 1878 | †29.927 |
| Mean temperature for the year ending June 30, 1878 | †52°.9 |
| Amount of rain-fall for the year ending June 30, 1878 | 45.03 inches. |

*One observation missed in March, 1878. †One observation missed in Dec., 1877.

The office is located in Major Block, southeast corner Madison and Lasalle streets.

Sergeant C. E. Brinsmade remained in charge until November 6, 1877, when he was relieved by Sergeant S. S. Bassler, and assigned to the station at San Francisco, Cal. Sergeant Bassler remained in charge until date of his discharge at expiration of his term of service, December 21, 1877. Sergeant J. G. Lynch was assigned to duty here January 23, 1878. During the year one assistant was relieved for promotion and one on account of sickness. Sergeant Lynch has two enlisted men of the Signal Corps and a civilian printer as assistants.

The station was inspected in February, 1878, by Lieutenant Buchanan, and found in fair condition, although the work of the station was not up to date, owing to the fact that for two weeks previous to the arrival of Sergeant Lynch there were only two enlisted men for duty.

Navigation closed November 15, at which date all insurance rates expired. Navigation opened officially April 15, vessels being insured after that date. There was, however, no interruption to navigation during the winter, the Goodrich line of steamers running daily on time to Milwaukee and other ports.

Six hundred and thirty-nine post-offices and seventeen individuals have been supplied with the Farmer's Bulletin.

No change has been made in the location of the office, and the instruments remain in the same position as at last report.

Cautionary signals have been displayed from the north end of the exposition building as being the most available place in the city.

The following extracts are made from the semi-annual reports of the sergeant:

The service is gaining in popularity daily, and valuable data is frequently obtained at this office for use in the United States and other courts, whereby several important decisions have been arrived at that would be difficult to obtain otherwise.

Valuable information has also been given oyster, game, and fruit shippers, in some instances saving them thousands of dollars. The Board of Trade has also recognized the efficiency of the weather reports, especially during the harvest season, the markets being wholly governed by the weather preceding and following the harvests.

The shipping interests have been considerably enhanced by the reports, especially towards the close of navigation, which is at a season when the most severe storms of the year occur, and the storm warnings received from the Chief Signal Office have been the means of saving a considerable amount of property and averting the loss of many lives.

The city has been benefited in the manner of lighting street lamps during the moonlight season, and from twenty-one reports received from this station seventeen of them were verified, at an estimated saving to the city of $17,000.

Thirty-five cautionary signals were displayed during the year. The sergeant reports that fifteen were justified and twenty not justified.

The sergeant remarks as follows in reference to some of these displays:

*September* 29 *to October* 1, 1877.—Vessels remained in port in consequence of this display.

*October* 2 *to* 4, 1877.—Severe storm on the lake. Brig Fashion beached, and will prove a total loss. A number of other vessels were more or less damaged.

*October* 19 *to* 21, 1877.—Several vessels arrived in a damaged condition.

*November* 1 *to* 3, 1877.—Several vessels were beached, but no serious disasters are reported.

*November* 4 *to* 6, 1877.—Storm very severe on the lake; many vessels dragged their anchors and went ashore. Of seventy vessels arriving at this port, few escaped damage. Schooner Mary Booth foundered in the middle of the lake. Schooner Seventh Ohio pounded to pieces on the breakwater.

*November* 6 *to* 9, 1877.—Very severe storm on the lake. Schooner D. G. Williams went to pieces on the breakwater. Schooners Chapin and Purrington also lost. Much damage along the lake front.

*March 23 and 24*, 1878.—The Minnie Corlett left port while signals were flying, and became a total wreck.

*May 23 and 24*, 1878.—In the suburbs houses were unroofed, and property generally much damaged.

PUBLICATIONS.

| | |
|---|---|
| Number of Farmers' Bulletins issued during the year ending June 30, 1878 | 203,447 |
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 7,733 |
| Number of Local Reports issued during the year ending June 30, 1878 | 1,666 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 144 |
| Total | 212,990 |

## CINCINNATI, OHIO.

[*Official number*, 65.]

| | |
|---|---|
| Latitude | 39° 6′ |
| Longitude | 84° 26′ |
| Elevation of barometer above mean sea-level | 620.4 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.936 |
| Mean temperature for the year ending June 30, 1878 | 58°.3 |
| Amount of rain-fall for the year ending June 30, 1878 | 38.16 inches. |

The office is located in Pike's Opera House, southeast corner of Fourth and Vine streets.

Sergeant S. S. Bassler was in charge of station until November 6, 1877, when he was relieved by Sergeant N. Gorom, and was ordered to Chicago, Ill. Sergeant Gorom remains in charge. The station was inspected by Lieutenant Buchanan in June, 1878, and was found in excellent condition. The standing of sergeant and assistants is excellent.

Five hundred and fifty-seven post-offices and nineteen individuals have been regularly supplied from this station with the Farmers' Bulletin.

Highest water in the river was 33 feet 5 inches on March 17, 1878; lowest was 3 feet 5 inches on October 7, 8, and 9, 1877.

The office was removed from room 25, 4th floor, to room N, 5th floor, July 6, 1877, by authority of letter dated Office Chief Signal-Officer, June 11, 1877.

The enlisted men at the station were constantly on duty during the riots of July and August last, and the Chief Signal Office was informed at short intervals by telegraph of the condition of affairs. These reports were continued from July 24 to August 14, 1877.

The following are extracts from the semi-annual reports from this station:

The interest manifested in the service by the business community is on the increase, and the bulletins and indications are daily sought for by the members of the exchange and the business men generally. The large weather-map is consulted daily by all classes.

The members of the Merchants' Exchange derive the most benefit from our reports, and all the most successful merchants and manufacturers in the city belong to the exchange.

Considerable interest is also taken in the river reports by river men, coal merchants, and business men generally, and reports carefully watched, especially during periods of high water.

Two large weather-maps were changed daily until August 30, when the Board of Trade removed to a smaller room, and, having no place for the map, it was returned to the office, and since that time the one at the Merchants' Exchange is the only one to be changed. The press takes the usual interest in the service, and all devote a considerable space for the reports furnished them by this office. At the telegraph office every facility is given the observer to enable him to get out the bulletins at the earliest possible moment. The temperature at certain points in the West are also sent over the gold and stock telegraph lines, in morning and afternoon, for the information of the business community.

The location of the office and instruments is the same as in my last report. The office is visited daily, by professional gentlemen, merchants, students, and, in fact, people from all the walks in life, for such information as can be found only at an office of this kind. The records on file in the office are frequently used as legal evidence in cases appearing before the courts from time to time. The verdict in several recent cases has been secured by our report alone.

Aside from the interest manifested by private individuals, it is a pleasure to note that manifested by the press, as it is probable that more space is devoted to the publishing of the reports here than elsewhere, the reports not only being published in full, but receive frequent editorial comments; but probably the greatest interest taken in the reports is by the members of corporations and the board of health; the latter publish weekly a tabulated statement of the local observations, and, tracing a connection between the state of the weather and the mortality lists, in this connection the reports are claimed, by those who should know, as invaluable. The Ohio River at this point was open to navigation during the entire winter season.

PUBLICATIONS.

| | |
|---|---|
| Number of Farmers' Bulletins issued during the year ending June 30, 1878 | 179,380 |
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 7,058 |
| Number of Local Reports issued during the year ending June 30, 1878 | 1,040 |
| Number of Forms 15 (manifold) issued during the year ending June 30, 1878 | 714 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 144 |
| Number of Forms 26 issued during the year ending June 30, 1878 | 2,918 |
| Total | 191,254 |

## CLEVELAND, OHIO.

[*Official number*, 34.]

| | |
|---|---|
| Latitude | 41°30′ |
| Longitude | 81°47′ |
| Elevation of barometer above mean sea-level | 689 feet 5 inches. |
| Mean barometer for the year ending June 30, 1878 | 29.981 |
| Mean temperature for the year ending June 30, 1878 | 52°.9 |
| Amount of rain-fall for the year ending June 30, 1878 | 37.13 inches. |

The office is located in room No. 19, national bank, northeast corner of Superior and Water streets.

Sergeant Prender was in charge of station until November 6, 1877, when he was relieved for change of station and Sergeant Cuthbertson assigned to duty in charge of station. Sergeant Dey remained on duty here from date of last report until July 31, 1877, when he was transferred to Mobile, Ala. The station was inspected by Lieutenant Buchanan in January, 1878, and was found in wretched condition. The inspector reported that Sergeant Prender was responsible for the condition of the office, and he was reduced to the rank of private soldier; steps were at once taken to put the office in good condition. Sergeant Cuthbertson has given satisfaction by his prompt attention to duty.

Navigation closed December 19, 1877, and ice broke up March 1, 1878, and navigation was resumed March 20, 1878.

The following extracts are made from the semi-annual reports of the sergeant:

Captain Pierce, agent for the Cleveland and Detroit Boat Company, states that no vessels leave this port without their master's consulting the official bulletin.

The custom-house (river office) authorities inform me that the bulletins are anxiously studied and watched by all seamen.

Mr. W. W. Blandin, grain merchant, states that the benefit he derives from them is worth hundreds of dollars to him, all his purchases being made by the weather bulletin. Mr. C. J. Burton and many others visit this office every morning before proceeding to the Corn Exchange, and they all agree that the merchants of this city cannot speak too highly of the great benefits they receive from our reports.

Very few sailing-vessels leave port when signals are "up."

The medical profession continue to receive valuable information from this office, and a report prepared weekly forms a part of the health office's official bulletin.

Thirty-five cautionary signals have been displayed during the year, of which number twenty-four were reported justified and eleven not justified.

The sergeant remarks as follows in reference to some of these displays:

*October* 2 *to* 5, 1877.—One vessel went ashore off the mouth of the harbor, and is now a wreck.

*October* 19 *to* 21, 1877.—A severe storm reported on the lake.

*October* 28 *and* 29, 1877.—A severe storm, with heavy sea, is reported on the lake.

*April* 24 *and* 25, 1878.—Several vessels left port, but were obliged to return.

*May* 18 *to* 21, 1878.—Several vessels deferred sailing on account of the signal. Several severe thunder-storms passed over the station during the display.

*June* 2 *to* 4, 1878.—Several grain merchants visited the office and commented on the great value of the service.

*June* 7 *to* 9, 1878.—Lake very rough. No sailing-vessels left port. The City of Detroit was detained by the storm.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878.. | 8,237 |
| Number of Local Reports issued during the year ending June 30, 1878..... | 1,648 |
| Number of Forms 15 (manifold) issued during the year ending June 30, 1878.. | 6,676 |
| Number of Forms 22 issued during the year ending June 30, 1878..... | 138 |
| Total ..... | 16,699 |

## COLORADO SPRINGS, COLORADO.

[*Official number*, 109.]

| | |
|---|---|
| Latitude ..... | 38° 55′ |
| Longitude ..... | 104° 58′ |

This station is continued as a supply station to Pike's Peak.

Sergeant W. Black remains in charge of the station in addition to the one at the Peak.

## COLUMBUS, OHIO.

[*Official number*, 187.]

| | |
|---|---|
| Latitude ..... | 39° 57′ |
| Longitude ..... | 83° 3′ |
| Elevation of barometer above mean sea-level ..... | 804.6 feet. |

The office is located in Huntington block, corner of High and Broad streets.

Sergeant D. D. Stansell was ordered to establish a station at this point, per Instructions No. 51, dated Office Chief Signal-Officer, June 22, 1878, to commence observations July 1, 1878.

Sergeant Stansell arrived for duty June 28, 1878.

## CORSICANA, TEX.

[*Official number*, 107.]

| | |
|---|---|
| Latitude ..... | 32° 5′ |
| Longitude ..... | 96° 30′ |
| Elevation of barometer above mean sea-level ..... | 445 feet. |
| Mean barometer for the year ending June 30, 1878 ..... | 29.966 |
| Mean temperature for the year ending June 30, 1878 ..... | 65°.8 |
| Amount of rain-fall for the year ending June 30, 1878 ..... | 48.53 inches. |

The office is located in the Commercial building, corner of Collins and Beaton streets.

Sergeant J. W. Smith has been in charge during the year. The sta-

tion was inspected by Lieutenant McClellan in May, 1878, and was found in good order, all records up to date and properly kept. No change has been made in location of office or instruments.

The following extracts are made from the semi-annual reports of the sergeant:

The citizens of this city and vicinity and the traveling public have manifested a deep interest in the service by their frequent visits to this office and manifold requests for meteorological reports of this and other places. The amount of interest really exceeds what could be expected, considering that so little of the workings of the service has been seen here.

The members of the meteorological committee have manifested a good degree of interest in the service, and are now preparing a communication to Hon. R. Q. Mills, member of Congress from this district, and a resident of this city, requesting his favorable consideration of all bills favoring the increasing, improving, and extending of the Signal-Service.

All intelligent classes are benefited by the reliable information furnished from this office, and I have known instances during the past year in which parties have been saved property to a considerable amount by the indications of the instruments at this office.

PUBLICATIONS.

| | |
|---|---|
| Number of Local Reports issued during the year ending June 30, 1878 | 312 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 45 |
| Total | 357 |

## DAVENPORT, IOWA.

[*Official number*, 51.]

| | |
|---|---|
| Latitude | 41° 32′ |
| Longitude | 90° 38′ |
| Elevation of barometer above mean sea-level | 603 feet 4 inches. |
| Mean barometer for the year ending June 30, 1878 | 29.958 |
| Mean temperature for the year ending June 30, 1878 | 53°.8 |
| Amount of rain-fall for the year ending June 30, 1878 | 33.86 inches. |

The office is located on the third floor of the First National Bank building, southwest corner of Maine and Second streets.

No change has been made in location of office or instruments.

Sergeant R. R. Martin is still in charge of the station.

The station was inspected in March, 1878, by Lieutenant Buchanan, and the office found in good condition and the work faithfully attended to.

Navigation closed on November 30, 1877; river covered with floating ice.

Navigation reopened on March 9, 1878.

Highest water in the river, 6 feet 10 inches, occurred on May 8 and June 9, 1878, and lowest water in the river, 0 feet 6 inches, on September 15, 1877.

The following extracts are made from the semi-annual reports of the sergeant:

The past winter being an unusually mild one, there was but little obstruction to navigation by ice. The river was clear from January 1 to January 4, when ice made its appearance in the river and continued fluctuating in amount until February 19, when the river at this point was entirely clear of ice. The ferry steamer that plies between Davenport and Rock Island made regular trips throughout the season, with the exception of three days, from January 5 to January 8, when it was laid up on account of obstruction by ice. Excursion steamers arrived several times throughout the season from Princeton, Le Claire, and other points on the river.

The season of navigation was opened at this point on March 9 (21 days earlier than last year) by the arrival of steamer Dan Hine with barges, being the first boat of the season from below the rapids. The first steamer from Saint Paul arrived March 23.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 5,416 |
| Number of Local Reports issued during the year ending June 30, 1878 | 9 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 60 |
| Total | 5,485 |

## DEADWOOD, DAKOTA TERRITORY.

[*Official number*, 185.]

| | |
|---|---|
| Latitude | 44° 22′ |
| Longitude | 103° 34′ |

Sergeant D. O'Leary arrived at this place November 15, under orders to establish a station of the first class. The office was located in Sherman street, and the first telegraphic report was made to the Office of the Chief Signal-Officer at midnight of December 18, 1877. Sergeant O'Leary was relieved December 4, 1877, and ordered to Fort Whipple for medical treatment, and Sergeant D. M. Kennedy placed in charge.

The station was inspected by Lieutenant Buchanan in May, 1878, who reported that the office was badly located, and that a suitable room could not be obtained in Deadwood, and recommended the transfer of the station to Lead City. The necessary orders were issued, and the station transferred to Lead City on June 1, 1878.

Telegraphic reports were received with regularity during the six months the station was in operation.

PUBLICATIONS.

| | |
|---|---|
| Number of local reports issued during the year ending June 30, 1878 | 224 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 12 |
| Total | 236 |

## DENVER, COLORADO.

[*Official number*, 76.]

| | |
|---|---|
| Latitude | 39° 45′ |
| Longitude | 105° 4′ |
| Elevation of barometer above mean sea-level | 5,269 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.963 |
| Mean temperature for the year ending June 30, 1878 | 49°.3 |
| Amount of rain-fall for the year ending June 30, 1878 | 13.81 inches. |

The office is located in Broadwell Block, corner Sixteenth and Larrimer streets. Sergeant Barwick has remained in charge of the station during the year, with the exception of the time when absent for re enlistment. The citizens of Denver and of the State of Colorado take a strong interest in the Signal Service reports, and Sergeant Barwick has furnished the newspapers and State Board of Health with very full weather reports.

Corporal McCarty was ordered to this station October 20, 1877, but was unable, after his arrival, to do any duty, and died December 29, 1877.

Sergeant A. C. Ford was ordered to this station as assistant June 10, 1878. The station was inspected by Lieutenant Buchanan in April, 1878. The office and records were found in excellent condition. Mr. F. S. Dellenbaugh, a citizen of Denver, was in charge of the station at the time of inspection, attending to all duties of the station in a satis-

factory manner, Sergeant Barwick being absent for the purpose of re-enlisting.

The following extracts are made from the semi-annual reports of the sergeant:

Corporal Thomas McCarty arrived at station December 24, 1877, and died at the Saint Nicholas Hotel on December 29, 1877. He was buried with military honors by the Governor's Guard on December 30, 1877.

Office removed from McClintock's Block, Sixteenth street, to Broadwell Block, corner Sixteenth and Larrimer streets, on July 1, 1877.

Barometers moved after taking 7 a. m. observation of July 1, 1877.

Ozone observations are still being taken, and furnished to the same parties (Colorado State Board of Health) as at my last semi-annual report.

PUBLICATIONS.

| | |
|---|---|
| Number of Local Reports issued during the year ending June 30, 1878 | 1,257 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 84 |
| Total | 1,341 |

## DETROIT, MICHIGAN.

[*Official number*, 36.]

| | |
|---|---|
| Latitude | 41° 21′ |
| Longitude | 83° 7′ |
| Elevation of barometer above mean sea-level | 635 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.937 |
| Mean temperature for the year ending June 30, 1878 | 51°.1 |
| Amount of rain-fall for the year ending June 30, 1878 | 36.71 inches. |

The office is located at the southwest corner of Congress and Griswold streets.

There have been no changes made in the location of office or instruments, nor are any deemed desirable at present.

Sergeant T. V. Van Heusen still continues in charge, and has given good satisfaction.

The enlisted printer was transferred to Leavenworth, Kans., October 25, 1877, since which date the bulletins have been printed by a civilian printer.

One assistant was transferred from and one to this station during the year.

Three hundred and thirty-five post-offices and thirteen individuals have been supplied with the Farmers' Bulletin from this station.

The station was inspected in February, 1878, and found in good condition.

The following extracts are made from the semi-annual reports of the sergeant:

The large weather-map in the rooms of the Board of Trade has been changed daily, Sundays and holidays excepted, and, as heretofore, has been carefully studied by the members of the board to their great pecuniary advantage. This map is the first thing visited by members upon entering the room, and by the nature of the weather as shown upon it are many important business transactions shaped.

The great advantage a map possesses over a bulletin for the purpose of giving public information concerning the weather, the synoptic feature of the former especially commending it for general use, is well understood by the citizens of this city, who desire the resumption of the manifold weather-maps formerly issued from this office.

The Farmers' Bulletin, as heretofore, has been printed and mailed regularly six times per week to the principal post-offices in Southern and Central Michigan and Northern Ohio and Indiana. So far as known—the opportunities of this office for obtaining information from the agricultural districts being very limited—these bulletins are well received and serve a most excellent purpose.

The addition of the rain-wind foot-note to the Farmers' Bulletin is a feature that has given a great deal of satisfaction to those who read them.

Weekly records of observations have been furnished as usual to the United States Lake Survey Office and to the Michigan State Board of Health.

Regular daily, weekly, and monthly reports have been furnished to and conspicuously published by the local press, to which this office is indebted for many courtesies.

The popularity of the storm signal, as it is so familiarly known, continues to increase. Much more attention is paid to it and a much more popular knowledge of its meaning is shown than in previous years. The necessity of more cautionary signal stations upon the shores of the lakes continues to be urged by those interested in lake commerce; and this in itself is the best of evidence as to the high estimation in which the system of storm signals is held.

The city authorities avail themselves of all the knowledge to be obtained at this office in regard to the probable condition of the sky at night in lighting the street-lamps.

Wholesale provision merchants, and those engaged in the commission business, during those seasons when the weather is in an unsettled condition, visit the office before ordering or making shipments of goods liable to damage through changes of weather, and are without exception guided in their movements by the information obtained.

On May 10, 1878, the following preambles and resolutions were unanimously adopted by the Board of Trade:

"Whereas the experience of the past seven years has satisfactorily demonstrated that the system of meteorological observations and reports, predictions of impending weather, display of storm warnings, &c., as practiced by the United States Signal Service, is of vital necessity for the protection and advancement of commercial and agricultural interests; and

"Whereas the usefulness and efficiency of this service has been impaired and its operations hampered through inadequate appropriations, greatly to the dissatisfaction, inconvenience, and loss of its many friends and patrons; and

"Whereas a recent investigation into the conduct of the affairs of the Signal Service has demonstrated its efficient management, its general popularity, the possibility of its improvement, and the desirability of its extension; be it, therefore,

"*Resolved*, That this board earnestly request our Representatives in Congress to use their influence to secure an extension of the service and an adequate appropriation therefor, to the end that its usefulness may be augmented.

*Resolved*, That the thanks of this board be extended to the Chief Signal-Officer of the Army, and his subordinates, for the prompt, thorough, and reliable manner in which the duties of this station have been discharged.

"*Resolved*, That a copy of these preambles and resolutions be forwarded to each of our Representatives in Congress and to the Chief Signal-Officer of the Army."

Twenty-seven cautionary signals were displayed during the year. Sergeant Van Heusen reports seven of the signals justified and twenty not justified.

The sergeant remarks as follows in reference to some of these displays:

*June* 30 *to July* 1, 1877.—No marine disasters are reported, but considerable local damage was done.

*October* 2 *to* 4, 1877.—A number of vessels were driven ashore, but no lives were lost.

*October* 7 to 9, 1877.—The barge B. C. Williams went down with all on board near Leamington, Ontario. Cargo of Iowa injured to amount of $2,000. Schooner Wisconsta ashore at Port Dover. No vessels left port during display.

*October* 10 *and* 11, 1877.—A large number of vessels are reported ashore at various points on the lake.

*October* 19 *to* 21, 1877.—Heavy gales are reported on the lake.

*November* 24 *to* 28, 1877.—Heavy gales are reported on the lake.

## PUBLICATIONS.

| | |
|---|---|
| Number of Farmers' Bulletins issued during the year ending June 30, 1878 | 120,218 |
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 5,622 |
| Number of Local Reports issued during the year ending June 30, 1878 | 1,225 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 73 |
| Total | 127,138 |

## DODGE CITY, KANSAS.

[*Official number*, 106.]

| | |
|---|---|
| Latitude | 37° 39′ |
| Longitude | 100° 8′ |
| Elevation of barometer above mean sea-level | 2,486 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.590 |
| Mean temperature for the year ending June 30, 1878 | 54°.9 |
| Amount of rain-fall for the year ending June 30, 1878 | 24.87 inches. |

The office is located at the southeast corner of Walnut street and Second avenue.

Sergeant E. Garland was relieved by Sergeant W. H. Clendenon February 19, 1878, and on March 21st was discharged the service for neglect of duty.

The station was inspected by Lieutenant Buchanan in May, 1878, and found in fair condition.

No changes have been made in the location of office or instruments.

Extracts from the semi-annual reports from this station:

The amount of interest taken by the public in the service has been steadily increasing during the last six months, and it is now held in good estimation, the people appreciating the benefits that accrue from a station being established in their midst.

Newspaper reports of the observations of rain-fall and temperature at this station have been and are attracting considerable attention, being found useful to the large emigration which is now pouring into the country with a view to engaging in agriculture.

Monthly mean reports are furnished regularly to eleven newspapers published in this city and in towns along the line of the Atchison, Topeka and Santa Fé Railroad. These reports are much sought after and are largely read by the public, who, by the interest they manifest in it, give the strongest proof of the favorable estimation in which the service is held.

## DUBUQUE, IOWA.

[*Official number*, 98.]

| | |
|---|---|
| Latitude | 42° 30′ |
| Longitude | 90° 44′ |
| Elevation of barometer above mean sea-level | 665 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.939 |
| Mean temperature for the year ending June 30, 1878 | 52° 3 |
| Amount of rain-fall for the year ending June 30, 1878 | 37.05 inches. |

The office is located in Sullivan's Block, southwest corner of Main and Sixth streets.

Sergeant D. M. Kennedy was transferred to Deadwood December 4, 1877, Sergeant J. H. Smith succeeding him in charge of the station.

The station was inspected by Lieutenant Buchanan, who reports the office in excellent condition and the work of the office satisfactorily performed.

Highest water in the river, 8 feet 8 inches, occurred on July 18 and 19, 1877, and lowest water in the river, 1 foot 9 inches, on September 13, 14, 15, 24, and 25, 1877.

Extracts from the semi-annual reports from this station:

Data, as to rain-fall of August 16, 1876, was furnished (January 11, 1878) in the case of Lewis Meisch *vs.* Gas Trustees and City of Dubuque, for damages caused by flood of that date. A verdict for plaintiff.

It is believed that the benefits accruing from the weather reports are well understood and fully appreciated by the business men of this city, the river reports, especially, being of great value to mill-owners and river-men generally.

*November* 30, 1877.—The river was gorged with floating ice.

Navigation closed on December 6, 1877.

Navigation opened on March 10, 1878, by the arrival of steamer Dan Hine.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 2,642 |
| Number of Local Reports issued during the year ending June 30, 1878 | 1,092 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 47 |
| Number of Forms 26 issued during the year ending June 30, 1878 | 5,371 |
| Total | 9,152 |

## DULUTH, MINNESOTA.

[*Official number*, 40.]

| | |
|---|---|
| Latitude | 46° 48′ |
| Longitude | 92° 8′ |
| Elevation of barometer above mean sea-level | 642.72 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.922 |
| Mean temperature for the year ending June 30, 1878 | 46°.3 |
| Amount of rain-fall for the year ending June 30, 1878 | 33.67 inches. |

The office is located in Edmonds' Block, southeast corner of Superior and Lake avenues.

Sergeant Collins, who was in charge of this station at date of last report, was discharged at expiration of his term of service on September 4, 1877.

Private J. D. Sumet was temporarily assigned to the station, and remained here until September 21, when he was relieved by Sergeant H. Bessant.

The office has not been inspected since date of last report. The building in which the signal office is located was partly destroyed by fire on the night of November 30, but neither instruments, property, nor records were damaged.

There has been no change in the location of office or instruments.

Extracts from the semi-annual reports:

Great interest is taken in the display of cautionary signals, and they are greatly relied on. From November 9, 1877, until December 10, 1877, there were seventy-eight visits made to this office by captains and other officers of vessels, in search of information in relation to storms, and the probable direction of the wind, all of whom expressed great confidence in the correctness of the cautionary signals.

Navigation closed at this port on the arrival of the steamer Manistee, December 5, 1877, although the lake has been free of ice during the entire month of December, owing to the extreme high temperature.

The past winter has been remarkably mild, and in consequence navigation opened considerably earlier than usual. The first departure of the season was made March 17, and the first arrival March 19. Cautionary signals were resumed March 15.

Of twenty-nine cautionary signals ordered for this station, eighteen were reported justified and eleven not justified.

The observer makes no remarks in reference to these displays.

## EASTPORT, MAINE.

[*Official number*, 94.]

| | |
|---|---|
| Latitude | 44° 55′ |
| Longitude | 66° 54′ |
| Elevation of barometer above mean sea-level | 61.25 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.933 |
| Mean temperature for the year ending June 30, 1878 | 43° .3 |
| Amount of rain-fall for the year ending June 30, 1878 | 55.46 inches. |

The office is located in the custom-house, northwest corner of Water and Washington streets.

There has been no change in the working force nor in location of office or instruments.

The station has not been inspected during the year.

Private George V. Russell was granted leave of absence from December 3 to 12, 1877.

Sergeant T. A. Taylor was granted 30 days leave of absence on January 17, 1878.

Extracts from semi-annual reports:

*December* 13, 1877.—During this gale several vessels dragged their anchors; hardest blow of the season. Maximum velocity, 50 miles N. W.

*December* 30, 1877.—This gale was accompanied by high and dangerous winds from N. E. and N., which reached a maximum of 36 miles per hour at two different times during the display, and caused delay in steamers due at this place of 24 hours. All vessels remained in port. No damage on this coast.

The amount of interest taken by all classes of citizens has increased, especially by captains of the international line, who never enter or leave port without first calling at my office for the latest reports and information regarding the weather.

The fish dealers and captains of vessels derive the greatest benefits, as a class, from the daily bulletins and cautionary signals, and eagerly scan the reports before buying fish or leaving port.

The new cautionary off-shore signal ordered to be displayed on January 1, 1878, has proved quite useful and given gratifying results. In the winter and spring it has been of great service to the fish dealers and others in freezing herring, &c., and to coast-wise vessels bound west, the captains of which, when this signal is displayed after the regular cautionary, are to be seen busily preparing to sail after the brunt of the off-shore gale has passed.

Fifty-seven cautionary signals were ordered for the station, of which number thirty-five were reported justified, and twenty-two not justified. Of twelve cautionary off-shore signals, eleven were fully justified; one justified as to direction, but not velocity.

The sergeant remarks as follows in reference to some of these displays:

*September* 17 *and* 18, 1877.—All vessels remained in port in consequence of the display.

*September* 21 *and* 22, 1877.—All vessels remained in port. One schooner blown ashore on Indian Island and broke her keel.

*October* 4 *to* 6, 1877.—All vessels remained in port.

*October* 8 *to* 10, 1877.—All vessels remained in port.

*October* 22 *and* 23, 1877.—"City of Portland" was obliged to return on account of the storm. All other vessels remained in port.

*November* 2 *and* 3, 1877.—Wharves were damaged and telegraph-wires blown down during the gale.

*November* 13, 1877.—One schooner blown on Dog Island ledges and broken in two.

*June* 8 *and* 9, 1878.—All vessels remained in port. Heavy rain.

*June* 23 *and* 24, 1878.—This display was of great benefit to fishing-vessels.

### PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 3,073 |
| Number of Forms 15 (manifold) issued during the year ending June 30, 1878 | 127 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 27 |
| Total | 3,227 |

## ERIE, PENNSYLVANIA.

[*Official number*, 97.]

| | |
|---|---|
| Latitude | 42° 7′ |
| Longitude | 80° 10′ |
| Elevation of barometer above mean sea-level | 681.1 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.947 |
| Mean temperature for the year ending June 30, 1878 | 52°.4 |
| Amount of rain-fall for the year ending June 30, 1878 | 50.01 inches. |

The office is located in Rindernecht's Block, southwest corner of Fifth and State streets.

Sergeant W. A. Chapman is still in charge, and at date of this report is alone at the station, his assistant, Private J. J. Fitzgerald, having been assigned to duty at Pioche, Nev. An assistant will be sent to this station as soon as one is available.

The station was inspected by Lieutenant Buchanan in January, 1878. The office was found in good condition. The work at the station is satisfactorily performed. No change has been made in location of office or position of instruments since last report.

Sergeant W. A. Chapman was granted leave of absence from January 17 to 28, 1878.

Of thirty-two cautionary signals ordered for Erie, twenty were reported justified and twelve not justified.

The sergeant remarks as follows in reference to some of these displays:

*October* 2 *to* 5, 1877.—Lake very rough; several vessels that had started out in spite of the warning were obliged to return.
*October* 7 *to* 9, 1877.—Two vessels that attempted to leave were disabled.
*October* 19 *to* 21, 1877.—Schooner A. P. Beales was beached; loss, $5,000.
*October* 28 *and* 29, 1877.—Lake very rough; no vessels left during display.
*November* 1 *to* 3, 1877.—Lake very rough; no vessels left during the display.
*November* 4 *to* 6, 1877.—Schooner Lady Duffee ran ashore near East Pier.
*April* 7 *to* 11, 1878.—Lake very rough. A number of minor accidents in the city.
*April* 24 *and* 25, 1878.—Signs were blown down and windows broken during this gale.
*May* 19 *to* 21, 1878.—Lake very rough; heavy rain and high wind.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 5,506 |
| Number of Local Reports issued during the year ending June 30, 1878 | 364 |
| Number of Forms 15 (manifold) issued during the year ending June 30, 1878 | 3,396 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 56 |
| Total | 9,322 |

## ESCANABA, MICHIGAN.

[*Official number*, 49.]

| | |
|---|---|
| Latitude | 45° 46′ |
| Longitude | 87° 14′ |
| Elevation of barometer above mean sea-level | 619.08 feet. |
| Mean barometer for the year ending June 30, 1878 | *29.951 |
| Mean temperature for the year ending June 30, 1878 | 45°.3 |
| Amount of rain-fall for the year ending June 30, 1878 | 42.64 inches. |

The office is located at the corner of Luddington and Dousman streets.

There has been no change made in the working force, or in the location of office or instruments. Sergeant Gilligan remains in charge and attends promptly to his duties.

The station has not been inspected during the year ending June 30, 1878.

Sergeant J. Gilligan reports on March 5, 1878: "The ice cleared from around docks, and three vessels arrived for ice."

Extracts from semi-annual reports from Escanaba, Mich.:

During the last season but one vessel that left this harbor was wrecked, the schooner Ætna, and if her captain had taken warning by the signal that was flying when he left here, he would not have lost his vessel.

During the display of signals very few vessels left this harbor, the masters always visiting the office, and often remaining until after midnight, watching the barometer and wind register. They are the people who derive the greatest benefit from the service. They take great interest and place the greatest confidence in the reports; and several of them stated to me at close of season that the very few misfortunes met by vessels leaving here was due to the timely warning given them by the service.

The citizens of this place—lumbermen and railroad employés—take a lively interest in the service, and place great confidence in its reports.

* Barometer unserviceable seven days during July, 1877.

Number of cautionary signals displayed during the year, thirty-two; justified, fourteen; not justified, eighteen.

The sergeant remarks as follows in reference to some of these displays:

*October* 2 *to* 4, 1877.—Seven vessels remained in port during the display.
*October* 25 *to* 28, 1877.—High winds and heavy sea reported on the lake. One schooner obliged to return.
*November* 6 *to* 9, 1877.—Schooner Ætna wrecked in Green Bay.
*April* 8 *to* 11, 1878.—Heavy sea running on the lake. The schooner Belle Brown was blown ashore at Bark River. Schooner E. P. Royce broke her rudder near the same place. The telegraph-line from here to Green Bay was blown down. Trains were delayed by trees falling on the track.
*May* 18 *to* 20, 1878.—High wind and heavy sea reported on the lake.

PUBLICATIONS.

| | |
|---|---|
| Number of Local Reports issued during the year ending June 30, 1878 | 52 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 12 |
| Total | 64 |

## FORT GIBSON, INDIAN TERRITORY.

[*Official number*, 93.]

| | |
|---|---|
| Latitude | 35° 43′ |
| Longitude | 95° 16′ |
| Elevation of barometer above mean sea-level | 510.99 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.937 |
| Mean temperature for the year ending June 30, 1878 | 60°.7 |
| Amount of rain-fall for the year ending June 30, 1878 | 46.02 inches. |

Sergeant G. H. Crane was in charge of the station until March 14, 1878, when he was relieved by Sergeant O. S. M. Cone, and ordered to Washington for discharge. No change has been made in the location of office or instruments. The office has not been inspected since last report.

## FORT SULLY, DAKOTA TERRITORY.

[*Official number*, 83.]

| | |
|---|---|
| Latitude | 44° 39′ |
| Longitude | 100° 40′ |
| Elevation of barometer above mean sea-level | 1.678 feet. |

Discontinued October 31, 1877.

The office was moved on October 1, 1877, to the Band Building.

The elevation of instruments was not changed.

The telegraph-line connecting Yankton and Fort Sully was so frequently out of order, and the reports so seldom received at office Chief Signal-Officer, that this place ceased to be important as a full reporting station, and, November 1, 1877, the station was discontinued, and Sergeant O'Leary and instruments transferred to Deadwood, Dakota Territory.

Fort Sully has not been inspected since last report.

Under date of July 31, 1877, Sergeant O'Leary reports that the telegraph-line was completely wrecked on July 26, 1877, by a hurricane. Instrument-shelter was blown down by same storm.

Highest water in the river from June to November, 1877, was 9 feet 5 inches, on July 1 and 5, 1877, and lowest water 1 foot 8 inches, on September 26, 27, and 28, 1877. These measurements indicate the actual depth of water in the channel.

## GALVESTON, TEXAS.

(*Official number*, 55.)

| | |
|---|---|
| Latitude | 29° 18′ |
| Longitude | 94° 50′ |
| Elevation of barometer above mean sea-level | 41.3 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.995 |
| Mean temperature for the year ending June 30, 1878 | 70°.2 |
| Amount of rain-fall for the year ending June 30, 1878 | 67.47 inches. |

The office is located at the northeast corner of Strand and Twenty-third streets.

Sergeant C. A. Smith was relieved by Sergeant E. O. C. MacInerney May 14, 1878, and ordered to office Chief Signal-Officer for discharge and re-enlistment.

On May 18 Private Kenealy was ordered to take charge of signal station at Indianola, relieving Private Foster, who was transferred to Galveston as assistant.

The station was inspected in May, 1878, and found in good condition, the records up to date, and properly kept. The inspector complimented Sergeant Smith and Private Kenealy for their faithful performance of duty.

No change has been made in location of office or instruments since last report.

Extracts from the semi-annual reports of the sergeant:

The Cotton Exchange still takes a lively interest in the reports. The limited appropriations for the service preventing telegraphic reports from the East Gulf stations from being sent to this point free, the Exchange has arranged, through the courtesy of the central office, for the receipt of these reports at their own expense. Agreeable to this arrangement, morning reports from eight of the East Gulf stations have been received regularly since November 20, and bulletined to the Exchange and to the public. A large weather-map is also changed daily from the data obtained from these reports.

Thirty-six cautionary signals were ordered during the year, of which number eighteen were reported justified, and eighteen not justified. Of nine cautionary off-shore signals, five were fully justified, two justified as to direction, and two not justified.

The sergeant remarks as follows in reference to some of these displays:

*September* 16 *to* 19, 1877.—Display accompanied by destructive tropical storm. The damage will probably amount to $100,000.

*November* 1 *and* 2, 1877.—Several wrecks are reported in the Gulf.

*November* 18 *and* 19, 1877.—Severe storm at Burton, northwest of this station. A two-story building was blown to fragments.

*December* 2 *to* 5, 1877.—Very high tide and heavy sea. The schooner Two Sisters foundered off Galveston on the 3d instant. Three persons drowned.

*December* 19 *and* 20, 1877.—Schooner Cornet reports having encountered a heavy gale eight miles off Galveston.

*January* 2 *to* 4, 1878.—The display of the new off-shore signal attracted great attention from seamen. All were favorably impressed with its usefulness.

*January* 2 *to* 9, 1878.—Bark Edward McDowell stranded near San Luis Pass, and is a total loss. Crew saved.

*February* 5 *to* 8, 1878.—Schooner Elizabeth stranded on Galveston Island on the 6th instant.

*February* 25 *to* 27, 1878.—This storm presented some of the characteristics of a cyclone. An unusually heavy sea and high tides are reported on the bay and gulf shores.

*March* 7 *to* 10, 1878.—A heavy thunder-storm, accompanied by hail, prevailed during this display. The schooner Flora S. was swamped by the heavy sea.

*March* 31 *and April* 1, 1878.—Two sailors were drowned by the capsizing of a small boat on the afternoon of the 31st.

*May* 3 *and* 4, 1878.—The schooner Garnock reports heavy weather off the mouth of the Brazos.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878... | 2,727 |
| Number of Local Reports issued during the year ending June 30, 1878 ..... | 604 |
| Number of Forms 22 issued during the year ending June 30, 1878..... | 92 |
| Total ..... | 3,423 |

## GRAND HAVEN, MICHIGAN.

[*Official number*, 48.]

| | |
|---|---|
| Latitude ..... | 43° 5′ |
| Longitude..... | 86° 18′ |
| Elevation of barometer above mean sea-level..... | 616.3 feet. |
| Mean barometer for the year ending June 30, 1878 ..... | 29.942 |
| Mean temperature for the year ending June 30, 1878 ..... | 51°.1 |
| Amount of rain-fall for the year ending June 30, 1878 ..... | 34.29 inches. |

The office is located in the Cutler House.

Sergeant J. M. Frantz was in charge of station until November 3, 1877, excepting the period from August 10, 1877, when he was ordered to Fort Wayne, Mich., for discharge and re-enlistment September 28, 1877, during which period Private Paul Daniels was in charge. Sergeant S. C. Emery relieved Sergeant Frantz, who was ordered to Los Angeles, Cal., November 3, 1877. Private A. P. Smith was temporarily in charge of station from March 27 to May 15, 1878, during the absence, for discharge and re-enlistment, of Sergeant Emery. The station was not inspected during the year ending June 30, 1878. No change has been made in location of office or instruments since last report.

The official closing of navigation occurred on the 1st of December, but sailing-vessels continued to leave this port up to the 15th, and one barge eft for Chicago on the 21st of December.

On account of the unusual mildness of the past winter, and the absence of ice from the river, navigation was open to steam-vessels throughout the winter season, steamers belonging to the Northwestern Transportation Company making regular trips to Milwaukee, with but few delays on account of rough weather, and on account of these boats cautionary signals were displayed all winter at this station. Navigation for all kinds of sailing-vessels was resumed on March 9, being several weeks earlier than for many years. The schooner Lookout, from Milwaukee, was the first to arrive, March 9, and cleared on the 10th of same month.

Forty-nine cautionary signals were displayed during the year, of which number twenty-six were reported justified and twenty-three not justified at the station.

The sergeant remarks as follows in reference to some of these displays:

*October* 2 *to* 4, 1877.—The schooners Eveline and Hope went ashore in this gale; can be floated off without great loss.

*October* 10 *and* 11, 1877.—Vessels of the Barge Company of Grand Haven were damaged to the amount of $5,000.

*November* 1 *to* 3, 1877.—Heavy sea running. The scow Flora is ashore below the South Pier.

*November* 21 *and* 22, 1877.—This storm was very severe on the lake.

*November* 25 *to* 28, 1877.—This storm is very severe on the lake. The signal was favorably commented on.

*February* 28 *to March* 4, 1878.—The steamer Amazon left during the display, but was obliged to return. The captain states that this was the most severe storm he has ever experienced.

*June* 2 *to* 4, 1878.—The schooner Guide, of Grand Haven, was blown ashore at 11 a. m. of the 2d instant; will be floated again.

PUBLICATIONS.

| | |
|---|---|
| Number of Forms 22 issued during the year ending June 30, 1878 ..... | 22 |

## INDIANAPOLIS, INDIANA.

[*Official number*, 43.]

| | |
|---|---|
| Latitude | 39° 47′ |
| Longitude | 86° 6′ |
| Elevation of barometer above mean sea-level | 746.7 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.947 |
| Mean temperature for the year ending June 30, 1878 | 56°.6 |
| Amount of rain-fall for the year ending June 30, 1878 | 36.38 inches. |

The office is located in Blackford's Block, corner of Meridian and Washington streets.

No change has been made in the working force of station, or in the location of office instruments. The station work has been properly and promptly attended to. Lieutenant Buchanan inspected this office in June, 1878, and found it in excellent condition. Sergeant Wappenhans is spoken of in the highest terms by the secretary of the Board of Trade and others.

Extracts from the semi-annual reports of the sergeant:

The temperature, wind, and weather of the morning bulletin has been furnished to the telegraph companies. The Western Union Telegraph Company sent this information with the commercial quotations and press reports to many places in Indiana and Ohio, and over the gold and stock telegraph to many business houses in the city.

The indications issued at the Chief Signal Office at 10.30 a. m. were also received from the Western Union Telegraph Company, rewritten on Forms No. 15 and furnished to the Evening News, and printed regularly in that paper, and one copy was furnished to Messrs. Engle & Drew, coal merchants, who wrote them in large letters on a black, board in front of their office, situated on one of the most frequented streets.

A report of all local observations of temperature, wind, and weather, and especially time and amount of rain, is daily furnished to the Empire Freight Line, and a copy of these is forwarded to the general superintendents at Terra Haute, Ind., and Cleveland, Ohio.

All local observations in full were also furnished to Dr. Haynes, M. D., to assist him in his investigations in the nature and under what atmospheric conditions certain maladies will prevail.

The publication of the various meteorological data with the annual report of the secretary of the State Board of Agriculture is deemed of importance, as no other publication brings these data so steadily before the public.

On January 22, 1878, in superior court, in the case of Anderson *vs.* City Railroad Company, the attorney for plaintiff objected to receiving the Signal Service records. The judge overruled objections, ruling that during the term of his practice as attorney he ordered the records into court on twenty occasions, and that all the judges and best authorities admit them as evidence.

### PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 8,219 |
| Number of Local Reports issued during the year ending June 30, 1878 | 1,719 |
| Numbers of Forms 15 (manifold) issued during the year ending June 30, 1878 | 8,721 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 144 |
| Total | 18,803 |

## INDIANOLA, TEXAS.

[*Official number*, 84.]

| | |
|---|---|
| Latitude | 28° 32′ |
| Longitude | 96° 38 |
| Elevation of barometer above mean sea-level | 25 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.997 |
| Mean temperature for the year ending June 30, 1878 | 71°.0 |
| Amount of rain-fall during the year ending June 30, 1878 | 50.79 inches. |

The office is located at the corner of Main and Cricket streets.

Sergeant H. S. Foster was reduced to the rank of private May 16, 1878, for neglect of duty, and on May 18 was transferred to Galveston as assistant, and Private Kenealy placed in charge of the station.

Lieutenant McClellan inspected the station in May, 1878, and found it in fair condition. No change in the location of office or instruments has been made since last report.

Thirty-eight cautionary signals were ordered for this station, of which number twenty-nine were reported justified and nine not justified. Four cautionary off-shore signals were ordered, two of which were fully justified, and one justified as to direction but not as to velocity, and one not justified.

The observer remarks as follows in reference to some of these displays:

*July* 20 *and* 21, 1877.—Schooner St. Joe was driven against the pier and broke her bowsprit.

*September* 16 *to* 19, 1877.—Schooner Crinoline, having lost her mainsail and two anchors, was driven ashore twelve miles from this station.

*October* 16 *and* 17, 1877.—Severe rain-storm, accompanied by blinding lightning. The anemometer spring was melted by the electric fluid. Roofs were blown off, fences prostrated, and the stock in warehouses badly damaged. The mail-schooner Little Albert was sunk. No lives lost.

*November* 8 *and* 9, 1877.—Schooner Fairy capsized twelve miles from this station. Two men were lost.

*December* 2 *to* 5, 1877.—Schooner Ajax lost one man and deck-load of lumber during this gale.

*February* 5 *to* 8, 1878.—This storm was accompanied by hail, during the continuance of which hundreds of cattle died.

*March* 18 *to* 20, 1878.—Steam-yacht Myrtle lost twenty-five miles southeast of Pass Cavallo, on the 19th instant. Crew saved.

### PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during year ending June 30, 1878 | 2,392 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 82 |
| Total | 2,474 |

## JACKSONVILLE, FLORIDA.

[*Official number*, 73.]

| | |
|---|---|
| Latitude | 30° 24′ |
| Longitude | 80° 40′ |
| Elevation of barometer above mean sea-level | 22.9 feet. |
| Mean barometer for the year ending June 30, 1878 | *30.030 |
| Mean temperature for the year ending June 30, 1878 | *70.0 |
| Amount of rain-fall for the year ending June 30, 1878 | 52.11 inches |

The office is located in Freedman's Bank building, corner Forsythe and Pine streets.

No change has been made in the working force nor in location of office or instruments.

The station was inspected by Lieutenant McClellan, Fifth Artillery, and assistant signal-officer, in March, 1878, who found it in excellent condition.

Sergeant Gosewisch has a good standing in the community.

Extracts from the semi-annual reports from this station:

A weekly summary of the local observations is furnished for the joint use of the Board of Health and the local Medical Society.

Monthly mean reports are published by the Sun and Press, Semi-Tropical Monthly Magazine, and the monthly Florida Immigrant.

These reports are considered valuable by them in distributing information with regard to the climate of Florida among parties contemplating immigration to the State.

* One observation missed in December, 1877.

Monthly mean reports are also furnished to Dr. A. S. Baldwin, of Jacksonville, who is chairman of the meteorological committee of the Board of Trade, Florida branch of the International Chamber of Commerce, and committee of vital statistics of the Board Health, all deriving benefits from these reports.

Of the benefits of the service Dr. Baldwin says: "The observations contain the record of the meteorology of this section, kept for the *past forty years*. Valuable information has been furnished to the Board of Health which will enable them to adopt sanitary measures, which will secure great improvements in the health of the city, and our medical societies, both State and county, are grateful participants in the benefits which the Signal-Service is constantly conferring upon the whole country."

During the fall, when fevers prevail, the local observations published in the Sun and Press were closely observed by the medical profession, and at their request the 11 p. m. observation was added to the report.

During the time the yellow fever was in this city the office was visited daily by the city authorities and physicians, and the records examined with regard to early pests of previous years and conditions which preceded them.

Fifteen cautionary signals were ordered for this station during the year, of which number six are reported justified and nine not justified. One cautionary off shore signal was ordered, and was justified as to velocity only.

The Sergeant remarks as follows in reference to some of these displays:

*September* 18 *to* 21, 1877.—Schooners were unable to leave port on account of the heavy sea on the bar.

*October* 1 *to* 4, 1877.—Many buildings were flooded by the unusually high tides. All vessels in an exposed position hauled into a sheltered anchorage.

*December* 29 *to* 31, 1877.—Severe gale and heavy sea reported off the coast.

*March* 3, 1878.—Schooner Florida got aground on the bar. Floated off.

*March* 27 *and* 28, 1878.—The steamer Sappho had her hurricane-deck torn off by a southwesterly squall.

*April* 4 *to* 6, 1878.—Steamer Agnes, of the Havana mail service, went ashore near Mosquito Inlet, sixty miles south of Saint Augustine, on the 3d instant. Will prove a total loss.

*April* 8 *to* 10, 1878.—During this gale, trees and fences were prostrated. Vessels in the stream dragged their anchors. Steamer Dictator left while the signal was flying, but fifteen passengers were deterred from sailing by the signal.

### PUBLICATIONS.

| | |
|---|---|
| Number of Local Reports issued during the year ending June 30, 1878 | 363 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 54 |
| Total | 417 |

## KEOKUK, IOWA.

[*Official number*, 47.]

| | |
|---|---|
| Latitude | 40° 23′ |
| Longitude | 91° 25′ |
| Elevation of barometer above mean sea-level | 583.9 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.916 |
| Mean temperature for the year ending June 30, 1878 | 55°.9 |
| Amount of rain-fall for the year ending June 30, 1878 | 42.86 inches. |

The office is located in State National Bank building, corner of Second and Main streets.

Sergeant E. F. Brady continues in charge, and has performed all the work of the station without assistance until May 7, 1878, when he was taken sick and Mr. L. O. McPherson was employed for four weeks. Sergeant Brady was again taken sick, and private Melton was ordered to report to him as his assistant and to remain as long as his services should be necessary.

The station was inspected in March by Lieutenant Buchanan and was found in good condition.

No change has been made in location of office or instruments.

Extracts from the semi-annual reports of the sergeant:

The river-men, shippers, and ice-men take an interest in the service, especially in that part relating to river.

The press still continues to evince a deep interest in the service, at all times willingly publishing any reports offered them.

The general public also manifests a steady interest in its workings.

The river was so low on August 2 and 20, 1877, that navigation over the Des Moines Rapids was prevented, causing irregular running of steamboats.

Canal navigation opened on October 18, 1877.

Highest water in the river, 11 feet 9 inches above bench-mark, occurred on June 10, 1878.

Lowest water, 9 inches above bench-mark, on October 1, 1877.

PUBLICATIONS.

| | |
|---|---|
| Number of Local Reports issued during the year ended June 30, 1878 | 446 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 31 |
| Total | 447 |

## ISLAND OF SAINT PAUL, ALASKA.

[*Official number*, 120.]

| | |
|---|---|
| Latitude | 57° 38′ |
| Longitude | 169° 50′ |

The Signal-Service property, after the death of Private E. G. Gill, was left in the charge of Mr. Hambden W. McIntire and Dr. Wheeler, who have taken care of the instruments, but have not forwarded meteorological reports.

Private Lucien M. Turner, Signal Service, U. S. A., was directed by Instructions No. 38, dated at Office Chief Signal-Officer, March 13, 1878, to proceed to Saint Paul's Island, Alaska, and secure the meteorological instruments belonging to the Signal Service, U. S. A., now in store at that point, and proceed with them to Unalashka Island, there to establish a meteorological station.

Private Turner arrived at Unalashka Island on May 8, 1878, and reports from that place, under date of May 22, 1878, that he has made arrangements for establishing stations at Saint Paul's Island and Fort Alexander.

## KEY WEST, FLORIDA.

[*Official number*, 25.]

| | |
|---|---|
| Latitude | 24° 32′ |
| Longitude | 81° 48′ |
| Elevation of barometer above mean sea-level | 32 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.007 |
| Mean temperature for the year ending June 30, 1878 | 77°.4 |
| Amount of rain-fall for the year ending June 30, 1878 | 46.30 inches |

The office is located in Louvre Hotel.

The station was inspected in March, 1878, and was found in excellent condition. Sergeant Shanefelter continues in charge. No change has been made in the location of office or instruments. Sergeant Shanefelter was granted thirty days' leave of absence February 4, 1878.

Fourteen cautionary signals were displayed, of which number six were justified and eight not justified. Two cautionary off-shore signals were displayed, one of which was justified.

The sergeant remarks as follows in reference to some of these displays:

*September* 19 *to* 21, 1877.—The Almora arrived in a leaking condition. Reports heavy sea and squalls.

*October* 1 *to* 4, 1877.—The storm-flag was torn to shreds. Heavy sea and squally weather reported. Steamship *San Antonio* encountered a heavy cyclone and was greatly damaged. Schooner Sarah Hall came in leaking badly, with spars and rigging much damaged. Steamship E. B. Souder, from *New Orleans*, passed through the northeast edge of the cyclone, near Tortugas light.

*December* 28 *to* 31, 1877.—Schooner Florida was wrecked on the 29th instant, while crossing the bar. Schooner S. H. Crawford struck on Pickles Reef.

*February* 26 *to* 28, 1878.—S. S. Tappahannock remained in port during the display.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 2,014 |
| Number of Local Reports issued during the year ending June 30, 1878 | 89 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 60 |
| Total | 2,163 |

## KITTYHAWK, NORTH CAROLINA.

[*Official number*, 129.]

| | |
|---|---|
| Latitude | 36° 0′ |
| Longitude | 75° 23′ |
| Elevation of barometer above mean sea-level | 22 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.021 |
| Mean temperature for the year ending June 30, 1878 | 69°.7 |
| Amount of rain-fall for the year ending June 30, 1878 | 60.82 inches. |

The office is located in upper story of Kittyhawk life-saving station. Sergeant S. W. Naylor was relieved by Corporal A. T. Sherwood, December 20, 1877, and ordered to duty in Texas. Private A. T. Sherwood was promoted to corporal for his energetic conduct at the time of the disaster to the United States steamer Huron, and placed in charge of station until April 10, 1878, when he was relieved and ordered to Fort Whipple for promotion. Private W. Davis distinguished himself by devotion to duty at the wreck of the steamer Metropolis, January 31, 1878, and was promoted to corporal, and when Corporal Sherwood was ordered in for promotion, was placed in charge of the station. The following accounts of the wrecks and the action of the station were published in the Monthly Weather Reviews of November, 1877, and January, 1878. The station has not been inspected during the year:

None of the life-saving stations on this coast are manned until December 1. The nearest sea-coast station of the Signal Service was at the life-saving station Kittyhawk, eight miles distant from the disaster. Information of the wreck was received there through two fishermen, between 10 and 11 a. m. A dispatch, as follows, was received at this office at 11.35 a. m.: "*To the Chief Signal-Officer of the Army, Washington, D. C.*: United States steamer Huron struck two miles north of No. 7 station at 1.30 a. m., foremast and main-topmast gone; steamer *a total wreck*; assistance needed immediately. The sea is breaking over her, and several have already washed ashore drowned. Number on board, 135. No cargo." (Signed) Naylor, Sergeant. A copy of this dispatch was immediately furnished for the information of the Secretary of the Navy and the Chief of the Life-Saving Service, by whom orders were at once telegraphed to the proper authorities. Instructions were sent from this office between 12 and 1 p. m. to keep open telegraphic communications day and night between Norfolk and Kittyhawk, and that a flagman should be sent immediately to the scene of the wreck to open communication with the ship or vessels aiding, and promptly forward all information to this office. Sergeant Naylor, who had gone to scene of wreck in person, carrying medicines, &c., returned to Kittyhawk at 6 p. m., and forwarded to this office a report, giving all information he had obtained, number of officers and men saved, &c. A telegraph station was opened before daylight of next day abreast of wreck, where, during the day, flag communication was had with the aiding vessels.

From that time there has been a telegraphic station open at the scene of the wreck.

where the number of messages received relative to the wreck up to December 11 was two hundred and fifty-seven, and sent three hundred and four. During the severe storm then experienced on that coast, and since, the telegraph-lines of the Signal Service from Norfolk to the wreck continued to work. The sea-coast telegraph of the Signal Service is used for the purpose of transmitting meteorological observations, for connecting life-saving stations or light-houses, for giving notice of apprehended storms, by the display of signals, and information of shipwrecks. The line is constructed near the beach, so that a telegraph station may be opened abreast of any wreck. All the stations are equipped with all that is required to open communication with ships in danger, in either the Signal Service or International Code.

Seventy-one cautionary signals were ordered during the year; fifty-eight were justified and thirteen not justified. Nineteen cautionary off-shore signals were ordered, eleven being justified, two as to velocity only, and six not justified.

The observer remarks as follows in reference to some of these displays:

*September* 11, 1877.—A schooner has been discovered sunk twelve miles north of this station. Her top-sail is in view.

*September* 28 *to October* 1, 1877.—Portions of a wreck came ashore.

*November* 21 *to* 24, 1877.—United States steamship Huron came ashore three miles north of No. 7 station at 1.30 a. m. of the 24th instant. Steamer a total loss. Out of a crew of one hundred and thirty-five men, only four officers and thirty seamen were saved.

*December* 2 *and* 3, 1877.—Schooner Frank Jameson was found abandoned on the morning of the 3d. Had the appearance of having been run into.

*December* 26 *to* 30, 1877.—A small schooner was picked up by a wrecking-steamer five miles northeast of the station on the 24th instant.

*January* 30 *and* 31, 1878.—Steamship Metropolis stranded on Currituck Beach, nineteen miles north of this station, on the morning of the 31st instant, and proved a total wreck. Out of two hundred and forty-eight persons on board, fifty swam ashore.

## KNOXVILLE, TENNESSEE.

[*Official number*, 42.]

| | |
|---|---|
| Latitude | 35° 56′ |
| Longitude | 83° 58′ |
| Elevation of barometer above mean sea-level | 980 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.014 |
| Mean temperature for the year ending June 30, 1878 | 58°.3 |
| Amount of rain-fall for the year ending June 30, 1878 | 43.04 inches. |

The office is located in the custom-house.

Lieutenant McClellan, Fifth Artillery, and acting signal-officer, inspected this station in June, 1878, and reported that it was not very carefully kept. Sergeant Payne was in charge during the year.

The office was removed from College Hill to United States custom-house and post-office building August 24 and 25, and observations reported, with new elevations, August 26, 1877.

Sergeant Payne reports:

The public interest in the service has increased very much since the removal to the custom-house; the number of visitors to the office has been more than doubled, and the universal expression of interest is remarkable.

### PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 624 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 58 |
| Total | 682 |

## LA CROSSE, WISCONSIN.

[*Official number*, 87.]

| | |
|---|---|
| Latitude | 43° 48′ |
| Longitude | 91° 23′ |
| Elevation of barometer above mean sea-level | 701.94 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.918 |
| Mean temperature for the year ending June 30, 1878 | 52°.2 |
| Amount of rain-fall for the year ending June 30, 1878 | 33.79 inches. |

The office is located in Anderson's Building, corner of Main and Second streets.

Sergeant J. G. Lynch was assigned to the charge of the important station at Chicago, Ill., January 23, 1878, being relieved by Sergeant G. R. Hancock, who is in charge. Lieutenant Buchanan, Fourteenth Infantry, acting signal-officer, inspected the station in February, 1878. It was in fair condition. No change has been made in the location of office or instruments. It is reported that the amount of interest in the service is steadily increasing.

The river-gauge was moved by order of the inspector, Lieut. James A. Buchanan, on February 23, 1878, from the piling of the Milwaukee and Saint Paul transfer dock, to the south end of the Milwaukee and Saint Paul depot.

The gauge is now attached to the wharf, and the zero remains the same as the old gauge, viz, low water of October, 1872.

On November 29, 1877, ice commenced running in the river and navigation closed; on December 21, 1877, the ice passed down the river, opening navigation for the ferries. Navigation closed again on January 4, 1878. The first boat of the season arrived on February 27, 1878.

Highest water in the river, 4 feet 11 inches above bench-mark, occurred July 12 and 13, 1877. Lowest water in the river, 2 feet 3 inches below bench-mark, on August 26, 1877.

### PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 2,212 |
| Number of Local Reports issued during the year ending June 30, 1878 | 1,810 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 43 |
| Total | 4,065 |

## LEAD CITY, DAKOTA TERRITORY.

[*Official number*, 188.]

| | |
|---|---|
| Latitude | 44° 22′ |
| Longitude | 103° 34′ |

Elevation of barometer above mean sea-level not yet determined.

On June 1, 1878, the office was moved from Deadwood to Lead City (in accordance with orders received from office Chief Signal-Officer on May 28), without missing any observations. Last observation was taken at Deadwood at 2.49 p. m. and first observation at Lead City at 9 p. m. June 1, 1878.

## LEAVENWORTH, KANSAS.

[*Official number*, 52.]

| | |
|---|---|
| Latitude | 39° 19′ |
| Longitude | 94° 58′ |
| Elevation of barometer above mean sea-level | 813.38 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.917 |
| Mean temperature for the year ending June 30, 1878 | 56°.2 |
| Amount of rain-fall for the year ending June 30, 1878 | 41.67 inches. |

The office is located at 315 Delaware street.

Sergeant J. R. Williams relieved Sergeant McChesney December 8, 1877, and is still in charge of station. Sergeant McChesney was discharged at Leavenworth, Kans., December 19, 1877. Private C. B. Dunne, the printer at this station, was discharged for misconduct January 21, 1878, and Private P. J. Lyons ordered to report to Sergeant Williams as assistant and printer.

The station was inspected by Lieutenant Buchanan, Fourteenth Infantry and acting signal-officer, in May, 1878, who found it in excellent condition.

No change has been made in location of office or instruments during the year. The number of Farmers' Bulletins issued daily by this office was 175, but on February 1 the number was reduced to 66, and February 16 to 32. These reductions resulted from changes made in the time that railroad trains left Leavenworth, which make it impossible to reach these post-offices in time to make the bulletin of value.

On December 29, 1877, the indications were not printed owing to drunkenness of Private C. B. Dunne.

On March 27, 1878, the Jim Watson, first boat of the season, arrived with a raft of 500 walnut logs in tow. The highest water in the river, 18 feet 7 inches, occurred on July 3, 1877; the lowest water in the river, 3 feet 7 inches, on January 10, 1878.

PUBLICATIONS.

| | |
|---|---|
| Number of Farmers' Bulletins issued during the year ending June 30, 1878 | 39,698 |
| Number of Local Reports issued during the year ending June 30, 1878 | 625 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 106 |
| Total | 40,429 |

## LOGANSPORT, INDIANA.

[*Official number*, 124.]

The office is located at 410 Market street.

The office was moved October 18, 1877, from No. 46 Fourth street to No. 410 Market street. Corporal Whiting continues in charge and gives satisfaction. One hundred and eighty-six post-offices and four persons have been regularly supplied with Farmers' Bulletins.

The station has not been inspected since date of last report.

PUBLICATIONS.

| | |
|---|---|
| Number of Farmers' Bulletins issued during the year ending June 30, 1878 | 62,400 |

## LOS ANGELES, CALIFORNIA.

[*Official number*, 141.]

| | |
|---|---|
| Latitude | 34° 3′ |
| Longitude | 118° 16′ |
| Elevation of barometer above mean sea-level | 318.25 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.945 |
| Mean temperature for the year ending June 30, 1878 | 61°.7 |
| Amount of rain-fall for the year ending June 30, 1878 | 21.26 inches. |

The office is located at the corner of Main and Commercial streets.

Sergeant C. E. Howgate was in charge of station until November 3, 1877, on which date he was ordered to office of the Chief Signal-Officer for discharge. Sergeant J. M. Frantz relieved Sergeant Howgate, and is in

charge at date of this report. The station has not been inspected since it was established.

No change has been made in location of office or instruments.

The local observations taken at this station are published daily in three morning and one evening paper, and a tabular form of the monthly means each month in good shape.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 1,271 |
| Number of Local Reports issued during the year ending June 30, 1878 | 637 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 31 |
| Total | 1,939 |

## LOUISVILLE, KENTUCKY.

[*Official number*, 64.]

| | |
|---|---|
| Latitude | 38° 18′ |
| Longitude | 85° 52′ |
| Elevation of barometer above mean sea-level | 530 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.964 |
| Mean temperature for the year ending June 30, 1878 | 59°.3 |
| Amount of rain-fall during the year ending June 30, 1878 | 43.33 inches. |

The office is located at the corner of Fourth avenue and Green streets, in Courier-Journal building.

Sergeant Sebree continues in charge and has one assistant. One assistant was ordered to Fort Whipple during the past year for promotion.

Lieutenant Buchanan inspected the station in June, 1878, and found it in excellent condition, and complimented Sergeant Sebree highly for his attention to duty and efficiency. No change has been made in location of office or position of instruments since date of last report.

Extracts from the semi-annual reports of sergeant:

The river men are very well satisfied with the manner the river interests have been looked after.

Navigation has not been closed, nor did any ice pass down last winter or spring.

The highest water in the river, 12 feet 4 inches, occurred on March 17, 1878, and lowest water, 2 feet 6 inches, on October 8, 1877.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 4,010 |
| Number of Local Reports issued during the year ending June 30, 1878 | 3,521 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 124 |
| Number of Forms 26 issued during the year ending June 30, 1878 | 2,783 |
| Total | 10,438 |

## LYNCHBURG, VIRGINIA.

[*Official number*, 44]

| | |
|---|---|
| Latitude | 37° 30′ |
| Longitude | 79° 2′ |
| Elevation of barometer above mean sea-level | 651.5 feet. |
| Mean barometer for the year ending June 30, 1878 | *29.998 |
| Mean temperature for the year ending June 30, 1878 | *60°.7 |
| Amount of rain-fall for the year ending June 30, 1878 | 50.44 inches. |

*One observation missed in March, 1878.

The office is located at No. 135 Main street, in the First National Bank Building.

Sergeant H. F. McFarland relieved Sergeant J. T. O'Keeffe, who was ordered to Fort Whipple for change of station December 4, 1877, and is in charge at date of this report. The station was inspected by Lieutenant McClellan in February, 1878, who reported it in good condition.

No change has been made in the location of the office or instruments.

The following extracts are made from the semi-annual report of the sergeant:

The interest in the service is on the increase, as the utility of the Signal Service was fully demonstrated during the great freshet of November, 1877. The indications from Washington during the great freshet were closely watched, and being verified in every respect, called forth expressions of good-will for the service. The people deriving the most benefit from the weather reports are the tobacco men, pork-packers, and wholesale oyster dealers, but more especially the tobacco men.

The only reports received are those from Knoxville, which, together with the local observations, are printed daily in the newspapers.

PUBLICATIONS.

| | |
|---|---|
| Number of Local Reports issued during the year ending June 30, 1878 | 621 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 34 |
| Total | 655 |

## MARQUETTE, MICHIGAN.

*[Official number, 50.]*

| | |
|---|---|
| Latitude | 46° 33′ |
| Longitude | 87° 36′ |
| Elevation of barometer above mean sea-level | 666.33 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.910 |
| Mean temperature for the year ending June 30, 1878 | 46°.5 |
| Amount of rain-fall for the year ending June 30, 1878 | 39.49 inches. |

The office is located in Adams and Frazer's Block, corner of Front and Spring streets.

Sergeant J. C. Rogers was ordered to Fort Whipple, for medical treatment, January 21, 1878, and Sergeant J. T. O'Keeffe placed in charge. Sergeant O'Keeffe has given good satisfaction.

No change has been made in the location of office and positions of instruments since date of last report.

Navigation closed on November 28, 1877, the steamer Winslow being the last boat to leave. Navigation opened on April 12, 1878, the first arrivals being the steam-tugs H. U. Powers, R. J. Hackett, and William McGregor, of Detroit.

Thirty-two cautionary signals were ordered for this station, of which number eight were reported justified and twenty-four not justified.

The sergeant remarks as follows in reference to some of these displays:

*November 6 to 9, 1877.*—Very high sea running. No vessels left port during the display.

*April 8 to 11, 1878.*—Several houses were unroofed and telegraph-lines prostrated.

*June 20 and 21, 1878.*—All vessels in port regarded the warning. The captains visited the office for information.

PUBLICATIONS.

| | |
|---|---|
| Number of Local Reports issued during the year ending June 30, 1878 | 17 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 24 |
| Total | 41 |

## MEMPHIS, TENNESSEE.

[*Official number*, 62.]

| | |
|---|---|
| Latitude | 35° 7′ |
| Longitude | 90° 7′ |
| Elevation of barometer above mean sea-level | 298.94 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.010 |
| Mean temperature for the year ending June 30, 1878 | 62°.4 |
| Amount of rain-fall for the year ending June 30, 1878 | 63.59 inches. |

The office is situated in the Irwin Block, No. 254 Second street.

Sergeant W. McElroy remains in charge. Two assistants were relieved during the year for change of station. The assistant at this station prints the Farmers' Bulletin. Twenty-seven post-offices and eleven persons are supplied from this office. Lieutenant McClellan inspected the station in May, 1878, and found it in good condition.

Extracts from the semi-annual reports of the sergeant:

The river observations continue to receive the same close attention as noted in former reports, and give satisfaction to all interested.

The Memphis Cotton Exchange, Chamber of Commerce, and city press manifest the greatest interest in whatever affects the service.

The Appeal and Avalanche, morning editions, devote generous space to the weather and river reports as published by this office. The Appeal is particularly kind. It says that the service is in its infancy, as yet; that its capabilities have not, as yet, been dreamed of, and that the near future will prove it to be the event of the century.

The special Indications sent this station 2d, 3d, 4th, 5th, 6th, and 7th of March, were highly appreciated; twenty copies were distributed each morning, and posted in the hotels. The Indications were also telegraphed to the small towns in the vicinity.

The highest water in the river, 29 feet 11 inches, occurred on May 1 and 2, 1878, and the lowest water, 3 feet 2 inches, on October 14 and 15, 1877.

### PUBLICATIONS.

| | |
|---|---|
| Number of Farmers' Bulletins issued during the year ending June 30, 1878 | 14,040 |
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 6,968 |
| Number of Local Reports issued during the year ending June 30, 1878 | 1,248 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 216 |
| Number of Forms 26 issued during the year ending June 30, 1878 | 4,992 |
| Total | 27,464 |

## MILWAUKEE, WISCONSIN.

[*Official number*, 38.]

| | |
|---|---|
| Latitude | 43° 3′ |
| Longitude | 87° 54′ |
| Elevation of barometer above mean sea-level | 695.31 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.955 |
| Mean temperature for the year ending June 30, 1878 | 49°.2 |
| Amount of rain-fall for the year ending June 30, 1878 | 48.66 inches. |

The office is located in room 72 Mitchell Building, southeast corner of East Water and Michigan streets.

Sergeant S. W. Rhode continues in charge of the station, and has satisfactorily attended to his duties. During the year two assistants have been transferred to other stations, and one relieved and discharged the service for neglect of duty.

Lieutenant Buchanan, Fourteenth Infantry, acting signal-officer, inspected the station in February, 1878, and found it in excellent order Sergeant Rhode was complimented by the inspector for his attention to duty.

In September, 1877, eight display stations were established on the western shore of Lake Michigan, and the orders issued to them through this office. They are located at the following places in Wisconsin: Kenosha, Racine, Sheboygan, Kewaunee, Clay Bank, Sturgeon Bay, Green Bay, and at Menomonee, Michigan. In October Manitowoc, Wisconsin, was added to the number, making a total of nine.

Sergeant Rhode reports as follows relative to the display of cautionary signals at these points:

It has been conclusively proven that the display of the cautionary signals at these points has been of material assistance to the shipping of the lakes.

In operating these stations great trouble was experienced by the frequent prostration of the telegraph wires, delaying orders to the stations and the acknowledgments to this office. These stations were closed December 10, 1877, and reopened March 15, 1878. In February, 1878, the station at Clay Bank was discontinued and moved to Horn's Pier, Wisconsin. The display of the signal at these points has been beneficial to the commerce of the lakes, and especially to the smaller class of coast vessels.

The service continues to maintain its popularity with the public at this station.

The following extracts are made from the semi-annual reports of the sergeant:

The organization of the meteorological committee of the Chamber of Commerce continues the same, viz: Col. John L. Hathaway, chairman, J. B. Merrill, esq., and Capt. E. M. Peck. In locating, fitting up, and removing the office to its present location, their assistance was invaluable. Scarcely a week passes but one of the members of the committee visits the office, and a constant vigilance is exercised over its management.

At the request of the Northwestern and Northern Transportation Companies, the display of cautionary signals at Milwaukee, Grand Haven, and Ludington were continued during the winter months. The signal frequently proved of great benefit to these companies.

One of the most important items that I can find worthy of note, and which has been of great interest to the public, is the statement in each cautionary signal order, since January 1, 1878, of the cause of display and the direction of wind and kind of weather expected. Heretofore frequent inquiries were made to this office for information of this nature, but owing to the few and scattered reports received; it was very seldom that satisfactory answers could be given. Now, when an order is received in the morning, a copy is immediately sent to each afternoon paper for publication; if received in the evening or at midnight, it is sent to the morning papers. In this way the cause of the signal being displayed is disseminated to every household in the city. From the present location of the office there are very few residences in the city from which the cautionary signal cannot be seen.

On March 23, 1878, the office at this station was removed from room 19 Insurance Block to room 72 Mitchell building, corner East Water and Michigan streets. The building is six stories in height, and surmounted in the center of the Michigan street front by a dome forty feet in height. In the dome the office is situated. The area of floor occupied is seven hundred and eighty-four square feet. The ceilings of all the rooms are thirteen feet in height. Between the ceilings and the roof of the dome is a space twenty-six feet square and nine feet in height, which is used as a battery and store-room. In the main office there are three windows, in bed-room two, and in private office of observer two, all of plate glass. All the doors have ground-glass in them. The wood-work is ash, hard finished. In the large north window of the main office is the instrument shelter of the standard pattern. The thermometers have a good exposure.

The wind-vane indicates the direction by a dial on the ceiling of the main office. The bottom of the flag-staff rests on the floor of the main office room, and is surrounded by a stairway leading to the roof of the dome. The roof of the dome is fifteen feet in diameter, and is surrounded by a strong iron railing five feet in height; around the flag-staff, and at an elevation of ten feet above the roof, is placed the large signal lamp. The total elevation of the lamp above the sidewalk is 155 feet. The roof of the dome commands a view of every portion of the bay, harbor, river, and city. There is no better position in the city for the display of the signal.

For the general plan of the office, adapted to the special uses of the service, and for many conveniences added, the thanks of the office are due Mr. E. Townsend Mix, architect, and Mr. C. Dingwall, superintendent of the construction of the Mitchell building. It is believed that no office in the service has a better location, or has the same facilities for the prompt discharge of duties.

During the year this office furnished quite a lengthy meteorological report for the annual report of the board of health.

Forty-eight cautionary signals were displayed at this station during the year, of which number twenty are reported by the sergeant justified and twenty-eight not justified.

The sergeant remarks as follows in reference to some of these displays:

*October* 2 *to* 4, 1877.—Seven disasters reported on the lake. Two lives lost.

*October* 12 *to* 15, 1877.—Heavy sea running. Several vessels lost portions of their canvas.

*October* 19 *and* 20, 1877.—The scow Forrest and the schooner James Garrett were damaged by collision. Scow Planet and schooner Thomas Parsons sprung a leak.

*October* 27 *to* 29, 1877.—Several minor disasters are reported.

*November* 1 *to* 3, 1877.—A number of disasters are reported on the lake.

*November* 4 *to* 5, 1877.—A very heavy storm prevailed on the lake. Many disasters to vessels occurred.

*November* 6 *to* 9, 1877.—The schooner Magellan was wrecked at Two Rivers. The captain and crew of eight men were lost. The schooner Bridgewater was driven ashore at Middle Village. The schooner Ætna was driven ashore at Long Tail Point. The schooner Empire State was wrecked in Thunder Bay. Many other minor disasters are reported.

*March* 23 *and* 24, 1878.—A number of minor disasters are reported throughout the lake.

*March* 26 *to* 28, 1878.—Schooner Three Bells, lumber-laden, sunk in the harbor. A number of disasters are reported in other parts of the lake.

*April* 8 *to* 11, 1878.—The schooner Belle Brown ran ashore near Bark River. The bark Vanderbilt was dismasted in the straits. Several vessels lost portions of their canvas.

*May* 17 *to* 20, 1878.—A large fleet of grain-vessels remained in port. Several vessels lost portions of their canvas.

*May* 22 *to* 24, 1878.—Several vessels lost portions of their rigging.

*June* 1 *to* 3, 1878.—A very severe electrical and rain storm. Two buildings and several trees were struck by lightning. Telegraph-wires were prostrated. The fall of rain was very heavy.

*June* 20 *and* 21, 1878.—A large number of minor disasters are reported. The schooner Tuscola was sunk off Highland Park.

### PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 6,091 |
| Number of Local Reports issued during the year ending June 30, 1878 | 651 |
| Number of Forms 15 (manifold) issued during the year ending June 30, 1878 | 4,030 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 120 |
| Total | 10,892 |

## MOBILE, ALABAMA.

[*Official number*, 27.]

| | |
|---|---|
| Latitude | 30° 42′ |
| Longitude | 87° 59′ |
| Elevation of barometer above mean sea-level | 39.3 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.026 |
| Mean temperature for the year ending June 30, 1878 | 67°.9 |
| Amount of rain-fall for the year ending June 30, 1878 | 65.84 inches. |

The office is located at the southeast corner of Government and Royal streets.

Sergeant C. Dill was relieved by Sergeant L. M. Dey, July 31, 1877, and ordered to office of Chief Signal-Officer for discharge. There is one assistant at the station.

Lieut. J. McClellan inspected this office in April, 1878, and found it in excellent condition.

The following extract is made from his official report:

I have the pleasure to commend to the Chief Signal-Officer the observer and assistant at this station, for their accurate and prompt performance of duty and for the excellent condition in which I find this office and its records.

No change has been made in the location of the office or of any of the instruments.

The following extracts are made from the semi-annual reports of the sergeant:

The weather-maps at the Board of Trade and Cotton Exchange are carefully scanned, and frequent application is made for more extended reports, especially from the cotton districts.

The medical profession continue to receive valuable information from the office, and a report, prepared monthly, forms a part of the health officers' official bulletin.

The members of the meteorological committee, the Board of Trade and Cotton Exchange continue to give the service their warm support, and are ever ready to co-operate in the promotion of its interests.

As heretofore, the press sustains the service in each and every particular. All special reports, including weeklies, monthlies, and the indications, are published. Two of the papers publish extracts from the bulletins, while one, the News, prints a local report furnished by the office.

Number of cautionary signals displayed during the year, fourteen; number justified, eight; number not justified, six. One cautionary off-shore signal was displayed during the year; it was justified as to velocity and not as to direction.

The sergeant remarks as follows in reference to some of these displays:

*September* 17 *to* 20, 1877.—The storm during the display was very severe, and was accompanied by an extraordinary rain-fall. The signal was universally heeded and favorably commented on. No vessels left during the display. The river rose very rapidly and flooded many buildings.

*October* 1 *to* 3, 1877.—A very severe gale prevailed in the bay, accompanied by heavy rain.

*February* 19 *to* 21, 1878.—During this display occurred the highest recorded velocity since the opening of the station. Two inches of rain fell in three hours. A schooner which went out while the signal was flying went ashore.

*February* 26 *and* 27, 1878.—The steamer Alabama delayed her departure two days on account of the signal.

*April* 8 *and* 9, 1878.—The bark Lanta was driven against a pier by the force of the wind.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 4,167 |
| Number of Local Reports issued during the year ending June 30, 1878 | 321 |
| Number of Forms 15 (manifold) issued during the year ending June 30, 1878 | 1,605 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 36 |
| Total | 6,129 |

## MONTGOMERY, ALABAMA.

[*Official number*, 26.]

| | |
|---|---|
| Latitude | 32° 22′ |
| Longitude | 86° 23′ |
| Elevation of barometer above mean sea-level | 219 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.029 |
| Mean temperature for the year ending June 30, 1878 | 66°.2 |
| Amount of rain-fall for the year ending June 30, 1878 | 46.06 inches. |

The office is located at No. 10 Market street.

Sergeant William J. Evans was relieved by Sergeant J. C. Rogers April 13, 1878, and ordered to Fort Whipple, Va., for discharge. Lieutenant McClellan, Fifth Artillery, and acting signal-officer, inspected the station in April, 1878, and reported it in good condition. The locations of the office and instruments remain unchanged since the date of last report.

Extracts from the semi-annual reports of the sergeant:

As heretofore, reports upon temperature, amount of rain-fall, &c., have been furnished regularly each week to the correspondents of several commercial associations who are interested in the cotton trade.

As stated in former reports, the benefits derived from the published reports of the Signal Service at this station are mainly restricted to the cotton-growing interests of this section. That this is true is evinced by the eagerness with which local reports of this station are sought after by various commercial associations and journals devoted to commercial interests, located in New York City and the larger cities of the Southern States.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 4,264 |
| Number of Local Reports issued during the year ending June 30, 1878 | 333 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 21 |
| Total | 4,618 |

## MORGANTOWN, WEST VIRGINIA.

[*Official number*, 92.]

| | |
|---|---|
| Latitude | 39° 36′ |
| Longitude | 79° 52′ |
| Elevation of barometer above mean sea-level | 1,027.88 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.979 |
| Mean temperature for the year ending June 30, 1878 | 53°.3 |
| Amount of rain-fall for the year ending June 30, 1878 | 41.65 inches. |

The office is located on top floor in tower of new hall, West Virginia University.

Sergeant L. Dunn remains in charge of the station, and has given satisfaction. No change has been made in location of office or position of any instrument during the year.

Thirty-two students of the West Virginia University have been instructed by the sergeant in signaling and telegraphy, and in manner of taking and recording meteorological observations.

The station was not inspected during the year.

Highest water in the river, 14 feet 6 inches, occurred at 2 a. m. November 25, 1877, and the lowest water, 0 feet 4 inches, August 29, 30, and 31, and September 4, 5, 6, 10, 11, 12, 13, and 17, 1877.

## MOUNT WASHINGTON, NEW HAMPSHIRE.

[*Official number*, 46.]

| | |
|---|---|
| Latitude | 44° 16′ 25″ |
| Longitude | 71° 16′ 26″ |
| Elevation of barometer above mean sea-level | 6,285.6 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.009 |
| Mean temperature for the year ending June 30, 1878 | 28°.9 |
| Amount of rain-fall for the year ending June 30, 1878 | 121.92 inches. |

The office is located in a house on the summit, built expressly for this purpose by the Signal Service, U. S. A.

Sergeant O. S. M. Cone remained in charge until January 20, 1878, when he was ordered to Fort Whipple for medical treatment and change of station, and Private Murphy, then on duty as assistant, has been in charge since that date. One assistant has been transferred to duty at office of the Chief Signal Officer.

The station has not been inspected during the year.

Extracts from the semi-annual reports from this station:

On November 4, 1877, Sergeant O. S. M. Cone left station in charge of Private D. C. Murphy and descended from the summit in order to obtain medical treatment at Littleton, N. H. He was suffering from partial paralysis of head and face. Recovered and returned to duty on January 5, 1878.

On January 20, 1878, Sergeant O. S. M. Cone left the summit *en route* to Washington, D. C., for medical treatment, in compliance with Signal Order No. 4, C. S. Before leaving, Sergeant Cone constructed a large sled for the purpose of conveying his trunks

to the base. Private D. C. Murphy accompanied him to Long Trestle, when, seeing imminent danger, Private Murphy jumped from the sled, receiving slight bruises. The sled was now moving at the speed of thirty miles an hour, and leaped from the track, throwing Sergeant Cone into the abyss and rendering him insensible. Assistance was immediately telegraphed for, and the necessary medical aid promptly given. Upon the return of Private Murphy to the summit, he found Private Doyle suffering from overexertion, caused by taking three heavy blankets to the relief of Sergeant Cone at the scene of the accident. Assistance telegraphed for. Mr. D. Harrington assisted Private Murphy with station duties from the morning of the 23d to the 27th of January (1878), inclusive.

A violent hurricane passed over the station on the 24th, tearing up two hundred feet of the Signal Service cable, and preventing the transmission of the sunset report of the 24th. With the assistance of Mr. Harrington the cable has been repaired.

The barometers were removed from the south side of the office room to the north side (the elevation remaining unchanged) on September 3d by permission from O. C. S. O., in letter dated September 1, 1877.

Two daily weather reports were sent from this office to all summer hotels in the White Mountains during the time of summer travel. I am informed by the landlords of several houses that the weather reports are of great benefit to the tourists and others who wish to make the ascent of Mount Washington.

## NASHVILLE, TENNESSEE.

[*Official number*, 63.]

| | |
|---|---|
| Latitude | 36° 11′ |
| Longitude | 86° 53′ |
| Elevation of barometer above mean sea-level | 506.8 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.002 |
| Mean temperature for the year ending June 30, 1878 | 60°.8 |
| Amount of rain-fall for the year ending June 30, 1878 | 44.26 inches. |

The office is located at No. 30 North College street.

Sergeant A. C. Ford was in charge until June 10, 1878, when he was relieved on account of ill health and ordered to Denver, Colo., as assistant, with the intention of assigning him to charge of the station as soon as he recovers sufficiently to be able to perform the duties. On the relief of Sergeant Ford, Private Prender was the only enlisted man at station, and has attended to all meteorological work without assistance, and to the satisfaction of this office.

The printing of Farmers' Bulletins is done by a civilian printer. Ninety-eight post-offices and eleven persons have been supplied with Farmers' Bulletins from this station.

Lieutenant McClellan, Fifth Artillery, acting signal-officer, inspected the station in June, 1878, and found it in good order.

Extracts from the semi-annual reports of the sergeant:

Forms 22 are issued monthly and distributed to the press, meteorological committees, and scientific institutions.

The publication of the reports of the service by the daily press of the city has continued regularly, and the information thus given to the public is generally regarded as a valuable feature of the newspapers.

The service has maintained its popularity with the citizens generally, and many more business men than ever before are using the reports in the transaction of their business.

Grain speculators, ice and coal merchants, and dealers in perishable goods, such as fish and vegetables, are coming more and more to base their transactions on the weather reports of the service. The scientific institutions of the city fully appreciate the value of the work which is being done by the service.

The sergeant has once been summoned to appear and produce the records of the office in a court of law.

Steamboatmen and cotton merchants continue to regard the reports as almost indispensable to their interests.

Highest water in the river, 27 feet 3 inches, occurred on April 26, 1878, and the lowest water, 1 foot 1 inch, on September 4 and October 20 and 21, 1877.

PUBLICATIONS.

| | |
|---|---|
| Number of Farmers' Bulletins issued during the year ending June 30, 1878 | 36,192 |
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 6,086 |
| Number of Local Reports issued during the year ending June 30, 1878 | 312 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 127 |
| Number of Forms 26 issued during the year ending June 30, 1878 | 2,860 |
| Total | 45,577 |

## NEW HAVEN, CONNECTICUT.

[*Official number*, 96.]

| | |
|---|---|
| Latitude | 41° 17′ |
| Longitude | 72° 57′ |
| Elevation of barometer above mean sea-level | 107 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.988 |
| Mean temperature for the year ending June 30, 1878 | 53°.4 |
| Amount of rain-fall during the year ending June 30, 1878 | 56.68 inches. |

The office is located in American National Life and Trust Company's building, No. 36 Chapel street.

Sergeant W. A. Glassford was placed in charge of this station November 6, 1878, relieving Sergeant M. F. Tighe, who was sent to Wood's Holl, Mass.

The station has not been inspected since the date of last report.

No change has been made in location of office or positions of instruments.

The following extracts are made from the semi-annual reports of the sergeant:

The cautionary off-shore signal has been spoken of favorably, and is reported to be a decided advance in the interest of Sound navigation.

The off-shore storm of the 9th and 10th of January was of unusual severity; vessels staid in port and steamers trying to make the Sound were compelled to put back.

The storm of March 24 and 25 was announced by signals and bulletin in a special telegram. Owing to the extraordinary splendor of the morning, not the slightest anticipation of the violent storm which burst upon the city at 3 p. m. was entertained, hence the many vessels in the harbor began getting under way; seeing this, a large flag was hoisted in addition to the cautionary off-shore signal then flying, and messages of warning sent by telephone; soon after, the special message announcing the approaching storms was received and instantly transmitted by telephone to the docks and shippers, and in fact to many others who I thought would wish the information it contained. This prompt action, by bringing the telephone into this use, was commented upon by many, and probably saved property which must otherwise have suffered.

There were fifty-five cautionary signals displayed during the year, of which number twenty-five were justified and thirty not justified.

Fourteen cautionary off-shore signals were displayed; seven were fully justified, four justified as to direction, and three not justified.

The sergeant remarks as follows in reference to some of these displays:

*July* 19, 1877.—Heavy sea at the mouth of the harbor. Several showers occurred.
*September* 29, 1877.—Forty vessels took refuge in the harbor.
*October* 3 to 5, 1877.—Over one hundred vessels took refuge in the harbor.
*October* 8 and 9, 1877.—A few minor casualties in the Sound.
*October* 21 and 22, 1877.—Many vessels took refuge in the harbor.
*November* 2 and 3, 1877.—During the gale accompanying this display, trees and chimneys were blown down.
*November* 24 to 26, 1877.—A very severe storm prevailed on the Sound.
*January* 10 to 12, 1878.—The storm during this display was very severe. The steamer Elm City was obliged to anchor in the Sound. The steamer Continental was obliged to return.

*January* 23 and 24, 1878.—Nearly a hundred vessels in port. Steamers Continental and Starin grounded at the entrance to the harbor.

*January* 30 to *February* 1, 1878.—Many disasters are reported on the coast. The Sound traffic was generally suspended.

*May* 5, 1878.—A large fleet of vessels remained in the harbor during the display.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 165 |
| Number of Local Reports issued during the year ending June 30, 1878 | 144 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 84 |
| Total | 393 |

## NEW LONDON, CONNECTICUT.

[*Official number*, 14.]

| | |
|---|---|
| Latitude | 41° 22′ |
| Longitude | 72° 9′ |
| Elevation of barometer above mean sea-level | 46.7 feet |
| Mean barometer for the year ending June 30, 1878 | 29.993 |
| Mean temperature for the year ending June 30, 1878 | 51°.9 |
| Amount of rain-fall for the year ending June 30, 1878 | 36.74 inches |

The office is located in the custom-house, Bank street.

No change has been made in the working force at this station. Sergeant I. A. Reed remains in charge and gives satisfaction.

No change has been made in the location of office or positions of instruments.

The station was not inspected during the year.

Sixty cautionary signals were displayed during the year, of which number twenty-nine were justified and thirty-one not justified. Fourteen cautionary off-shore signals were displayed during the year; seven were justified, five justified as to direction, and two not justified.

The sergeant remarks as follows in reference to some of these displays:

*July* 19, 1877.—A large number of vessels remained at anchor in the harbor during the display.

*August* 1, 1877.—A large fleet remained in the harbor during the display.

*August* 2 *and* 3, 1877.—A large number of vessels remained in the harbor. The steamer Elm City, from New Haven, Conn., with excursionists for Block Island, put into Stonington on account of the rough weather. The schooner S. C. Muldon is a total loss at Horton's Point. Crew saved.

*September* 1, 1877.—A very severe thunder-storm passed over the station, doing considerable damage to government property at Fort Trumbull.

*September* 6, 1877.—A large number of vessels remained in port during the display.

*September* 7 *and* 8, 1877.—The United States steamer Dexter started out, but was obliged to return, owing to the severity of the gale.

*October* 3 *to* 6, 1877.—A large fleet anchored in the harbor during the display.

*October* 8 *and* 9, 1877.—The steamer Bristol put into this harbor for shelter.

*November* 2 *and* 3, 1877.—Forty-five vessels remained in port. The steamer City of Lawrence was obliged to return. Several minor casualties occurred.

*November* 8 *to* 10, 1877.—A large fleet of vessels took refuge in the harbor.

*November* 24 *to* 26, 1877.—This storm was very severe on the Sound. All steamers were detained.

*December* 5 *to* 7, 1877.—Sound very rough. Steamers generally delayed.

*December* 29, 1877, *to January* 1, 1878.—A number of minor accidents to shipping occurred.

*January* 4 *to* 6, 1878.—The schooner Granite State went to pieces during the gale.

*January* 23 *and* 24, 1878.—This was the most severe gale that has passed over this station for some time. All vessels remained in port. The revenue steamer Grant rescued a vessel in distress in Gardner's Bay.

*January* 30 *to February* 1, 1878.—The schooner Ella Haynes went ashore on Plumb Island and sank. Several lives were lost.

*February* 21 *to* 23, 1878.—This storm extended over a wide range of country. The railroads suffered considerably. The schooner J. T. Dunton went to pieces on Block Island.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 3,330 |
| Number of Forms 15 (*manifold*) issued during the year ending June 30, 1878 | 162 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 64 |
| Total | 3,556 |

## NEW ORLEANS, LOUISIANA.

[*Official number*, 28.]

| | |
|---|---|
| Latitude | 29° 58′ |
| Longitude | 90° 07′ |
| Elevation of barometer above *mean sea-level* | 55.81 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.005 |
| Mean temperature for the year ending June 30, 1878 | 69°.3 |
| Amount of rain-fall for the year ending June 30, 1878 | 73.31 inches. |

The office is located in the United States custom-house.

Sergeant Nelson Gorom was relieved for change of station November 6, 1877, and Sergeant W. U. Simons placed in charge.

One assistant was transferred to the office of the Chief Signal-Officer during the year.

The station was inspected by Lieutenant McClellan in April, 1878, who found it in good order, although the room occupied as an office is not a suitable one.

The sergeant and his assistant perform their duties well and faithfully. The location of office or position of instruments has not been changed since last report.

Extracts from the semi-annual reports of the sergeant:

The members of the Cotton Exchange take great interest in the service, and at their annual meeting, held November 28, they passed a resolution memorializing Congress to increase the appropriation of the Signal Service, to increase its efficiency. The office is frequently visited by members of this organization, who call to make inquiries as to the working of the service, and the reports bulletined in their room are eagerly watched by them, and the large weather-map consulted as regularly as are their reports of the cotton marts of the world.

Great interest is also taken in the reports of the service by the Eads Jetty Company, who are supplied with the river bulletin daily, which they telegraph down to the mouth of the river, and are guided in their operations and work on the jetties thereby; also, they are informed of all signal orders received here, which they telegraph down to their works, and cheerfully give any information that can be obtained as to results of storms or damage done by winds at the mouth of the river.

The business men of the city take great interest in the reports of the service, and at the Cotton Exchange the rise or fall of cotton is often guided and governed by the reports from the cotton districts.

Steamboat and ship owners and agents take a lively interest in the reports, especially the river changes in the river bulletins, and all are earnest in their requests that a cautionary station would be of vast importance to them if established at the mouth of the river.

Twenty cautionary signals were displayed during the year, of which number thirteen were justified and seven not justified.

Two cautionary off-shore signals were displayed; one was justified, and one justified as to direction only.

The sergeant remarks as follows in reference to some of these displays:

*September* 17 to 20, 1877.—Vessels generally remained in port during the display. A number of vessels broke from their moorings and went ashore. Damage to the amount of $35,000 was done to buildings in the city. The levee was badly washed.

*February* 6 to 8, 1878.—The steamship Texas was blown ashore inside of the bar.

*February* 19 to 21, 1878.—Several coal-barges were wrecked, involving a loss of $35,000. A coal-bark also sunk, and proved a total loss. In the city chimneys were blown down, fences demolished, and several persons injured.

*March* 7 to 10, 1878.—Considerable damage was done to the shipping and in the city. The steamboat Shannon collided with the United States monitor Canonicus and sunk. The city and suburbs were flooded by the heavy rain. The levees were badly washed.

Highest water in the river, 3 feet 6 inches below bench-mark, occurred on March 21 and May 19 and 20, 1878, and the lowest water, 14 feet 6 inches below bench-mark, on October 10 and 24, 1877.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878.. | 8,106 |
| Number of Forms 22 issued during the year ending June 30, 1878..... | 59 |
| Number of Forms 26 issued during the year ending June 30, 1878..... | 5,226 |
| Total..... | 13,391 |

## NEWPORT, RHODE ISLAND.

[*Official number*, 130.]

| | |
|---|---|
| Latitude..... | 41° 29′ |
| Longitude..... | 71° 19′ |
| Elevation of barometer above mean sea-level..... | 46.086 feet. |
| Mean barometer for the year ending June 30, 1878..... | 29.980 |
| Mean temperature for the year ending June 30, 1878..... | 51°.8 |
| Amount of rain-fall for the year ending June 30, 1878..... | 55.84 inches. |

The office is located in the custom-house.

Sergeant J. Craig remains in charge of this station, and gives satisfaction by the accuracy with which all work intrusted to him is performed.

The station has not been inspected since date of last report.

No change has been made during the past year, either in location of office or positions of instruments.

Extracts from the semi-annual reports from this station:

The citizens still continue to take a great interest in the service.

The local reports and monthly abstracts are furnished regularly to the press, and published by them.

Capt. S. C. Baily, chairman of the Meteorological Committee, still continues to give the service his warm support, and is always ready to advance its interests.

The present collector, F. A. Pratt, has made several alterations, without expense to the service, putting in a new window on the east side, which greatly improves the appearance of the office.

Sixty cautionary signals were displayed during the year, of which number seventeen were justified, and forty-three not justified. Fifteen cautionary off-shore signals were displayed during the year; six were fully justified, eight justified as to direction, and one not justified.

The sergeant remarks as follows in reference to some of these displays:

*October* 3 *to* 6, 1877.—Fifteen vessels remained in port during the display. United States schooner Joseph Henry ran ashore on Lime Rock, sustaining severe injuries. Considerable damage was done throughout the city. The rain-fall was very heavy.

*October* 8 *and* 9, 1877.—A large fleet was detained by the storm.

*November* 2 *and* 3, 1877.—Steamers were delayed and several minor casualties occurred. The tide was unusually high.

*November* 5 *and* 6, 1877.—Over one hundred vessels remained in port.

*November* 18 *and* 19, 1877.—Forty-five vessels put into the harbor, several having been slightly damaged.

*December* 5 *to* 7, 1877.—Sixty-seven vessels put into the harbor.

*January* 4 *to* 6, 1878.—One of the Old Colony steamers was damaged to the amount of $500. Schooner ashore at Narraganset Pier.

*January* 30 *to February* 1, 1878.—Heavy snow and high sea during the display. The mails via the sound were delayed twenty-four hours. Business in the city was almost suspended.

*May* 15 *and* 16, 1878.—Very high wind and heavy sea. One hundred and fifteen vessels in the harbor.

PUBLICATIONS.

| | |
|---|---|
| Number of Local Reports issued during the year ending June 30, 1878..... | 72 |
| Number of Forms 22 issued during the year ending June 30, 1878..... | 7 |
| Total..... | 79 |

## NEW RIVER INLET, NORTH CAROLINA.

[*Official number*, 138.]

| | |
|---|---|
| Latitude | 34° 30′ |
| Longitude | 77° 23′ |

The office is located in the house of Dr. Ward.

Corporal C. C. Corbin was on duty with the repair party working on sea-coast telegraph line, under Lieutenants Booth and Tingle, until February 25, 1878, when he was ordered to resume his station. There is but one man on duty at this station, and as his orders require him to make, each week, two round trips over his repair section, his time is almost entirely occupied with repair duties.

Sunset observations have been regularly taken since Corporal Corbin reopened the station.

A number of small coasting-vessels pass through the inlet, and as a rule, before going to sea, the captains visit the station to ascertain whether or not cautionary signals are flying on the coast, and govern themselves accordingly. These captains request that New River Inlet be made a cautionary signal station.

## NEW YORK, NEW YORK.

[*Official number*, 15.]

| | |
|---|---|
| Latitude | 40° 42′ 43″ |
| Longitude | 74° 0′ 3″ |
| Elevation of barometer above mean sea-level | 164 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.006 |
| Mean temperature for the year ending June 30, 1878 | 53°6 |
| Amount of rain-fall for the year ending June 30, 1878 | 42.68 inches. |

The office is located in the tower of Equitable Insurance Building, No. 120 Broadway.

Sergeant H. J. Penrod was ordered to Office of the Chief Signal-Officer, for medical treatment, and, as soon as his health was sufficiently recovered, was assigned to duty at the Chief Signal Office.

Sergeant A. Dunhauser was assigned to duty in charge of this station and gives satisfaction. Two assistants have been ordered to Fort Whipple for instruction for promotion, and two transferred to the Office of the Chief Signal-Officer during the year. The force on duty at this office consists of one sergeant, three privates of the Signal Corps, and a civilian printer as assistant.

A standard barometer has been placed in the Maritime Exchange Building, and will soon be ready for use. The sergeant or a competent assistant will be present at the Exchange, for one hour each day, to make comparisons with ship or other barometers.

The office was moved August 13th, 1877, to what is known as the "Broadway Tower of the Equitable Building."

The following extracts are made from the semi-annual reports of the sergeant:

Superintendent Smith, of the Maritime Exchange, furnishes this office a communication, of which the following is an extract: "As regards the information furnished the Maritime Association by the Signal Service Department, we consider it of vital importance to the ship-owners and captains frequenting the rooms, the figures being much sought after and the various changes always anxiously looked for, and, in fact, from the numerous applications made by the seafaring community as to the state of the weather, as reported by the Signal Service Department, it is daily being appreciated by the class of men to whom it is of such importance."

The off-shore signals, which have been instituted since the date of the last semi-annual report, have worked very satisfactorily, and have been most useful. They are

of great service to the mariners, by whom they are closely watched, especially by masters of sailing-vessels.

The widespread interest felt in this matter is shown by the fact that 2,000 circulars, relating to the off-shore signals, having been distributed by the board of marine underwriters, application for copies are made almost daily at this office.

Fifty-eight cautionary signals have been displayed during the year, of which number thirty-one were justified and twenty-seven not justified at the station.

Fifteen cautionary off-shore signals were displayed, ten being fully justified and five not justified.

The sergeant remarks as follows in reference to some of these displays:

*October* 3 *to* 5, 1877.—Considerable damage was done in and around the city. Trees were torn up, fences, roofs, and frail structures of all kinds overthrown, and cellars were flooded by the overflow of the sewers. The steamer Massachusetts was wrecked on the coast of Long Island. Numerous disasters occurred on the Hudson River. The display of the signal and the special bulletin gave ample warning of the approach of the storm, and many vessels remained in harbor in consequence.

*January* 23 *and* 24, 1878.—Both signal lanterns and halliards were broken. A number of accidents are reported in the city. The ferry-boats experienced great difficulty in making their trips. Sound steamers were late.

*January* 30 *to February* 1, 1878.—This storm was accompanied by heavy snow, blocking the streets and delaying trains. Buildings, signs, and chimneys were blown down. Eight lives were lost on Manhattan Beach.

### PUBLICATIONS.

| | |
|---|---|
| Number of Farmers' Bulletins issued during the year ending June 30, 1878 | 224,705 |
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 10,001 |
| Number of Local Reports issued during the year ending June 30, 1878 | 388 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 360 |
| Number of Forms 26 issued during the year ending June 30, 1878 | 2,548 |
| Total | 238,002 |

## NORTH PLATTE, NEBRASKA.

[*Official number*, 105.]

| | |
|---|---|
| Latitude | 41° 8′ |
| Longitude | 100° 53′ |
| Elevation of barometer above mean sea-level | 2,838 feet 2 inches. |
| Mean barometer for the year ending June 30, 1878 | 29.571 |
| Mean temperature for the year ending June 30, 1878 | 49°.8 |
| Amount of rain-fall for the year ending June 30, 1878 | 28.77 inches. |

The office is located in the court-house.

Sergeant H. U. Jones remains in charge of station, and attends satisfactorily to his duties. Lieutenant Buchanan made an inspection of the office in March, 1878, and found it in excellent condition.

The instrument-shelter, with the different thermometers and hygrometer, was moved from the cupola of the court-house on October 29, 1877, by authority of letter from Chief Signal Office, dated September 29, 1877, and placed at the northwest window of the office, where they now have a much better exposure.

Extracts from semi-annual reports:

A weekly synopsis and mean of the local observations is published each week by the Western Nebraskian.

The large increase in rain-fall, as shown by the Signal Office reports for this section during 1877, and up to date for 1878, has induced many settlers to take up "homesteads" in this county for agricultural purposes. Stock-raising has heretofore been the only use to which it has been adapted.

The interest shown by the public generally in the Signal Service reports is increasing in proportion as their object and usefulness become more thoroughly understood.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 3,015 |
| Number of Local Reports issued during the year ending June 30, 1878 | 23 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 24 |
| Total | 3,062 |

## NORFOLK, VIRGINIA.

[*Official number*, 30.]

| | |
|---|---|
| Latitude | 36° 51′ |
| Longitude | 76° 19′ |
| Elevation of barometer above mean sea-level | 54.5 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.023 |
| Mean temperature for the year ending June 30, 1878 | 60°.2 |
| Amount of rain-fall for the year ending June 30, 1878 | 66.28 inches. |

The office is located at corner of Main and Gray streets.

Sergeant W. Stein was reduced to the rank of private and relieved from duty at this station October 10, 1877, and Private D. Moore was promoted to corporal and placed in charge. Corporal Moore remained in charge until November 3, 1877, when he was relieved by Sergeant A. W. Browne and ordered to Fort Whipple for instruction for promotion. Sergeant Browne was relieved by Sergeant Onslow January 29, 1878. Two assistants have been transferred to office of the Chief Signal-Officer, one ordered to Fort Whipple for instruction, and one relieved on account of reduction of force. Private Thompson was ordered, April 2, 1878, to open a flying station on Bogue Bank, North Carolina.

The station was inspected by Lieut. James Allen, Third Cavalry, in July, 1877, and by Lieutenant McClellan in February, 1878. Lieutenant Allen found the station in satisfactory condition, and recommended Private Moore for promotion. Sergeant Browne was in charge when station was inspected by Lieutenant McClellan. The station was not in good condition.

Since March 6, 1878, the assistant has been required to sleep at the office, and as the office is supplied with an electric gong, which is connected with the telegraph line after signal hours, the man on duty can always be awakened and messages transmitted to Chief Signal Office.

Extracts from semi-annual reports from this station:

There is the same amount of public interest manifested in the Signal Service as has heretofore been reported.

Upon hoisting the storm-flag by day or the lantern by night the office is visited by masters and captains of vessels about to leave port, agents of the several lines of steamers, and others contemplating trips for business or pleasure to New York, Baltimore, or elsewhere, and the predictions of the central office are relied upon as being almost infallible. *In threatening weather, also, when no signals are displayed,* the office is consulted by captains of vessels about leaving port as to the probable weather for ensuing twenty-four hours.

The section of line from this city to north side of Lynn Haven Bay is under the supervision of the observer at this station; it has been in constant working order and is now in first-class condition. The Signal-Service line has proved of much value to masters and owners of distressed or disabled vessels in procuring speedy and efficient aid from wrecking companies here.

Forty-three cautionary signals were displayed during the year, of which number seventeen were justified and twenty-six not justified. Fifteen cautionary off-shore signals were displayed, three of which were fully justified, nine justified as to direction, and three not justified.

The sergeant remarks as follows in reference to some of these displays

*September 19 to 22, 1877.*—All vessels remained in port. Office was visited by sea captains and others.

*November 21 to 24, 1877.*—The United States Steamer Huron was lost off Kittyhawk. The steamer left Hampton Roads during the display of the signal.

*January 4 and 5, 1878.*—The Italian bark Francisco Bellagamba ran ashore near Cape Henry. Crew safe.

*January 22 to 24, 1878.*—The British bark Southern Belle ran ashore at the life-saving station No. 3. Vessel floated off again.

*January 30 and 31, 1878.*—All outward-bound vessels remained in port. Steamers from Baltimore and Washington were delayed several hours. Brig C. C. Oreston was lost near Ocracoke Inlet with all on board.

*April 4 and 5, 1878.*—The German steamer Leipzig put into Hampton Roads with a broken shaft.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 5,056 |
| Number of Local Reports issued during the year ending June 30, 1878 | 936 |
| Number of Forms 15 (manifold) issued during the year ending June 30, 1878 | 3,372 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 36 |
| Total | 9,400 |

## OLYMPIA, WASHINGTON TERRITORY.

[*Official number*, 148.]

| | |
|---|---|
| Latitude | 47° 2′ |
| Longitude | 122° 56′ |
| Elevation of barometer above mean sea-level | 36 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.963 |
| Mean temperature for the year ending June 30, 1878 | 51°.3 |
| Amount of rain-fall during the year ending June 30, 1878 | 81.86 inches. |

Office located in Grangers Building, corner Main and Fifth streets.

Sergeant E. F. Kubel has been in charge since the establishment of the station, and gives satisfaction. The station has not as yet been inspected.

Observations were begun on July 1, 1877, and mail reports on July 19, 1877, the first telegraphic report being transmitted on July 13, 1877. Since then reports have been forwarded regularly, those by telegraph being repeatedly delayed by the frequent interruptions to telegraphic communication. Olympia being on a loop fifteen miles from the main line, the wires, passing through dense timber, are frequently prostrated by falling trees.

No changes have been made in the location of the office or instruments, except that the telescopic rod for anemometer furnished the station was placed in position December 5, 1877, increasing the elevation of the anemometer above ground to 53 feet 3 inches.

Reports from Portland and Roseburg, Oreg., Red Bluff and Sacramento, Cal., are received at this station, and sunset reports from Victoria, New Westminster, and Lytton, British Columbia, have been received for transmission.

Frequent interruptions have occurred in the receipt of these reports, owing to troubles on telegraph lines running north.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 3,410 |
| Number of Local Reports issued during the year ending June 30, 1878 | 54 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 21 |
| Total | 3,485 |

## OMAHA, NEBRASKA.

[*Official number*, 67.]

| | |
|---|---|
| Latitude | 41° 16′ |
| Longitude | 96° 0′ |
| Elevation of barometer above mean sea-level | 1,054.59 feet. |
| Mean barometer for the year ending June 30, 1878 | *29.879 |
| Mean temperature for the year ending June 30, 1878 | *53°.2 |
| Amount of rain-fall for the year ending June 30, 1878 | 38.08 inches. |

The office is located in room 23, Helman's Building, corner Thirteenth and Farnam streets.

Sergeant F. P. Bayes was in charge of the Omaha office until August 22, 1877, when he was relieved for drunkenness and replaced by Sergeant C. Dill.

The station was inspected by Lieutenant Buchanan in March, 1878, and found in fair condition.

The location of office and position of instruments remain unchanged since last report.

Extracts from the semi-annual report of the sergeant:

The daily papers publish regularly extracts from the forenoon and afternoon bulletins, and the public generally manifest a decided interest in them.

The daily river report, made and bulletined in connection with the afternoon meteorological report, is of special interest, and tends to make the afternoon bulletin more generally scrutinized than the forenoon bulletin. The office has been frequently visited by parties seeking meteorological data, and in each instance I have been able to give the desired information.

Navigation opened on February 19, 1878.

Highest water in the river, 17 feet 10 inches, occurred June 25, 1878, and lowest water, 5 feet 2 inches, on December 18, 19, 22, 1877, and January 4, 1878.

### PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (*manifold*) issued during the year ending June 30, 1878 | 5,358 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 60 |
| Total | 5,418 |

## OSWEGO, NEW YORK.

[*Official number*, 31.]

| | |
|---|---|
| Latitude | 43° 28′ 32″ |
| Longitude | 76° 35′ 5″ |
| Elevation of barometer above mean sea-level | 299 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.978 |
| Mean temperature for the year ending June 30, 1878 | 51°.1 |
| Amount of rain-fall for the year ending June 30, 1878 | 41.24 inches. |

The office is located in Grant Block.

Sergeant J. O. Barnes relieved Sergeant Lewis in charge of station, December 8, 1877.

The station was inspected by Lieutenant Buchanan in June, 1878, and it was found in excellent order.

No changes have been made in office or positions of instruments during the year.

On March 9, 1878, the tug Horton arrived from Cape Vincent, being the first arrival of the season.

Twenty-six cautionary signals were ordered for Oswego during the year, of which number seven were justified and nineteen not justified.

* One observation missed in August, 1877.

The sergeant remarks as follows in reference to some of these displays:

*October* 3 *to* 5, 1877.—Twelve vessels remained in port while the signal was flying. Very high wind reported on the lake.

*November* 2 *and* 3, 1877.—No vessels left during the display. Three schooners arrived in a damaged condition.

*November* 17 *and* 18, 1877.—One propeller left during the display, but was obliged to return. Heavy sea reported.

*December* 4 *to* 7, 1877.—Schooner Wayne sunk at the entrance to the harbor.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 5,157 |
| Number of Local Reports issued during the year ending June 30, 1878 | 632 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 48 |
| Total | 5,837 |

## PEMBINA, DAKOTA TERRITORY.

[*Official number*, 86.]

| | |
|---|---|
| Latitude | 49° 0′ |
| Longitude | 97° 5′ |
| Elevation of barometer above mean sea-level | 790 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.925 |
| Mean temperature for the year ending June 30, 1878 | 42°.6 |
| Amount of rain-fall for the year ending June 30, 1878 | 22.47 inches. |

The office is located on lot 5, block 5.

Sergeant J. Kabernagle remained in charge until May 8, 1878, when he was relieved by Sergeant J. Cassidy, and ordered to Fort Whipple for discharge and re-enlistment. The station was not inspected during the year.

No change has been made in the location of the office or instruments.

Reports from other stations have not been received, nor have any reports been bulletined or published at this station.

The Red River of the North was frozen over on November 5, 1877.

Sergeant J. Kabernagle reported that the Red River Transportation Company's steamer Manitoba arrived on March 22, 1878, being the first arrival of the season, though navigation was virtually opened on the 18th.

## PIKE'S PEAK, COLORADO.

[*Official number*, 99.]

| | |
|---|---|
| Latitude | 38° 48′ |
| Longitude | 104° 59′ |
| Elevation of barometer above mean sea-level | 14,150.68 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.946 |
| Mean temperature for the year ending June 30, 1878 | 18°.0 |
| Amount of rain-fall for the year ending June 30, 1878 | 28.45 inches. |

The office is located in a stone house on the summit of Pike's Peak.

Sergeant William Black was placed in charge of the station at Pike's Peak, and also the supply station at Colorado Springs, August 28, 1877, relieving Sergeant Hobbs, who was ordered to Fort D. A. Russell for discharge, his term of service having expired. Private Greenwell was relieved for neglect of duty, and Private Choate ordered here as assistant. No change has been made in the positions of the instruments. The station was inspected by Lieutenant Buchanan in April, 1878, and was found in a very bad and uncomfortable condition.

No reports have been received by telegraph from other stations, and the only ones sent have been sunset predictions, which have been for-

warded quite regularly, considering the condition of the line and the snow over and through which it passes.

## PHILADELPHIA, PENNSYLVANIA.

*[Official number, 17.]*

| | |
|---|---|
| Latitude | 39° 57′ |
| Longitude | 75° 10′ |
| Elevation of barometer above mean sea-level | 46.9 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.006 |
| Mean temperature for the year ending June 30, 1878 | 55°.5 |
| Amount of rain-fall for the year ending June 30, 1878 | 39.39 inches. |

Office located in Chamber of Commerce building, No. 133 South Second street.

Sergeant F. M. M. Beal remains in charge of station and is prompt, energetic, and capable.

Two assistants have been ordered to Fort Whipple as candidates for promotion, and one transferred to the office of the Chief Signal-Officer for duty.

Lieut. James Allen inspected the station in January, 1878, and found it in good condition.

A civilian printer is employed to print the Farmers' Bulletin. Eight hundred and fifteen post-offices and twelve persons have been regularly supplied with the bulletins from this station.

There has been no change in the location of the office since the last report, nor in the positions of the instruments.

The use of the room for office purposes is given free of charge by the Commercial Exchange Association, and is suitable for the proper performance of the duties.

The board of health publishes a full weekly report of local observations.

The following extracts are made from the semi-annual reports of the sergeant:

The kindness of the Chief Signal Office in keeping this station posted in reference to the Huron disaster was highly appreciated by the friends here of those connected with that vessel.

On account of the desire of shippers here to know when cautionary signals are ordered for Cape May, a cautionary-signal indicator is displayed in the Maritime Exchange in connection with orders to that station.

The fourteen steamers of the Reading Railway, engaged in carrying coal to coastwise cities, have been furnished with a steam-signal code, which they are required to use in passing the Signal Service station at Cape May, N. J., which station being acquainted with the code, report these vessels passing to this office via office Chief Signal-Officer, and are forwarded to the Reading Railroad authorities through the Maritime Exchange. This action on the part of the Signal Service is very highly appreciated by the company, as it assists them in anticipating the arrival of these vessels and prepare cargoes for them accordingly.

The 10.30 a. m. indications are furnished the Philadelphia Local Telegraph Company, which are sent over their different lines in the city and are recorded on the numerous instruments located in offices and residences in all parts of the city; also to the Philadelphia, Reading and Pottsville Telegraph Company, which send them to several daily papers in the interior of the State.

March 18, 1878.—The Delaware and Raritan Canal opened to-day.

The canal at Harrisburg opened March 19, 1878.

### PUBLICATIONS.

| | |
|---|---|
| Number of Farmers' Bulletins issued during the year ending June 30, 1878 | 262,418 |
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 5,844 |
| Number of Local Reports issued during the year ending June 30, 1878 | 2,868 |
| Number of Forms 15 (manifold) issued during the year ending June 30, 1878 | 5,625 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 362 |
| Total | 277,117 |

## PIOCHE, NEVADA.

[*Official number*, 140.]

| | |
|---|---|
| Latitude | 37° 57′ |
| Longitude | 114° 26′ |
| Elevation of barometer above mean sea-level | 5,778.61 feet. |
| Mean barometer for the year ending June 30, 1878 | *29.787 |
| Mean temperature for the year ending June 30, 1878 | *48°.5 |
| Amount of rain-fall for the year ending June 30, 1878 | *7.25 inches. |

The office is located on east side of McCannon street.

Corporal H. Hall continued in charge during the year. On June 25, 1878, orders were issued directing Private J. J. Fitzgerald to take charge of station, and directing Corporal Hall to report at Fort Whipple, Va., for change of station.

No change has been made in the location of office or position of instruments.

Very little interest is manifested in the service at this place. No inspector has visited the station since it was opened.

## PITTSBURGH, PENNSYLVANIA.

[*Official number*, 41.]

| | |
|---|---|
| Latitude | 40° 32′ |
| Longitude | 80° 2′ |
| Elevation of barometer above mean sea-level | 776.98 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.956 |
| Mean temperature for the year ending June 30, 1878 | 54°.7 |
| Amount of rain-fall for the year ending June 30, 1878 | 32.53 inches. |

The office is located in room 18, third floor, First National Bank building, corner Fifth avenue and Wood street.

Sergeant George W. Hay continues in charge, and is energetic and efficient. Two assistants, Privates J. B. Chapman and C. P. Rowley, were discharged the service during the year for misconduct. The present force consists of the sergeant and one private of the Signal Corps and a civilian printer as assistants.

The station was inspected in January, 1878, by Lieutenant Buchanan, and was found in good condition.

Three hundred and seventeen post-offices and sixteen persons have been furnished with the Farmers' Bulletin from this printing-office.

The location of the office and position of instruments remain unchanged.

The newspapers of the city continue to devote a liberal amount of space to the weather reports. The classes of citizens deriving the greatest amount of benefit from the reports are rivermen and farmers.

Highest water in the river, 18 feet 2 inches, occurred on November 25, 1877, and lowest water, 0 foot 7 inches below bench-mark, on October 2 and 3, 1877.

### PUBLICATIONS.

| | |
|---|---|
| Number of Farmers' Bulletins issued during the year ending June 30, 1878 | 104,315 |
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 6,086 |
| Number of Local Reports issued during the year ending June 30, 1878 | 624 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 183 |
| Number of Forms 26 issued during the year ending June 30, 1878 | 1,820 |
| Total | 113,028 |

* Eleven months only. Observations began July 28, 1877.

## PORT HURON, MICHIGAN.

[*Official number*, 103.]

| | |
|---|---|
| Latitude | 42° 58′ |
| Longitude | 82° 29′ |
| Elevation of barometer above mean sea-level | 630 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.936 |
| Mean temperature for the year ending June 30, 1878 | 49°.3 |
| Amount of rain-fall for the year ending June 30, 1878 | 31.20 inches. |

The office is located in the city-hall.

Sergeant J. E. Mayhew was discharged, re-enlisted, and reassigned to this station February 5, 1878.

One assistant was discharged for misconduct, and two were transferred to duty at office of the Chief Signal Officer.

The office was inspected by Lieut. James A. Buchanan in February, 1878, who reported it in excellent condition.

Kerosene has been substituted for lard oil in the signal-lantern with very good results. The cautionary signal can be seen from all parts of the harbor.

Sergeant Mayhew reports that a strong interest is taken in the service by the steamboat companies and mariners.

The location of the office and position of instruments have remained unchanged since the last report.

Sergeant J. E. Mayhew on leave of absence from February 12 to 23, 1878.

Lake navigation opened on March 24, 1878, the steamer Evening Star making first trip from port.

Of thirty cautionary signals which were displayed at this station, nine were reported justified and twenty-one not justified.

The sergeant remarks as follows in reference to some of these displays:

*August* 23, 1877.—The schooner Valentine, which left during the display, was badly injured, having encountered a severe storm a *short distance from* the station.

*October* 8 *and* 9, 1877.—Several vessels that left during the display were towed back, badly injured by encountering a severe storm.

*March* 23 *to* 25, 1878.—The schooners Athenian and Crawford were damaged during the gale.

*April* 24 *and* 25, 1878.—*Two schooners* were driven into port from Lake Huron.

### PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 1,964 |
| Number of Local Reports issued during the year ending June 30, 1878 | 312 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 29 |
| Total | 2,305 |

## PORTLAND, MAINE.

[*Official number*, 12.]

| | |
|---|---|
| Latitude | 43° 40′ |
| Longitude | 70° 16′ |
| Elevation of barometer above mean sea-level | 45.45 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.952 |
| Mean temperature for the year ending June 30, 1878 | 49°.3 |
| Amount of rain-fall for the year ending June 30, 1878 | 45.61 inches. |

The office is located in the custom-house on Fore street.

No change has been made in the force on duty, nor has any change been made in the location of office or position of instruments.

The work of the station has been satisfactorily performed. The station was not inspected during the year.

The interest in the service continues the same as at former reports. Various conflicting opinions are expressed in regard to the value of the display of "cautionary off-shore signals" at this port. The matter was thoroughly discussed by the meteorological committee of the Board of Trade, and the report made by them to the board was a favorable one.

Extracts from the semi-annual reports of the sergeant:

The small percentage of verifications on the display of cautionary signals is due to the fact that the storm may not be felt in the immediate vicinity of Casco Bay, and still be quite severe forty or fifty miles off the coast; this has been the case several times when the signal was reported as not justified in immediate vicinity. The displays of signals are generally heeded by mariners at this port, except through the summer months.

The observer has been called frequently, during the term of court, to give testimony in regard to the weather at different periods, extending as far back as 1871. Many of the cases on trial have turned on the evidence given by the observer, and large sums of money saved from being illegally paid.

Fifty-two cautionary signals were displayed during the year, of which number twenty-one were justified and thirty-one not justified.

Fourteen cautionary off-shore signals were displayed, of which number six were justified, five as to direction, and three not justified.

The sergeant remarks as follows in reference to some of the displays:

*October* 4 *to* 6, 1877.—All vessels remained in port. A few minor casualties occurred.

*November* 5 *and* 6, 1877.—Very heavy sea outside. Steamers were generally delayed; signal-lantern was kept lit with great difficulty.

*January* 4 *to* 6, 1878.—Brisk winds prevailed during the display. Heavy snow fell.

*January* 10 *to* 12, 1878.—*Harbor very rough. Several minor casualties.*

*January* 30 *to February* 2, 1878.—A severe gale prevailed along the coast. Mails were generally delayed.

*March* 27 *to* 30, 1878.—A small boat with two men was swamped near Long Island; one man drowned.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 3,172 |
| Number of Forms 15 (manifold) issued during the year ending June 30, 1878 | 2,028 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 84 |
| Total | 5,284 |

## PORTLAND, OREGON.

[*Official number*, 74.]

| | |
|---|---|
| Latitude | 45° 30′ |
| Longitude | 122° 27′ 30″ |
| Elevation of barometer above mean sea-level | 96 feet 10 inches. |
| Mean barometer for the year ending June 30, 1878 | 30.036 |
| Mean temperature for the year ending June 30, 1878 | 54°.6 |
| Amount of rain-fall during the year ending June 30, 1878 | 59.16 inches. |

The office is located on First, between Ash and Pine streets.

Orders were issued June 10, 1878, transferring Sergeant E. Lloyd to Visalia, Cal., and directing Corporal Hermann to take charge of this station.

Sergeant Lloyd had given satisfaction and was relieved on account of ill health. There is one assistant on duty at this station.

No inspection has been made since date of last report.

This office was moved on January 1, 1878, into the bank building of the Oregon and Washington Trust Company, situated on First, between Ash and Pine streets, one block from the telegraph-office.

On August 18, 1877, five stations, Olympia, Roseburg, Red Bluff,

Sacramento, and San Francisco, commenced reporting here, the reports of which stations are bulletined twice a day and posted in the most prominent locations in the city. The reports are also published daily by four daily newspapers.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 4,284 |
| Number of Local Reports issued during the year ending June 30, 1878 | 447 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 70 |
| Total | 4,801 |

## PORTSMOUTH, NORTH CAROLINA.

[*Official number*, 137.]

| | |
|---|---|
| Latitude | 53° 2′ |
| Longitude | 76° 4′ |

Has no barometer.

The office is located in the United States marine hospital.

Private W. Daly relieved Private R. F. Straine December, 6, 1877, and continues in charge of station, giving satisfaction by his attention to duty. He has an assistant, and the line on this repair section has been thoroughly patrolled and kept in order. Much temporary trouble has been caused by the reopening of Whalebone Inlet, the poles near it being frequently washed out. This inlet has now filled up. The same meteorological observations have been taken as during the preceding year. The observations have been regularly taken since an assistant was sent to station, April 23, 1878, and forwarded by mail.

No change in the location of office or instruments was made during the past six months.

The station was established mainly as a repair station, and is very necessary as such, in consequence of the extremely low beach from Hatteras to Whalebone Inlet.

The cable at Ocracoke Inlet is in charge of this station, and requires much care in stormy weather, in consequence of the shifting of the points of beach.

The cable at Ocracoke Inlet was washed from its fastenings during the severe storm of January 30 and 31. As it was well secured to buoys in anticipation of trouble, it was easily found and secured. Sergeant Robinson arrived and took charge of repairs February 2; he spliced six hundred and eleven yards to north end, removed the boxing from south end, and attached the ends of cable to the box-poles by means of chains provided for the purpose. Since then this cable has caused no trouble whatever, and is now in good condition.

February 19 to 21, sixty-three iron poles were put up at Whalebone Inlet under the supervision of Sergeant Robinson. They have been found very useful, as, owing to the strong currents and constant changing of the beach, wooden poles could not have been kept up; some even of these heavy iron poles were washed out, but only in cases where the beach was cut to a depth of from four to six feet.

The only other point on this section where much trouble was found is known as "The Wells." Iron poles will be placed here as soon as they can be obtained.

The following extracts are made from the semi-annual reports from this station:

The British bark Henry Pelham, of Cork, Ireland, came ashore within one mile of Ocracoke Inlet in the southeast gale of February 21 and 22. The disaster was reported

over the coast telegraph line with all possible dispatch. Assistance was promptly rendered from Norfolk, Va. The British consul at Norfolk, Va., took charge of the crew. In this case the captain stated that were it not for the aid rendered from this office his vessel would have been a total loss. She was successfully floated March 22, and towed to Norfolk, Va.

The steamer Acadia, of Boston, put in here May 13, 1878, short of coal. Telegrams were sent to Newbern and Norfolk, asking assistance, which was rendered from the latter place, and the steamer proceeded on her voyage all well.

## PUNTA RASSA, FLORIDA.

[*Official number*, 59.]

| | |
|---|---|
| Latitude | 26° 36′ |
| Longitude | 82° 10′ |
| Elevation of barometer above mean sea-level | 17 feet. |
| Mean barometer for the year ending June 30, 1878 | *30.027 |
| Mean temperature for the year ending June 30, 1878 | *74°.2 |
| Amount of rain-fall for the year ending June 30, 1878 | 54.54 inches. |

The office is located in a small building erected for the observer.

Sergeant McFarland was arrested by the United States marshal on charge of smuggling, and sent to Key West for trial. He was acquitted by the court, and was then transferred to Lynchburg, Va., for duty.

Mr. Fleming, a citizen, took charge of the station from November 6 until arrival of Private Roby, December 4, 1877.

Private C. W. Roby was ordered to this station, but upon his arrival pronounced himself incompetent to perform the duties required of him. He was either incompetent or willfully neglected his duties, and, January 29, orders were issued for his discharge from the service. Sergeant A. W. Browne was then placed in charge, and has given satisfaction. Upon his arrival he found the records of the office incomplete, and has thus had much additional labor placed upon him to complete these records to date.

The station was inspected by Lieutenant McClellan in April, 1878, and found in good order.

## RED BLUFF, CALIFORNIA.

[*Official number*, 143.]

| | |
|---|---|
| Latitude | 40° 10′ |
| Longitude | 122° 16′ |
| Elevation of barometer above mean sea-level | 337.64 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.931 |
| Mean temperature for the year ending June 30, 1878 | 63°.9 |
| Amount of rain-fall for the year ending June 30, 1878 | 53.17 inches. |

The office is located on the third floor of Crandall's Building, on Main street.

Sergeant R. R. Rodgers continues in charge of this station, and renders all reports in a prompt and satisfactory manner. The station has not been inspected since its establishment.

The regular series of observations were commenced the morning of July 1, 1877, and regular reports have been transmitted to the Chief Signal Office, Washington, D. C., via the Western Union Telegraph Company, up to this date.

Regular reports have been received thrice daily from three stations, viz: Portland, Oreg., Olympia, Wash., Roseburg, Oreg.; these reports have been issued for public information by means of the daily bulletin, and have been of the greatest interest to the citizens of Red Bluff, Cal.,

* One observation missed in September and three in November, 1877.

so much so that after frequent requests on the part of the merchants and business men of the town, reports from Sacramento, Cal., have been received three times daily since December 15, 1877.

Extracts from the semi-annual reports of Sergeant Rodgers:

Stock owners and wood merchants have frequently informed me that the reports issued daily here have been of the greatest value to them.

The two local papers being weeklies, the day's observations previous to the issue, together with such notes for the week as may be of importance, have been furnished and have been published.

Seven of the most prominent places are provided with bulletin-boards (for manifold bulletins), on which bulletins are regularly posted.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (*manifold*) issued during the year ending June 30, 1878 | 6,246 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 44 |
| Total | 6,290 |

## ROCHESTER, NEW YORK.

[*Official number*, 32.]

| | |
|---|---|
| Latitude | 43° 8 |
| Longitude | 77° 51′ |
| Elevation of barometer above mean sea-level | 584.1 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.946 |
| Mean temperature for the year ending June 30, 1878 | 50°.5 |
| Amount of rain-fall for the year ending June 30, 1878 | 45.41 inches. |

The office is located in room 212 Powers block.

Sergeant E. B. Garriott continues in charge, with Private J. E. Miller as assistant. One assistant was transferred to office of Chief Signal Officer during the year. The telegraphic and local reports have been promptly rendered. The office has not been inspected since date of last report.

Sergeant Garriott was absent from station on leave from May 16 to May 31, 1878.

Navigation closed at Charlotte, the port of Rochester, on the 21st of November, no boats leaving after that date.

The first cautionary signal of the season was displayed on the 16th of March, although navigation did not open at Charlotte until the 4th day of April.

Extracts from the semi-annual reports of the sergeant:

The good will of the press and their disposition to forward the interest of the service by giving so much space to publications of reports is very encouraging. No heartier support could be wished for than is given the service by the press of this city.

The reports and indications received, posted, and published at this place are consulted and studied by all classes, and, as the public are becoming more and more convinced of their accuracy and reliability, the demand for them continues to increase. The records of this office are often consulted by lawyers in connection with lawsuits, and the data obtained is always taken as conclusive.

Referring to the displays which were not justified at this place, I would state that in a generality of cases high winds were reported on the lakes while they were displayed here. No disasters were reported as having been caused by storm for which no signals were ordered. The signals are of considerable benefit to builders, roofers, contractors, &c., as heavy winds will sometimes do serious damage to unfinished buildings and unroofed houses.

Twenty-six cautionary signals were displayed during the year, of which number ten were reported justified and sixteen were not justified.

The sergeant remarks as follows in reference to some of these displays:

*September* 6, 1877.—Rough weather reported on the lake.
*October* 3 *to* 5, 1877.—The yacht Ida capsized; no lives were lost.
*November* 2 *to* 3, 1877.—Several minor casualties are reported.
*November* 5 *and* 6, 1877.—The schooner Delos de Wolfe went ashore near Charlotte and became a total wreck.
*May* 19 *to* 21, 1878.—Much damage was done to the wheat crop by the hail accompanying the storm. One man was killed by lightning.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878.. | 4,329 |
| Number of Local Reports issued during the year ending June 30, 1878..... | 1,039 |
| Number of Forms 15 (manifold) issued during the year ending June 30, 1878 .. | 238 |
| Number of Forms 22 issued during the year ending June 30, 1878 ..... | 94 |
| Total ..... | 5,700 |

## ROSEBURG, OREGON.

[*Official number*, 146.]

| | |
|---|---|
| Latitude ..... | 43° 10′ |
| Longitude ..... | 123° 16′ |
| Elevation of barometer above mean sea-level ..... | 536.98 feet |
| Mean barometer for the year ending June 30, 1878 ..... | *30.018 |
| Mean temperature for the year ending June 30, 1878 ..... | *52°.8 |
| Amount of rain-fall for the year ending June 30, 1878 ..... | *43.29 inches |

The office is located on the east side of Jackson street, between Oak and Washington streets.

Sergeant J. Dascomb arrived to open station on the 18th of June, 1877, and at once secured the room now occupied as an office, but owing to the fact that it was in an unfinished condition, did not take possession until the 12th of the following month. In compliance with telegraphic instructions received by him July 15, Sergeant Dascomb commenced sending partial reports on that date. The office stores arrived on the 15th of August, after which full reports were sent.

Regular tri-daily reports are received from Portland, Oreg., and Olympia, Wash.; these, together with reports taken here at same time, are bulletined and posted in stage office. Weekly means and amount of rain-fall are furnished to the weekly paper (Western Star) and are published for the benefit of its readers.

Extracts from semi-annual reports of the sergeant:

Judge Mosher requested, on behalf of the farmers, that this office would furnish a daily mean report for weeks ending Wednesday, to be published in the Western Star newspaper. The report is furnished and published regularly.

Persons understanding the service speak of it in the highest terms of praise; in fact all classes take a deep interest in it, and are anxious to learn all about it.

The station has not been inspected since it was opened.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878.... | 1,489 |
| Number of Forms 22 issued during the year ending June 30, 1878 ..... | 20 |
| Total ..... | 1,509 |

*Eleven months only; observations began July 15, 1877.

## SACRAMENTO, CALIFORNIA.

[*Official number*, 144.]

| | |
|---|---|
| Latitude | 38° 35′ |
| Longitude | 121° 31′ |
| Elevation of barometer above mean sea-level | 76.33 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.950 |
| Mean temperature for the year ending June 30, 1878 | 61°.8 |
| Amount of rain-fall for the year ending June 30, 1878 | 24.86 inches. |

The office is located in the northwest corner of St. George Building, Fourth street.

This station was opened with the morning telegraphic report of the first of July, 1877, since which time observations have been taken uninterruptedly.

The two daily newspapers of the city have regularly published local observations and, for some time, the reports from other stations.

Sergeant R. B. Watkins continues in charge and gives satisfaction.

Extracts from the semi-annual reports of the sergeant:

I have, since November 27, 1877, taken daily, at 2.45 p. m., local time, an observation of the fluctuations of the Sacramento River by the river-gauge of 1849, whose low-water mark, or zero, is the lowest point to which the river fell in 1849.

The most important event of the half year was the flood, caused by the breaking of the levee, in the early morning of February 5, full accounts of which, accompanied by extracts from local newspapers, were, from time to time, promptly sent to the central office. On account of the river remaining so long out of its banks, cellars and the grounds generally in the city became so saturated that there has been an unusual amount of sickness, chiefly typhoid fever and chills and fever.

The rainy season for 1877 and 1878 began October 21, 1877, and ended May 31, 1878, total amount of rain-fall being 24.87; the normal amount is said to be 18 inches. It is said the amount before January 1, 1878, is generally the same as afterward, but the past season showed a vast discrepancy—3.24 inches and 21.63 inches respectively.

An earthquake, shock quite lively, on May 8.

A light hail on January 22d. A little ice in January, and frost in January and March. Fog in January and February.

Almond and peach trees were in bloom early in February, also some flowers. Roses were blooming in the open air all the winter. Willow and other trees were beginning to leaf in February. Grass green the whole year.

### PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 2,769 |
| Number of Local Reports issued during the year ending June 30, 1878 | 737 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 32 |
| Total | 3,538 |

## SALT LAKE CITY, UTAH TERRITORY.

[*Official number*, 70.]

| | |
|---|---|
| Latitude | 41° 10′ |
| Longitude | 112° 00′ |
| Elevation of barometer above mean sea-level | 4,362.25 feet. |
| Mean barometer for the year ending June 30, 1878 | *29.950 |
| Mean temperature for the year ending June 30, 1878 | *52°.6 |
| Amount of rain-fall for the year ending June 30, 1878 | 18.32 inches. |

The office is located in Wasatch Hotel, corner of Main and South Second streets.

Sergeant W. McGillivray continues in charge. He was discharged and re-enlisted at Camp Douglas, Utah, promoted a sergeant and reassigned to station August 21, 1877.

*One observation missed in September, 1877.

Lieut. James A. Buchanan, *acting signal officer*, inspected the station in March, 1878. He reported it in fair condition.

Since the date of last report no changes have been made in the location of the office, or in position of the instruments.

Sergeant McGillivray reports that citizens of Salt Lake City manifest no interest whatever in the reports from other stations. Local data, so far as it relates to precipitation, moisture, and temperature, is frequently asked for, both by individuals and for publication.

Extracts from the semi-annual reports from the station:

The surveying parties of Major Powell and Lieutenant Wheeler compare their barometers with the office standard.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 2,573 |
| Number of Local Reports issued during the year ending June 30, 1878 | 591 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 75 |
| Total | 3,239 |

## SAN DIEGO, CALIFORNIA.

[*Official number*, 75.]

| | |
|---|---|
| Latitude | 32° 44′ 41″ |
| Longitude | 117° 8′ 0″ |
| Elevation of barometer above mean sea-level | 67.1 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.993 |
| Mean temperature for the year ending June 30, 1878 | 61°.3 |
| Amount of rain-fall for the year ending June 30, 1878 | 16.10 inches. |

The office is located in room No. 4, in building corner of D and Fifth streets.

Sergeant M. M. Sickler continued in charge until March 7, 1878, at which time the station was placed under the immediate charge of the officer in charge of the military telegraph line, Lieutenant Booth, acting signal officer. Sergeant Sickler is still the observer, and has given satisfaction in every respect.

The San Diego Union and San Diego News commenced August 23 and 27 publishing a press report, comprising reports from stations in California and Arizona. The same papers have continued the publication of daily local reports and Form 22.

The station has not been inspected during the year by an officer of the Signal Corps.

By order of the Chief Signal Officer the office was moved from Horton's Bank block to the building corner Fifth and D streets on April 24, 1878. This removal changed the elevation of barometer from 66 to 67.1 feet above sea-level, and the thermometer from 23 to 19.6 feet, rain-gauge from 42 to 31 feet, anemometer from 60 to 49 feet, and wind-vane from 61 to 53 feet above the ground.

There has been no change in the working force or the number of reports received.

The following extracts are made from the semi-annual reports of Sergeant Sickler:

On January 13, 1878, I commenced the issue of daily bulletins, which are posted regularly in telegraph office and furnished the local press for publication.

The office has been inspected at various times by members of meteorological committee, and this part of their duty seems to be conscientiously performed.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 1,152 |
| Number of Local Reports issued during the year ending June 30, 1878 | 873 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 24 |
| Total | 2,049 |

## SANDUSKY, OHIO.

[*Official number*, 184.]

| | |
|---|---|
| Latitude | 41° 27′ |
| Longitude | 82° 43′ |
| Elevation of barometer above mean sea-level | 638.5 feet. |
| Mean barometer for the year ending June 30, 1878 | *29.973 |
| Mean temperature for the year ending June 30, 1878 | *51°.9. |
| Amount of rain-fall for the year ending June 30, 1878 | *36.01 inches. |

The office is located in the West House, the largest hotel in the city, on the corner of Water street and Columbus avenue, the two principal streets, contiguous to the Western Union Telegraph office, with the Atlantic and Pacific Telegraph office in the same building, and within a block of the post-office. The office-room is on the fifth floor, and is of easy access. The office has two windows facing nearly north, from one of which the instrument-shelter, of the standard pattern, is built.

Sergeant McComas opened this station and remained in charge until February 7, 1878, when he was reduced to the rank of a private soldier and ordered to Fort Whipple for discharge. Sergeant C. R. Daw was then placed in charge, but failed and neglected to render certain reports called for from Office of the Chief Signal Officer, and was for this cause reduced to the rank of private. Notwithstanding this punishment, Private Daw still neglected to comply with orders, and Sergeant W. A. Massey was assigned to the station June 11, 1878. Private Daw has since been discharged the service.

The station was inspected by Lieutenant Buchanan in February, 1878, and was found in excellent condition.

The sergeant reports that the cautionary signal, when displayed from the dome, can be plainly seen from every portion of the harbor.

The first observation was taken at 7 a. m. of August 2, 1877, and the first telegraphic report was sent on the morning of the same date.

There has been no change in the location of office or instruments since the opening of the station.

Extracts from the semi-annual reports from the station:

The last sailing-vessels to leave here were the barges H. S. Wolbridge, J. T. Johnson, and C. N. Ryan, in tow of steam-barge Ohio, to Huron Light, and the last arrival was the steam-barge Ohio, from Huron, on the same date, December 21, 1877.

With regard to the display of cautionary signals, I would state that in nearly every instance since the opening of this station the display has been beneficial, and in a great many instances largely so.

The interest taken in the service at this station is very great, and the service seems to be fully appreciated by all classes; in fact the reports are sought and eagerly examined not only by the mariner and the vessel owner and those interested in commerce, but by the fishermen and the dealers in fish (the fish interest here being very large).

On January 5, 1878, the bay was closed with ice. The Golden Eagle came to entrance of bay, but was forced to return to the islands, on account of the blockade.

Navigation opened on March 6, 1878, when the steamer Golden Eagle arrived from Put-in-Bay, with freight, being the first boat of the season.

On March 9, 1878, the Red Jacket cleared for Marblehead, and steamboat H. Bell commenced running to points in the bay.

On March 11, 1878, the steamer R. B. Hayes commenced her regular trips to points in the bay.

*Mean of 10 months and 30 days only.

Thirty-three cautionary signals were displayed during the year, of which number twenty-seven were justified and six not justified.

The sergeant remarks as follows in reference to some of these displays:

*August* 23, 1877.—Rough weather and heavy sea reported on the lake.

*September* 6, 1877.—No sailing-vessels left during the display. Steamers Gazelle and Ferris omitted their regular trips.

*October* 2 *to* 5, 1877.—Steamer Ferris remained in port. The propeller Gazelle had a rough passage.

*October* 7 *to* 9, 1877.—No vessels left during the display.

*October* 19 *to* 22, 1877.—No sailing-vessels left during the display. The yacht John Bender, jr., went to pieces east of Cedar Point light-house. The crew were saved. The scow Clippers Vision was water-logged.

*October* 26 *to* 27, 1877.—Lake very rough.

*April* 22, 1878.—A squall, accompanied by thunder and heavy rain, occurred during the display.

*April* 24 *and* 25, 1878.—A severe squall blowing down telegraph wires.

*June* 7 *to* 9, 1878.—Lake very rough. Steamers were delayed.

### PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 5,412 |
| Number of Local Reports issued during the year ending June 30, 1878 | 320 |
| Number of Forms 15 (manifold) issued during the year ending June 30, 1878 | 2,282 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 40 |
| Total | 8,054 |

## SANDY HOOK, NEW JERSEY.

[*Official number*, 112.]

| | |
|---|---|
| Latitude | 40° 28′ |
| Longitude | 74° 1′ |
| Elevation of barometer above mean sea-level | 29.25 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.000 |
| Mean temperature for the year ending June 30, 1878 | 54°.4 |
| Amount of rain-fall for the year ending June 30, 1878 | 54.86 inches. |

The office is located at the northeast point of Sandy Hook, between the east beacon light and the ordnance building.

Private P. J. Huneke, who was in charge at date of last report, was promoted to corporal October 1, 1877, and to sergeant May 6, 1878, for attention to duty, and remains in charge of the station. Private Goss was relieved, on account of sickness, August 7, 1877, and replaced by Private R. Chapman, jr., who has been prompt and attentive.

The office at this point, which was located, at the date of last report, in the office building of the Engineer Department, was moved, on the 5th and 6th of April, 1878, to the building of the Atlantic and Pacific Telegraph Company, situated on the beach on the northeast point of Sandy Hook, N. J., northwest of the ordnance office.

The house is a two-story frame building, with a tower eight feet square and sixteen feet high. The room occupied as an office is in the second story.

The instrument-shelter is located in front of the northeast window of the first story of the tower.

The anemometer and anemoscope are secured upon the roof of the tower.

The cautionary signals are displayed from a jointed pole fifty-two feet high, which is situated forty feet northwest of this building.

The office was occupied April 6, 1878. The removal was accomplished without the loss of an observation and without injury to any instrument.

The following extracts are made from the semi-annual reports of Sergeant Huneke:

The interest in the cautionary-signal display continues, and the loss of the head-light (cautionary night signal) by fire, during the severe storm on the night of March 23 to 24, 1878, is greatly regretted by all interested in signals at this point. The head-light showed a fine light a distance of ten to twelve miles, as it could be seen nicely from the Narrows, and as well if not better than the flag during the day, which is not the case with the lanterns.

The commanders of sea-going vessels say they care very little for the signals in New York City; what they want to know is how the weather is outside; hence the inquiries are made of the Western Union operators by telegraph whether this station has signals hoisted or not.

The cautionary off-shore signal is considered here of the greatest importance to navigation.

The agent of the Associated Press for this section, Mr. White, stated to me that, as a rule, the Signal-Service reports of marine disasters were far ahead in time of any other sources of information; that, for instance, in the cases of the schooners Lizzie and Namari and the Carrie S. Hart, and the bark Nellie T. Guest, the first knowledge he had of it was when he read the Signal-Service report of the same in the papers, although he was in this neighborhood at the time.

Seventy-nine cautionary signals were displayed during the year, of which number fifty-seven were reported justified and twenty-two not justified.

Of thirty cautionary off-shore signals displayed during the year, twenty-three were justified, three justified as to direction, and four not justified.

In regard to some of the storms for which signals were ordered, Sergeant Huneke submits the following remarks:

*January* 1, 1878.—Severe northeast gale (maximum velocity 48 miles). Vessels remained in harbor during display of cautionary signals until off-shore signals were hoisted, when ocean steamers and a few sailing-vessels went to sea. No damage done to shipping.

*January* 22–24, 1878.—Severe *northwest* gale, (maximum velocity 64 miles). Schooner Eva Holmes, after losing two of her anchors, was driven ashore three miles south of this station. Captain Borden says: When I saw the signal hoisted I made all possible preparation for rough weather; but the gale was too heavy. The Holmes got off without material damage on the 25th.

*January* 30 to *February* 1, 1878.—Severe northeast gale (maximum velocity 76 miles), accompanied by snow, sleet, and rain. Brig Ella M. Tucker, with cargo of coffee from Rio Janeiro for New York, came ashore near life-saving station No. 6. Vessel and cargo total loss. Crew saved by crew of life-saving station No. 6. Signal Service, Western Union, and Atlantic and Pacific telegraph lines and poles washed away at the Highlands. The high tide and heavy sea-swell destroyed the track of the New Jersey Southern Railroad between the highlands of Navesink and Seabright for a distance of two miles, washing the rails and ties into the Shrewsbury River. The Siren buoy, east of this station, was carried over ten miles from its anchorage and thrown ashore about half a mile north of life-saving station No. 2.

*February* 9–10, 1878.—Schooner Thomas G. Smith went ashore directly in front of life-saving station No. 8. Vessel and cargo total loss. No lives lost.

*February* 21–22, 1878.—About 1 a. m. February 22, during a severe east gale and dense fog, while a heavy sea was running, schooner Clements, with oysters from Virginia for Keyport, went ashore about two miles north of Wreck Pond Inlet. Cargo total loss. No lives lost. Three-masted schooner Maggie McDonald (cargo pine lumber and gunpowder), from Philadelphia for New York, was wrecked about 5 a. m. February 22 about two miles north of Squan Village. Life-saving crew of station No. 9 assisted crew and passengers ashore. Vessel broke up soon after she struck. Part of cargo was saved. Information of the above wrecks was given to tugs and wrecking steamer Relief immediately after the news reached this station. Private Chapman opened station at Shark River, near the wrecks, and sent detailed reports.

*March* 2–3, 1878.—Sloop L. C. Wallace, of Absecom, N. J., came ashore, at 12.15 a. m. March 3, about one-third of a mile south of life-saving station No. 1, whose crew assisted to get her off safely. Weather foggy and rainy.

*March* 24–26, 1878.—Severe northwest gale attended by snow (maximum velocity 54 miles). The cautionary night signal (head-light) was destroyed by fire during the storm on the night of the 24th and 25th.

*June* 22, 1878.—Austrian bark Nicolo Tomasso, from Trieste for New York, ran aground on Flinn's Knoll—towed off without having sustained serious damages.

The repair section of the Signal Service coast line allotted to this station, extending from Sandy Hook to north side of Barnegat Inlet, has not worked as well as it did in the six months ending December 31, 1877, but the trouble, with a few exceptions, has been quickly repaired.

In conclusion, I should state that the officers of the Engineer and Ordnance Department at this point have shown a very kind disposition towards the service, and this station is under many obligations for favors and assistance received from them.

PUBLICATIONS.

| | |
|---|---|
| Number of Forms 15 (manifold) issued during the year ending June 30, 1878 | 100 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 4 |
| Total | 104 |

## SAN FRANCISCO, CALIFORNIA.

[*Official number*, 29.]

| | |
|---|---|
| Latitude | 37° 47′ 35″ |
| Longitude | 122° 26′ 15″ |
| Elevation of barometer above mean sea-level | 60 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.984 |
| Mean temperature for the year ending June 30, 1878 | 56°.6 |
| Amount of rain-fall for the year ending June 30, 1878 | 35.18 inches. |

The office is situated in room 42 Merchants' Exchange.

On November 6, 1877, Sergeant S. W. Beall, who had been in charge of this station since June 30, 1874, was relieved and ordered to Albany, N. Y., and replaced by Sergeant Brinsmade from Chicago. Private Cochran, the assistant, was ordered, June 29, 1878, to take charge of the Sacramento station, during absence of Sergeant Watkins.

The station has not been inspected since date of last report.

No change has been made in the location of this office or position of the instruments during the year.

Since the date of last report, regular reports have been received from the following additional stations, viz, Boise City, Deadwood, Olympia, Pioche, Red Bluff, Roseburg, Sacramento, Winnemucca, and Umatilla, and reports from all southern and Arizona stations have been discontinued.

Extracts from the semi-annual reports from this station:

A considerable amount of interest in the service is manifested by the citizens in general, and many inquiries are made at this office for back meteorological data, and especially the amount of rain-fall, which is very closely watched and recorded throughout the State.

Reports are furnished to three daily and five weekly papers, and fourteen copies of Forms 22 are furnished to the press monthly, and are published in full or a synopsis given.

Monthly means have been forwarded to office of the Chief Signal-Officer by mail each month, from an average of over ninety stations on the line of the Central Pacific and South Pacific Railroad and connecting branches, and since April 1 the means from Roseburg, Red Bluff, Portland, Olympia, San Diego, Los Angeles, and Visalia have been telegraphed to this station and forwarded from here by mail on the 1st of the month.

Steamers of the Pacific Mail and Occidental and Oriental Steamship Lines have been taking observations at sea, and the barometers of these vessels are compared with the station barometer when they arrive at this port. A large standard barometer for such comparison has been received, and put up in a case in the Merchants' Exchange reading-room on June 29th.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 2,236 |
| Number of Local Reports issued during the year ending June 30, 1878 | 1,377 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 164 |
| Total | 3,777 |

## SANTA FÉ, NEW MEXICO.

[*Official number*, 69.]

| | |
|---|---|
| Latitude | 35° 41′ |
| Longitude | 106° 10′ |
| Elevation of barometer above mean sea-level | 6,851 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.793 |
| Mean temperature for the year ending June 30, 1878 | 47°.1 |
| Amount of rain-fall for the year ending June 30, 1878 | 15.11 inches. |

The office is located on the ground floor of Johnson Building, on east side of Main plaza.

Sergeant B. F. Hough was in charge of station from date of last report until December 8, when he was relieved and discharged the service at his own request, and Sergeant M. Frost was assigned to the station, and remained in charge until March 23, 1878, when by order of the Chief Signal-Officer the station was placed under the immediate supervision of the officer in charge of the New Mexico division of the United States Military Telegraph lines. Sergeant Frost has continued to be observer, and has given satisfaction.

On March 27, 1878, the office was removed from Sena Building to office United States Military Telegraph line in Johnson Building.

Extracts from the semi-annual reports from this station:

Owing to the presence of many visitors and several surveying parties in Santa Fé during the past six months, more central location of the office, &c., more interest is manifested in the service by citizens. Immigrants and railroad men have frequently called for information. Four aneroid barometers and several thermometers have been compared with standard instruments at the station, and on the whole I must say the benefits of the service are beginning to be appreciated.

Forms 22 and weekly reports of means and other items have been regularly published by the Santa Fé New Mexican, the only newspaper in the town.

### PUBLICATIONS.

| | |
|---|---|
| Number of Local Reports issued during the year ending June 30, 1878 | 179 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 23 |
| Total | 202 |

## SAVANNAH, GEORGIA.

[*Official number*, 22.]

| | |
|---|---|
| Latitude | 32° 5′ |
| Longitude | 81° 8′ |
| Elevation of barometer above mean sea-level | 87 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.036 |
| Mean temperature for the year ending June 30, 1878 | 68°.3 |
| Amount of rain-fall for the year ending June 30, 1878 | 52.44 inches. |

The office is located in room No. 13, third floor of Commercial Building, southeast corner of Bay and Drayton streets.

Sergeant J. T. Downes was relieved by Sergeant Popple, April 13, 1878, and granted five months furlough, with permission to go beyond the sea. Private H. White, the assistant, was replaced by Private Truesdell, December 3, 1877, and ordered to duty at office Chief Signal-Officer.

The station was inspected by Lieutenant McClellan, Fifth Infantry, and acting signal-officer, in March, 1878, and was found by him in excellent order.

The Morning News, the only paper issued in the city, publishes a local report and all items of interest relating to the service.

The station has been frequently inspected by the members of the meteorological committee, who commend its workings.

No change has been made in the location of the office or any of the instruments.

Eighteen cautionary signals were displayed during the year, of which ten were reported justified, and eight not justified.

Of two cautionary off-shore signals displayed, one was fully justified, and one justified as to the direction of the wind.

The sergeant remarks as follows in reference to some of these displays:

*October* 1 *to* 4, 1877.—The rice and cotton interests were greatly affected by the storm. The steamship *Magnolia* was lost off Cape Hatteras. Terrible weather has prevailed north of this point since the 1st instant.

*January* 4 *and* 5, 1878.—Some damage was done to buildings in the city.

*February* 20 *to* 22, 1878.—Much interest was taken in the display. Many vessels remained in port.

*February* 26 *to* 28, 1878.—This signal was greatly appreciated. Two schooners are ashore off Tybee.

*March* 27 *to* 29, 1878.—Men connected with foreign vessels visited the office and commented favorably on the great value of the signal.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 5,511 |
| Number of Local Reports issued during the year ending June 30, 1878 | 321 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 42 |
| Total | 5,874 |

## SHREVEPORT, LOUISIANA.

[*Official number*, 72.]

| | |
|---|---|
| Latitude | 32° 30′ |
| Longitude | 93° 45′ |
| Elevation of barometer above mean sea-level | 205 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.996 |
| Mean temperature for the year ending June 30, 1878 | 65°.9 |
| Amount of rain-fall during the year ending June 30, 1878 | 63.30 inches. |

The office is located on the second floor of Martin's Building, corner of Milam street and Martin's alley.

Sergeant J. B. Campbell continues in charge. He has no assistant. Lieutenant McClellan inspected the station in May, 1878, and it was found in excellent condition. A river-gauge is much needed here, as at present the sergeant is obliged to estimate the rise and fall of the river, and has no means of measuring it with accuracy. This is done with every possible care, a graduated stick being used. It is proposed to erect a gauge very shortly.

There has been no change in the location of the office or position of instruments since last report.

The *Times*, a morning paper, has published the local reports with great regularity. The Sunday Herald has published the reports occasionally.

Highest water in the river, 25 feet 11 inches, occurred on January 31, 1878; lowest water, 2 feet 6 inches, on October 15, 1877.

PUBLICATIONS.

| | |
|---|---|
| Number of Local Reports issued during the year ending June 30, 1878 | 400 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 60 |
| Number of Forms 26 issued during the year ending June 30, 1878 | 2,132 |
| Total | 2,592 |

## SMITHVILLE, NORTH CAROLINA.

[*Official number*, 133.]

| | |
|---|---|
| Latitude | 33° 55′ |
| Longitude | 78° 1′ |
| Elevation of barometer above mean sea-level | 32.7 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.049 |
| Mean temperature for the year ending June 30, 1878 | 64°.2 |
| Amount of rain-fall for the year ending June 30, 1878 | 63.78 inches. |

The office is situated in Mr. W. J. Potter's house, Front street.

Sergeant Seyboth took charge of this station July 13, 1878, relieving Sergeant Ralston, who was transferred to Wilmington, N. C. There is one assistant at this station.

The section of sea-coast telegraph line between Smithville and Wilmington is kept in repair by the men on duty here.

This station was inspected by Lieutenant Allen in July, 1877, and by Lieutenant McClellan in February, 1878. It was found in excellent condition.

Location of office and position of instruments remain unchanged since date of last report.

No reports are received at this station, and no bulletins or other publications are issued.

Owing to the immediate vicinity of the bar and ocean to this harbor, and to the fact that all vessels to or from Wilmington have to pass it, the cautionary signals are of more than ordinary importance to masters and pilots, and have been heeded with but one or two exceptions.

Extracts from the semi-annual reports of the sergeant:

The Norwegian bark Cito went to sea on the morning of October 2, despite the signal, and returned to this port on October 6, badly damaged and in a leaking condition, having been caught in the severe storm of October 4.

The resident pilots place the fullest confidence in the storm warnings.

The telegraph line to Wilmington has stood remarkably well during severe weather, and has consequently occasioned small expense and trouble. All necessary facilities for the transmittal of shipping messages have been given free of charge, and the service is deservedly popular for it. It would be difficult to overestimate the pecuniary and other advantages which this work has conferred upon owners, masters, brokers, pilots, and others. The line has also been valuable to government interests, as for the rapid movement and concentration of troops during the July riots and for revenue purposes.

International signals are at times brought into use in communicating with vessels in the harbor or anchored off the bar. They have proved useful in several ways.

General service code signals are used in communicating with the United States revenue-cutter stationed here, often to the advantage of the revenue service.

This is, in fact, a general utility and information office for everybody connected with shipping interests, and masters, pilots, steamboatmen, &c., can be found here on business at all hours of the day.

Thirty-two cautionary signals were displayed during the year, of which number twenty-three were justified and nine not justified. Of six cautionary off-shore signals displayed, four were justified and two as to direction only.

The sergeant remarks as follows in reference to some of these displays:

*September* 19 *to* 21, 1877.—No vessels left port during the display.

*September* 28 *to* 30, 1877.—Heavy wind and sea.

*October* 2 *to* 5, 1877.—Terrible weather and heavy sea. Bark Cito returned to port without sails, and mainmast broken.

*December* 29 *to* 31, 1877.—Heavy gale reported outside.

*January* 3 *to* 5, 1878.—No vessel left until the off-shore signal was hoisted.

*February* 9 *to* 12, 1878.—The United States revenue steamer Colfax started for sea, but had to return owing to the heavy sea on the bar.

*February* 20 *to* 22, 1878.—The German bark Margaretha went ashore, but floated off at high water.

*June* 10, 1878.—The schooner Alabama went ashore on Frying Pan Shoals. Telegraphic communication with Wilmington interrupted.

## SPRINGFIELD, MASSACHUSETTS.

[*Official number*, 110.]

| | |
|---|---|
| Latitude | 42° 6′ |
| Longitude | 72° 36′ |
| Elevation of barometer above mean sea-level | 119.88 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.922 |
| Mean temperature for the year ending June 30, 1878 | 52°.1 |
| Amount of rain-fall for the year ending June 30, 1878 | 54.08 inches. |

The office is located in Haynes Opera building, southeast corner of Main and Pynchon streets.

No changes have been made in the working force, the location of office, or position of instruments.

Tabular reports of the observations have been furnished to the daily papers and regularly published by them.

No telegraphic reports are received at this station, and consequently no bulletins are issued.

The station was not inspected during the past year.

The following extract is made from the semi-annual report of Sergeant Welsh:

> There are many who derive great benefit from the service at this point; among the first to be named are the railroad corporations, from whom I receive frequent requests for data from our reports, to enable them to adjust questions of damage in the shipments of produce, &c. The station is also of benefit to the fruit-dealers, of which there are a large number in the city, and who unanimously acknowledge the help they receive from the reports.

## SAINT LOUIS, MISSOURI.

[*Official number*, 66.]

| | |
|---|---|
| Latitude | 38°37′28″ |
| Longitude | 90°15′16″ |
| Elevation of barometer above mean sea-level | 543.54 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.970 |
| Mean temperature for the year ending June 30, 1878 | 58°.6 |
| Amount of rain-fall for the year ending June 30, 1878 | 41.68 inches. |

The office is located at the northwest corner of Sixth and Locust streets.

Sergeant William Finn is in charge at date of this report. He has three assistants, one of whom is a printer. Three hundred and seventy-one post-offices and twelve persons are supplied with Farmers' Bulletins from this distributing center.

Two assistants have been transferred since last report to duty at office of the Chief Signal Officer.

The station was inspected in May by Lieutenant Buchanan, who found it in satisfactory condition.

The records of the office are frequently sought for settlement of disputed questions, both in the courts and by railroad companies. By the latter in relation to damage to goods shipped over their roads.

Observations on temperature of water have been discontinued since April 5, 1878.

Reports of the stage of water at Yankton, Omaha, and Leavenworth have been sent since May 16, to the engineer in charge of construction of bridge at Glasgow, Mo.

The report furnished to the board of health is highly regarded by that body. Medical men in general are giving increased attention to meteorological statistics in their relation to the health of the community. The

interest in the service is unabated. All classes, from the pleasure seeker to the grain merchant, have a very strong interest in the weather reports.

The operations of the latter are largely governed by the weather, while the excursions and other out-door amusements of the former are in doubtful weather almost entirely regulated by information received at this office. At the cotton exchange the desire for increased reports from the "cotton belt" continues.

The press maintains a very friendly spirit toward the service.

Reports are published in the two most important daily papers and partially in eight others.

Highest water in the river, 26 feet 6 inches, occurred on July 4, 1877, and lowest water, 6 feet 10 inches, on October 4, 1877.

PUBLICATIONS.

| | |
|---|---|
| Number of Farmers' Bulletins issued during the year ending June 30, 1878 | 169,848 |
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 6,746 |
| Number of Local Reports issued during the year ending June 30, 1878 | 2,568 |
| Number of Forms 15 (manifold) issued during the year ending June 30, 1878 | 2,130 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 333 |
| Number of Forms 26 issued during the year ending June 30, 1878 | 2,955 |
| Total | 184,580 |

## SAINT MARK'S, FLORIDA.

[*Official number*, 24.]

| | |
|---|---|
| Latitude | 30° 10′ |
| Longitude | 84° 12′ |
| Elevation of barometer above mean sea-level | 15 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.025 |
| Mean temperature for the year ending June 30, 1878 | 66°.7 |
| Amount of rain-fall for the year ending June 30, 1878 | 77.55 inches. |

The office is located ¼ mile north of Saint Mark's Row.

Sergeant J. A. Cody was relieved by Sergeant A. C. Dobbins on May 4, 1878, and ordered to Vicksburg, Miss., for duty.

Lieutenant McClellan inspected the station in April, 1878. It was found in good condition. Very little interest is manifested in the service at this point.

No change has been made in the location of the office or any of the instruments.

There is no assistant on duty at this station, nor is one required, except to avoid an interruption in case of sickness.

This being a very unhealthy locality, great danger exists that serious interruption in reports may occur from this cause.

No reports from other stations are received here. Those from this station have been forwarded with regularity.

Extracts from the semi-annual reports of the sergeant:

Cautionary signals have been displayed as directed by telegrams from the Office Chief Signal Officer. No known benefits have been observed. There is no commerce, and the station being nine miles from the Gulf, signals are not visible from that point.

Sixteen cautionary signals were displayed during the year, of which number nine were reported justified and seven not justified.

The sergeant remarks as follows in reference to one of these displays:

*October 1 to 4*, 1877.—The crops throughout the State were greatly damaged. The tide rose 12 feet above the mean.

## SAINT MICHAEL'S, ALASKA.

[*Official number*, 119.]

| | |
|---|---|
| Latitude | 63° 48′ |
| Longitude | 161° 0′ |
| Elevation of barometer above mean sea-level | 30 feet. |
| Mean barometer for the year ending June 30, 1878 | *29.650 |
| Mean temperature for the year ending June 30, 1878 | *24.°8 |
| Amount of rainfall for the year ending June 30, 1878 | *11.06 inches. |

The office is located in the building of the Alaska Commercial Company.

Private E. W. Nelson, Signal Corps, U. S. A., arrived at Fort Saint Michael's, Alaska, July 14, 1877, and relieved Private L. M. Turner. He reports that he found the station and property in good condition, with the exception of such things as have been reported as unfit for use in Private Turner's final report of property on hand.

Eight meteorological observations have been taken daily at this station, and the records of these observations, for the year ending June 30, 1878, have been received at the Office of the Chief Signal Officer.

No change has been made in the location of any of the instruments except the anemometer, which has been moved to the west end of the house occupied as an office, and mounted on a longer post. This change was made in order to prevent currents of air caused by neighboring houses affecting the instrument.

## SAINT PAUL, MINNESOTA.

[*Official number*, 39.]

| | |
|---|---|
| Latitude | 44° 53′ |
| Longitude | 93° 5′ |
| Elevation of barometer above mean sea-level | 795.50 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.874 |
| Mean temperature for the year ending June 30, 1878 | 49°5. |
| Amount of rain-fall for the year ending June 30, 1878 | 23.44 inches. |

The office is located in Ingersoll Block, corner of Wabasha and Third streets.

Sergeant R. J. Lewis was ordered from Oswego, N. Y., to this station December 8, 1877, and Sergeant Barnes transferred to Oswego. Corporal McCarty, the assistant at this station, was transferred to Denver October 20, 1877, on account of ill health. Since Corporal McCarty left there has been no assistant on duty here, and, although one has been asked for, the request cannot at present be granted. The station was inspected by Lieutenant Buchanan in February, 1878; and was found in excellent condition.

Highest water in the river, 7 feet 1 inch, was reached July 8 and 9, 1877, and lowest water, 1 foot 9 inches, from September 5 to 13, 1877. Navigation closed November 27, 1877, although the river was open during the latter part of December.

The office and instruments were removed from 78 West Third street to its present location in Ingersoll Block, corner of Third and Wabasha streets, on April 24, by authority of the Chief Signal Officer, dated April 16, 1878.

Extracts from the semi-annual reports from this station:

The Mississippi River at this point opened February 28, making the total number of days which the river was blockaded by ice during the winter of 1877 and 1878, eighty. The steamboat Arkansas, from Saint Louis, arrived here on March 20, being the first arrival of the season which had passed through Lake Pepin.

* Observations commenced July 15, 1877.

The stage of water has not been high during the spring and summer, but sufficient for all navigation purposes.

The people of the Northwest, and this city in particular, are deeply interested in the work of the Signal Corps.

On October 29, 1877, Sergeant J. O. Barnes availed himself of thirty days' leave of absence granted October 22, 1877.

### PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (*manifold*) issued during the year ending June 30, 1878 | 4,966 |
| Number of Local Reports issued during the year ending June 30, 1878 | 190 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 84 |
| Total | 5,240 |

## THATCHER'S ISLAND, MASSACHUSETTS.

[*Official number*, 125.]

| | |
|---|---|
| Latitude | 42° 36′ |
| Longitude | 70° 34′ |
| Elevation of barometer above mean sea-level | 49 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.970 |
| Mean temperature for the year ending June 30, 1878 | 49°.0 |
| Amount of rain-fall for the year ending June 30, 1878 | 46.17 inches. |

The office is located near the central part of the island.

Corporal Edmund Davis is still in charge of the station, and continues to give satisfaction.

Telegraphic reports are not made from this station. The cable connecting the island with the mainland has been out of order three times during the past year, the armor wires having been worn away by rubbing in the stony bottom of the bay. In each case the cable has been repaired as promptly as possible, and in the mean time cautionary signal orders have been signaled from the mainland.

Forty-six cautionary signals were displayed during the year, of which number thirty-two were justified and fourteen not justified.

Seventeen cautionary off-shore signals displayed during the year; eleven were justified, and four justified as to direction only, and two not justified.

Corporal Davis remarks as follows in reference to some of these displays:

*September* 6, 1877.—Very heavy sea running.

*September* 21 and 22, 1877.—Ninety-three vessels in sight when the signal was hoisted. All made harbor.

*October* 3 to 6, 1877.—All vessels made for harbor when the signal was hoisted.

*October* 21 to 23, 1877.—The cable was badly damaged by the storm.

*November* 18 to 20, 1877.—A lumber schooner, water-logged, was towed into Rockport Harbor.

*December* 30, 1877, to *January* 1, 1878.—The steamer City of Portland was obliged to put back to Gloucester on account of the storm.

*January* 4 to 6, 1878.—Heavy snow and wind storm. The schooner Julia Newell drove ashore two miles southwest of the island. The vessel and cargo are a total loss.

*January* 10 to 12, 1878.—Highest sea running that has been known since the opening of the station.

## TOLEDO, OHIO.

[*Official number*, 35.]

| | |
|---|---|
| Latitude | 41° 40′ |
| Longitude | 83° 32′ |
| Elevation of barometer above mean sea-level | 640.7 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.946 |
| Mean temperature for the year ending June 30, 1878 | 54° 0 |
| Amount of rain-fall for the year ending June 30, 1878 | 34.66 inches. |

The office is located at the southeast corner of Summit and Madison streets.

Sergeant W. Line has been in charge of station since date of last report. He has one assistant. Private Connor was relieved from duty at this point *April 10, 1878*, and ordered to Fort Whipple, Va., for promotion.

The station was inspected by Lieutenant Buchanan, who found it in good condition.

On December 18, 1877, Sergeant W. Line reports the closing of navigation at this port. The barge Mary Barton was the last vessel to arrive. The last to report was the scow *Minnie, on December 7, 1877.*

The rain-gauge was moved to a more exposed position, four feet higher than it formerly occupied, by Lieut. J. A. Buchanan, inspector, on February 6. No other change has been made in the positions of instruments.

Of *thirty-four cautionary* signals displayed during the year, fifteen were reported as justified and nineteen not justified at this place.

The sergeant remarks as follows in reference to some of these displays:

*October 10 and 11, 1877.—Severe storm on the lake. Some damage to vessels.*

*April 8 to 11, 1878.*—An ice-house was blown down during the display, and great damage was done to fences and trees.

*April 24 and 25, 1878.*—Great damage was done to buildings by this gale.

*May 2, 1878.*—One house was blown down, and other damage done throughout the city.

*June 2 and 3, 1878.*—A severe thunder-storm occurred during the display. A barn and several *telegraph offices were struck* by lightning and burned.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 3,598 |
| Number of Forms 22 issued during the year ending *June 30, 1878* | 120 |
| Total | 3,718 |

## TYBEE ISLAND, GEORGIA.

*[Official number, 121.]*

| | |
|---|---|
| Latitude | 32° 0′ |
| Longitude | 80° 52′ |
| Elevation of barometer *above mean sea-level* | 28 feet 8 inches. |
| Mean barometer for the year ending June 30, 1878 | 30.029 |
| Mean temperature for the year ending *June 30, 1878* | 66° 5′ |
| Amount of rain-fall for the year ending June 30, 1878 | 59.49 inches. |

The office is located at the northern end of Tybee Island, on a small hill about 10 or 15 feet above spring-tide mark, 150 feet from the beach.

The station was inspected by *Lieutenant McClellan in March, 1878,* and was in good condition, everything being clean and neat. The inspector reported that the office-room was not sufficient, and recommended that an additional room be added to the building occupied, and that some other changes be made. Sergeant Popple, the only enlisted man on duty here, requested a change of station, which request was approved by Lieutenant McClellan, and Sergeant Hathaway was ordered to the station, Sergeant Popple being transferred to Savannah. This station is a subordinate signal station to Savannah, the cautionary signals being hoisted here whenever ordered for Savannah.

No change has been made in the location of the office nor in the instruments, excepting the wind-vane, which was transferred from a pole (damaged by the storm of June 8) near the office, to a pole on the roof

of the office, having about the same exposure as before, and making a much better appearance.

Mr. H. J. Vallian was *in charge of station* from December 23 to 28, 1877, during absence of Sergeant W. S. Popple for re-enlistment.

Of seventeen cautionary signals displayed during the year, twelve were reported justified and five not *justified*. Two cautionary off-shore signals were ordered, both of them being justified as to direction.

The sergeant remarks as follows in reference to some of these displays:

*September* 28 *and* 29, 1877.—Heavy gales and high sea have prevailed during the greater portion of the week.

*October* 3 *and* 4, 1877.—No vessels left port. Telegraph lines were blown down.

*January* 3 *to* 5, 1878.—A large number of vessels *anchored in the harbor*.

*February* 26 *to* 28.—The schooners A. D. Henderson and F. Saint Clair Edwards were wrecked on the 27th instant. The steamer Dictator was *delayed twenty-four hours*. No vessels passed out during the display.

## UMATILLA, OREGON.

[*Official number*, 147.]

| | |
|---|---|
| Latitude | 45° 55′ |
| Longitude | 119° 21′ |
| Elevation of barometer above mean sea-level | 461 feet. |
| Mean barometer for the year ending June 30, 1878 | *30,122 |
| Mean temperature for the year ending June 30, 1878 | *53°.3 |
| Amount of *rain-fall for the year ending* June 30, 1878 | *8.36 inches. |

The office is located in a frame-house belonging to Mr. Kunzie.

Sergeant M. L. Hearne was in charge of the station until February 7, 1878, when he was relieved, for carelessness in performance of duty, by Private Wells.

Sergeant Hearne arrived here June 19, with orders to begin station work on the morning of July 1, 1877, but did not commence forwarding reports *until July 15*. The *delay* was *caused* by his not being able to procure a room of any kind to set up the instruments in, even temporarily, but through the kindness of Mr. J. H. Kunzie, who purchased an old building and fitted it up, the office was *finally opened and is quite* comfortable for this place.

The station has not been inspected. The instruments have not been moved since they were first put up.

On account of *an inadequate* telegraphic communication, the three telegraphic reports are sent at 4.35 p. m. Washington time, when the line is working, which is frequently not the case.

There is *no assistant on this station*.

A river-gauge was established March 23, 1878; daily observations have been made since that date and a weekly report mailed to Maj. J. M. Wilson, United States Engineer, *Portland, Oreg.*, besides the one to the Chief Signal Officer.

Highest water in the river, 18 feet, on June 12, 1878; lowest water in the river, 8 feet 7 inches, on March 24, 1878. These figures give the result of observations *from* March 24, 1878, to June 30, 1878.

## UNALASHKA, ALASKA.

[*Official number*, 186.]

| | |
|---|---|
| Latitude | 53° 25′ |
| Longitude | 166° 49′ |

Private Lucien M. Turner, Signal Service, U. S. A., was directed, March 13, 1878, to proceed, without delay, from this city to Saint Paul's

* Eleven months only.

Island, Alaska, and secure the meteorological instruments belonging to this service and in store at that point, and then proceed to Unalashka Island to establish a meteorological station.

Having complied with these instructions, he was directed to proceed to Atka, Attu, and Saint Paul's Island, and from thence to Billskoffsky and Fort Alexandria, Alaska, and make arrangements for establishing a meteorological station at each of the points named, using such instruments as may be supplied from this office, and then return to his proper station at Unalashka.

The following shows the difference in time between Washington and the points in Alaska named, taken from the Coast Survey chart of 1869:

Unalashka, 5 hours 58 minutes; Atka, 6 hours 29 minutes; Attu, 7 hours 22 minutes; Saint Paul's Island, 6 hours 14 minutes; Billskoffsky, 5 hours 39 minutes; Fort Alexandria, 5 hours 25 minutes.

Private L. M. Turner reports, on May 22, 1878, from Unalashka Island, Alaska, his arrival at that station on May 8, 1878. He has made arrangements in reference to establishing station at Saint Paul's Island and Fort Alexandria; states that Mr. A. Greenebaum, the agent of the company, does not yet know when vessels will start for the different stations to which he is ordered.

By paragraph 5 of Special Orders No. 95, dated Office Chief Signal Officer, July 6, 1878, paragraph 2 of Special Orders No. 38, current series from this office, was so modified as to direct Private L. M. Turner, Signal Service, U. S. A., to establish and take personal charge of the meteorological station at the island of Attu, instead of Unalashka, and to proceed to Attu for that purpose, as soon as he has complied with the provisions of Special Orders No. 38, in establishing meteorological stations at each of the points therein designated, including Unalashka.

## VICKSBURG, MISSISSIPPI.

[*Official number*, 61.]

| | |
|---|---|
| Latitude | 32° 23′ |
| Longitude | 90° 54′ |
| Elevation of barometer above mean sea-level | 243.46 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.031 |
| Mean temperature for the year ending June 30, 1878 | 65°.3 |
| Amount of rain-fall for the year ending June 30, 1878 | 60.26 inches. |

The office is located at the southwest corner of Washington and Crawford streets, third story.

Sergeant T. S. Collins remained in charge until May 4, 1878, when he was ordered to Fort Whipple, Va., for medical treatment, Sergeant Cody being transferred to this station from Saint Mark's, Fla. Lieutenant McClellan inspected the station in May and reported Sergeant Collins for neglect of duty and intoxication, on account of which report he was discharged the service. The office was in good condition at time of inspection.

There has been no change in the location of the office or instruments since the date of last report.

Extracts from the reports of the sergeant in charge:

The class of people deriving the greatest benefit from the reports are the cotton factors, who are members of the cotton exchange, and cotton planters and steamboatmen. The former regulate their purchases by the condition of the weather, as regards rain-fall and frost, and the latter utilize the river reports in regard to the overflow of the low-land plantation and the probable condition of the roads in marketing the crop, while the river-men regulate their loads with regard to the stage of water reported.

A local weather report, consisting of the 7 and 11.04 a. m., 2, 3.39 and 9 p. m. observations, mean daily and maximum temperature and rain-fall, is furnished daily to the Vicksburg Herald, which also publishes regularly the river bulletin.

A weekly report, consisting of the maximum, minimum, and mean temperature, total rain-fall, and number of rainy days, is furnished D. W. Lamkin, who forwards it to New York for publication in the Commercial and Financial Chronicle.

Highest water in the river, 41 feet, occurred March 25, 27, and 28, 1878, and the lowest water in the river, 11 feet 4 inches, on August 31, 1877.

The river in front of Vicksburg having filled in, in consequence of cut-off, the river receded from the gauge on September 1, 1877, and no readings were taken until November 4, 1877, when they were resumed.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 3,118 |
| Number of Local Reports issued during the year ending June 30, 1878 | 120 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 34 |
| Number of Forms 23 issued during the year ending June 30, 1878 | 1,913 |
| Total | 5,185 |

## VIRGINIA CITY, MONTANA TERRITORY.

[*Official number*, 77.]

| | |
|---|---|
| Latitude | 45° 20′ |
| Longitude | 112° 03′ |
| Elevation of barometer above mean sea-level | 5479.93 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.697 |
| Mean temperature for the year ending June 30, 1878 | 42°.2 |
| Amount of rain-fall for the year ending June 30, 1878 | 20.16 inches. |

The office is located in Thompson's building, corner of Wallace and Jackson streets.

Sergeant E. McGovern has been on duty at this station since May 21, 1878, at which date he relieved Sergeant R. B. Watkins, who was ordered to Sacramento, Cal.

The office remains in the same location as at last report, and no change has been made in positions of instruments, as the Western Union telegraph office in this city is not open at the hour of sending the morning and night reports. These reports are sent by the sergeant, and for that purpose he is provided with a key and sounder, which is connected to the main line by a "loop."

The station was inspected by Lieut. J. A. Buchanan in April last, and the condition and management of the station were reported as satisfactory. Telegraphic communication from this point still continues to be uncertain, and during the spring season of the year interruptions have been quite frequent.

No reports of any kind are issued or published at this station, excepting the monthly means of temperature and rain-fall, which are published in a weekly paper issued in this city and called the Madisonian.

## VISALIA, CALIFORNIA.

[*Official number*, 142.]

| | |
|---|---|
| Latitude | 36° 20′ |
| Longitude | 119° 16′ |
| Elevation of barometer above mean sea-level | 348.15 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.966 |
| Mean temperature for the year ending June 30, 1878 | 62°.4 |
| Amount of rain-fall for the year ending June 30, 1878 | 10.49 inches. |

The office is located in Palace Hotel, northeast corner of Court and Mill streets.

Orders were issued June 10, 1878, transferring Corporal R. R. Herman to Portland, and directing Sergeant E. Lloyd to take charge of the Signal Service station at this point.

The station was opened July 1, 1877.

The instrument shelter projects from a window facing north.

No change has been made in the location of office or instruments.

No reports from other stations are received at this station.

A weekly synopsis of the local observations is furnished the Weekly Iron Age and is regularly published; the same paper also publishes the monthly meteorological summary.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 1,876 |
| Number of Local Reports issued during the year ending June 30, 1878 | 14 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 34 |
| Total | 1,924 |

## WASHINGTON, D. C.

[*Official number*, 19.]

| | |
|---|---|
| Latitude | 38° 53′ |
| Longitude | 77° 1′ |
| Elevation of barometer above mean sea-level | 105.5 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.023 |
| Mean temperature for the year ending June 30, 1878 | 56° 9′ |
| Amount of rain-fall for the year ending June 30, 1878 | 57.61 inches. |

The office is located at 1719 and 1721 G street, N. W.

Sergeant James B. Newlin has been in charge of station at the office Chief Signal Officer during the year, and has faithfully and satisfactorily attended to all his duties. Sergeant Allen Buell was discharged from the service, at his own request, April 20, 1878.

Two assistants have been relieved from duty and ordered to Fort Whipple for promotion and one relieved and ordered there for instruction as assistant.

Sergeant H. J. Penrod was assigned to duty in station-room October 22, 1877.

Four hundred and forty-six post-offices and three persons have been regularly supplied with the Farmers' Bulletin from this station.

Mr. James A. Swift, electrician, continues in charge of the telegraph room at this office, and has given satisfaction in every particular. Sergeant J. H. Robinson has been in temporary charge of the office on several occasions during the absence of Mr. Swift on repair duty, and has attended faithfully to his duties.

PUBLICATIONS.

| | |
|---|---|
| Number of Farmers' Bulletins issued during the year ending June 30, 1878 | 132,900 |
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 12,517 |
| Number of Maps issued during the year ending June 30, 1878 | 105,753 |
| Number of Local Reports issued during the year ending June 30, 1878 | 1,355 |
| Number of Forms 15 (manifold) issued during the year ending June 30, 1878 | 13,513 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 142 |
| Number of Weekly Chronicles issued during the year ending June 30, 1878 | 4,603 |
| Number of Monthly Weather Reviews issued during year ending June 30, 1878 | 11,055 |
| Number of International Bulletins issued during the year ending June 30, 1878 | 108,229 |
| Total | 390,067 |

## WILMINGTON, NORTH CAROLINA.

[*Official number*, 20.]

| | |
|---|---|
| Latitude | 34° 11′ |
| Longitude | 78° 10′ |
| Elevation of barometer above mean sea-level | 73.6 feet. |
| Mean barometer for the year ending June 30, 1878 | 30.028 |
| Mean temperature for the year ending June 30, 1878 | 63°.8 |
| Amount of rain-fall for the year ending June 30, 1878 | 84.12 inches. |

The office is located on the fourth floor of the Bank of New Hanover building, northwest corner of Front and Princess streets.

Sergeant D. C. Ralston has been in charge of this station since July 13, 1877, at which date he relieved Sergeant Seyboth. He has one assistant. Private N. G. Brewer, there on duty as assistant, was ordered May 22, 1878, to proceed to Sloop Point, N. C., and take charge of the flying station at that point. Lieutenant McClellan inspected the office in February, 1878, and reported it in good condition.

The sea-coast telegraph line has worked with but few interruptions between here and Smithville.

Great attention is paid to the warning given at this port by the display of the signal.

The location of the office is the best the city affords. The display of the cautionary signal from its roof can be seen from all parts of the harbor and city.

Reports of the arrival of vessels received from Smithville are furnished to the Chamber of Commerce of this city, and are of great benefit to the shipping merchants.

Extracts from the semi-annual reports of the sergeant:

In personal conversation with captains of vessels I have been informed by them that they place great reliance on the display of the warning signal, especially the captains of the New York and Baltimore steamers, who informed me they govern the movements of their vessels entirely by the warning given.

The greatest interest is manifested in the service by all classes of citizens.

Thirty cautionary signals were displayed at this station during the year. The sergeant reports fifteen justified and fifteen not justified.

Seven cautionary off-shore signals were displayed, four being justified, and two justified as to direction, and one not justified.

### PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 5,498 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 60 |
| Total | 5,558 |

## WINNEMUCCA, NEVADA.

[*Official number*, 139.]

| | |
|---|---|
| Latitude | 41° 00′ |
| Longitude | 117° 41′ |
| Elevation of barometer above mean sea-level | 4,335.3 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.970 |
| Mean temperature for the year ending June 30, 1878 | 50°.6 |
| Amount of rain-fall for the year ending June 30, 1878 | 5.66 inches. |

The office is located in the Central Pacific Hotel building.

The station was established by Corporal John Healy, Signal Service, U. S. A., in obedience to Special Orders No. 62, War Department, Office of the Chief Signal-Officer, Washington, May 21, 1877, who arrived here on June 12, 1877, and, as instructed, promptly selected a suitable room for office purposes, and by July 1 the several meteorological instruments

were placed in position. Observations and reports were commenced, and have been continued without interruption.

From July 1 to September 19 reports were received and bulletined tridaily from 14 stations, viz: Davenport, Iowa; Boise City, Idaho; Cheyenne, Wyo.; North Platte, Nebr.; Omaha, Nebr.; Pioche, Nev.; Sacramento, Cal.; San Francisco, Cal.; Salt Lake City, Utah; Virginia City, Mont.; Olympia, Wash.; Portland, Oreg.; Red Bluff, Cal., and Roseburg, Oreg.

Since September 19 no reports have been received from Olympia, Portland, Red Bluff, or Roseburg, the reports from these stations being forwarded as special messages since that date.

The office is in the Central Pacific Hotel building, where it was first located, and the position of instruments has remained unchanged.

No change has been made in the working force of the station.

The morning bulletin and local reports were regularly published in the Silver State until the beginning of Bannock hostilities, in the early part of June, when all weather reports were crowded out to make more room for Indian war news.

The general items copied from Form 22 have been regularly published in the daily newspaper.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 1,456 |
| Number of Forms 15 (manifold) issued during the year ending June 30, 1878 | 310 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 22 |
| Total | 1,788 |

## WOOD'S HOLL, MASSACHUSETTS.

[*Official number*, 60.]

| | |
|---|---|
| Latitude | 41° 33′ |
| Longitude | 70° 40′ |
| Elevation of barometer above mean sea-level | 50 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.989 |
| Mean temperature for the year ending June 30, 1878 | 51°.6 |
| Amount of rain-fall for the year ending June 30, 1878 | 52.37 inches. |

The office is located on Main street.

Sergeant M. F. Tighe remained in charge from date of last report up to the time of his death, June 11, 1878, since which date Private J. D. Sumet has performed all station work without assistance.

The station has not been inspected during the year.

No change has been made in the location of office or instruments since last report.

On the 3d of May a new flag-staff, fifty feet in height, for the display of the signal flag, was erected at Nobsque Point.

Number of cautionary signals displayed during the year, fifty-seven; twenty-six signals are reported as justified, and thirty-one not justified. Sixteen cautionary off-shore signals were displayed; nine were reported fully justified, four justified as to direction of wind, and three not justified.

The sergeant remarks as follows in reference to some of these displays:

*July* 1 *and* 2, 1877.—Vessels passing through the sound made for port when the signal was hoisted. Heavy sea running.

*July* 19, 1877.—A number of vessels sought refuge in the harbor.

*September* 7 *and* 8, 1877.—Very high winds are reported at different points on the coast.

*September* 21 *and* 22, 1877.—A large fleet took refuge in the harbor. The observer piloted in one large schooner.

*October* 3 *to* 6, 1877.—A large fleet remained in port in consequence of the display.

*October* 16 *and* 17, 1877.—Violent wind on the bay. No vessel could have lived in the whirlwind.

*October* 22 *and* 23, 1877.—A small fleet of vessels entered the harbor when the signal was displayed. Owing to the sheltered position of this place a gale is always more severe on the sound and bay than here. The steamer Island Home reports a terrible gale a short distance from this station, with a heavy sea running.

*November* 2 *and* 3, 1877.—Two hundred vessels entered the harbor during the display.

*November* 5 *to* 7, 1877.—About five hundred vessels anchored in the harbor.

*December* 29, 1877, *to January* 2, 1878.—Very rough weather on the sound. Steamers from this point omitted their usual trips.

*January* 3, 1878.—A large steamer was blown ashore ten miles southeast of here. Cable communication was interrupted.

*January* 10 *to* 12, 1878.—Six schooners went ashore at Vineyard Haven. Cable to the Vineyard not working.

*January* 14, 1878.—A schooner was driven ashore about two miles from the lighthouse.

*January* 30 *to February* 2, 1878.—Heavy snow-storm; trains and steamers were delayed.

*February* 21 *to* 23, 1878.—All steamers remained in port.

## YANKTON, DAKOTA TERRITORY.

[*Official number*, 95.]

| | |
|---|---|
| Latitude | 42° 45′ |
| Longitude | 97° 30′ |
| Elevation of barometer above mean sea-level | 1,275 feet. |
| Mean barometer for the year ending June 30, 1878 | 29.941 |
| Mean temperature for the year ending June 30, 1878 | 49°.3 |
| Amount of rain-fall for the year ending June 30, 1878 | 28.63 inches. |

The office is located at No. 68 Capitol street.

There has been no change in the station or of instruments during the past year.

Sergeant C. A. Shaw still continues in charge.

The river closed for a couple of days, November 10 and 11, and closed again November 29. The warm weather in December caused the ice to break up again about the 24th, the river continuing more or less open until the end of the month.

Extracts from the semi-annual reports from this station:

The record of the river is made daily, but under considerable disadvantages. The bank is so broken and so continually breaking that it is impossible to maintain a perfectly accurate bench-mark or a permanent gauge.

A well-built permanent gauge would be somewhat expensive, and I do not know that at present it could be securely placed, but when the new steamboat-ways are all laid it seems probable that a fixed basis could be taken and maintained.

Highest water in the river, 11 feet 10 inches, occurred on July 1, 1877, and lowest water, 4 feet, on December 29, 30, and 31, 1877.

## FLYING STATION AT LIFE-SAVING STATION No. 3.

[*Official number*, —.]

| | |
|---|---|
| Latitude | ° ′ |
| Longitude | ° ′ |

A station was established at this point by Special Orders No. 35, Par. III. dated Office of the Chief Signal Officer, March 6, 1878, by Private William Bolton, who was detached from the station at Portsmouth, N. C., for that purpose, and still remains in charge of the station, the location of which is midway between Kittyhawk, N. C., and Cape Henry, Va. He reported at that place ready for duty on March 14 and opened station March 20, 1878.

The object of the station is to keep the line in constant repair and open prompt telegraphic communication with this office at the immediate scene of wrecks or danger, and for that purpose the enlisted man in charge is required to regularly patrol on each side of the flying station until he meets the patrol from either Cape Henry or Kittyhawk. His directions are, in cases of wrecks, upon having notified the Chief Signal Officer, to proceed at once to the scene of wreck and open telegraphic communication thence along the line to this office. The station is fully equipped as a communicating signal and repair station, with mule and wreck-knapsack and other necessary appliances for sending assistance in cases of wrecks and for making needed repairs to the telegraph line. The section of line patrolled from this station extends from Cape Henry, Va., to Kittyhawk, N. C.

Observations are taken of character of sunset when observer is not on repair-duty. These observations are telegraphed to Office Chief Signal Officer.

## FORT MACON, NORTH CAROLINA.

[*Official number*, —.]

Latitude ..... ° '
Longitude ..... ° '

A station was opened at Bogue Bank, N. C., by Special Orders No. 47., Par. IV, dated Office of the Chief Signal Officer, April 2, 1878, and Private George H. Thompson was assigned to the charge thereof, and reported his arrival by telegraph at 10 a. m., April 19, 1878. The station was removed from Bogue Bank to Old Topsail (Fort Macon), N. C., which was found to be a more suitable place, by Instructions No. 44, Par. 1, dated Office Chief Signal Officer, May 23, 1878.

The section of telegraph line kept in repair from this station extends from the south side of Old Topsail Inlet to the north side of Bogue Inlet, a distance of twenty-five (25) miles. This station, like the others, is supplied with a mule, wreck-knapsack, and other appliances for rendering assistance in case of wrecks, and for properly repairing the telegraph line. Two trips are made each week over the entire repair section, and the enlisted man is required to be constantly on the lookout for wrecks or other disasters. Observations of the character of the sunset are made each day and telegraphed to the Central Office. A record of the same is also forwarded at the end of each month.

This station has been designated as a cautionary signal display station, and cautionary signals will be displayed thereat from and after July 1, 1878, from a flag-staff, which is 125 feet high.

## FLYING STATION AT SLOOP POINT.

[*Official number*, —.]

Latitude ..... ° '
Longitude ..... ° '

Sloop Point was opened in accordance with Special Orders No. 57, Par. I, dated Office of the Chief Signal Officer, April 23, 1878, and Sergeant F. J. Papst assigned to duty there. He arrived for duty and opened station May 27, 1878. The section of coast telegraph line kept in repair from this station extends from New River to the main road, near Sloop Point, a distance of twenty-one (21) miles. The repair-man in charge is mounted and supplied with the Signal Service (or wreck) knapsack and other appliances, to enable him to properly discharge the duties assigned him. He is required to make two trips each week over the entire section intrusted to his care, whether the line is in working order or not,

and carefully note and make any repairs which may be needed, and, in case of storms, must be on the lookout for wrecks and be ready to render every assistance in his power.

In addition to his other duties he is required to take an observation of the character of the sunset each day.

Sergeant Papst was relieved by Private N. G. Brewer May 30, 1878. Private Brewer still remains in charge.

The following table shows the location of the cautionary signal display stations under the direction of the office of the Chief Signal Officer, the names of the display men, the date at which each was established, the number of cautionary signals displayed, the number reported justified and the number reported not justified, from the date of establishment up to and including June 30, 1878.

*Section No. 1, on or near Lake Michigan.*

| Stations. | Date established. | Name of display-man. | Cautionary signals. | | | Remarks. |
|---|---|---|---|---|---|---|
| | | | Number ordered displayed. | Number reported justified. | Number reported not justified. | |
| Clay Bank, Wis | Sept. 16, 1877 | H. Halverson | 14 | 12 | 2 | Station transferred to Horn's Pier, Wis., March 15, 1878. |
| Green Bay, Wis | Sept. 16, 1877 | J. H. Elmore | 27 | 12 | 13 | No report was received as to justification or non-justification of two signals. |
| Horn's Pier, Wis | Mar. 15, 1878 | H. Halverson | 14 | 11 | 3 | |
| Kenosha, Wis | Sept. 16, 1877 | H. B. Simmons | 30 | 20 | 10 | |
| Kewaunee, Wis | Sept. 16, 1877 | A. D. Laughlin, P. M | 31 | 23 | 8 | |
| Manitowoc, Wis | Sept. 16, 1877 | C. Anderson | 25 | 20 | 4 | No report was received as to justification or non-justification of one signal. |
| Menomonee, Mich | Sept. 16, 1877 | N. Gram | 31 | 24 | 7 | |
| Racine, Wis | Sept. 16, 1877 | G. W. Scanlon | 26 | 23 | 1 | No report was received as to justification or non-justification of two signals. |
| Sheboygan, Wis | Sept. 16, 1877 | J. L. Mallery | 31 | 23 | 7 | No report was received as to justification or non-justification of one signal. |
| Sturgeon Bay, Wis | Sept. 16, 1877 | J. B. Scott | 29 | 20 | 3 | No report was received as to justification or non-justification of six signals. |

Section No. 1 is under the charge of the sergeant at Milwaukee, Wis., and all cautionary signal orders received by him are duplicated to the sub-stations in his section, and by them acknowledged by telegraph.

Cautionary signal display stations were established at Ludington, Mich., January 20, 1878, and at Lewes, Del., February 25, 1878, which stations receive their orders for displaying signals direct from this office.

| Stations. | Date established. | Name of display-man. | Cautionary signals. | | | Cautionary off-shore signals. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Number ordered displayed. | Number reported justified. | Number reported not justified. | Number ordered displayed. | Number reported justified. | Number reported not justified. | Number reported justified as to velocity only. | Number reported justified as to direction only. |
| Ludington, Mich | Jan. 20, 1878 | H. T. Alexander | 20 | 18 | 2 | ..... | ..... | ..... | ..... | ..... |
| Lewes, Del | Feb. 25, 1878 | Charles M. Marshall | 21 | 11 | 10 | 11 | 7 | 2 | 0 | 2 |

*Table showing the location of the special river stations, reporting to the Chief Signal-Officer, the names of the observers, the date at which each began reporting originally, and the highest and lowest water at each during the year ending June 30, 1878, with the dates thereof.*

| Stations. | Rivers. | Names. | Commenced reporting. | Highest water. | | Date of highest water. | Lowest water. | | Date of lowest water. |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Feet. | Inches. | | Feet. | Inches. | |
| 1. Freeport, Pa | Allegheny | M. H. Alter | Apr. 17, 1873 | 17 | 0 | February 24, 1878 | 0 | 4 | October 1, 2, and 3, 1877. |
| 2. Hermann, Mo | Missouri | Edward Kehr | Apr. 24, 1873 | 14 | 10 | July 3, 1877 | 1 | 6 | January 12, 1878. |
| 3. Jefferson City, Mo | do | Louis C. Lohman | May 12, 1873 | 17 | 11 | May 30, 1878 | 1 | 9 | September 25 to October 2, 1877. |
| 4. Oil City, Pa | Alleghany | W. R. Stevenson, C. E | Apr. 20, 1873 | 10 | 2 | February 23, 1878 | —0† | 5 | September 30 and October 1, 2, 3, and 4, 1877. |
| 5. Brownsville, Pa | Monongahela | J. Allen Hubbs | June 6, 1873 | 16 | 6 | November 25, 1877 | —1† | 6 | October 3, 1877. |
| 6. Evansville, Ind | Ohio | J. P. Elliott | Apr. 21, 1873 | 27 | 10 | March 17, 1878 | 1 | 0 | October 14, 1877. |
| 7. Confluence, Pa | Youghiogheny | M. Tannehill | Apr. 23, 1873 | 11 | 7 | November 24, 1877 | —0† | 6 | October 3, 1877. |
| 8. New Geneva, Pa | Monongahela | H. T. Davenport | Apr. 24, 1873 | 21 | 9 | November 25, 1877 | 0 | 10 | October 2 and 3, 1877. |
| 9. Lexington, Mo | Missouri | Z. S. Mitchell | Apr. 28, 1873 | 16 | 6 | June 30, 1878 | 3 | 3 | December 20, 21, and 22, 1877, and February 9, 1878. |
| 10. Kansas City, Mo | do | W. A. M. Vaughan | Apr. 21, 1873 | 19 | 6 | July 1 and 2, 1877, and June 10, 1878. | 3 | 6 | January 12 and 13, 1878. |
| 11. Brunswick, Mo | do | G. D. Kennedy | May 1, 1873 | 12 | 10 | July 2 and 3, 1877 | —3† | 3 | January 12 and 13, 1878. |
| 12. Little Rock, Ark | Arkansas | Albert Cohen | Apr. 21, 1873 | 22 | 3 | June 28, 1878 | 0 | 2 | October 14 and 15, 1877. |
| 13. Plattsmouth, Nebr | Missouri | A. L. Child, M. D | Apr. 20, 1873 | 14 | 1 | June 25 and 26, 1878 | —0† | 4 | January 4 and 5, 1878. |
| 14. Marietta, Ohio | Ohio | J. H. Best | Apr. 19, 1873 | 22 | 8 | February 25, 1878 | 2 | 5 | October 6 and 7, 1877. |
| 15. Saint Joseph, Mo | Missouri | Robert Gunn | May 8, 1873 | 17 | 2 | June 27 and 28, 1878 | 1 | 0 | January 12, 1878. |
| 16. Warsaw, Ill | Mississippi | D. H. Cox | May 7, 1873 | 12 | 4 | July 1, 1877 | 0 | 0 | October 4, 1877. |
| 17. Paducah, Ky | Ohio | Capt. C. Bachmann | May 1, 1873 | 29 | 0 | April 29, 1878 | 0 | 3 | September 15 and 16, 1877. |
| 18. Boonville, Mo | Missouri | Charles W. Hazell | Apr. 28, 1873 | 16 | 7 | July 5, 1877 | 2 | 2 | January 11 and 12, 1878. |
| 19. Le Claire, Iowa | Mississippi | C. P. Disney | June 2, 1873 | 5 | 6 | January 5, 1878 | 1 | 0 | September 25, 26, and 27, 1877, and January 9, 1878. |
| 20. Helena, Ark | do | J. B. Miles | Feb. 25, 1874 | 38 | 10 | May 3, 1878 | 5 | 0 | October 16 and 17, 1877. |
| 21. Decatur, Ala | Tennessee | F. Ludwig | Oct. 1, 1875 | 13 | 4 | February 26, 1878 | 0 | 3 | October 8, 1877. |
| 22. Chattanooga, Tenn | do | Charles E. Stivers | Sept. 17, 1875 | 19 | 0 | February 25, 1878 | 1 | 2 | October 5, 1877. |
| 23. Johnsonville, Tenn* | do | W. H. Johnson | Oct. 1, 1875 | | | | | | |
| 24. Muscatine, Iowa | Mississippi | William Molis | Jan. 1, 1878 | 10 | 2 | June 10, 1878 | 2 | 7 | January 9, 1878. |

*Reports so incomplete that highest and lowest water cannot be given. †Below bench-mark.

Observations of the stage of water were taken daily during the year and reported to the Office of the Chief Signal Officer weekly on Form 28. A telegraphic report of the rivers, each Saturday, was also forwarded. In cases where the water rose to near the "danger line" special telegraphic reports were made and continued until discontinued by orders from this office.

In addition to these a report of the depth of water and changes in the river is received regularly on Form 28 each week from Mr. William Molis, at Muscatine, Iowa, who receives no compensation for his services.

*Table showing stations on the United States military telegraph line in Arizona and California from which reports have been received during the year ending June 30, 1878, with the kind of reports sent, whether complete or partial.*

| Name of station. | Reports commenced. | Reports discontinued. | Number of reports by telegraph (daily). | Character of reports received by mail on Form 4 (weekly). |
|---|---|---|---|---|
| Burkes, Ariz | Dec. 1, 1877 | | 0 | Observations of thermometer, hygrometer, direction of wind and state of weather, clouds and rain-fall taken three times a day. |
| Camp Apache, Ariz | June 23, 1878 | | 3 | Observations of thermometer, hygrometer, direction of wind and state of weather and clouds taken three times a day. |
| Camp Grant, Ariz | July 14, 1877 | | 3 | Complete observations, except velocity of wind, taken three times a day. |
| Campo, Cal | (*) | | 3 | Complete observations taken three times a day. |
| Camp Verde, Ariz | (*) | | 0 | Complete observations, except velocity of wind, taken three times a day. |
| Florence, Ariz | (*) | | 0 | Observations of thermometer, hygrometer, direction of wind and state of weather, clouds, rain-fall, and maximum and minimum thermometers taken three times a day. |
| Maricopa Wells, Ariz | (*) | Mar. 14, 1878 | | |
| Phœnix, Ariz | (*) | | 0 | Observations of barometer, thermometer, hygrometer, direction of wind and state of weather, clouds and rain-fall taken three times a day. |
| Prescott, Ariz | (*) | | 3 | Complete observations, except velocity of wind, taken three times a day. |
| San Diego, Cal | (*) | | 3 | Complete observations taken seven times a day. |
| Stanwix, Ariz | (*) | Dec. 1, 1877 | | |
| Tucson, Ariz | (*) | | 3 | Complete observations, except velocity of wind, taken three times a day. |
| Wickenburg, Ariz | (*) | | 0 | Observations of thermometer, hygrometer, direction of wind and state of weather, clouds, rain-fall and maximum and minimum thermometers taken three times a day. |
| Yuma, Ariz | (*) | | 3 | Complete observations taken three times a day. |

*Reporting at date of last annual report, June 30, 1877.

The following report of stations on United States military telegraph line, division of Arizona and California, is compiled from the annual report of Lieut. Charles A. Booth, First Infantry, acting signal-officer, U. S. A., and officer in charge of that division, and from data on file in the office of the Chief Signal-Officer, Washington, D. C.:

## APACHE PASS, ARIZONA TERRITORY.

[*Official number*, —.]

Latitude ..... ° ′
Longitude ..... ° ′

*Enlisted men on duty at this station.*—Private Thomas Gibson, Signal Service U. S. A., in charge, and Private Charles Ryall, H, Sixth Cavalry, repairman.

*No. of messages during the year.*—Sent paid, 318; sent collect, 82; received paid, 253; received collect, 52; sent D. H., 548; received D. H., 552. Total, 1,805. Free business, $415.75.

*Receipts.*—This line, $116.80; other lines, $52.98; sundries, $24.05. Total, $193.83.

This station has a full set of telegraph instruments and repair-tools. There are no meteorological instruments on station, and no observations are taken.

*Changes during the year.*—July 1, 1877, Private J. W. Harrison, H, Sixth Cavalry, in charge; October 9, 1877, Private J. W. Harrison, H, Sixth Cavalry, relieved and ordered to Camp Grant; December 23, 1877, Private Thomas Gibson, Signal Service, U. S. A., assigned in charge.

The station was inspected by First Lieut. A. W. Greely, Fifth Cavalry, acting signal-officer, U. S. A., August 5 and 6, 1877. The office is well located, comfortable, large, and convenient. Condition of office good.

## BURKES, ARIZONA TERRITORY.

[*Official number*, 191.]

Latitude ..... ° ′
Longitude ..... ° ′

*Enlisted men on duty at this station.*—Private W. Manderfield, Signal Service, U. S. A., in charge; Private James Bollinger, I, Sixth Cavalry, repairman.

*Number of messages during year.*—Sent paid, 321; sent collect, 103; received paid, 173; received collect, 50; sent D. H., 112; received D. H., 15. Total, 774. Free business, $206.22.

*Receipts.*—This line, $109.26; other lines, $26.80. Total, $136.06.

The station is furnished with a full set of telegraph instruments and repair-tools, and the following serviceable meteorological instruments: One thermometer, standard; one thermometer, maximum; one thermometer, minimum; one thermometer, hygrometer; one anemoscope; one wind-vane (large); one compass; one rain-gauge.

Observations are taken tri-daily, and were sent by telegraph until April 1, 1878, being forwarded since that time by mail.

*Changes during year.*—December 1, 1877, Private W. J. Daily, Signal Service, U. S. A., in charge; March 1, 1878, relieved and ordered to Yuma. March 1, 1878, Private J. J. Munroe, Signal Service, U. S. A., assigned in charge. March 15, 1878, Private W. Manderfield, Signal Service, U. S. A., assigned in charge. March 15, 1878, Private J. J. Munroe, Signal Service, U. S. A., relieved and ordered to San Diego, Cal., for discharge.

The station has not yet been inspected.

"Meteorological observations have been interrupted several times during the past six months, the observer having to go out to make necessary repairs on the telegraph line."

The office was moved to Burkes Station December 4, 1877, by authority of Lieut. Philip Reade.

No local benefit is derived from the meteorological reports, though they may be of marked advantage to commercial and agricultural interests of other sections of the country.

United States military telegraph office moved from Stanwix, Ariz., to Burkes, on December 4 and 5, 1877.

## CAMP APACHE, ARIZONA TERRITORY.

[*Official number*, 192.]

Latitude ..... 33° 47′ 18″
Longitude ..... 109° 57′ 52″

The following-named enlisted men are on duty at station: Private J. J. Falvey, Signal Service, U. S. A., in charge; Private Samuel Harris, E, Sixth Cavalry, repair-man.

Station opened October 9, 1877.

*Number of messages since opening station.*—Sent paid, 372; sent collect, 25; received paid, 170; received collect, 87; total, 654. Free business, $210.55.

*Receipts.*—This line, $314.70; other lines, $98.30; total, $413.

The station is supplied with a full set of telegraph instruments and repair-tools, and the following serviceable meteorological instruments: One thermometer, standard; one thermometer, maximum; one thermometer, hygrometer.

Partial tri-daily observations are taken at this station and sent by telegraph.

Private J. J. Falvey, Signal Service, U. S. A., has been in charge since opening of station, October 9, 1877.

This station has not been inspected.

The station was opened October 9, 1877. It is not favorably situated for a proper exposure of instruments, the door facing northeast and the window to the southwest.

The commanding officer states, however, that it is in contemplation to erect a building that may be used as a telegraph office. In such an event the necessary exposures can be secured.

Elevation corrected for 5,000 feet.

The first Form 4 received from this station was for the week ending June 29, 1878.

## CAMP GOODWIN, ARIZONA TERRITORY.

[*Official number*, —.]

Latitude ..... 32° 4′ 14″
Longitude ..... 110° 5′ 37″

Private O. W. White, Signal Service, U. S. A., in charge. Station opened September 22, 1877.

*Number of messages during year.*—Sent paid, 605; sent collect, 158; received paid, 423; received collect, 169; total, 1,355. Free business, $228.85.

*Receipts.*—This line, $282.35; other lines, $111.94. Total, $394.29.

This station has a full set of telegraph instruments and repair-tools. There are no meteorological instruments and no observations are taken.

This station has not been inspected.

## CAMP GRANT, ARIZONA TERRITORY.

[*Official number*, 182.]

Latitude ..... 32° 25′
Longitude ..... 109° 56′

Private W. H. Agey, Signal Service, U. S. A., in charge. Private Andrew Newland, Company I, Eighth Infantry, repairman.

*Number of messages during year.*—Sent paid, 708; sent collect, 189; received paid, 780; received collect, 206; sent D. H., 393; received, D. H., 227. Total, 2,503. Free business, $885.75.

*Receipts.*—This line, $307.64; other lines, $100.08; sundries, $25.21. Total, $432.93.

The station is supplied with a full set of telegraph instruments and repair-tools, and the following serviceable meteorological instruments: Two thermometers, standard; one thermometer, maximum; two thermometers, minimum; one thermometer, hygrometer; one barometer; one wind-vane (large); one wind-vane (small); one rain-gauge; one compass.

Observations are taken tri-daily and sent by telegraph. Full reports are also forwarded by mail.

*Changes during year.*—October 9, 1877, Private J. J. Falvey relieved and ordered to Apache. October 9, 1877, Private J. W. Harrison, H, Sixth Cavalry, assigned in charge. April 1, 1878, Private J. W. Harrison, H, Sixth Cavalry, relieved and ordered to Phœnix. April 1, 1878, Private W. H. Agey, Signal Service, U. S. A., assigned in charge.

The station was inspected August 9, 1877, by First Lieut. A. W. Greely, Fifth Cavalry, acting signal-officer, U. S. A., and found in good condition, the records being up to date and neatly kept, and the instruments in good order.

The office, consisting of one room, is situated in the building occupied by the regimental headquarters of the Sixth Cavalry and post commander.

Meteorological instruments were put in position July, 1877. Observations have been taken and reports sent regularly since above date.

The barometer is suspended in a window facing west, about four feet and a half from the ground. Thermometers in instrument-shelter in a window, on west side of building. Wind-vane (small) on roof of building occupied by the office. Rain-gauge on the ground near the office.

All telegraph business for Camps Apache, Thomas, San Carlos, Indian agency, Safford and Pueblo Viejo, Ariz., are relayed at this office.

The completion of the line to Apache has been a source of great benefit both to military authorities and citizens at Apache, Thomas, and adjacent settlements.

## CAMP VERDE, ARIZONA TERRITORY.

[*Official number*, 179.]

Latitude ..... 34° 23′ 42″
Longitude ..... 111° 53′ 5″

Enlisted force on duty at the station, Lance Corporal I. R. Birt, Signal Service, U. S. A., in charge. Private Oliver B. Winthrop, B, Eighth Infantry, repairman.

*Number of messages during year.*—Sent paid, 416; sent collect, 30; received paid, 226; received collect, 75; sent D. H., 1,074; received D. H., 295. Total, 2,116. Free business, $344.12.

*Receipts.*—This line, $219.60; other lines, $69.89; sundries, $7.24. Total, $296.73.

The station is supplied with a full set of telegraph instruments and repair-tools, and the following serviceable meteorological instruments: One thermometer, standard; one thermometer, maximum; one thermometer, minimum; one thermometer, hygrometer; one barometer; one wind-vane (large); one wind-vane (small); one rain-gauge; one compass.

Observations are taken tri-daily, and were sent by telegraph until April 1, 1878; since that time they have been forwarded by mail.

*Changes during year.*—July 1, 1877, Private William Baber, Signal Service, U. S. A., in charge. June 11, 1878, Sergeant William Baber, Signal Service, U. S. A., relieved and ordered to Prescott. June 11, 1878, Private Isaac R. Birt, Signal Service, U. S. A., in charge.

The station was inspected on August 23 and 24, 1877, by First Lieut. A. W. Greely, Fifth Cavalry, acting signal-officer, U. S. A., who reports that the office is quite well located, that the thermometers are in good condition, and are exposed in an excellent shelter of double blind, and that the records are in good condition and up to date.

This station was closed temporarily for six days during the month of October, 1877, by order of Lieut. Philip Reade, acting signal-officer in charge, to enable the enlisted man in charge to obey a subpœna from the judge-advocate of a general court-martial convened at Prescott, Ariz.

With the exception of the velocity of the wind full tri-daily reports are now rendered. The instrument shelter faces the northeast and affords an excellent exposure. No change has been made in the location of the office, nor is any contemplated.

Sergeant William Baber on May 15, 1878, reports that, being ordered by Lieut. C. A. Booth to temporarily close office and take charge of repair party at Prescott, Ariz., observations will be discontinued for the present, his repairman being unable to perform station duties.

## CAMPO, CALIFORNIA.

[*Official number*, 171.]

| | |
|---|---|
| Latitude | 32° 22′ |
| Longitude | 116° 28′ |

Sergeant Martin L. Hearne, Signal Service, U. S. A., is in charge, and the only enlisted man on duty at this point.

*Number of messages during year.*—Sent paid, 66; sent collect, 49; received paid, 123; received collect, 48; sent D. H., 20; received D. H., 21. Total, 327. Free business, $240.38.

*Receipts.*—This line, $75.79; other lines, $17.86. Total, $93.65.

The station is supplied with a full set of telegraph instruments and repair tools, and the following serviceable meterological instruments: one thermometer, standard; one thermometer, maximum; one thermometer, minimum; one thermometer, hygrometer; one barometer, one rain gauge, and one compass.

Observations are taken tri-daily, and were sent by telegraph up to April 1, 1878. Since that time they have been forwarded by mail.

*Changes during the year.*—July 1, 1877, Private F. C. Kelly, Signal Service, U. S. A., assigned in charge; January 1, 1878, relieved, and ordered to Tucson. January 1, 1878, Private W. H. Agey, Signal Service, U. S. A., in charge; April 1, 1878, relieved and ordered to Camp Grant. April 1, 1878, Sergeant M. L. Hearne, Signal Service, U. S. A., in charge.

The station was inspected by First Lieut. A. W. Greely, Fifth Cavalry, acting signal-officer, U. S. A., on September 18 and 19, 1877, and by Lieut. Philip Reade, Third Infantry, acting signal-officer, U. S. A., in charge of the military telegraph line in California and Arizona, on September 20, 1877, and by them found to be in fair condition.

## FILLIBUSTER, ARIZONA TERRITORY.

[*Official number*, —.]

| | |
|---|---|
| Latitude | ° ′ |
| Longitude | ° ′ |

Private W. J. Dailey is in charge of this repair-station.

There are no books or records kept at this station, nor are there any instruments.

## FLORENCE, ARIZONA TERRITORY.

[*Official number*, 172.]

| | |
|---|---|
| Latitude | 33° 2′ 32″ |
| Longitude | 111° 17′ 14″ |
| Amount of rain-fall for the year ending June 30, 1878 | 7.18 inches. |

The following enlisted men are on duty at this station:

Lance Corporal William E. Guild, Signal Service, U. S. A., in charge. Private Levi Pitts, Signal Service, U. S. A., assistant. Corporal Alex. Grignoon, I Sixth Cavalry, repairman.

*Number of messages during year.*—Sent paid, 2,998; sent collect, 918; received paid, 2,690; received collect, 813; sent D. H., 758; received D. H., 76. Total, 8,253. Free business, $245.24.

*Receipts.*—This line, $1,212.18; other lines, $1,185.82. Total, $2,398.

This station is supplied with a full set of telegraph instruments and repair tools, and the following serviceable meteorological instruments: one thermometer, standard; one thermometer, maximum; one thermometer, minimum; one thermometer, hygrometer; one anemoscope; one rain-gauge.

Observations have been taken tri-daily, and were forwarded by telegraph up to April 1, 1878; since that time they have been forwarded by mail.

*Changes during the year.*—July 1, 1877, Private H. A. Dusouchet, Signal Service, U. S. A., assigned in charge of station. July 26, 1877, Private H. A. Dusouchet, Signal Service, U. S. A., relieved and ordered to Wickenburg. July 26, 1877, Private William E. Guild, Signal Service, U. S. A., ordered to take charge of station. March 4, 1878, Private E. J. Falconer, Signal Service, U. S. A., assigned as assistant. April 1, 1878, Private E. J. Falconer, Signal Service, U. S. A., relieved and ordered to Prescott. April 1, 1878, Private Levi Pitts, Signal Service, U. S. A., assigned as assistant.

First Lieut. A. W. Greely, Fifth Cavalry, acting signal-officer, U. S. A., visited and inspected this station August 16, 1877, and found the office well located for all purposes. The instruments were in good condition, but some of the records had been neglected by Private Dusouchet. Some were only fairly kept, while others were in good condition and up to date.

Station barometer was sent to Tucson, Ariz., on June 18, 1878, by order of Lieut. C. A. Booth, acting signal-officer in charge.

## MARICOPA WELLS, ARIZONA TERRITORY.

[*Official number*, 206.]

Latitude ..... 33° 11′
Longitude ..... 112° 4′

This station was in operation from July 1, 1877, to March 14, 1878, when it was moved to Phœnix.

*Number of messages.*—Sent paid, 335; sent collect, 154; received paid, 246; received collect, 98; sent D. H., 61; received D. H., 29. Total, 923. Free business, $158.69.

*Receipts.*—This line, $125.44; other lines, $32.65. Total, $158.09.

Tri-daily observations were taken at this station, and sent by telegraph until office was moved to Phœnix.

*Changes.*—July 1, 1877, Sergeant I. R. Birt, Signal Service, U. S. A., in charge; August 1, 1877, Private W. Story, Signal Service, U. S. A., in charge; August 11, 1877, Lance Sergeant W. C. Barden, Signal Service, U. S. A., in charge; September 22, 1877, Sergeant I. R. Birt, Signal Service, U. S. A., in charge; September 22, 1877, Lance Sergeant W. C. Barden, Signal Service, U. S. A., assistant; March 14, 1878, Private I. R. Birt, Signal Service, U. S. A., and station ordered to Phœnix.

The station was inspected August 28, 1877, by First Lieut. A. W. Greely, Fifth Cavalry, acting signal-officer, U. S. A. The instruments and records were found in good condition, and the latter posted to date.

## PHŒNIX, ARIZONA TERRITORY.

[*Official number*, 175.]

Latitude ..... 33° 18′
Longitude ..... 112° 0′ 15″

Private J. W. Harrison, Company H, Sixth Cavalry, in charge. Private Thomas Farroll, Company I, Sixth Cavalry, repairman.

*Number of messages during the year.*—Sent paid, 335; sent collect, 154; received paid, 246; received collect, 98; sent D. H., 61; received D. H., 29. Total, 923. Free business, $280.25.

*Receipts.*—This line, $911.52; other lines, $558.70. Total, $1,470.22.

This station is supplied with a full set of telegraph instruments, repeater, and line-repair tools, and the following serviceable meteorological instruments: two thermometers, standard; one thermometer, maximum; one thermometer, minimum; two thermometers, hygrometer; one barometer; two anemoscopes; one wind-vane; three rain-gauges; two compasses.

Observations have been taken tri-daily, and were sent by telegraph up to April 1, 1878; since that time have been forwarded by mail.

*Changes during year.*—July 1, 1877, Private J. J. Nanry, Signal Service, U. S. A., in charge of station; December 19, 1877, Private W. Manderfeld, Signal Service, U. S. A., in charge of station; December 19, 1877, Private J. J. Nanry, Signal Service, U. S. A., relieved and ordered to Yuma; March 4, 1878, Private I. R. Birt, Signal Service, U. S. A., assigned to duty in charge; March 4, 1878, Private W. Manderfeld, Signal Service, U. S. A., assigned to duty as assistant; March 15, 1878, Private W. Manderfeld, Signal Service, U. S. A., relieved and ordered to Burkes; April 1, 1878, Private J. W. Harrison, H, Sixth Cavalry, assigned to duty as assistant; June 11, 1878, Private I. R. Birt, Signal Service, U. S. A., relieved and ordered to Melvin Station; June

11, 1878, Private J. W. Harrison, H, Sixth Cavalry, assigned to duty in charge of station.

First Lieut. A. W. Greely, Fifth Cavalry, acting signal-officer, U. S. A., inspected this station August 27, 1877, and found the office and papers in good condition and the records well kept, evidencing care and interest on the part of Private Nanry in his work.

The office was closed from December 22 to December 29, 1877, and no observations taken, the observer being ordered to assume temporary charge of station at Maricopa Wells, Ariz. Barometrical observations commenced January 13, 1878. The loop to Phœnix was completed March 13, 1878.

## PRESCOTT, ARIZONA TERRITORY.

[*Official number*, 176.]

| | |
|---|---|
| Latitude | 34° 29′ 6″ |
| Longitude | 112° 30′ 30″ |
| Amount of rain-fall for the year ending June 30, 1878 | 13.81 inches. |

*Enlisted men and employés on duty at station.*—J. S. Hunter, employé, temporarily in charge; Private H. A. Dusouchet, Signal Service, U. S. A., assistant; Sergeant William Baber, Signal Service, U. S. A., in charge meteorological office, temporarily absent in charge of repair party.

*Number of messages during year.*—Sent paid, 3,598; sent collect, 1,065; received paid, 3,565; received collect, 1,214; sent D. H., 14,993; received D. H., 3,882. Total 28,317. Free business, $2,586.54.

*Receipts.*—This line, $1,796.41; other lines, $3,299.40; sundries, $550.40. Total, $5,646.21.

A full set of telegraph instruments and repair tools and the following meteorological instruments are in use at this station: One thermometer, standard; one thermometer, maximum; one thermometer, minimum; one thermometer, hygrometer; one barometer; one anemoscope; one anemometer; one rain-gauge.

Observations are taken tri-daily and sent by telegraph to office Chief Signal-Officer. Full reports are also forwarded by mail.

*Changes during year.*—July 1, 1877, Private William Story, Signal Service, U. S. A., in charge; July 17, 1877, F. H. Merrill, employé, in charge; September 22, 187-, Private W. H. Agey, Signal Service, U. S. A., assistant operator; October 9, 1877, J. S. Hunter, employé, chief operator; January 1, 1878, Private W. H. Agey, Signal Service, U. S. A., relieved and ordered to Campo; March 9, 1878, Private Newton Phelps, Signal Service, U. S. A., assigned assistant operator; April 1, 1878, Private E. J. Falconer, Signal Service, U. S. A., assigned assistant operator; April 1, 1878, Sergeant Newton Phelps, Signal Service, U. S. A., relieved and ordered to Tres Alamos; June 11, 1878, Sergeant William Baber, Signal Service, U. S. A., assigned charge of meteorological office; June 11, 1878, Private H. A. Dusouchet, Signal Service, U. S. A., assigned assistant operator; June 11, 1878, Private E. J. Falconer, Signal Service, U. S. A., relieved and ordered to Wickenburg.

The station was inspected by First Lieut. A. W. Greely, Fifth Cavalry, acting signal officer, U. S. A., from August 22 to August 25, 1877. The office is well located for handling all official business, and is commodious and suitable. The office is, generally, in good condition.

The following extracts are made from the semi-annual reports of the sergeant:

The United States Military Telegraph Line has proved to be an inestimable benefit to the press, government, and the commercial community, and is steadily increasing in favor and usefulness; in fact, without the telegraph line the people would be almost isolated from the civilized world.

The office in the city of Prescott was put on main line May 26, 1878. The proprietors give the use of the room to the telegraph line rent free.

No records or forms of any kind are at the station for period of time previous to May 12, 1877, Lance Sergeant Ochus having, it is believed, destroyed them at the time of his desertion.

All records are complete from May 12, 1877, and the original record, Forms 4 and 22, have been made regularly without break or interruption.

## SAN DIEGO, CALIFORNIA.

[*Official number*, 75.]

| | |
|---|---|
| Latitude | 32° 31′ 59″ |
| Longitude | 117° 5′ 15″ |
| Mean barometer for the year ending June 30, 1878 | 29.993 |
| Mean temperature for the year ending June 30, 1878 | 61°.3 |
| Amount of rain-fall for the year ending June 30, 1878 | 16.10 inches. |

(A report from this station will also be found among the reports of regular stations.)

The following is the list of enlisted men and civilian employés on duty at this office:

J. M. Ramos, citizen employé, operator in charge; Private J. K. McKenna, Signal Service, U. S. A., assistant.

*Number of messages.*—Sent paid, 3,447; sent collect, 1,241; received paid, 4,643; received collect, 1,373; sent D. H., 1,078; received D. H., 654. Total, 12,436.

On business connected with the government and maintenance of line: Number of words sent, 116,449; number of words received, 119,869. Total, 236,318. Free business, $1,257.47.

*Receipts.*—This line, $2,189.72; other lines, $66.76; sundries, $72. Total, $2,328.48.

*Changes.*—July 1, 1877, Sergeant W. T. Blythe, Signal Service, U. S. A., operator in charge; July 17, 1877, J. M. Ramos, citizen employé, assistant; August 11, Private William Story, Signal Service, U. S. A., assistant; August 11, Sergeant W. T. Blythe, Signal Service, U. S. A., relieved; August 11, J. M. Ramos, employé in charge; December 1, 1877, Corporal William Story, Signal Service, U. S. A., relieved and assigned at Yuma; January 1, 1878, Private J. J. Munroe, Signal Service, U. S. A., assistant; March 1, 1878, Private J. J. Munroe, Signal Service, U. S. A., relieved and ordered to Burkes; March 4, 1878, Private J. K. McKenna, Signal Service, U. S. A., assigned assistant operator.

Meteorological office, Sergeant Marion M. Sickler in charge.

*Changes during year.*—July 1, 1877, Sergeant C. E. Howgate, Signal Service, U. S. A., in charge; July 9, 1877, Sergeant C. E. Howgate, Signal Service, U. S. A., relieved; July 9, 1877, Sergeant Marion M. Sickler, Signal Service, U. S. A., in charge.

The office was located in room No. 7, Horton Bank building, from July 1, 1877, to April 24, 1878, when, pursuant to instructions from the Chief Signal Officer, it was moved to same building with telegraph offices, corner of Fifth and D streets.

Seven daily observations are taken at this station, and tri-daily reports are sent by telegraph to office of the Chief Signal Officer.

Full reports are forwarded by mail.

Local reports, Bulletins and Form 22 are furnished and published by the San Diego Daily Union and San Diego Daily News.

The office is regularly visited by the meteorological committee of San Diego Society of Natural History.

When the line is down east or west of Santa Fé, the signals are concentrated at this station and sent via San Francisco.

The following meteorological instruments are at this station: Two thermometers, standard; one thermometer, maximum; one thermometer, minimum; one thermometer, *hygrometer*; two barometers; two anemometers; two self-registers for anemometers; one wind-vane (large); one wind-vane, (small); one rain-gauge.

The station was inspected by First Lieut. A. W. Greely, Fifth Cavalry, acting signal officer, U. S. A., from September 22 to 25, 1877. All the books and records, except the telegraph register and check ledger, appear to have been neglected by Sergeant W. T. Blythe when he was in charge, but the telegraph work appears to have been promptly handled by him and Private Story, both of whom stand well in the general community.

## STANWIX, ARIZONA TERRITORY.

[*Official number*, 177.]

| | |
|---|---|
| Latitude | 32° 57′ |
| Longitude | 113° 25′ 12″ |

The station was inspected by First Lieut. A. W. Greely, Fifth Cavalry, acting signal-officer, U. S. A., on August 29, 1877, and the office found to be located in a small room in the only house in the place. The records were up to date and in good condition.

This office was in operation from July 1 to December 1, 1877, under charge of Private W. J. Daily, Signal Service, U. S. A., when it was moved to Burkes, eight miles east of Stanwix.

## TRES ALAMOS, ARIZONA TERRITORY.

[*Official number*, —.]

| | |
|---|---|
| Latitude | 32° 9′ |
| Longitude | 110° 12′ |

Sergeant Newton Phelps, Signal Service, U. S. A., is in charge.

*Number of messages during year.*—Sent paid, 197; sent collect, 89; received paid, 145; received collect, 28; sent D. H., 134; received, D. H., 100. Total, 693. Free business, $51.36.

*Receipts.*—This line, $58.85; other lines, $11.98. Total, $70.83.

The station is supplied with a full set of telegraph instruments and repair tools. No meteorological instruments at, and no reports made from, this station.

*Changes during the year.*—July 1, 1877, Private Levi Pitts, Signal Service, U. S. A., in charge; April 1, 1878, Private Levi Pitts, Signal Service, U. S. A., relieved and ordered to Florence; April 1, 1878, Sergeant Newton Phelps, Signal Service, U. S. A., assigned in charge.

The station was inspected August 11 and 12, 1877, by First Lieut. A. W. Greely, Fifth Cavalry, acting signal-officer, U. S. A. The office is in the best location to be had, and is suitable for the accommodation of the present business.

Sergeant Newton Phelps, under date of May 1, 1878, states that the only record kept at station is that of telegrams sent and received. The record commences with June 22, 1877.

## TUCSON, ARIZONA TERRITORY.

[*Official number*, 178.]

| | |
|---|---|
| Latitude | 32° 14′ |
| Longitude | 110° 56′ |
| Amount of rain-fall for the year ending June 30, 1878 | 13.03 inches. |

The following-named enlisted men are on duty at this station: Lance Corporal George V. Phillips, Signal Service, U. S. A., in charge; Private Fred. C. Kelley, Signal Service, U. S. A., assistant; Private George Wilts, M, Sixth Cavalry, repairman.

*Number of messages during year.*—Sent paid, 3,582; sent collect, 1,079; received paid, 3,340; received collect, 1,294; sent D. H., 2,137; received D. H., 1,428. Total, 12,860. Free business, $987.18.

*Receipts.*—This line, $1,960.51; other lines, $1,912.39; sundries, $192.94. Total, $4,065.84.

The station is supplied with a full set of telegraph instruments, including "button-repeater" and the following meteorological instruments: One thermometer, standard; one thermometer, maximum; one thermometer, minimum; one thermometer, hygrometer; one barometer; one wind-vane (large); one wind-vane (small); one rain-gauge; one anemometer.

Observations are taken tri-daily and sent by telegraph to Office of the Chief Signal-Officer. Full reports are also forwarded by mail.

July 1, 1877, Private W. C. Barden, Signal Service, U. S. A., assigned to duty in charge; July 1, 1877, Private C. Butler, Signal Service, U. S. A., assigned to duty as assistant; July 1, 1877, Private C. M. Clark, Signal Service, U. S. A., assigned to duty as assistant; August 11, 1877, Private W. C. Barden, Signal Service, U. S. A., relieved and ordered to Maricopa; August 11, 1877, Sergeant W. T. Blythe, Signal Service, U. S. A., assigned to duty in charge; October 9, 1877, Private C. M. Clark, Signal Service, U. S. A., relieved and ordered to Apache; November 8, 1877, Sergeant W. T. Blythe, Signal Service, U. S. A., relieved and ordered to Yuma; November 8, 1878, Private G. V. Phillips, Signal Service, U. S. A., assigned in charge; June 1, 1878, Private F. C. Kelley, Signal Service, U. S. A., assigned to duty as assistant.

The station was inspected by First Lieut. A. W. Greeley, Fifth Cavalry, acting signal-officer, U. S. A., on August 13, 14, and 15, 1877, and found not to be fully equipped with telegraph instruments; otherwise it was in good condition.

The situation of the office is the same as at last report, on the second floor of building northwest corner Main and Congress streets, the best location in town for the display of meteorological instruments.

From January 1 to June 19, partial reports, and from June 19 to 30th, full meteorological reports transmitted to Chief Signal-Officer.

Maximum and minimum thermometers were placed in position January 31, and readings taken from same from February 1, 1878.

The following extract is made from the semi-annual reports from this station:

> On May 30, 1878, a meteor of supposed large dimension fell on mountains 10 miles northeast of town, leaving trail of smoke one mile in length; upon striking earth a huge volume of smoke ascended, and was visible for from 10 to 15 minutes.

Barometer No. 180 arrived at station on June 19, 1878, and observations commenced with afternoon report of that date.

## WICKENBURG, ARIZONA TERRITORY.

[*Official number*, 168.]

Latitude..... 33° 58′
Longitude..... 112° 42′

Private E. J. Falconer, Signal Service, U. S. A., is in charge of station work.

Corporal Oliver Vowles, K, Sixth Cavalry, is on duty as repairman.

*Number of messages during year.*—Sent paid, 920; sent collect, 361; received paid, 758; received collect, 212. Total, 2,251. Free business, $153.44.

*Receipts.*—This line, $363.22; other lines, $292.89. Total, $656.11.

The station is provided with a full set of telegraph instruments and repair tools, and the following serviceable meteorological instruments: One thermometer, standard; one thermometer, maximum; one thermometer, minimum; one thermometer, hygrometer; one anemoscope; one rain-gauge; one compass.

Observations are taken tri-daily, and were sent by telegraph up to April 1, 1878; since that time have been forwarded by mail.

*Changes during year.*—July 1, 1877, Private William E. Guild, Signal Service, U. S. A., assigned to duty in charge; July 26, 1877, Private William E. Guild, Signal Service, U. S. A., relieved and ordered to Florence; July 26, 1877, Private H. A. Dusouchet, Signal Service, U. S, A., assigned to duty in charge; June 11, 1878, Private H. A. Dusouchet, Signal Service, U. S. A., relieved and ordered to Prescott; June 11, 1878, Private E. J. Falconer, Signal Service, U. S. A., assigned in charge.

This station was inspected by Lieut. A. W. Greely, Fifth Cavalry, acting signal-officer, U. S. A., August 19, 1877.

The office is well located and is large and commodious. The records were not up to date, and showed evidences of neglect on the part of Private W. E. Guild.

The office was moved on February 20 and 21, 1878.

## YUMA, ARIZONA TERRITORY.

[*Official number*, 169.]

| | |
|---|---|
| Latitude | 32° 43′ 32″ |
| Longitude | 114° 36′ 9″ |
| Amount of rain-fall for the year ending June 30, 1878 | 2.00 inches. |

The following-named enlisted men are on duty at this station:

Corporal and Lance Sergeant William Story, Signal Service, U. S. A., in charge; Private M. A. Cunningham, assistant; Private Daniel Cameron, L, Sixth Cavalry, repairman.

*Number of messages during year.*—Sent paid, 2,366; sent collect, 1,466; received paid, 3,077; received collect, 758; sent D. H., 2,942; received D. H., 1,340. Total, 11,949. Free business, $569.60.

*Receipts.*—This line, $933.21; other lines, $350.75. Total, $1,283.96.

A full set of telegraphic instruments and repair tools, and the following meteorological instruments, are at this station: Four thermometers, standard; two thermometers, maximum; two thermometers, minimum; two thermometers, hygrometer; two barometers; one anemometer; one anemoscope; two compasses; one rain-gauge.

Observations are taken tri-daily, and are sent by telegraph to office Chief Signal-Officer. Full reports are also forwarded by mail.

*Changes during year.*—July 1, 1877, Private G. V. Phillips, Signal Service, U. S. A., assigned to duty in charge of station; July 1, 1877, Private O. W. White, Signal Service, U. S. A., as assistant; September 22, 1877, Private O. W. White relieved and ordered to Camp Thomas; November 8, 1877, Sergeant W. T. Blythe, Signal Service, U. S. A., assigned in charge; November 8, 1877, Private G. V. Phillips, Signal Service, U. S. A., relieved and ordered to Tucson; November 14, 1877, Private J. J. Monroe, Signal Service, U. S. A., assigned as assistant operator; December 1, 1877, Corporal William Story, Signal Service, U. S. A., assigned in charge; December 1, 1877. Private W. T. Blythe,

Signal Service, U. S. A., relieved and ordered to Santa Fé; December 19, 1877, Private J. J. Nanry, Signal Service, U. S. A., assigned as assistant; January 1, 1878, Private J. J. Monroe, Signal Service, U. S. A., relieved and ordered to San Diego; March 1, 1878, Private William J. Daily, Signal Service, U. S. A., assigned as assistant; March 15, 1878, Private M. A. Cunningham, Signal Service, U. S. A., assigned as assistant operator.

The services of the assistant have been required the greater portion of the time on telegraph construction duty, in consequence of which the whole station work (telegraph office and meteorological station) devolves upon one person, which is thought rather severe, although the work appears to have been performed satisfactorily.

Lieut. Philip Reade, acting signal-officer and superintendent, arrived and inspected station March 7, 1878.

No change has been made in location of office or instruments since last report.

By direction of the Chief Signal-Officer a copy of monthly Form 22, giving temperature, rain-fall, and direction of wind, has been furnished the chief engineer of the Central Pacific Railroad Company, San Francisco, Cal.

A maximum thermometer was set up March 8, 1878, and observations on maximum temperature have been taken since that date.

The station was inspected by Lieut. A. W. Greely, Fifth Cavalry, acting signal-officer, U. S. A., on August 29 and 30 and September 1, 1877, and by Second Lieut. Philip Reade, Third Infantry, acting signal-officer, U. S. A., in charge of California and Arizona Military Telegraph Line, March 8, 1878. Station found in good condition.

The following report of stations on the United States Military Telegraph Line, New Mexico Division, is compiled from the annual report of Lieut. James Allen, Third Cavalry, acting signal-officer, U. S. A., and from data on file in the office of the Chief Signal-Officer of the Army:

*Table showing stations on the United States Military Telegraph Line in New Mexico from which reports have been received during the year ending June 30, 1878, with the kind of reports received, whether complete or partial.*

| Name of station. | Reports commenced. | Date discontinued. | Number of reports by telegraph (daily). | Character of reports received by mail on Form 4 (weekly). |
|---|---|---|---|---|
| El Paso, Tex. | Apr. 13, 1878 | | 3 | Observations of thermometer, hygrometer, direction of wind and state of weather, clouds, rain-fall, and maximum and minimum thermometers taken three times a day. |
| Fort Bayard, N. Mex. | (*) | May 22, 1878 | 0 | |
| Fort Craig, N. Mex. | (*) | | 3 | Complete observations, except velocity of wind, taken three times a day. |
| La Mesilla, N. Mex. | (*) | | 3 | Complete observations taken three times a day. |
| Santa Fé, N. Mex. | (*) | | 3 | Complete observations taken seven times a day. |
| Silver City, N. Mex. | May 22, 1878 | | 3 | Complete observations, except maximum and minimum thermometers, taken seven times a day. |

*Reporting at date of last annual report, June 30, 1877.

## ALBUQUERQUE, NEW MEXICO.

[*Official number*, —.]

Latitude ..... 35° 2′
Longitude ..... 106° 40′

No meteorological reports are furnished from this station, except sunset reports.

No meteorological instruments at this office.

Operator in charge, Private R. J. White, Signal Service, U. S. A., who gives satisfaction.

On June 30, 1877, Mr. W. M. Smith, civilian, was the operator in charge. He was relieved by present incumbent on February 10, 1878.

The station was inspected by First Lieut. A. W. Greely, Fifth Cavalry, acting signal-officer, U. S. A., on July 20, 1877. The office is located on the main street, and is neat and commodious. The records are in good order and up to date. The office-room is furnished free of rent by the citizens, and in case the office receipts do not equal the pay of the operator they make up the difference.

## BELEN, NEW MEXICO.

[*Official number*, —.]

Latitude ..... ° ′
Longitude ..... ° ′

There are no meteorological records kept at this station, as it is only a branch of the Los Lunas office.

The station was inspected on July 21, 1877, by First Lieut. A. W. Greely, Fifth Cavalry, acting signal-officer, U. S. A., in connection with his inspection of that office. The instruments, consisting of one key, relay and sounder, with a switch and ground wire, were in good order, and sufficient for the office.

The office-room is furnished free of rent.

No books or records are kept here, as all the business done is entered in those at Los Lunas.

## EL PASO, TEXAS.

[*Official number*, 195.]

Latitude ..... ° ′
Longitude ..... ° ′

Full telegraphic reports and sunset observations are taken at this office.

The meteorological instruments in use are one standard thermometer; one hygrometer; one maximum thermometer; one anemometer; one self-register; one rain-gauge; one minimum thermometer.

The operator and observer is Private Robert Reeder, Signal Service, U. S. A., who has been stationed here since establishment of office, November 5, 1877, and has given satisfaction.

There are eight enlisted men, of the Fifteenth Infantry, on duty with this line as repairmen.

On June 30, 1877, there were employed on this section one civilian repairman, who was discharged February 28, 1878, and a civilian teamster, who was discharged December 31, 1877.

The station has not been inspected.

Telegraphic reports were first received from El Paso on April 1, 1873.

Private Robert Reeder reports on May 17, 1878, that the record of sunset observations has been kept since January 1, 1878, and of hygrometer, thermometer, direction and force of the wind, clouds and state of weather, since May 1, 1878.

## FORT BAYARD, NEW MEXICO.

[*Official number*, 170.]

| | |
|---|---|
| Latitude | 32° 46′ |
| Longitude | 108° 10′ |

No meteorological reports are furnished except sunset observations. No meteorological instruments are at this office.

Private F. W. Mallory, Company D, Fifteenth Infantry, acts as operator, and does very well under the circumstances.

Private H. Voss, Signal Service, U. S. A., was the operator and observer on June 30, 1877; he was relieved by Private William D. McChesney, Signal Service, U. S. A., and discharged for misconduct May 16, 1878. On May 22, 1878, Private McChesney and all meteorological instruments and records were transferred to Silver City, N. Mex.

The station was inspected by First Lieut. A. W. Greely, Fifth Cavalry, acting signal-officer, U. S. A., on August 2 and 3, 1877. The office was found to be neat, comfortable, and commodious; records up to date, neat and well kept, and instruments in good condition and sufficient for the office.

Meteorological records and books transferred to Silver City, and received at latter station on May 15, 1878.

## FORT CRAIG, NEW MEXICO.

[*Official number*, 180.]

| | |
|---|---|
| Latitude | 33° 42′ |
| Longitude | 107° 8′ |

Full telegraphic and sunset observations are taken at this office.

Meteorological instruments in use: Two barometers; one standard thermometer; one maximum thermometer; one minimum thermometer; one anemometer; one self-register; one wind-vane; one rain-gauge; one hygrometer.

Private Eugene Peters, Signal Service, U. S. A., is the operator and observer in charge; he has not given satisfaction and has been recommended for discharge.

On June 30, 1877, Private C. J. Costello, Signal Service, U. S. A., was the operator and observer. He was discharged for misconduct February 25, 1878.

Local and midday observations were discontinued on April 10, 1878.

First Lieut. A. W. Greely, Fifth Cavalry, acting signal-officer, U. S. A., visited and inspected the station July 22, 23, and 25, 1877, and found the office commodious, clean, and well located. The records were up to date and books in good condition, and the instruments were in good condition and sufficient for the office. The observer, Private J. W. Costello, was well spoken of by all as attentive to his duties and well behaved.

## FORT CUMMINGS, NEW MEXICO.

[*Official number*, —.]

| | |
|---|---|
| Latitude | 32° 18′ |
| Longitude | 107° 32′ |

This station is a repair station, and is in charge of an enlisted man of the Fifteenth Infantry. Private James Connolly, Company E, Fifteenth Infantry, was assigned to duty here on June 1, 1878.

## FORT SELDEN, NEW MEXICO.

[*Official number*, —.]

Latitude ..... ° ′
Longitude ..... ° ′

First Lieut. A. W. Greely, Fifth Cavalry, acting signal-officer, U. S. A., inspected this station on July 26, 27, and 30, 1877. The office is well located, there being nothing but the post to accommodate. There are no meteorological instruments at the station.

The records were very poorly kept, and not up to date. The office is operated by an enlisted man of the Fifteenth Infantry, who is detailed for the purpose, and is merely the headquarters of a repair party, and will probably be broken up in the autumn when Fort Selden is eventually abandoned.

## LA MESILLA, NEW MEXICO.

[*Official number*, 181.]

Latitude ..... 32° 17′
Longitude ..... 106° 48′

This station was inspected by First Lieut. A. W. Greely, Fifth Cavalry, acting signal-officer, U. S. A., on July 28 and 29, 1877.

The office is well located for all telegraphic purposes; the roof-instruments have excellent exposure; but the shelter for instruments is not good, but can be made fair. The books were found in good condition, though formerly they had not been well kept. The instruments—meteorological and telegraphic—are also in good condition, and are sufficient for the office. Private R. J. White was in charge, and was well spoken of at Mesilla.

Full telegraphic and sunset observations are taken at this office.

The following meteorological instruments are in use at this station: Two barometers; one standard thermometer; one hygrometer; one maximum thermometer; one minimum thermometer; one anemometer; one self-register; one wind-vane, one rain-gauge.

Corporal Martin Hoover, Signal Service, U. S. A., is the operator and observer, and gives entire satisfaction.

On June 30, 1877, Mr. Henry Fenton, civilian, was the operator. He was transferred elsewhere on September 15, 1877.

Local and midday observations were discontinued April 10, 1878, by direction of Lieut. James Allen, acting signal-officer.

## LOS CRUCES, NEW MEXICO.

[*Official number*, —.]

Latitude ..... ° ′
Longitude ..... ° ′

This station was inspected in connection with La Mesilla, of which it is a branch office, by First Lieut. A. W. Greely, Fifth Cavalry, acting signal-officer, U. S. A., on July 28 and 29, 1877.

No meteorological reports are made except sunset reports. No meteorological instruments at this office.

Mr. W. G. Adams, civilian, has been the operator in charge since establishment of office, October 10, 1877, and has given satisfaction.

## LOS LUNOS, NEW MEXICO.

[*Official number*, —.]

| | |
|---|---|
| Latitude | ° ′ |
| Longitude | ° ′ |

First Lieut. A. W. Greely, Fifth Cavalry, acting signal-officer, U. S. A., inspected this station July 21, 1877. The office is a large and commodious room in one of the principal buildings in the town. The record books were up to date and well and neatly kept, and the instruments in good condition. The office is furnished rent free by the people of Los Lunos, and when the amount of receipts at the office is not sufficient to pay the operator the deficiency is made up by them.

No meteorological reports are made from this station except sunset reports. There are no meteorological instruments at this office.

Mr. W. M. Smith, civilian, operator (who gives satisfaction), is at present in charge.

On June 30, 1877, Mr. A. E. Lindsay, civilian, was the operator. He resigned February 10, 1878, when present incumbent was placed in charge.

## SANTA FÉ, NEW MEXICO.

[*Official number*, 69.]

| | |
|---|---|
| Latitude | 35° 41′ |
| Longitude | 106° 10′ |
| Mean barometer for the year ending June 30, 1878 | 29.793 |
| Mean temperature for the year ending June 30, 1878 | 47°.1 |
| Amount of rain-fall for the year ending June 30, 1878 | 15.11 inches. |

(A report from this station will also be found in the list of regular stations.)

The station was inspected from July 11 to 16, 1877, by First Lieut. A. W. Greely, Fifth Cavalry, acting signal-officer, U. S. A., who found the telegraph office excellently located for business, and in a very comfortable and convenient building near the post-office and main business houses. The record books were to date and well and carefully kept, the instruments, &c., in good condition, and the general condition of the office was excellent.

Full meteorological reports are made by this office.

*Meteorological instruments in use.*—Three barometers; two standard thermometers; one maximum thermometer; one minimum thermometer; one hygrometer; one anemometer; one self-register; one anemoscope; one large wind-vane; one rain-gauge.

*Force on duty.*—Sergeant Max Frost, Signal Service, U. S. A., observer and clerk in the superintendent's office; Mr. A. K. Sinnott, chief operator of line and manager of office; one enlisted man, Fifteenth Infantry, who performs duty as repairman and messenger.

Sergeant Max Frost and Mr. Sinnott have given entire satisfaction in the performance of their respective duties, being fully competent and very conscientious in the discharge of same. The force at this office is entirely inadequate, but cannot be increased, owing to the scarcity of men and there being no funds to hire additional help.

On June 30, 1877, there was on duty at this office the following force: Sergeant Max Frost, Signal Service, U. S. A., chief clerk and in charge of repairmen; J. W. Anderson and E. Rowcroft, civilian clerks; G. A.

Stolbrand, civilian, chief operator, and Private Martin Hoover, Signal Service, U. S. A. Mr. G. A. Stolbrand resigned his position August 30, 1877. Mr. J. W. Anderson was discharged September 1, 1877. Mr. E. Rowcroft was discharged April 1, 1878, and Private Hoover transferred to duty elsewhere September 15, 1877.

## SILVER CITY, NEW MEXICO.

[*Official number*, 194.]

Latitude ..... ° ′
Longitude ..... ° ′

The station was inspected August 3, 1877, by First Lieut. A. W. Greely, Fifth Cavalry, acting signal officer, U. S. A., and was found in excellent condition as regards records and instruments. Everything indicated that Mr. B. W. Rice, the operator, was interested in and attentive to his work. The office is well located on Main street, and is convenient to the principal business houses.

Full meteorological observations are made at this station.

The following meteorological instruments are in use at this station: Two barometers; one standard thermometer; one hygrometer; one maximum thermometer; one minimum thermometer; one anemometer; one self-register; one wind-vane; one rain-gauge.

Sergeant William T. Blythe and Private William D. McChesney, Signal Service, U. S. A., are on duty as operator and observer, and have given satisfaction.

The operator on June 30, 1877, was Mr. C. O. Butts, civilian, who resigned, and was relieved by Mr. Henry Fenton, civilian, on September 15, 1877. Mr. Fenton resigned, and was relieved by Sergeant Blythe on December 1, 1877.

Private McChesney was assigned to duty as assistant, and a full meteorological station established on May 22, 1878.

Private W. D. McChesney arrived at station May 16, 1878, with all meteorological instruments. Instruments put up with as good exposure as possible. The tube of barometer No. 307 was found to contain a speck of air.

Observations commenced on May 17, 1878. No exposure could be found for the maximum and minimum thermometers, and readings of these instruments are not taken.

Elevation of station and a constant correction for elevation received from office Chief Signal-Officer, with instructions to work up a table of corrections for elevations. Elevation of station, 6,893.

On May 18, 1878, the property was transferred to Private W. T. Blythe.

Order to use constant correction rescinded per instructions from office Chief Signal-Officer.

On June 26, 1878, commenced moving office and continued it on June 27. Except a break of about twelve hours in wind-register, the regular work was not interrupted.

## SOCORRO, NEW MEXICO.

[*Official number*, —.]

Latitude ..... ° ′
Longitude ..... ° ′

Private G. L. Wright, Fifteenth Infantry, was on duty at this station as repairman until April 10, 1878, when he was transferred to Belen.

The following report of stations on the United States Military Telegraph Line, Texas division, is compiled from the annual report of Lieut. George S. Grimes, Second Artillery, acting signal-officer, U. S. A., and from data on file in the office of the Chief Signal-Officer of the Army:

*Table showing stations on the United States Military Telegraph Line in Texas from which reports have been received during the year ending June 30, 1878, with the kind of reports sent, whether complete or partial.*

| Name of station. | Reports commenced— | Number of reports by telegraph (daily). | Character of reports received by mail on Form 4 (weekly.) |
|---|---|---|---|
| Boerne, Tex | (*) | 0 | Complete observations taken three times a day. |
| Brackettville, Tex | (*) | 0 | Complete observations taken seven times a day. |
| Brownsville, Tex | (*) | 3 | Complete observations taken three times a day. |
| Cambridge, Tex | (*) | 0 | Closed and reports discontinued on January 5, 1878. Office reopened for commercial business June 1, 1878. |
| Castroville, Tex | (*) | 0 | Complete observations (except velocity of wind) taken three times a day. |
| Coleman City, Tex | (*) | 0 | Complete observations taken three times a day. |
| Concho, Tex | (*) | 0 | Complete observations taken six times a day. |
| Decatur, Tex | (*) | 0 | Complete observations taken once a day. |
| Denison, Tex | (*) | 3 | Complete observations taken seven times a day. |
| Eagle Pass, Tex | (*) | 3 | Complete observations taken three times a day. |
| Edinburg, Tex | (*) | 0 | Observations of thermometer, hygrometer, direction of wind and state of weather, clouds and rain-fall taken once a day. |
| Fort Davis, Tex | April 1, 1878 | 3 | Complete observations taken three times a day. |
| Fort Griffin, Tex | (*) | 3 | Complete observations taken three times a day. |
| Fort McKavett, Tex | (*) | 0 | Complete observations taken once a day. |
| Fort Sill, Ind. T | (*) | 3 | Complete observations taken three times a day. |
| Fredericksburg, Tex | (*) | 0 | Complete observations taken once a day. |
| Graham, Tex | (*) | 0 | Complete observations taken once a day. |
| Henrietta, Tex | Feb. 14, 1878 | 0 | Complete observations taken once a day. |
| Jacksboro', Tex | (*) | 0 | Complete observations taken three times a day. |
| Laredo, Tex | (*) | 0 | Complete observations taken six times a day. |
| Mason, Tex | (*) | 3 | Complete observations taken three times a day. |
| Pilot Point, Tex | (*) | 0 | Complete observations taken once a day. |
| Rio Grande City, Tex | (*) | 0 | Complete observations taken once a day. |
| San Antonio, Tex | (*) | 3 | Complete observations taken three times a day. |
| Stockton, Tex | (*) | 3 | Complete observations taken three times a day. |
| Uvalde, Tex | (*) | 0 | Complete observations taken once a day. |

* Reporting at date of last annual report, June 30, 1877.

## BOERNE, TEXAS.

[*Official number*, 207.]

Latitude ..... 29° 48′
Longitude ..... 98° 39′

Mr. Eugene Lane was in charge of this office during the year, except during the following intervals, in which the exigencies of the service and the small operating force on the lines necessitated the removal of Mr. Lane to other points (and the consequent closing of this office) where the services of an operator were imperatively and immediately needed: from January 1, 1878, to February 6, 1878; from April 1, 1878, to May 10, 1878, and June 22, 1878.

This section maintains in repair about forty miles of wire.

The elevation of station is one thousand three hundred and thirty-three feet.

The office is conveniently located, and is sufficient for the amount of business.

A complete outfit of meteorological instruments is at the station, except the dry-bulb thermometer, which has been broken.

No press reports or bulletins are issued.

Station inspected November 28, 1877, by First Lieut. George S. Grimes, Second Artillery, acting signal-officer, U. S. A.

The office records were found in excellent order, and the duties of the office, both meteorological and telegraphic, seem to be faithfully and intelligently performed.

Lieut. George S. Grimes, acting signal-officer, U. S. A., reports, under date of January 3, 1878, that it has been found necessary to close office, temporarily, and assign the operator to duty at San Antonio, Tex. Weather reports from this station will, therefore, be suspended from December 31, 1877, until the station can be re-established.

Office closed April 1, 1878, and reopened May 10, 1878.

Office closed on June 22, 1878, and Mr. Eugene Lane directed to report to Sergeant J. T. Bradley, at San Antonio, Tex., for duty at that station during illness of Private Milburn; Mr. Lane to return to Boerne and resume his duties upon the recovery of Private Milburn.

## BRACKETTVILLE, TEXAS.

[*Official number*, 204.]

| | |
|---|---|
| Latitude | 29° 17′ |
| Longitude | 100° 25′ |
| Amount of rain-fall for the year ending June 30, 1878 | 26.18 inches. |

Sergeant D. D. Stansell reports that the office is located in building corner of Main and Fort street.

The office occupies half of the main building, also back room adjoining, in the window of which are placed the instruments.

Height of barometer above sea-level is approximated at one thousand and twenty-six feet.

Office was moved to its present location June 1, 1877.

The station has not been inspected during the year.

Sergeant I. T. Shadle, Signal Service, U. S. A., was in charge of this station June 30, 1877, and remained in charge until relieved by Sergeant D. D. Stansell, Signal Service, U. S. A., September 10, 1877, who remained in charge until May 1, 1878, when he was relieved by Private R. J. Somers, and ordered to Denison, Tex., for discharge.

Sergeant Stansell was discharged at Denison, Tex., by reason of expiration of term of service May 9, 1878, to date May 6, 1878.

Private Frank Mangels was on duty at this station as assistant operator and line repairman from December 11, 1877, up to June 25, 1878, except when confined in the post guard-house at Fort Clark, Tex. Mr. W. W. McConihe was on duty at this station as assistant operator and repairman from January 24, 1878, up to April 16, 1878.

Corporal Somers was in charge of the Brackettville office June 30, 1878. Repair section, forty-eight miles.

## BROWNSVILLE, TEXAS.

[*Official number*, 174.]

| | |
|---|---|
| Latitude | 26° 00′ |
| Longitude | 97° 30′ |
| Amount of rain-fall for the year ending June 30, 1878 | 27.37 inches. |

Corporal H. C. Wineland, Signal Service, U. S. A., was in charge of this station, assisted by Private J. Gerard, June 30, 1877, Corporal

Wineland remaining in charge up to June 30, 1878, and Private Gerard was on duty thereat, except when temporarily detached at Rio Grande City, Tex., up to March 31, 1878, when he was discharged, by order, at Rio Grande City, Tex.

Repair section, twenty-five miles. This station has not been inspected during the year.

There are no bulletins issued, but the telegrams from the Chief Signal Officer, announcing the display of cautionary signals at Gulf stations, are handed to Mr. M. J. Gomila, agent Morgan's Steamship Line, and by him transmitted by telegraph to Brazos Santiago, for the benefit of shipping in that port.

## CAMBRIDGE, TEXAS.

[*Official number*, 150.]

| | |
|---|---|
| Latitude | 33° 42′ |
| Longitude | 98° 00′ |

Private W. M. Weddington was in charge of this station from June 30, 1877, up to January 5, 1878, when the office was closed, Private Weddington having been ordered to duty at Fort Griffin, Tex.

This office was reopened June 1, 1878, and Mr. W. M. Weddington, civilian, placed in charge. He was still on duty here June 30, 1878.

No meteorological duty performed at this station since date of re-opening.

Station not inspected during the year.

Meteorological work discontinued and telegraph office at this station closed on January 5, 1878, by order of Lieut. George S. Grimes, acting signal-officer, U. S. A., and Private W. M. Weddington ordered to report for duty at Fort Griffin, Tex.

Office and property turned over to Mr. J. J. Mullen. Office reopened June 1, 1878, for commercial business.

## CASTROVILLE, TEXAS.

[*Official number*, 149.]

| | |
|---|---|
| Latitude | 29° 25′ |
| Longitude | 98° 50′ |

Corporal W. E. Smith was in charge of this station June 30, 1877, and up to July 16, 1877, at which date, having been relieved by Mr. W. W. Holmes, he was transferred to San Antonio, Tex.

Mr. Holmes continued in charge until January 26, 1878, and having been relieved by Private R. J. Somers, was discharged. Private R. J. Somers remained in charge until relieved April 29, 1878, by Private T. Jones, Signal Service, U. S. A.; he was then ordered to Brackettville, Tex.

Private Jones was in charge of this station June 30, 1878. About forty miles of line are repaired from this station.

The station has not been inspected during the year.

The elevation of station, as adopted at office of Chief Signal Officer, is 676 feet, founded on the authority of the Mexican Boundary Commission, which gives the elevation as 672 feet, the elevation of barometer above ground, 4 feet, added thereto, makes the elevation to be corrected for.

## COLEMAN CITY, TEXAS.

[*Official number*, 151.]

Latitude ..... ° '
Longitude ..... ° '
Amount of rain-fall for the year ending June 30, 1878..... 39.38 inches.

First. Lieut. George S. Grimes, Second Artillery, acting signal-officer, U. S. A., inspected this station October 28, 1877.

All records of the office were found in good order and well and neatly kept.

Private C. A. Ray was in charge of this station from June 30, 1877, up to December 18, 1877, when he was ordered to Stockton for duty, having been relieved at the former station by Private James A. Perkins, Signal Service, U. S. A., who was in charge of this station June 30, 1878. Repair section, ninety miles.

Private James A. Perkins reports that on January 7, 1878, the office was removed from the court-house to the new United States Military Telegraph building.

## CONCHO, TEXAS.

[*Official number*, 152.]

Latitude..... 31° 22'
Longitude ..... 100° 20'
Amount of rain-fall for the year ending June 30, 1878..... 23.83 inches.

Corporal W. J. Cundall was in charge of this station during the year, assisted by Private J. Peters as repairman. About one hundred miles of line are maintained in order by the repairman on duty at this station.

This station was inspected November 5, 1877, by First Lieut. George S. Grimes, acting signal-officer, U. S. A. The office is well located and is about 400 yards from the headquarters building of the post of Fort Concho. The building is a mere shell, and is poorly suited for the purposes for which it is used. Proposals have been invited for the construction of a new stone building, and it is hoped that a more suitable building will soon be put up. The elevation of the barometer is 1,750 feet.

The station is supplied with a complete set of meteorological instruments.

No bulletins or press reports are issued. The telegraph work of the station has been well performed and has given general satisfaction. The books and papers were generally well and neatly kept, and posted up to date.

Mr. John Yates was in charge of this office from June 30, 1877, up to the date of closing of station, October 20, 1877, when he was discharged.

## DECATUR, TEXAS.

[*Official number*, 153.]

Latitude..... 33° 10'
Longitude ..... 97° 30'

This station has not been inspected during the year.

Private R. J. Somers was in charge of this station from June 30, 1877, up to January 21, 1878, when he was ordered to Brackettville, Tex., having been relieved by Mr. W. E. Garver. Mr. Garver was in charge of this station June 30, 1878. Repair section forty miles.

Anemometer put up February 11, 1878. Telegraphic reports of the wind's velocity, as shown by the self-register, commenced February 17, 1878.

## DENISON, TEXAS.

[*Official number*, 154.]

| | |
|---|---|
| Latitude | 33° 50′ |
| Longitude | 96° 40′ |
| Mean barometer for the year ending June 30, 1878 | 29.962 |
| Mean temperature for the year ending June 30, 1878 | 63°.7 |
| Amount of rain-fall for the year ending June 30, 1878 | 50.19 inches. |

The meteorological work of this station was performed by Corporal W. A. Massey, Signal Service, U. S. A., from June 30, 1877, except when sick, up to January 22, 1878, when he was ordered to Fort Whipple, Va., for change of station. Sergeant S. W. Naylor relieved Corporal Massey, January 22, 1878, and remained on duty as observer at this office up to June 30, 1878.

Sergeant Herman Frey was on duty at this office, as observer, from June 17 to June 30, 1878. In addition to the regular observations and reports required from full reporting stations, the further duty of collecting and consolidating the meteorological observations taken at the several offices on the line, and which are concentrated at Denison from all stations except Santa Maria, Tex., and Cambridge, Tex., for record, and from eight stations, for transmission to the Chief Signal Officer of the Army.

The operating department of the office was in charge of Corporal Eugene Peters, Signal Service, U. S. A., June 30, 1877, who, having been ordered to Fort Whipple, Va., for medical treatment, was relieved by John Sims, July 12, 1877, who remained in charge up to August 20, 1877, when he was discharged for misconduct, having been relieved by C. M. Carr, who was relieved by George I. Copp, September 5, 1877; the latter having been temporarily placed in charge until relieved by Mr. Floyd Shock, September 9, 1877, who was in charge until January 16, 1878, when he was relieved by Corporal James O'Dowd, Signal Service, U. S. A., who was on duty June 30, 1878.

Corporal R. R. Geraghty, Signal Service, U. S. A., has been continuously on duty at this office, as chief clerk of the division, from June 30, 1877, up to June 30, 1878. Private Will Stromberger, Signal Service, U. S. A., reported for duty September 21, 1877, and continued on duty as clerk at this office from that date until June 30, 1878.

George I. Copp reported for duty at this office as clerk and assistant operator July 19, 1877, and remained on these duties until September 20, 1877, when he was ordered to Rio Grande City, Tex., to take charge of the United States Military Telegraph Office at that point. Walter McArthur was on duty as clerk at this office from October 1, 1877, up to June 3, 1878, on which date he was discharged at his own request.

Station has not been inspected during the year.

## EAGLE PASS, TEXAS.

[*Official number*, 155.]

| | |
|---|---|
| Latitude | 28° 40′ |
| Longitude | 100° 15′ |
| Amount of rain-fall for the year ending June 30, 1878 | 25.43 inches. |

This is a full reporting station. Private Fred. Belford was in charge of this station June 30, 1877, and remained in charge until relieved by Private McClosky, Signal Service, U. S. A., February 8, 1878. Private McClosky was in charge of this office until March 19, 1878, when he was placed in confinement at Fort Duncan, Tex., awaiting trial, up to June 30, 1878. Private E. G. Prince, Signal Service, U. S. A., was in charge

of this station from March 19, 1878, up to June 30, 1878. Private T. Bowlus was on duty at this office as repairman during the year. Private F. Mangels was on duty at this office from October 28, 1877, as assistant operator and repairman, up to December 11, 1877.

The station has not been inspected during the year.

## EDINBURG, TEXAS.

[*Official number*, 156.]

| | |
|---|---|
| Latitude | 26° 03′ |
| Longitude | 98° 03′ |

Private Edson T. Peck, Signal Service, U. S. A., was in charge of this station from June 30, 1877, up to April 24, 1878, at which date he was relieved by Private Jerome Williams, Signal Service, U. S. A., who was in charge of the station June 30, 1878. Private Edson T. Peck was discharged at Brownsville, Tex., by reason of expiration of term of service, April 22, 1878.

Repair section forty miles.

This station has not been inspected during the year.

## FORT DAVIS, TEXAS.

[*Official number*, 163.]

| | |
|---|---|
| Latitude | 30° 30′ |
| Longitude | 103° 45′ |

This station was opened December 24, 1877, on the completion of the Stockton and Davis extension of the United States Military Telegraph Lines, and Mr. E. M. Dunbar placed in charge.

Mr. Dunbar was in charge June 30, 1878, assisted by Corporal J. M. Kistler, as assistant operator and repairman.

Fort Davis was made a full reporting station April 1, 1878, and meteorological reports received therefrom, commencing April 1, 1878.

About thirty-five miles of line are maintained in order from this station.

Telegraphic reports from Fort Davis were first received at Office of Chief Signal Officer on April 1, 1878. Barometer not received until 10 a. m. April 3, 1878.

Mr. E. M. Dunbar has been directed to use an elevation of 5,203 feet, as given by the engineer of the Texas and Pacific Railroad, in reducing barometer readings to sea-level.

This station has not yet been inspected.

## FORT GRIFFIN, TEXAS.

[*Official number*, 158.]

| | |
|---|---|
| Latitude | 32° 53′ |
| Longitude | 99° 21′ |
| Amount of rain-fall for the year ending June 30, 1878 | 37.96 inches. |

The station has not been inspected during the year.

Sergeant J. Taylor Bradley was in charge of this station June 30, 1877, and continued on duty thereat until January 28, 1878, when he was ordered to San Antonio, Tex., having been relieved at the former station by Private W. M. Weddington, who continued in charge until April 6, 1878, when he was relieved by Corporal J. C. Rickli, who was in charge June 30, 1878.

Private Weddington was discharged at Denison, April 17, 1878.

About forty miles of wire are maintained in order from this station.

## FORT McKAVETT, TEXAS.

[*Official number*, 161.]

Latitude..... 30° 48′
Longitude..... 99° 58′

Mr. C. F. Burroughs was in charge of this station from June 30, 1877, up to April 3, 1878, when he absconded, taking away the public funds and part of the public property of this station. Mr. Eugene Lane was temporarily placed in charge of this station from April 3 up to May 6, 1878, when he was ordered back to the Bœrne office, having been relieved at the McKavett office by Private H. Marsh, who was in charge June 30, 1878. About forty miles of line are maintained in repair from this station.

The elevation of barometer is two thousand and fifty feet.

Station inspected November 23, 1877, by First Lieut. George S. Grimes, Second Artillery, acting signal-officer, U. S. A.

The office is convenient and well located, in post headquarters building, but the exposure of meteorological instruments is not very good. A complete set of instruments is at the station, which were in good condition at the time of inspection. No bulletins are published from office. Records have been badly kept, and were not up to date at time of inspection.

## FORT SILL, INDIAN TERRITORY.

[*Official number*, 165.]

Latitude..... 34° 40′
Longitude..... 98° 30′
Amount of rain-fall for the year ending June 30, 1878..... 50.31 inches.

Mr. George I. Copp was in charge of this station from June 30, 1877, up to July 11, 1877, when he was relieved by Sergeant William Dowes, Signal Service, U. S. A., who was on duty at this station until May 28, 1878, when he was relieved by Private John McCann, Signal Service, U. S. A., who was in charge of the station June 30, 1878. Sergeant Dowes was discharged by order June 13, 1878. About forty miles of line are maintained in order from this station.

There has been no change in location of office or instruments during the six months ending June 30, 1878. This station is supplied with a single set of standard meteorological instruments. No reports have been issued from this station, except the regular weekly and monthly reports rendered to the Chief Signal Officer and officer in charge United States Military Telegraph Line, Texas Division; and the tri-daily telegraphic reports which have been transmitted regularly to the central office.

The station has not been inspected during the year.

## FREDERICKSBURG, TEXAS.

[*Official number*, 157.]

Latitude..... 30° 20′
Longitude..... 98° 40′

Private E. G. Prince, Signal Service, U. S. A., was in charge of this station June 30, 1877, and remained on duty thereat until March 9, 1878, when he was ordered to Eagle Pass, having been relieved at Fredericksburg by Private C. F. Tansill, Signal Service, U. S. A., who was in charge of this office June 30, 1878. About forty miles of line are maintained in repair from this station.

The elevation of station is one thousand six hundred and fourteen feet. The office is located in the principal hotel in the town.

No bulletins or press reports are issued. The station was inspected by First Lieut. George S. Grimes, Second Artillery, acting signal-officer, U. S. A., November 26, 1877. The station is supplied with a complete outfit of instruments, except minimum thermometer, which is broken. The exposure of the anemometer and wind-vane is excellent; that of the other instruments is not so good.

## GRAHAM, TEXAS.

[*Official number*, 183.]

Latitude ..... 33° 01'
Longitude ..... 98° 27'

The station was not inspected during the year.

Mr. Floyd Shock was in charge of this station June 30, 1877, and continued on duty here until September 8, 1877, when he was ordered to Denison, Tex., for temporary duty, and remained at the latter station until January 16, 1878. Mr. Shock again took charge of the Graham station January 23, 1878, and was in charge thereof June 30, 1878; from September 12, 1877, until January 23, 1878, during Mr. Shock's absence, Mr. W. T. Ditto was temporarily in charge of this station, no meteorological duty having been performed during the interim.

The anemometer and self-register were placed in position February 9, 1878.

## HENRIETTA, TEXAS.

[*Official number*, 196.]

Latitude ..... 33° 48'
Longitude ..... 98° 00'

This station has not been inspected during the year.

Mr. George I. Cole was in charge of this office June 30, 1877, and remained in charge up to August, 1877, when he was discharged, having been relieved by Mr. J. J. Mullen, who was in charge June 30, 1878. Meteorological reports were forwarded from this station, commencing February 14, 1878.

Repair section, forty miles.

First regular telegraphic report from this station was received at 4.35 p. m. of February 14, 1878.

On February 11, 1878, Lieut. George S. Grimes, acting signal-officer, U. S. A., directed that the same elevation be used at this station for correcting barometrical readings as that used at Cambridge, Tex., viz, nine hundred and fifteen feet.

Barometrical observations commenced June 1, 1878.

## JACKSBORO', TEXAS.

[*Official number*, 159.]

Latitude ..... 33° 10'
Longitude ..... 98° 00'

Corporal P. M. Wilson, Signal Service, U. S. A., was in charge of this station from June 30, 1877, to September 22, 1877, and from December 10, 1877, to June 30, 1878.

Corporal Wilson was sick and on furlough from September 22, 1877,

to December 10, 1877, during which time Mr. G. K. Davidson was in charge of the Jacksboro' office.

Repair section, fifty miles.

Corporal J. M. Kistler was on duty at this station as repairman June 30, 1877, and was on duty repairing line between that point and Fort Stockton, Tex., and constructing extension of line westward to Fort Davis, until January 25, 1878, when he was relieved from duty at Jacksboro' and permanently assigned as repairman and assistant operator near Fort Davis, Tex.

Corporal P. M. Wilson reported from sickness to duty on December 1, 1877.

The seven daily observations were commenced at this station April 1, 1878, and the sending of the 6.02 a. m. and 9.27 p.m. telegraphic observations was discontinued on the same date.

The 3.02 p. m. observation and sunset prediction are the only reports telegraphed.

This station has not been inspected during the year.

## LAREDO, TEXAS.

[*Official number*, 160.]

| | |
|---|---|
| Latitude | 27° 32′ |
| Longitude | 99° 26′ |
| Amount of rain-fall for the year ending June 30, 1878 | 20.88 inches. |

Sergeant John McGlone, Signal Service, U. S. A., was in charge of this station from June 30, 1877, assisted by Private William L. Miller, Signal Service, U. S. A., repairman, up to June 30, 1878.

Repair section, one hundred miles.

The station has not been inspected during the year.

Barometrical observations commenced on February 24, 1878.

On March 19, 1878, Lieut. George S. Grimes, acting signal-officer, U. S. A., directed that an elevation of 325 feet be used for correcting barometrical readings to sea-level.

Local observations commenced April 1, 1878.

## MASON, TEXAS.

[*Official number*, 205.]

| | |
|---|---|
| Latitude | 30° 42′ |
| Longitude | 99° 02′ |
| Amount of rain-fall for the year ending June 30, 1878 | 22.98 inches. |

Corporal J. C. Rickli was in charge of this station June 30, 1877, and continued on duty up to August 14, 1877, from which time up to September 23, 1877, he was on furlough. The office in the interim was operated by Miss Bella Babcock. Corporal Rickli reassumed charge September 23, 1877, and continued on duty thereat until March 10, 1878, when he was ordered to Fort Griffin, Tex., having been relieved at Fort Mason, Tex., by Sergeant E. O'C. McInerney, who remained in charge up to May 11, 1878, when he was relieved by Private James A. Gleason, having been ordered for duty to Galveston, Tex. Private Gleason was in charge of the Fort Mason office June 30, 1878. This is a full reporting station. About forty miles of line are maintained in repair.

The elevation of station is eighteen hundred feet. The office is conveniently located in the central portion of the town, and occupies the upper front room of a good stone building.

The station was inspected November 25, 1877, by First Lieut. George S. Grimes, Second Artillery, acting signal-officer, U. S. A.

No press reports or bulletins are issued. A complete outfit of instruments is at the station. The exposure of instruments is excellent, and their condition is good.

The books and records are generally in good order, and the work of the station seems to be well and intelligently done.

## PILOT POINT, TEXAS.

[*Official number*, 162.]

| | |
|---|---|
| Latitude | 33° 20′ |
| Longitude | 96° 50′ |

Private F. Mangels was in charge of this station June 30, 1877, and remained in charge up to October 19, 1877, when he was relieved by Private E. F. Reeves, Signal Service, U. S. A., who was in charge on June 30, 1878. Repair section, forty miles.

The station has not been inspected during the year.

## RIO GRANDE CITY, TEXAS.

[*Official number*, 164.]

| | |
|---|---|
| Latitude | 26° 22′ |
| Longitude | 98° 45′ |

Sergeant John R. Williams, Signal Service, U. S. A., was in charge of this station June 30, 1877, and remained in charge up to October 1, 1877, at which date he was ordered by the Chief Signal-Officer of the Army to Fort Whipple, for discharge. Private J. Gerard was temporarily in charge of this station from October 1 to October 6, 1877, when Mr. George I. Copp, civilian operator, took charge of the station and remained in charge up to February 7, 1878, on or about which date he absconded, taking with him all public funds at station.

Private Gerard was temporarily in charge of station from February 4 to February 7, 1878, when Mr. D. G. Vasbinder took charge of same and continued on duty thereat until March 8, 1878, when he was relieved by Corporal Fred. Belford, Signal Service, U. S. A., who remained in charge up to June 30, 1878. Mr. D. G. Vasbinder was, on account of incompetency for station duty, ordered, March 8, 1878, on duty with repair party in the field between Rio Grande City and Brownsville, Tex., and remained on duty therewith until discharged April 10, 1878.

Private James Brown, Signal Service, U. S. A., was on duty as repairman at this station during the year. Repair section, one hundred miles.

The station has not been inspected during the year. Barometrical observations commenced May 13, 1878.

## SAN ANTONIO, TEXAS.

[*Official number*, 197.]

| | |
|---|---|
| Latitude | 29° 28′ |
| Longitude | 98° 22′ |
| Amount of rain-fall for the year ending June 30, 1878 | 38.83 inches. |

Corporal T. W. Milburn was in charge of this station June 30, 1878, assisted by Miss Anna Pollmar, civilian operator, and was relieved as manager by Sergeant J. Taylor Bradley, Signal Service, U. S. A., February 3, 1878, Corporal Milburn, by orders, remaining thereat as his

assistant. Miss Anna Pollmar was on duty at this office from June 30, 1877, to December 31, 1877, when she was discharged. Mr. Eugene Lane was on duty as assistant operator at this office from January 1, 1878, to February 5, 1878, and from June 22 to 30, 1878, Sergeant Bradley (in charge), Private Milburn and Mr. Eugene Lane were on duty at this station June 30, 1878. Corporal W. E. Smith was on duty temporarily as assistant operator at this office from July 17 to August 27, 1877. Private Smith was discharged without character, at San Antonio, Tex., August 27, 1877.

The office is conveniently located in the central and business portion of the town. Three bulletins and two press reports compose the list of official publications.

The station is supplied with a complete set of instruments, the exposure of which is good. Station inspected December 2, 1877, by First Lieut. George S. Grimes, Second Artillery, acting signal-officer, U. S. A. Lieutenant Grimes reports as follows:

> The daily journal, postage-book, daily record of observations, and letters-received book are well and neatly kept, and posted to date. The other records have been neglected, which Corporal Milburn excuses on the plea of there being more work at the station than could be done by the force there, which the inspector admits, and recommends that an additional man be sent there.

On March 30, 1878, the removal to new office was completed and everything placed satisfactorily without a single mishap.

PUBLICATIONS.

| | |
|---|---|
| Number of Bulletins (manifold) issued during the year ending June 30, 1878 | 1,590 |
| Number of Forms 22 issued during the year ending June 30, 1878 | 24 |
| Total | 1,614 |

## SANTA MARIA, TEXAS.

[*Official number*, —.]

| | |
|---|---|
| Latitude | ° ′ |
| Longitude | ° ′ |

This station was opened for telegraphic business April 25, 1878, by Mr. Frank Pierce, who remained in charge up to June 30, 1878. No meteorological observations taken are at this station. Repair section is about twenty-six miles in length. The station has not been inspected during the year.

## STOCKTON, TEXAS.

[*Official number*, 166.]

| | |
|---|---|
| Latitude | 30° 50′ |
| Longitude | 102° 50′ |
| Amount of rain-fall for the year ending June 30, 1878 | 14.63 inches. |

Private James O'Dowd, Signal Service, U. S. A., was in charge of this station June 30, 1877, and remained on duty thereat until ordered to Denison for duty January 4, 1878, having been relieved at the former station by Private C. A. Ray, Signal Service, U. S. A., who was in charge June 30, 1878. This is a full reporting station. Repair section, fifty miles.

This station was inspected November 11, 1877, by First Lieut. George S. Grimes, Second Artillery, acting signal-officer. The office is built of adobe, and is a good, comfortable building. It is well located, and is

about one-half mile from the headquarters building of the post of Fort Stockton.

A complete set of meteorological instruments are at the station, and were in good condition, except the barometer and anemometer, which are broken. The books and papers were in excellent condition, the former posted to date and the latter properly briefed and filed. The barometer readings, when taken, are corrected for an elevation of three thousand feet.

### UVALDE, TEXAS.

[*Official number*, 167.]

| | |
|---|---|
| Latitude | 29° 13′ |
| Longitude | 99° 40′ |

Mr. G. O. Appleby was in charge of this station June 30, 1877; was relieved by Private William Norrington, Signal Service, U. S. A., July 27, 1877, and was discharged on that date for misconduct. Private Norrington was in charge of this office from July 27, 1877, up to June 30, 1878.

The repair section of this station is forty miles in length. The station has not been inspected during the year.

## WEST INDIAN STATIONS.

### BARBADOES, W. I.—(BRIDGETOWN.)

[*Official number*, 8.]

| | |
|---|---|
| Latitude | 13° 4′ 12″ |
| Longitude | 59° 37′ 0″ |

Two observations were taken daily, at hours synchronous with the 7.35 a. m. and 4.35 p. m. observations taken at Washington, and were regularly telegraphed to the office of the Chief Signal-Officer from September 2, 1877, to October 18, 1877. Reports have also been forwarded by mail, but not with regularity.

### GUADELOUPE, W. I.—(POINT A PITRE.)

[*Official number*, 9.]

| | |
|---|---|
| Latitude | 16° 3′ |
| Longitude | 61° 30′ |

Two observations were taken daily, at hours synchronous with the 7.35 a. m. and 4.35 p. m. observations taken at Washington, and were regularly telegraphed to the office of the Chief Signal-Officer from September 2, 1877, to October 17, 1877. Reports have also been forwarded by mail but not with regularity.

### HAVANA, CUBA.

[*Official number*, 100.]

| | |
|---|---|
| Latitude | 23° 9′ 24″ |
| Longitude | 82° 22′ |

Three observations are taken daily, at hours synchronous with the telegraphic series taken in the United States, two of which, the 7.35 a. m. and 4.35 p. m. (Washington time), have been telegraphed regularly to the office of the Chief Signal-Officer since September 4, 1877, and the three observations reported weekly, by mail, on Form 4.

## KINGSTON, JAMAICA.

[*Official number*, 4.]

| | |
|---|---|
| Latitude | 17° 58′ |
| Longitude | 76° 47′ 30″ |

Two observations are taken daily, at hours simultaneous with the 7.35 a. m. and 4.35 p. m. observations taken at Washington, and were telegraphed regularly to the office of the Chief Signal-Officer from September 2, 1877, to October 16, 1877, and have been reported by mail, weekly, on Form 4.

## SANTIAGO DE CUBA.

[*Official number*, 3.]

| | |
|---|---|
| Latitude | 19° 55′ |
| Longitude | 75° 50′ |

Two observations were taken daily, at hours simultaneous with the 7.35 a. m. and 4.35 p. m. observations at Washington, and were telegraphed regularly to the office of the Chief Signal-Officer from September 21, 1877, to October 16, 1877.

Reports have also been forwarded by mail, but not with regularity.

## SAINT THOMAS.

[*Official number*, 102.]

| | |
|---|---|
| Latitude | 18° 20″ 24″ |
| Longitude | 64° 55′ 45″ |

Two observations were taken daily, at hours simultaneous with the 7.35 a. m. and 4.35 p. m. observations taken at Washington, and were telegraphed regularly to the office of the Chief Signal-Officer from September 4, 1877, to October 15, 1877, and observations reported by mail on Form 4, up to and including January 19, 1878.

## NAVASSA ISLAND.

| | |
|---|---|
| Latitude | 18° 25′ |
| Longitude | 75° 3′ |

Two observations are taken daily, at hours simultaneous with the 7.35 a. m. and 4.35 p. m. observations taken at Washington, and have been reported by mail to the office of the Chief Signal-Officer since July 1, 1877.

# BRITISH AMERICAN STATIONS.

## YORK FACTORY, H. B. T.

[*Official number*, 11.]

Latitude ..... 57° 2′
Longitude ..... 92° 26′

The last mail reports received from this station are dated June 1, 1878.

# DOMINION OF CANADA.

Telegraphic reports have been regularly received during the year from the stations named below, after concentration at the Central Office of the Dominion Meteorological System in Toronto:

## CHATHAM, NEW BRUNSWICK.

[*Official number*, 2.]

Latitude ..... 47° 1′
Longitude ..... 65° 30′

Three observations are taken daily, at hours simultaneous with the telegraphic series taken in the United States, and are forwarded regularly to the office of the Chief Signal-Officer, tri-daily by telegraph and weekly by mail, on Form 1 (Canadian).

## FATHER POINT, QUEBEC.

[*Official number*, 5.]

Latitude ..... 48° 31′ 25″
Longitude ..... 68° 27′ 40″

Three observations are taken daily, at hours simultaneous with the telegraphic series taken in the United States, and are forwarded regularly to the office of the Chief Signal-Officer, tri-daily by telegraph and weekly by mail, on Form 1 (Canadian).

## FORT GARRY, MANITOBA.

[*Official number*, 88.]

Latitude ..... 49° 52′
Longitude ..... 97° 0′

Three observations are taken daily, at hours simultaneous with those of the telegraphic series taken in the United States, and are forwarded regularly to the office of the Chief Signal-Officer, tri-daily by telegraph and weekly by mail, on Form 1 (Canadian.)

## HALIFAX, NOVA SCOTIA.

[*Official number*, 89.]

Latitude ..... 44° 39′ 20″
Longitude ..... 63° 36′ 40″

Three observations are taken daily, at hours simultaneous with those of the telegraphic series taken in the United States, and are forwarded regularly to the office of the Chief Signal-Officer, tri-daily by telegraph and weekly by mail, on Form 1 (Canadian).

## KINGSTON, ONTARIO.

[*Official number*, 80.]

| | |
|---|---|
| Latitude | 44° 12′ |
| Longitude | 75° 41′ |

Three observations are taken daily at this station, at hours simultaneous with those of the telegraphic series taken in the United States, and are forwarded regularly to the office of the Chief Signal-Officer, tri-daily by telegraph and weekly by mail, on Form 1 (Canadian).

## MONTREAL, QUEBEC.

[*Official number*, 56.]

| | |
|---|---|
| Latitude | 45° 31′ 0″ |
| Longitude | 73° 33′ 14″ |

Three observations are taken daily, at hours simultaneous with those of the telegraphic series taken in the United States, and are forwarded regularly to the office of the Chief Signal-Officer, tri-daily by telegraph and weekly by mail, on Form 1 (Canadian).

## PARRY SOUND, ONTARIO.

[*Official number*, 108.]

| | |
|---|---|
| Latitude | 45° 22′ 0″ |
| Longitude | 80° 12′ 45″ |

Three observations are taken daily, at hours simultaneous with those of the telegraphic series taken in the United States, and are forwarded regularly to the office of the Chief Signal-Officer, tri-daily by telegraph and weekly by mail, on Form 1 (Canadian).

## QUEBEC, QUEBEC.

[*Official number*, 57.]

| | |
|---|---|
| Latitude | 46° 48′ |
| Longitude | 71° 12′ |

Three observations are taken daily, at hours simultaneous with those of the telegraphic series taken in the United States, and are forwarded regularly to the office of the Chief Signal-Officer, tri-daily by telegraph and weekly by mail, on Form 1 (Canadian).

## ROCKLIFFE, ONTARIO.

[*Official number*, 7.]

| | |
|---|---|
| Latitude | 46° 10′ |
| Longitude | 77° 45′ |

Three observations are taken daily, at hours simultaneous with those of the telegraphic series taken in the United States, and are forwarded regularly to the office of the Chief Signal-Officer, tri-daily by telegraph and weekly by mail, on Form 1 (Canadian).

## SAUGEEN, ONTARIO.

[*Official number*, 81.]

| | |
|---|---|
| Latitude | 44° 40′ |
| Longitude | 81° 10′ |

Three observations are taken daily, at hours simultaneous with those of the telegraphic series taken in the United States, and are forwarded regularly to the office of the Chief Signal-Officer, tri-daily by telegraph and weekly by mail, on Form 1 (Canadian).

## SYDNEY, CAPE BRETON.

[*Official number*, 6.]

| | |
|---|---|
| Latitude | 46° 12′ |
| Longitude | 60° 12′ |

Three observations are taken daily, at hours simultaneous with the telegraphic series taken in the United States, and are forwarded regularly to the office of the Chief Signal-Officer, tri-daily by telegraph and weekly by mail, on Form 1 (Canadian).

## TORONTO, ONTARIO.

[*Official number*, 58.]

| | |
|---|---|
| Latitude | 43° 39′ 4″ |
| Longitude | 79° 23′ 15″ |

Three observations are taken daily, at hours simultaneous with those of the telegraphic series taken in the United States, and are forwarded regularly to the office of the Chief Signal-Officer, tri-daily by telegraph and weekly by mail, on Form 1 (Canadian).

Mail reports only have been received from the following stations:

## CHARLOTTETOWN, PRINCE EDWARD ISLAND.

[*Official number*, 127.]

| | |
|---|---|
| Latitude | 46° 14′ |
| Longitude | 63° 10′ |

Three observations are taken daily, at hours simultaneous with the telegraphic series taken in the United States, and are sent to the office of the Chief Signal-Officer by mail weekly, on Form 1 (Canadian).

## BROCKVILLE, ONTARIO.

[*Official number*, 126.]

| | |
|---|---|
| Latitude | 44° 34′ |
| Longitude | 75° 51′ |

Three meteorological observations are taken daily at a. m. and p. m., at hours simultaneous with the telegraphic series taken in the United States, and the other at 9 p. m., local time, and are sent to the office of the Chief Signal-Officer by mail, weekly, on Form 1 (Canadian).

## PORT DOVER, ONTARIO.

[*Official number*, 79.]

| | |
|---|---|
| Latitude | 42° 47′ |
| Longitude | 80° 13′ |

Three observations are taken daily, at hours simultaneous with the telegraphic series taken in the United States, and are sent to the office of the Chief Signal-Officer by mail, weekly, on Form 1 (Canadian).

## PORT STANLEY, ONTARIO.

[*Official number*, 78.]

| | |
|---|---|
| Latitude | 42° 40′ 00″ |
| Longitude | 81° 13′ 30″ |

Three observations are taken daily, at hours simultaneous with the telegraphic series taken in the United States, and are sent to the office of the Chief Signal-Officer by mail, weekly, on Form 1 (Canadian).

## SAINT ANDREWS, N. B.

[*Official number*, 193.]

Latitude ..... 45° 4′ 3″
Longitude ..... 67° 3′ 0″

Began reporting January 1, 1878. Three observations are taken daily, at hours simultaneous with the telegraphic series taken in the United States, and are sent to the office of the Chief Signal-Officer by mail, weekly, on Form 1 (Canadian).

## STAYNER, ONTARIO.

[*Official number*, 128.]

Latitude ..... 44° 25′
Longitude ..... 80° 15′

Two observations are taken daily, except Sunday, and are simultaneous with the morning and afternoon observations of the telegraphic series taken in the United States, and are forwarded to the office of the Chief Signal-Officer weekly, by mail, on Form 1 (Canadian).

## SAINT JOHNS, N. F.

[*Official number*, 10.]

Latitude ..... 44° 17′
Longitude ..... 66° 3′

The Hon. John Dulaney, postmaster-general of Newfoundland, reports on Form 4, Signal Service, U. S. A., weekly, three observations a day, two of which (the a. m. and p. m.) are synchronous with the telegraphic observations taken at Washington at 7.35 a. m. and 4.35 p. m., and the other at 9.12 p. m., local time.

*Table showing the location of the sunset stations, Signal Service, United States Army, with the names of the observers and the dates of their establishment.*

| Station. | Observer. | Date established. |
|---|---|---|
| Austin, Nev. | L. A. Weller | July 1, 1877 |
| Central City, Nebr | George Bockes | July 1, 1877 |
| Deadwood, Dak.* | | July 1, 1877 |
| Des Moines, Iowa | C. S. Moores | July 1, 1877 |
| Deep Creek, Utah | E. R. Ferguson | July 1, 1877 |
| Elmira, N. Y | D. F. Pickering, P. M. | July 1, 1877 |
| Eugene City, Oreg | J. Kemble Peters | July 1, 1877 |
| Fillmore City, Utah | Andrew Henry, P. M. | July 1, 1877 |
| Fort Fetterman, Wyo | W. H. Murphy, P. M. | July 1, 1877 |
| Fort Shaw, Mont.† | J. H. McKnight | July 1, 1877 |
| Hamilton, Nev. | H. Carpenter, P. M. | July 1, 1877 |
| Hat Creek, Wyo. | John H. Bowman | July 1, 1877 |
| Kit Carson, Colo. | O. Branham | July 1, 1877 |
| Lytton, British Columbia | W. H. Wright | July 1, 1877 |
| Monterey, Cal. | Felipe Gomez, P. M. | July 1, 1877 |
| New Westminster, British Columbia | Adolphus Peele | July 1, 1877 |
| Santa Barbara, Cal | G. P. Tebbetts | July 1, 1877 |
| Sault de Ste. Marie, Mich | Charles Ripley, assistant P. M | July 1, 1877 |
| Sidney, Nebr. | G. W. Dudley | July 1, 1877 |
| Saint George, Utah | John Pymm | July 1, 1877 |
| Saint Mary's, Wyo | M. R. McDonald | July 1, 1877 |
| Trinidad, Colo | C. S. Wheeling | July 1, 1877 |
| Victoria, Vancouver's Island | John Smith | July 1, 1877 |
| Wadena, Minn | C. J. Stuart | July 1, 1877 |
| Waterville, Kans | Mrs. Clara B. Phillips | July 1, 1877 |
| Yreka, Cal | C. H. Pyle | July 1, 1877 |

* Discontinued November 1, 1877. † Discontinued February 2, 1878.

Observations of the character of the sunset are taken each day at sunset and are telegraphed to the nearest regular Signal-Service station, and are embodied in the next telegraphic report from that station to this office.

PUBLICATIONS FOR YEAR ENDING JUNE 30, 1878.

| | |
|---|---|
| Farmers' Bulletins | 2,069,176 |
| Manifold Bulletins | 279,144 |
| Maps | 105,753 |
| Local Reports | 46,128 |
| Forms 15 (manifold) | 62,458 |
| Forms 22 | 6,180 |
| Forms 26 | 40,767 |
| Weekly Chronicles | 4,603 |
| Monthly Weather Review | 11,055 |
| International Bulletins | 108,229 |
| Total | 2,733,493 |

## GENERAL SUMMARY.

### UNITED STATES STATIONS.

*Number of stations Signal Service, U. S. A., in operation June 30, 1878.*

| | |
|---|---|
| Number of regular stations taking seven observations daily, and making full reports three times a day by telegraph | 91 |
| Number of United States military telegraph stations taking seven observations daily, and making full reports three times a day by telegraph | 5 |
| Number of regular stations taking seven observations daily, and making full reports once a day by telegraph | 1 |
| Number of regular stations taking seven observations daily, and making sunset report by telegraph | 2 |
| Number of United States military telegraph stations taking three observations daily, and reporting three times a day by telegraph | 15 |
| Number of United States Military Telegraph stations taking seven observations daily, and reporting by mail weekly, and sunset report by telegraph | 1 |
| Number of regular stations taking seven observations daily, and reporting by mail only, and sunset report by telegraph | 10 |
| Number of regular stations taking six observations daily, and reporting by mail only | 1 |
| Number of regular stations taking no observations | 1 |
| Number of United States military telegraph stations taking no observations | 9 |
| Number of United States military telegraph stations taking six observations daily, reporting by mail weekly, and sunset reports by telegraph | 3 |
| Number of United States military telegraph stations taking three observations daily, reporting by mail weekly, and sunset reports by telegraph | 8 |
| Number of United States military telegraph stations taking one observation daily, reporting by mail weekly, and sunset reports by telegraph | 10 |
| Number of United States military telegraph stations making sunset reports only | 2 |
| Number of printing stations | 3 |
| Number of flying stations on coast | 3 |
| Number of special river stations | 23 |
| Number of display stations | 11 |
| Number of sunset stations | 24 |
| | 224 |
| Number of regular stations discontinued during the year | 2 |

### WEST INDIAN STATIONS.

| | |
|---|---|
| Number of stations making full reports by mail and telegraph | 1 |
| Number of stations making full reports by mail only | 2 |
| Number of stations making full reports by mail and telegraph during portion of the year | 4 |
| | 7 |

### CANADIAN AND BRITISH AMERICAN STATIONS.

| | |
|---|---|
| Number of stations making full reports by mail and telegraph | 12 |
| Number of stations making full reports by mail only | 8 |
| | 20 |

A portion of the meteorological statistics for the year ending June 30, 1878, as had from the regular reporting stations, are given in detail in papers 14 to 21.

Eighty-five stations, including those upon the telegraph-lines in the interior, were inspected during the year ending June 30, 1878. Paper 7 shows the name of each station inspected, with date of inspection.

The average cost of maintaining each full station of observation during the year ending June 30, 1878, exclusive of the cost of telegraphing reports and the pay and maintenance of the enlisted men on duty at each, has been $384.63. The average cost of the stations has been increased this year by the fact that it has been necessary to equip with instruments an increased number of them for the first time.

In the cost of each station, as here given, is included the cost of rent and of maintaining a suitable office or room at each place for the public use, with facilities for the necessary exposure of instruments and for the display of cautionary signals when such signals are required.

The duties of the enlisted men at each station were fully described in the last annual report, as follows:

At stations forwarding telegraphic reports they are required to take, put in cipher, and furnish, to be telegraphed tri-daily on each day, at different fixed times, the results of observations made at those times, and embracing, in each case, the readings of the barometer, the thermometer, the wind velocity and direction, the rain-gauge, the relative humidity, the character, quality, and movement of upper and lower clouds, and the condition of the weather. These observations are taken at such hours, at the different stations, as to provide the three simultaneous observations, taken daily at three fixed moments of physical time (7.35 a. m., 4.35 p. m., and 11 p. m., Washington mean time), throughout the whole extent of the territory of the United States. The differences between these fixed times and the local times at the different stations cause it to happen that at some stations the observations are to be made in the earliest hours in the morning and at others in the latest of the night. The work thus practically extends, the differences of time at the different stations being taken into consideration, throughout the twenty-four hours. Each of these observations is required to be carefully recorded in writing, for future reference, at the time it is taken. Three other observations to be taken at the local times, 7 a. m., 2 p. m., and 9 p. m., are also taken and recorded at each station. A seventh and especial observation is taken and recorded at noon on each day. If at this observation such instrumental changes are noted as to cause anxiety, the fact is to be telegraphed to the central office, at Washington.

An eighth observation is required to be taken at the exact hour of sunset at each station. This observation, embracing the appearance of the western sky, the direction of the wind, the amount of cloudiness, the readings of the barometer, thermometer, and hygrometer, and amount of rain-fall since last preceding report, is reported with the midnight report.

At the stations at which cautionary signals are displayed an observer must be constantly on duty to receive the order and to show the signal, which may be ordered at any moment. At stations from which river reports are furnished, an observation and record of the depth and temperature of the water is made and reported at 3 o'clock p. m., local time, on each day. In the cases of threatening storms or dangerous freshets, any station may be called upon to make hourly reports. In cases of violent storms reports are sometimes required to be made hourly throughout the night.

The data thus gathered on the files at each station are to be consolidated, first weekly, on forms which, with copies of the telegraphic-cipher reports, are to be sent weekly to the central office, then monthly, in the form of a careful digest, also to be forwarded. The thorough study of the work of the month is then to be condensed in the form of a monthly chart. None of these observations or records ought to be dispensed with, nor can they, with meteorological instruments as they now exist, be taken and recorded more economically. At stations where the population warrants it the duties of the enlisted men are increased by the receipt and record of data from other stations, to be exhibited upon written bulletins or furnished to the press for public use. In the great cities there are the further duties of the display, at the rooms of the boards of trade, chambers of commerce, and other similar places, of symbol maps on which the meteoric conditions are shown by symbols changeable daily.

There are to be prepared and posted, also by the enlisted men, at these stations, bulletins of the storm-warning orders as received from the central office, on which appear very frequently, in addition to the order, brief notes as to the force of the anticipated storm, the direction in which it may be moving, the names of places menaced, though storm-signals may not yet have been ordered at them, and other items of information, all of which require to be carefully copied and posted with quick dispatch.

In cases of disasters occurring on the lakes or sea-coasts, full information concerning which is often in the possession of the service, or in the instances of any matter of public interest coming within the scope of the duties of the service, the station force is required to exhibit bulletins containing in detail full reports.

The local offices of the Signal Service are always places of resort for inquiry on the part of those desiring to be informed what changes of weather have been particularly noticed or are likely to affect the various industries in which the populations are engaged.

In the cities upon the sea-coasts of the United States, or at the lake ports, the offices of the service are open for the comparison of instruments, the examination of their data, or to furnish whatever information may be practicable to captains of vessels or others concerned in shipping interests. At stations upon telegraphic lines in charge of or constructed by the service in pursuance and furtherance of its duties, the ordinary duties of telegraphing and the maintenance of the lines devolve upon the force there stationed, in addition to duties of observation.

The cautionary signal flag is always, when flown and officially, an invitation to mariners or others interested to visit the offices for information. The courtesies and duties of the office are not limited to the people of the United States alone, but are tendered freely to the people of any nation who may be within our borders.

The distribution of Farmers' Bulletins for the uses of agricultural populations has been frequently and is elsewhere described.

The forms exhibiting, condensed, the labor thus required of the Signal Service men stationed at separate stations, and the instructions under which the separate observations and reports are made, are herewith described. (Paper 22.)

In times of especial emergencies or danger of any kind threatening the separate States or the United States, the different stations make, by order and in cipher, regular reports upon any subject under the attention of superior authorities.

The enlisted men in charge of stations are responsible for the care, cleanliness, and good working of the instruments, the clearness of the

records, the correctness and punctuality of reports, the display of signals or bulletins, and, in fine, for the conduct and good condition of the station itself. It has been considered necessary to make this description thus minute that it might be understood what duties are required of the non-commissioned officers and privates of the Signal Corps in addition to the military duties heretofore referred to, and that it may be comprehended that the force must consist of men of more than ordinary acquirements to be competent for them.

The sum of the pay and allowances of these soldiers comprehends every allowance which is permitted the soldier to house, feed, and clothe himself, to meet in full every expense of his maintenance wherever in the wide extent of the territories of the United States the vicissitudes of the service may call him. It must be borne in mind that as a soldier he can have no home, and that he must purchase anew with every change of station the little comforts which homes gather around them. The regular tour of duty permits service on each station for two years only. These soldiers are liable to all a soldier's duties. On the occurrence of serious disturbances, the armed detachments of the corps are, with its officers, held in readiness, wherever they may be, for service at a moment's warning. In the service upon the frontier, they are exposed in their duties of the construction, repair, and maintenance of telegraph-lines, or whenever they may accompany expeditions, to the dangers of the field.

In times of dangerous pestilence these soldiers are by their duties more exposed than other forces of the Army. Other forces may be moved for sanitary reasons to places of comparative safety. The exigencies of the service and the need that regular series of data should be had, by observation, on which to base precautions against existing epidemics for the time, and for the study of them thereafter, have required that the enlisted men of the service should remain faithfully at their posts during some of the worst visitations which have devastated the country. They have done so without a murmur. In three cities, in the districts scourged by yellow fever in the season just passed, three members of the corps, Sergeant William McElroy and First-Class Privates J. F. Tenney and J. Cashell, have died bravely at their posts in the steady and faithful discharge of their allotted duties. The office files show no murmur of complaint or shrinking from their dangerous duty on the part of any of all those of the corps exposed in these cities or elsewhere. It is a grateful duty to record such fidelity.

It has been considered that as the United States have, as above rehearsed in the case of the body of men constituting the Signal Corps, the military services of a force trained and competent to act as armed soldiers when there is need, there is in effect secured by the duties other than armed duties on which these men are employed the benefits of all the especial services rendered by the corps at stations of meteorological observations and report, at cautionary signal stations, at stations on telegraphic lines, at sea-coast stations and elsewhere, with little compensation to the men, or cost beyond that of any other merely military force, equal in number, to the public.

The work of a constant watchfulness for the whole territory of the United States and of a plan of observation and report extending by its different branches around the northern hemisphere is had through the service in the Signal Corps of one hundred and fifty sergeants, thirty corporals, and two hundred and seventy privates. This force is less than the military force of non-commissioned officers and privates employed in the duties of charting, engineering, observing, and duties of a similar character in the rigidly managed armies of Great Britain, Aus-

tria, or Russia. It is needless with such facts in view, and after eighteen years of continuous service, to reiterate the advantages secured to the Signal Service by its military organization. Service under military organization is that form of a permanent civil service of disciplined citizens in which the duties are compulsory for the term of the service, and a proper discharge of them can be enforced by punishment. The experience of centuries has proven that whenever tasks covering in their reach the extent of nations, and involving in their execution interests of life and property, are to be undertaken, men have sought, as if by instinct, for faithful co-operation and prompt action through the regular control and sure reward or punishment which attend the military system. The soldiers of the United States are simply its citizens, held under what ought to be wise rules and regulations to duties which they have voluntarily accepted.

The duties of an army in time of peace have been defined as properly limited in their exercise to those of a police force for the nation. It is considered that those rendered by the Signal Service have demonstrated that the men carried upon its rolls have been able to perform these duties and others requiring a higher standard of attainment and rendering a better equivalent for the necessary cost. They have not failed to be ready to act as an armed police upon any intimation that there was need of such readiness.

The favorable legislation of Congress has at last provided for the enlisted force some promotion.

The military school at West Point would be useless, so far as its extended course of study is concerned, if the officers thence graduated were not intended to be employed on duties requiring scientific culture.

The duties of the force stationed at the office of the Chief Signal-Officer, at the War Department, are many and onerous. In rendering these duties it ought to be borne in mind that they are continued day and night without cessation for holidays or days of rest. There is no single day of the year in which the work is suspended. It must of necessity and for this reason be performed by details of men who relieve each other at fixed times.

In estimating the numbers required to be present for duty, it is difficult to make a comparison between an establishment thus conducted and others in which the work is limited to certain hours of daylight only. This office is the center to which the daily and nightly, weekly and monthly contributions of all other offices or stations of the Signal Service scattered throughout the United States tend to be daily condensed, and finally elaborated and made of practical value. There are here concentrated, also, the reports from the five hundred and ninety-nine places at which voluntary reports of daily observations are now made on this continent, and from the four hundred and twenty-three locations in foreign countries from which reports of daily simultaneous observations are had. From the great mass of data thus collected, and which enhances each year in value, are continuously elaborated, the results which appear in the different issues of the office, whether in the form of forecasts telegraphed to the press throughout the country, of charts or bulletins distributed hence, of generalizations announced as apparent, of cautionary-signal orders, or of the weekly and monthly publications. No single report of any observation received at the office fails to receive attention or study.

It is at this office that are had the management and supervision of telegraphic lines, erected and now worked by the United States, upon the Indian frontier and in the States and Territories of the interior. The

wires of the coast lines have here their terminal connection and here concentrates the labor of the different coast stations. Upon this office devolves, and with each year an increasing extent, the duty of transmission of many and important messages from superior authorities to and from distant posts and parts of the United States, for the safe delivery and proper guarding of which, by cipher, this office is responsible. The rooms of the telegraphic department are never closed or left without an operator. The brief narration possible in a report of this character can convey but little idea of the various and incessant labors incident to such an establishment.

A regular exchange of telegraphic reports now had for a number of years by comity of exchange with the chief meteorological office of the Dominion of Canada has been maintained. Meteorological reports of observations taken simultaneously, and furnished according to the form of this office, have been received tri-daily from twelve stations within the Dominion, and warnings have been regularly transmitted to the meteorological office of the Dominion at Toronto, as affording material on which to base the display of signals to be exhibited at ports of the Dominion at times of threatening danger. The telegraphic reports of observations received from twenty-six Signal Service stations of the United States have been furnished tri-daily to the agent of the Dominion office at Buffalo, N. Y. The relations thus maintained between the two services continue to be of service to both.

While this office has been prepared to co-operate in this manner with any foreign office, and to the limit of its power, in the furnishing of material for study, by the use of its consolidated reports or by especial warnings, it is not authorized by law to co-operate with any institution or party for the publication or display of any forecasts, indications, or cautionary signals not emanating from this bureau, or so controlled by it as not to conflict or confuse those hence issued for the Territories of the United States, the lakes, rivers, or coasts in or bordering upon them.

In view of the increased appropriation made available by the action of Congress at the last session, the series of telegraphic reports from stations in the West Indies, extending from Cuba, by Jamaica, to Barbadoes and the Windward Islands, has been resumed, one report of observation being had on each day from each station. Constantly recurring difficulties attend the collection of reports from these stations. The defective working of the telegraphic cables has frequently impaired the value of them by delay. It is difficult to secure the services of skilled observers or to obtain instrumental readings which at all accord with those at the regular stations. The crude reports are, however, at times useful. In instances hurricanes, which for days after moved near our Gulf and Atlantic coasts, have been heralded by notices from these stations; and the cautionary signals of the service have been kept displayed at ports at which the weather was fair, while dangerous hurricanes in progress at sea, and of which there would have been else no record, threatened everything which might sail from them. The expense of the telegraphic transmission, which at one time rendered extensive systems of West India reports too costly to be attempted, has been greatly lessened. The sums charged are still quite large for continuous work, amounting in some instances to one dollar per word. It is in view to cause each of these stations to be visited in person by an officer attached to this office, and it is hoped such changes and rearrangements may be made as will permit the character and transmission of the reports to be greatly improved.

The net-work of the Signal Service stations extends now on this con-

tinent to both the Atlantic and Pacific coasts, and over the intervening territory of the United States. The work of the stations has been rendered utilizable for the daily prevision of meteoric changes to occur over this whole geographical extent, including the great interior plateau. While the stations are in some districts far too widely separated, the gaps are closing each year with the steady progress. The service now has its stations located in continuous lines along the northern frontier of the United States from Maine to west of Lake Superior; along the Atlantic coast; along the southern or Gulf coast; along the southwestern boundary, separating the United States from Mexico, to the Pacific Ocean; thence northerly along the Pacific coast to British North America, and at selected points throughout the whole interior within these boundary lines. A continuous telegraphic line to follow, with near proximity, the line by which the United States, bound on British North America, from the Pacific Ocean to Lake Superior, mentioned in the last annual report as something to be hoped for and needed to complete the northern line of the circuit of stations, may be considered as already commenced in construction by the lines this summer erected in the Northwest under an appropriation provided by Congress. As other and new telegraphic lines extend within the boundary lines above referred to, they will make possible the establishment of other and much needed interior stations. The experience of years has reduced the matter of opening, equipping, and rapidly utilizing a station to a system.

The meteorological work of the United States keeps pace everywhere with the telegraphic construction. In the hands, and under the management, of a single corps, the two duties are necessarily co-extensive.

The following list exhibits the stations as classified and as located in States and Territories on June 30, 1878:

*Alabama.*—Mobile,* Montgomery.* *Alaska.*—Attu,* Fort Saint Michaels,* Saint Paul's Island.* *Arizona.*—Apache Pass,§ Burkes,* Camp Apache,* Camp Goodwin,§ Fillibuster,§ Florence,* Camp Verde,* Phœnix,* Prescott,* Camp Grant,* Tres Alamos,§ Tucson,* Wickenburg,* Yuma.* *British Columbia.*—Lytton,† New Westminster,† Vancouver's Island.† *California.*—Los Angeles,* Red Bluff,* Sacramento,* San Diego,* San Francisco,* Visalia,* Campo,* Monterey,† Santa Barbara,† Yreka.† *Colorado.*—Denver,* Pike's Peak,* Kit Carson,† Trinidad.† *Connecticut.*—New Haven,* New London.* *Delaware.*—Lewes,‡ *District of Columbia.*—Washington.* *Dakota Territory.*—Bismarck,* Lead City,* Pembina,* Yankton.* *Florida.*—Jacksonville,* Key West,* Punta Rassa,* Saint Mark's.* *Georgia.*—Augusta,* Savannah,* Tybee Island.* *Idaho Territory.*—Boise City.* *Illinois.*—Cairo,* Chicago,* *Indiana.*—Logansport,¶ Indianapolis.* *Indian Territory.*—Fort Gibson,* Fort Sill.* *Iowa.*—Burlington,¶ Davenport,* Dubuque,* Keokuk,* Des Moines,† *Kansas.*—Dodge City,* Leavenworth,* Waterville.† *Kentucky.*—Louisville.* *Louisiana.*—New Orleans,* Shreveport.* *Maine.*—Bangor,¶ Eastport,* Portland.* *Maryland.*—Baltimore.* *Massachusetts.*—Boston,* Springfield,* Thatcher's Island,* Wood's Holl.* *Michigan.*—Alpena,* Detroit,* Escanaba,* Grand Haven*, Ludington,‡ Marquette,* Menomonee,‡ Port Huron,* Sault de Ste. Marie.† *Minnesota.*—Breckenridge,* Duluth,* Saint Paul,* Wadena.† *Mississippi.*—Vicksburg.* *Missouri.*—Saint Louis.* *Montana Territory.*—Virginia City.* *Nebraska.*—North Platte,* Omaha,* Central City,† Sidney.† *Nevada.*—Pioche,* Winnemucca,* Austin,† Hamilton.† *New Hampshire.*—Mount Washington.* *New Jersey.*—Atlantic City,* Barnegat,* Cape May,* Sandy Hook.* *New*

* Stations of first class. † Sunset stations. ‡ Display stations. § Repair stations. ¶ Printing stations.

SIGNAL SERVICE STATIONS
MARCH
REFERENCES
Represent Stations sending full Tel. & Mail Reports.
Mail Reports & one Tel. Report.
& Sunset Repts by Tel..
Sunset.
Display
Printing
sending Met. Reports by Tel. & Mail from Texas, New Mexico, & Arizona
Commercial & Repair in
OLYMPIA
PORTLAND
UMATILLA
EUGENE CITY
ROSEBURG
YREKA
RED BLUFF
SACRAMENTO
SAN FRANCISCO
MONTEREY
VISALIA
SANTA BARBARA
LOS ANGELES
SAN DIEGO
NEW WESTMINSTER
FT BENTON
FT SHAW
VIRGINIA CITY
BOISE CITY
WINNEMUCCA
AUSTIN
HAMILTON
DEEP CREEK
SALT LAKE CITY
FILLMORE
PIOCHE
ST GEORGE
DEADWOOD
HAT CREEK
ST MARY
SIDNEY
DENVER
PIKES PEAK
KIT CARSON
TRINIDAD
SANTA FE
ALBUQUERQUE
BELEN
SOCORRO
FT CRAIG
MARTIN'S WELL
FT SELDEN
LAS CRUCES
LA MESILLA
EL PASO
PRESCOTT
CAMP VERDE
CAMP APACHE
WICKENBURG
PHOENIX
MARICOPA WELLS
TUCSON
CAMP BOWIE
FT GRIFFIN
COLEMAN CITY
FT CONCHO
CAMP STOCKTON
FT DAVIS
BRACKETTVILLE
EAGLE PASS
RIO GRANDE CITY
EDINBURGH
BROWNSVILLE
CORSICANA
SHREVEPORT
VICKSBURG
ST PAUL
DUBUQUE
DAVENPORT
DES MOINES
OMAHA
BURLINGTON
ST JOSEPH
KANSAS CITY
LEXINGTON
BOONVILLE
ST LOUIS
LOGANSPORT
INDIANAPOLIS
CINCINNATI
LOUISVILLE
CAIRO
Paducah
Johnsonville
Chattanooga
Little Rock
Helena
MEMPHIS
NASHVILLE
KNOXVILLE
AUGUSTA
CHARLESTON
SAVANNAH
TYBEE Is.
JACKSONVILLE
MONTGOMERY
MOBILE
NEW ORLEANS
PUNTA RASSA
KEY WEST
HAVANA
SAULT ST MARIE
MARQUETTE
ESCANABA
Menominee
Green Bay
Kewaunee
Manitowoc
Sheboygan
MILWAUKEE
CHICAGO
Ludington
GRAND HAVEN
DETROIT
TOLEDO
CLEVELAND
SANDUSKY
Oil City
Freeport
PITTSBURGH
Brownsville
Marietta
Morgantown
WASHINGTON
BALTIMORE
PHILADELPHIA
CAPE HENRY
KITTYHAWK
CAPE HATTERAS
CAPE LOOKOUT
SMITHVILLE
WILMINGTON
LYNCHBURG
NORFOLK
SANDY HOOK
BARNEGAT
ATLANTIC CITY
NEWPORT
WOODS HOLL
THATCHER'S Is.
MONTREAL
KINGSTON
TORONTO
OSWEGO
ROCHESTER
ALBANY
ELMIRA
EASTPORT

*York.*—Albany,* Buffalo,* New York,* Rochester,* Oswego,* Elmira.† *New Mexico.*—Albuquerque,‖ Fort Craig,* Fort Cummings,§ Fort Selden,§ La Mesilla,* Los Cruces,§ Los Lunos, Santa Fé,* Silver City,* Fort Bayard,§ Socorro.§ *North Carolina.*—Cape Hatteras,* Cape Lookout,* Flying Station No. 3,‡ Flying Station at Sloop Point,§ Fort Macon,‡ Kittyhawk,* New River Inlet§, Portsmouth,* Smithville,* Wilmington.* *Ohio.*—Cincinnati,* Cleveland,* Columbus,* Sandusky,* Toledo.* *Oregon.*—Portland,* Roseburg,* Umatilla,* Eugene City.† *Pennsylvania.*—Erie,* Philadelphia,* Pittsburgh.* *Rhode Island.*—Newport.* *South Carolina.*—Charleston.* *Tennessee.*—Knoxville,* Memphis,* Nashville.* *Texas.*—Boerne,* Brackettville,* Brownsville,* Cambridge,§ Castroville,* Coleman City,* Concho,* Corsicana,* Decatur,* Denison,* Eagle Pass,* Edinburg,* El Paso,* Fort Davis,* Fort Griffin,* Fredericksburg,* Galveston,* Graham,* Henrietta,§ Indianola,* Jacksborough,* Laredo,* Mason,* McKavett,* Pilot Point,* Rio Grande City,* San Antonio,* Santa Maria,§ Stockton,* Uvalde.* *Utah Territory.*—Salt Lake City,* Saint George.† *Vermont.*—Burlington.* *Virginia.*—Cape Henry,* Lynchburg,* Norfolk.* *West Virginia.*—Morgantown.* *Washington Territory.*—Olympia.* *Wisconsin.*—Green Bay,‡ Horn's Pier,‡ Kenosha,‡ Kewaunee,‡ Manitowoc,‡ Milwaukee,* La Crosse,* Racine,‡ Sheboygan,‡ Sturgeon Bay.‡ *Wyoming Territory.*—Cheyenne,* Deep Creek,† Fillmore City,† Fort Fetterman,† Hat Creek,* Saint Mary's.†

Map A exhibits the location of stations and the extent of territory brought by them under constant observation for the purposes of study.

The territory of the United States is not yet covered by the located stations as fully as it ought to be, and valuable opportunities for study, which must be made good hereafter, and at an increased expense, are lost. This fault is lessened each year with the extension of interior telegraph lines, and with the increased appreciation won by the service. The field of its labors has increased greatly and of necessity each year, as it has been learned how these labors may be turned to the best benefit of different classes of citizens. The amount estimated as necessary to be appropriated for this service for the ensuing year, the sum of three hundred and seventy-five thousand dollars, can be wisely expended. The whole working force of the corps, four hundred and fifty men, will be constantly employed and, in instances, overworked. The services of citizens, in addition, will be needed as in preceding years.

The uses of the reports of observation collected by this office were referred to in the last annual report, as follows: "The reports of observations had in ceaseless succession from the stations already established, while daily and primarily employed in the studies needed for the daily issuing of forecasts and the display of cautionary signals, form also the bases for future work, to be of equal value with that made possible by the first use of them, and constitute a record, to increase in worth hereafter with every year for which it is continued.

"The data already secured are worth to the country and to the world, even if the service had up to this time rendered no other return, all it has cost to obtain them.

"From the moment at which it is made each of the reports becomes to some extent complementary to all other reports had elsewhere. It is not possible to break this connection, nor in the present state of meteorological science ought any good report to be dispensed with.

"It will be found, with the lapse of years, such observations have settled, by facts, questions hitherto treated by theory only.

* Stations of first class. † Sunset stations. ‡ Display stations. § Repair stations.
‖ Telegraph and sunset station. ¶ Printing stations.

"It is upon the data now accumulating upon the files of this office and there daily compared, compiled, and treated with an accuracy each year increased by experience, and becoming more rigid as the office is warned, sometimes by notable inaccuracies elsewhere occurring, that the future studies of the climatology and meteorology of this continent will be based. It seems not impossible that upon the results of systems of observations here set on foot will be founded such studies for the northern hemisphere. It is not to the discredit of the United States that a work set on foot by them should render such ends possible."

The permanence, regularity, and accuracy of reports to be had from the West Indies ought to be secured. No system providing warnings for the Gulf or Atlantic coasts can be considered as complete or reliable without the means of continued reports of observation, to be made from these stations. It seems to be established that the great cyclones originating within the tropics rarely, if ever, reach any coast of the United States without such indications of their existence and of their line of movement as well-managed stations among these islands would detect and announce. The possibility of protection will be increased and extended to more northern coasts whenever telegraphic communication can be had with the Bermuda Islands.

It is greatly to be desired that the separate States should so arrange that series of observations, including the tri-daily simultaneous observations, and to be in connection with the duties of this office, should be taken at the county town of each county in each State. A plan for the arrangement of instruments, now nearly completed at this office, would render this work practicable.

It is possible such an arrangement might be had in many of the States through the school organizations.

The attention of the office has continued to be directed, during the past year, to the solution of the very difficult question as to the best mode by which to compare, for the purposes of the necessary daily studies, the observations of meteoric changes taking place upon the Pacific coast, near the sea-level, and on the great elevated plateau of the interior, with the reports of observations had on the eastern slope of the Rocky Mountains, and extended to the Gulf and Atlantic coasts at the sea-level. The plans for the tri-daily charts for use in the study-room of the office exhibit a progress in this direction. It is found not difficult to extend some of these charts from the Pacific to the Atlantic coasts at the times of each tri-daily report, with the lines of the charting in so far accurate as to afford very valuable suggestions as to the changes approaching.

The forward march of civilization over the great interior plateau west of the Mississippi each year renders more extended observations practicable in that region.

The field of study has been pushed in that direction as rapidly as the means at the disposal of the office have permitted. The barometrical readings made in this region still lose part of their value by the difficulty of reduction to the hypothetical readings at sea-level. There seems, however, no longer reason to apprehend that the unreduced readings cannot be utilized for purposes to which the reduced only have been hitherto applied. It is, perhaps, by multiplying stations and continuing the comparison of observations had at them, the correct solutions of all problems will be most rapidly attained.

The increased knowledge had with each year's experience in the office enables improvements to be made each year in the modes of digesting the masses of observations received for its records, and suggests each

year better methods of study to attain the accuracy of prediction which is constantly sought.

The long-felt need of careful studying the changes occurring upon the interior plateau led to the establishment, prior to the date of the last annual report, of a series of observations had at what are known as "sunset" stations. This series has been continued during the year just passed with good results. The circular (Paper 26) sufficiently describes the duties of the employed observers at these stations and the character of the report to be had from them. Some of these observations are roughly spectroscopic, the sunset reports being based in part on such different appearances of the sun and of the effects produced by its rays as are caused by their passage through differently conditioned atmospheric media. It is one of the advantages that the necessary observations are so little complicated in their character that they may be taken at and reported from any point reached by the telegraphic wires. It seems probable that a simple form of spectroscope may be utilized for observations of this sort. Experiments are now in progress by which it is hoped that a form of that instrument suitable for the use of enlisted men may be arrived at. Map 2 exhibits the method of charting the sunset reports. These reports are found of value in often-recurring instances in which they furnish some indication of the atmospheric changes in progress at points from which it has been impossible to obtain the full report of observation.

It has been established that a certain accuracy of prediction of the local changes to occur within a period of twenty-four hours is attainable by the local observers, the sergeants of the Signal Service charged with the making of the sunset reports, these sergeants having the use of instruments and access to a portion of the data which pass their stations on their way to this office. This accuracy has reached, as computed from the records on file, a maximum percentage of eighty and eight-tenths for the regions west of the Mississippi Valley, where the weather conditions are notably constant, and eighty-five and six-tenths for the region east of the western bounds of that valley. The percentage of "doubtful" reports was one for the region east of the Mississippi Valley and four and seven-tenths for the region west of it.

There appears to be no reason that any intelligent farmer, supplied with the necessary simple instruments, habituated to similar observations, and furnished with data, either in figures or condensed by charts, as it is believed they readily may be through the press, should fail to attain an equal accuracy.

Since the date of the last annual report the instrument known as the Weather Case or Farmer's Weather Indicator, and to which reference is made later in this report, has been prepared with a view to its use by farmers generally, and also at the sunset stations as above described.

The usefulness for meteorological purposes of the sea-coast stations of the Signal Service, in connection with the Life-Saving Service, and located at the Life-Saving Service stations, has continued to be demonstrated.

As explained in earlier reports, the observations taken at these stations have the advantage of being taken on the sea-coast itself, and from positions which permit the condition of the sea-swell to be reported. The stations have the further advantage of being directly connected with this office by the telegraphic lines under its control. Reports of any character can so be had at any hour they may be called for, or signals may be displayed to warn of danger.

The facilities afforded by these lines admit of conversations even being

had, as they frequently are, in reference to meteorological changes or other matters of interest, as, for instance, of the precautions to be taken against coming storms by those engaged in the salvage of wrecked ships, or other action in cases of shipwreck. The reports of observations had upon the sea-coast itself, or upon the ocean-beach, differ frequently and markedly from those had from stations farther in the interior, and suggest the approach of weather conditions which, without such indications, might either have escaped attention, or could not have been observed in time.

The generalizations had from the reports received from these stations become each year of increasing value for the prediction of the weather conditions to be expected near our coasts. The reports themselves, published in the daily journals, and so known to those interested, either at the several ports or in the interior, give reliable information as to the circumstances under which coasting voyages may be taken or are being made. The benefits to follow a sea-coast service, with its stations prepared and equipped as these stations show one may be, are such as cause it to be hoped that all the exposed and frequented coasts of the United States may early have the advantage of such protection.

It is considered to have been demonstrated that by the services of single sea-coast stations there has been saved, at different times, property amounting in value to more than the cost of manning and maintaining all the stations from the dates at which they were first put in operation. Improving modes of communication promise as possible such close connection between the stations that it seems practicable to so arrange that there need be no points upon our coasts but to which aid can be immediately summoned, and none but from which summons for aid can go, if need be, to naval stations, ports, and cities.

Since the date of the last annual report, experiments have been made with the uses of telegraphic gongs connected by wire, after the manner of those used for fire-alarms, and proposed to be operated from any point upon the coast at which telegraphic communication now exists, or may be even temporarily established. Gongs to be operated in this way are now placed in the office at Norfolk, and the central office, in this city.

The uses to follow the establishment of these stations are yet in the infancy of their development.

The stations on the telegraphic lines, constructed in pursuance of acts of Congress in the Southwest and on the Indian and Mexican frontiers for the better protection of frontier populations, and for the purpose of connecting military posts and stations, serve better each year, the ends for which, in part, the lines were at first recommended, that of extending the fields of meteorological research over regions so sparsely settled as to be almost beyond the limits of civilization.

They have made possible the daily receipt of meteorological data from regions in which the collection of them had been before considered so impracticable as to have been hardly contemplated, and they have furnished for the office a daily knowledge of the atmospheric conditions existing along the whole course of the wires. The value of these reports, completing as they do the southern line of the whole system of reports established for the territory of the United States, and which, without them, could not have been completed, is very great. The lines make practicable also the receipt at the regular telegraphic stations of reports from points in the interior of the country near them which has been but recently explored, and from which every reported observation is of value. The commenced extension of a line to be similarly constructed and managed for similar purposes in proximity to, and following the general

direction of, our northwestern frontier, from the station at Bismarck westward, toward stations in Idaho and Oregon, foreshadows the best results for the interests of this especial service, and for the production and development of that portion of our territory.

The events of the years past have illustrated what might be the uses of such lines in Indian wars. They make safer the settlement of the country. They make possible the establishment of stations valuable for meteorological reports.

Telegraphic reports from the eastern Mexican coast (the western coast of the Mexican Gulf) are still to be desired for the proper protection of the shipping in the Gulf and of the Gulf coasts of the United States. Cyclones moving over the West Indies, and thence pursuing a course over the Gulf of Mexico, would doubtless often manifest themselves on or near the coast of Mexico in time to permit warnings to be thence given to our own. The regularity of the telegraphic communication now had over the government lines upon the Mexican frontier and in the State of Texas has established the fact that reports collected in Mexico along or near the Mexican coasts, and transmitted over wires working with fair success, could be concentrated at this office with sufficient rapidity. The organization by the Mexican Government, under Señor Mariano Barcena, since the date of the last annual report, of a system of meteorological reports from stations extended over a great portion of the Mexican territory, and carefully conducted, renders the results of that work more valuable for this purpose than in any preceding year. The notices for the display of cautionary signals issued from this office could reach Mexican ports as well as our own.

It is to be hoped that the sums appropriated for the service and the co-operation of the Mexican Government will permit reports to be had from these coasts within the coming year.

The proposition adopted at the congress of persons charged with meteorological duties, assembled at Vienna in 1873, and to the effect that it is desirable, with a view to their exchange, that at least one uniform observation, of such character as to be suited for the preparation of synoptic charts, be taken and recorded daily and simultaneously at as many stations as practicable throughout the world, has continued to have practical effect.

By authority of the War Department, and with the courteous co-operation of scientific men and chiefs of meteorological services representing the different countries, a record of observations taken daily, simultaneously with the observations taken throughout the United States and the adjacent islands, is exchanged semi-monthly. These reports are to cover the territorial extent of Algiers, Austria, Australasia, Belgium, Great Britain, China, Central America, Denmark, France, Germany, Greece, Greenland, India, Italy, Iceland, Japan, Mexico, Morocco, The Netherlands, Norway, Portugal, Russia, Spain, Sweden, Switzerland, Turkey, Tunis, British North America, the United States, The Azores, Sandwich Islands, Malta, Mauritius, West Indies, South Africa, and South America.

On July 1, 1875, the daily issue of a printed bulletin, exhibiting these international simultaneous reports, was commenced at this office, and has been since maintained. A copy of this bulletin is furnished each co-operating observer. The results to be had from the reports thus collated are considered as to be of especial importance. The bulletin combines, for the first time of which there is record, the labors of the nations in a work of this kind for their mutual benefit. There is needed only the assistance to be had from the naval forces of the different

powers (that of the navies of the United States and of Portugal being as heretofore related already given to extend the plan of report upon the seas) to bring more fully within the scope of study observations practically extending around the northern hemisphere. This end is to a great extent already attained.

In this connection the office has to acknowledge the cordial and valuable co-operation of the meteorological services of the different countries, represented as follows:

Algiers, by General Teissier, Commandant Supérieur du Génie; Austria, by Prof. Dr. Julius Hann, Director of the Imperial and Royal Central Meteorological Institute at Vienna; Belgium, by J. C. Houzeau, Director of the Royal Observatory at Brussels; Great Britain, by Robert H. Scott, esq., F. R. S., Secretary of the Meteorological Council, London; Alexander Buchan, M. A., F. R. S. E., Secretary of the Scottish Meteorological Society, Edinburgh, and the respective observers; Costa Rica, by Señor Federico Maison, Director of the Central Office of Statistics and Meteorology; Denmark, by Capt. N. Hoffmeyer, Director of the Royal Danish Meteorological Institute at Copenhagen; France, by U. J. Le Verrier, Director of the Paris Observatory, Prof. E. Mascart, Director of the Central Meteorological Bureau of France, and the respective observers; Germany, by Prof. Dr. Geo. Neumayer, Director of the German Naval Observatory, Hamburg; Greece, by Prof. Dr. J. F. Julius Schmidt, Director of the Royal Observatory at Athens; India, by H. F. Blanford, Meteorological Reporter to the Government of India; Italy, by the Minister of Agriculture, Industry, and Commerce, and the respective observers; Japan, by the Imperial Meteorological Observatory, and the Imperial University of Tokei, Japan; Mexico, by Señor Mariano Barcena, Director of the Central Meteorological Observatory in the City of Mexico, and the respective observers; Netherlands, by Prof. Buys Ballot, Director of the Royal Meteorological Institute of the Netherlands at Utrecht; Norway, by Prof. H. Mohn, Director of the Royal Norwegian Meteorological Institute at Christiania; Portugal, by J. C. de Brito Capello, Director of the Meteorological Observatory of the Infante Don Luiz, at Lisbon; Russia, by Prof. H. Wild, Director of the Imperial Central Physical Observatory of Russia, at St. Petersburg; Spain, by Antonio Aguilar, Director of the Royal Observatory at Madrid, and the respective observers; Sweden, by Prof. R. Rubenson, Director of the Royal Swedish Meteorological Institute at Stockholm, and of Dr. H. H. Hildebrandsson, Chief of the Meteorological Division of the Upsala Observatory; Switzerland, by Prof. R. Wolf, Director of the Observatory at Zurich, and of Prof. E. Plantamour, Director of the Observatory at Geneva; Turkey, by A. Coumbary, Effendi, Director of the Central Observatory at Constantinople, and of Prof. C. V. A. Van Dyck, Superintendent of the Lee Observatory at Beirut; Canada, by Prof. G. T. Kingston, Director of the Magnetic Observatory at Toronto, and Superintendent of the Meteorological Office of the Dominion of Canada, and the respective observers; United States Navy, by Navy Department, through Rear-Admiral Daniel Ammen, and Commodore W. D. Whiting, U. S. N., Chiefs of the Bureau of Navigation; and by individual observers at other points.

The office has to regret the death since the date of the last annual report of two distinguished colaborers in the work, Urbain Jean Joseph Le Verrier, Director of the Paris Observatory, Prof. Ernest Quetelet, Director of the Royal Observatory at Brussels, Prof. Edward Heis, of Münster, and Prof. Pietro Angelo Secchi, of Rome.

A number of observations taken on vessels at sea to complement the

synchronous reports of the service, and at the request of the department, have been received on the form provided for the purpose, paper 49. Their utility is evident in the study of storms approaching our coasts or which endanger vessels sailing from our ports.

The co-operation of the Navy of the United States in the taking of observations simultaneously with the system adopted at this office, wherever naval vessels of the United States may be, as assured by the general order of the Secretary of the Navy, dated December 25, 1876, has largely increased the data of this class. This co-operation has been skillfully rendered by the Navy Department and the United States Navy, through the Chief of the Bureau of Navigation.

The people of the United States are thus the first nation whose Army and Navy co-operate, as all armies and navies should, under official orders, in the taking of simultaneous observations wherever the forces may be.

In view of the existence of the system of simultaneous reports to be made at sea by the vessels of the naval and commercial marines of the United States and other nations, and to provide for its extension, carefully tested barometers of the best make have, since the date of the last annual report, been prepared and located, as standards, at the ports of New York and San Francisco.

These barometers have been publicly located to afford means for comparison of the ships' barometers of the shipping of all nations. The instruments, while carefully guarded, are easily accessible. Public notice is given of the location, and a sergeant of the Signal Corps attends daily to give information and to take charge of any ship's barometer which may be brought for comparison. (Paper 48.)

The standard barometer for the use of shipping in the Atlantic Ocean is located at the Maritime Exchange, in New York City; the standard barometer for the use of shipping in the Pacific Ocean is located at the Merchants' Exchange, in the city of San Francisco.

The officers of the Signal Service at the different cities and ports of the United States and upon the sea-coast offer every facility and aid in their power to the vessels of any nation.

With the plans for charting now adopted at this office, and with the reports now received here, it appears that the meteoric changes occurring over a great portion of the continents north of the equator can be charted with an accuracy sufficient to permit careful and valuable study. This charting to be of the best attainable value, must be supplemented from the records of observations had on the seas. A ship at sea becomes one of the best of stations for a simultaneous system. The value of the record is enhanced by the change of the ship's location occurring within each period of twenty-four hours. There is no sea-going vessel but which carries human life, and each ought to carry by compulsion, if need be, meteorological instruments. The smallest craft, in caring for its own safety, may use them enough to add to the value of the most extensive record. There is no nation without interest in the work proposed to be based upon exchanged simultaneous reports, and none has hitherto hesitated, when the subject has been properly presented, to aid in a duty which, so easily done as to require very little effort on the part of any one person, has for its object a good to mankind. The work cannot, from its nature, be for the selfish good of any section.

A number of the great steamship companies, foreign and domestic, operating the principal commercial sea-routes, have promised and will give their powerful influence and aid.

The office has the co-operation of the Pacific Mail Steamship Com-

pany, through its agents, Williams, Blanchard & Co.; the White Star Line, through its agents, Ismay Imrie & Co., Liverpool, and R. J. Curtis, New York; the Occidental and Oriental Steamship Company, through its president, George H. Bradbury; the North German Lloyd, through its agents, A. Schumacher & Co.; the American Steamship Company, through its president, H. D. Welsh; the Red Star Line, through its president, James A. Wright, and the Allan Line, through its agents, A. Schumacher & Co.

The United States bear, in the cases of all maritime observers co-operating in this system, all expenses for forms, postages, &c., when so desired, and not infrequently, and, when necessary, loan the required instruments.

The number of observations made daily on separate vessels at sea is one hundred. (Paper 13.)

Research has already gone far enough to indicate the paths by which, if it cannot be directly predicted, it can at least be studied, to learn what sequences to follow conditions reported on or near the eastern coast of Asia, or on the Pacific, will be found on our own western coasts.

Similar studies will have reference to our own southern and eastern coasts, and to the western coasts of the European continent. The time cannot be far distant when vessels leaving any Atlantic port may be informed whether any notable disturbance exists at sea and where it is likely to threaten the voyage.

The establishment of permanent ocean stations in lines traversing the oceans over or near the telegraphic cables, and in telegraphic communication with either continent, is not considered impracticable and has been referred to in a preceding report.

There is reason to hope that a progress has been made which will eliminate from the study of practical international meteorology some of the difficulties hitherto encountered.

There are grounds to hope also that the atmospheric conditions and changes of condition can be charted with sufficient accuracy over any extent of the earth's surface. If the hope has fruition, meteorological barriers will, as against study, practically cease to exist.

A copy of the International Bulletin herewith (Paper 27) exhibits the character of the international reports, and that of the information had from each station. The chart accompanying this bulletin shows as nearly as practicable the location of the stations, and foreshadows the duties and reports had from them will make practicable. The number of stations reporting increases.

While the stations are crowded in some localities, each is useful—each serving to check the work of the other, and each aiding to close the gaps the failure of other stations might sometimes cause. The work is not likely to be abandoned by those in the different countries who have taken part in establishing it, and who share its benefits. If it serve no other purpose than to maintain, as it does, the pleasant co-operation of those charged with the meteorological duties of the different countries, it would be of value. It is hoped that by systems of observations thus extensive, generalizations may be had to permit the announcement of meteoric changes for periods longer in advance than have been hitherto practicable.

The average number of daily simultaneous observations now made in foreign countries is two hundred and ninety-three. The total number of stations on land and on vessels at sea from which reports are entered in the bulletin regularly is five hundred and fifty-seven. The co-operation of the different nations secured by this plan of exchange, as above

described, renders the additional cost to the United States of the grand system of reports it makes possible but little more than that of the cost of the preparation, paper, and binding of the International Bulletin and the accompanying charts, a cost which would have to be met in great part for the proper preservation of the records themselves even if the bulletins were not distributed.

The Chief Signal-Officer is gratified to announce in this report that the work of the collection of the reports of international simultaneous observations, carried on in foreign countries in co-operation with the United States, as well as within the territories of the United States and upon the seas thus above referred to, has in the year just passed so far progressed as to have attained one principal result for which it was set on foot. On July 1, 1878, it became possible for the first time in the history of this office to commence the issue, on that date, of a daily international weather map, charted daily and issued daily, each chart based upon the data appearing upon the international bulletin of simultaneous reports of similar date. The charting extends around the world, and embraces for its area the whole northern hemisphere.

The daily issue of a chart of this kind, thus daily issued for the first time by the United States, is without a precedent in history. It exhibits the co-operation, for a single purpose, of the civilized powers of the world north of the equator.

The studies of such charts make possible the improvement which will come as the work progresses and the area of the chart is better filled with reports of observations carefully elaborated, are fully appreciated by scientific men. The questions as to the translations of storms from continent to continent, and of the times and directions they may take in such movements; the movement of areas of high and of low barometer; the conditions of temperature, pressure, and wind-direction existing around the earth at a fixed instant of time, permitting thus the effects of day and night to be contrasted; the distribution and amount of rainfall, and other studies, many and valuable, only suggested by this enumeration, may be by such studies settled. It seems not impossible that in the future questions of climatology, and perhaps others bearing upon the prediction of weather changes far in advance of the time at which these changes may happen, or questions of the character of coming seasons even, may be answered by the researches these charts will make practicable.

The very great aid and material furnished in this elaborated form gives to the search for generalization, or for data in the support of theories, was referred to in the last annual report. In frequent cases little more than collation is necessary.

As a means of better combining the work and the interests of the several nations; of certainly securing that co-operation at sea which will enable the lines of the charting to be drawn as fully and as well over oceans as over continents; and which will give the world ultimately a knowledge as practical of the movement of areas of disturbance in the midst of the seas as is now had of such movements on some continents, the undertaking is of much importance.

It is an advantage of the charting draughted from simultaneous reports that studies by normals, not possible in any other way, can be made. The normal pressure, temperature, &c., arrived at from observations taken at any one place, at the same and a fixed instant of time every day, become established as to that place and time with accuracy. Many causes of error are eliminated.

The intercomparison of these normals with the normals taken at other

places simultaneously with the first and under the similar condition that the normals to be found for those places are to be from observations taken at those places at a fixed time and on every day, gives results reliable and differing from those to be had by the use of normal readings arrived at in any other manner. Normals for the year, for the season, and for the month may be determined by such procedure. The comparison of such normals will show in the case of abnormal changes in any district or section for any season whether and how they are compensated by compensating variations elsewhere. There are interesting studies as to what sequences there may be to follow such atmospheric variations occurring over any region or country—either in that region or country or elsewhere—and how and where the compensating variations occur, and with what concomitants or sequences of meteoric changes.

There is the hope to gain in this way or by studies such study will suggest information to affect the commercial and agricultural interests of the world.

There is the further hope that as it is more fully realized by the different peoples how close in the future the practice of such investigations draws, each member of the family of nations will find its own interests in labors of this description, and draw more closely the bonds and join with energy in a work which has so begun to connect them. The undertaking, world-wide in extent, is capable of rendering a world-wide benefit.

The total number of daily reports of all kinds now received and filed at the office of the Chief Signal-Officer is as follows: Number of daily service telegraphic reports, four hundred and seventy-one; number of international daily simultaneous reports, four hundred and twenty-three; number of reports from voluntary observers, three hundred and two; number of reports received from the Medical Corps of the Army, ninety-two; number of reports received from United States naval observers, fifty-one; making a total of one thousand three hundred and thirty-nine reports received regularly for discussion. (Papers 11 and 12.)

As described in the last annual report, the daily official deductions or forecasts issuing from the office of the Chief Signal-Officer and constituting the tri-daily "Synopses and Indications" (as they are styled), and the especial deductions, in pursuance of which the orders for the display of cautionary signals at stations are given when necessary, are based upon the regular reports of the service stations of observation, transmitted tri-daily to this office by telegraph, after passing over a system of telegraphic circuits so arranged as to once concentrate the reports at this office and to distribute in doing so certain numbers of them at designated cities and stations. Especial reports are demanded from any station, or number of stations, whenever additional information is required as to impending disturbances. The synopses are those of the meteoric conditions existing over and near the United States for each period of twenty-four hours terminating at the hour for each general report. The Indications are announcements of the changes, considered from the study of the charts, in connection with such rules and generalizations as the experience of this office and the study of meteorologists seem to have determined to be indicated as to happen within the twenty-four hours then next ensuing. The study for each issue requires the draughting and examination of seven charts, these charts exhibiting chartographically the data furnished by the simultaneous reports of the stations heretofore referred to, and located in the United States, on the Atlantic and Pacific coasts, on the coasts of the Gulf of Mexico and of the lakes, in the western interior, and in the Dominion of Canada,

Nova Scotia, Newfoundland, New Brunswick, and the West India Islands. These charts are as follows: (*a*) A chart of barometric pressures reduced to the temperature of freezing and sea-level; of temperatures and of winds, together with the wind directions, and the velocities at the different stations; the amount, but not the nature, of the cloud formations at the different stations; the character of the precipitation, if any, occurring at the time of the report; and the amount of the precipitation, if any, since the time of the last preceding report. This chart exhibits barometric pressures and the temperatures noted at stations in their relations to districts of territory and to each other, by a system of isobaric and isothermal lines inscribed. The isobars are charted for inches and tenths of inches of barometric pressure; the isothermals for temperatures represented by the different multiples of 10°. The wind directions are shown by arrows at the different stations. (Map 3.) (*b*) A chart of the relative humidities appearing to exist over territorial districts, with the temperatures at the different stations in relation to districts and to each other. The chart of humidities enables studies to be made in reference to territorial sections, the difficulties attending the study of observations of this character being obviated to a very considerable extent by the inter-correction of stations among themselves and by the great extent of the regions over which the readings are made simultaneously. In fields so great purely local conditions in part disappear, or affect very slightly the general result. This chart contains also the character and amount of the lower clouds, and the character, amount, and direction of motion of the upper clouds, when these are visible. On this chart are traced lines of equal relative humidity, and isothermals are also drawn, as described in chart *a*. (Map 4.) (*c*) A chart of the cloud conditions prevailing over the United States, in which the character of the different varieties of clouds and their amount, as viewed from each station, are represented graphically by appropriate symbols. On this chart also appears the weather as reported at each station at the time of each report by symbols; the stations at which rain has fallen since the preceding report, as well as the direction of movement of the upper and lower clouds, and on it each morning there are entered the minimum temperature noted during the preceding night at the separate stations at the local times synchronous with the hour of 11 p. m., Washington mean time, and lines of minimum temperature are traced to exhibit these temperatures in relation to districts of territory. On this map are entered also the maximum velocities of the wind at particular stations when required to be specially reported in the intervals between the hours of regular report. The cloud areas appearing on this map are surrounded by an outline charted to enable the extent and probable movement of these areas to be considered. There also appears on the copy of this chart made at the hour of the midnight report the appearance of the sunset at each station, as reported by the observer at that station, and as considered by him to indicate, when taken in connection with the appearance of the western sky at sunset, the character of the weather to be anticipated at that station for the twenty-four hours next ensuing. (Map 5.) (*d*) A chart of normal pressures and variations from normal pressures for each eight hours. There have been computed during the past year, at this office, the means of the observed pressures recorded at each station, at each of the hours at which observations are made at that station, for the regular simultaneous telegraphic reports for each monthly period. The series of observations used in computing these means has been for as many years as was possible at each station. These mean pressures are the mean pressures computed from the actual readings had

at each station, at the habitual hour of observation, for each of the tri-daily full telegraphic reports required to be made from that station, and obtained, as explained above, by reducing the readings then made to a uniform temperature—freezing—and correcting for instrumental error (variation from the standard) only. Mean pressures so obtained are styled in this office "normal pressures" for the station, for its local hour of the report and for the month. On this chart is entered at each station, with the symbol + or —, the value by which the actual reading reported from that station at the hour of any report is above or below the "normal pressure" for that station for the hour of that telegraphic report and for that month. These deviations from such normal pressures may be styled "departures" from the normal pressure; the comparison of these departures for each period of eight hours shows what changes have taken place in the atmospheric pressure at the different stations, in each period of eight hours, after eliminating the horary variations of pressure. On the chart are traced lines of "no variation" in normal pressures, being the lines along which the pressures are at the time practically normal, and also lines of "departure" from the normal pressure for each one-tenth of an inch of mercury, by which the actual readings as reported are found to be above or below the computed normal. Such lines are traced for each period of eight and of twenty-four hours. This method of noting barometric pressures enables those taken and reported simultaneously from any number of different stations to be considered for purposes of study in relation to each other without reference in each case to the local questions of altitude, horary variations of pressure, or other disturbing causes at the places at which they may be taken. (Map 6.) (*e*) A chart of actual barometric variations. This chart exhibits the observed readings of the barometer at different stations, corrected for instrumental error [variation from the standard at Washington] and for temperature, the mercury reduced to the temperature of freezing, but not reduced to the hypothetical readings at sea-level. In this office, observed readings so treated are known as the "actual readings." On this chart are traced lines of "no variation," showing the lines along which no change in actual pressure has occurred for the periods of eight and twenty-four hours, respectively, preceding the hours of report, and also lines showing the lines of rises or falls of the actual readings of the barometer for each one-tenth of an inch and for the same respective periods. This chart is valuable as exhibiting the nature and extent of actual barometric pressures, and the changes of such pressures, taking place at the different stations, and over the different territorial districts. (Map 7.) (*f*) A chart of dew-point variations. On this chart there are entered the values of the changes of the dew-point at the several stations for the periods of eight and twenty-four hours preceding the hours of report; there are traced also lines along which there has been "no variation" in dew-point during such periods respectively, and lines showing the rises and falls for each five degrees in the dew-point for the same periods. (Map 8.) (*g*) A chart of dew-points, vapor tensions, and actual humidity. On this chart are entered the values of the dew-point at the different stations, and lines of equal dew-point are traced for each ten degrees difference of the dew-point readings. At the extremities of these lines are noted the values of vapor tensions and actual humidity, corresponding to the given dew-point lines. The examination of the charts F and G enables the hygrometric condition of the air and the changes in such conditions which have occurred within the periods of eight and twenty-four hours, respectively, to be considered in so far as these are indicated by the wet and dry bulb psychrometers at the different stations.

Several series of computations have been made in the computing-room of the office to enable additional charts each to exhibit in the lines of its charting the condensed data in their relations to each other.

The number of separate graphic chartings made and examined in the study-room, for the purpose of the daily studies of the office, during the year ending June 30, 1878, has been seven thousand six hundred and seventy-five. The charts prepared for the issues of the Monthly Review, and exhibiting each the data received for the month and discussed for the month, have been three in number for each month, a total of thirty-six for the year.

The data thus accumulating on the files of this office have afforded scope for generalization differing from and perhaps more extensive in number than any before had by any one nation.

The number of reports received daily and unceasingly have necessitated a constant labor to keep up, in the discussion of them, and in the record of the results of that discussion, to the dates at which the reports are recorded, in order to prevent an accumulation which, by its mass, might lessen their usefulness. The published daily study-charts of the office and the Monthly Review, with its charts of generalizations, are examples of this work—the study-charts exhibiting a study of the data telegraphically received on each day; the charts of the Monthly Review combining the results had from these data and those received from other sources for each month during the year. It has been thus in the power of the office to lay before scientists and the public, at the close of each day, if necessary, and at the close of each month and of each year, a summary for the periods then terminating. The labor of referring to the individual records in figures, which, after a time, becomes almost impracticable, is thus rendered unnecessary on the part of those who receive these papers. The charts of the average direction and velocity of movement of areas of low barometer, charts of the average barometric pressures at the hours of tri-daily report, charts of wind-direction found most frequent at the different stations before rain-fall charts of rain-frequencies for the different months, are examples of other studies of generalization. Studies of this character, and incidental to those which have in view the preannouncement of storms or other meteoric changes, furnish results valuable for practical uses.

Information of this character has been so freely and so widely furnished that it is not always considered that by no other nation is information of a similar character furnished to nearly a similar extent, and that eight years ago it had not been contemplated in the United States as possible to furnish it at all.

It is by studies of this kind, and in this great field of research, that the hoped-for rules, each of which is to add its aid in the effort to attain precision of forecast and foreknowledge of climatology for the United States, are to be elaborated. It is by such rules and such knowledge, slowly but each year improving, the widest benefits of the service are to be sought. These will follow the practical use, by the people themselves, of the information gained through the work of the service, either in their attempts to have foreknowledge of coming changes from the study of their own instruments, or by supplementing that study by reference to the daily-published bulletins and reports of this office. There is hardly a class of the people, or an industry they practice, but to which good may, in this way, and from such studies, result. Enough has already been done to prove that it is possible.

The policy pursued by the office of diffusing as widely as possible, and in condensed form, the information in its possession, and that of

extending the scope of its observations, enables it to benefit, in studies like these, by the labors of students everywhere. The results returned to the office, in the able suggestions made by distinguished scholars who have received its publications, and based upon deductions had from the charts and data so furnished, aid in forming the rules on which its duties rest. The list of correspondents to whom the publications of the office are furnished contains the names of many of the leading scholars and scientific men in different parts of the world. The instances are not infrequent in which the most interesting papers upon the subject of meteorology, read before the most distinguished and learned societies in the United States, have rested for their value almost wholly upon the studies of the data of observations and charts prepared at and furnished from this office.

The search for generalizations or the support of theories becomes comparatively easy when the material is furnished in elaborated form, requiring little more than collation for either.

The Synopses and Indications have been furnished for the press at the regular hours, 1 o'clock a. m., 10.30 a. m., and 7.30 p. m., daily, and under the same rules as in preceding years. There has been no failure in the delivery of any report during the year. The total number of statements thus issued for publication has been one thousand and ninety-five. These have been telegraphed at the moment of their issue to the principal cities, and have appeared in some form in almost every journal in the United States. A careful analysis of these statements of the office, made for the year terminating June 30, 1878, and a comparison with the meteoric conditions afterward occurring within the twenty-four hours next ensuing, and within the district to which each forecast has had reference, has given a percentage of verifications as follows:

The percentage of verifications for each district and for each month of the year is stated in the following table. Reference is had to the district map:

*Amount of verifications of indications for each month of the year ending June 30, 1878.*

| | 1877. | | | | | | 1878. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. |
| New England | 84.5 | 79.8 | 83.0 | 84.4 | 90.6 | 85.9 | 81.6 | 86.8 | 87.0 | 81.8 | 84.0 | 84.2 |
| Middle States | 84.0 | 82.2 | 85.5 | 88.7 | 86.8 | 86.5 | 84.7 | 88.7 | 88.8 | 80.5 | 86.6 | 83.0 |
| South Atlantic States | 82.1 | 81.1 | 86.7 | 86.1 | 85.5 | 87.7 | 83.9 | 85.8 | 87.6 | 79.6 | 84.6 | 86.6 |
| Eastern Gulf States | 81.9 | 81.6 | 84.2 | 89.8 | 86.9 | 82.9 | 86.4 | 84.8 | 79.5 | 76.7 | 82.3 | 88.0 |
| Western Gulf States | 85.6 | 85.0 | 87.2 | 83.6 | 87.6 | 84.2 | 86.5 | 87.5 | 81.7 | 78.7 | 80.9 | 86.6 |
| Lower lakes | 84.6 | 85.8 | 86.2 | 81.0 | 85.9 | 88.2 | 84.9 | 87.7 | 87.2 | 80.1 | 84.8 | 87.6 |
| Upper lakes | 82.9 | 82.3 | 85.9 | 83.9 | 87.9 | 83.5 | 80.9 | 86.3 | 87.4 | 78.8 | 83.5 | 86.1 |
| Tennessee and Ohio Valleys | 84.4 | 80.9 | 83.1 | 86.6 | 89.8 | 84.9 | 83.8 | 85.3 | 87.4 | 77.4 | 82.5 | 87.3 |
| Upper Mississippi Valley | 86.4 | 83.2 | 88.0 | 84.1 | 86.7 | 80.0 | 82.0 | 85.3 | 86.6 | 77.1 | 82.7 | 88.0 |
| Lower Missouri Valley | 84.5 | 84.2 | 85.0 | 80.5 | 87.2 | 78.0 | 82.5 | 83.7 | 84.6 | 76.0 | 80.6 | 82.9 |
| Total percentage of verifications | 84.1 | 82.6 | 85.5 | 84.9 | 87.5 | 84.2 | 83.7 | 86.2 | 85.8 | 78.7 | 83.2 | 86.0 |
| Percentage of verifications for the year (changes of barometric pressures, temperatures, wind-direction, and character of weather expected comprised) | | | | | | | | | | | | 84.36 |
| Percentage of verifications for the year (forecasts of the character of the weather only) | | | | | | | | | | | | 88.4 |

The percentages of accuracy first above given are for statements comprising the predictions of the changes of barometric pressures, temperatures, wind-directions, as well as the character of weather to be expected in the districts to which they have reference. Such predictions

are more difficult to make correctly than those relating to the future conditions of the weather alone. The percentage of accuracy of forecasts limited to the preannouncement of the character of the weather to be expected in the districts, exclusive of the other conditions above referred to, has been 88.4 per cent.

The attempt has been made to utilize the statements of indications to be issued in bulletin form by adding, when possible, precise information as to the location of areas of disturbance or storm-centers, their expected direction of movement, and such other facts as might be stated fully on the bulletins to be displayed at board of trade rooms and other prominent points in cities, and be of utility both as amplifying the reports of indications as furnished for the press, and also as capable of being issued from the central office at any hour it might be considered necessary so to issue them. The press reports are habitually furnished at fixed hours only. The popular faith in the announcements of the office, now in the eighth year of their issue, has increased. So far as can be judged from reports, notably more attention has been paid to the reports among the farming population. There seems each year more confidence and a greater willingness to be guided by the statements of forecasts in the conduct of agricultural operations.

This confidence has not at any time been sensibly lessened by the errors and omissions which sometimes direct attention to the fact that in the present condition of science, and with a system of observation still too limited, premonitions having for their scope a territory so great as that of the United States cannot always be correct for every part of a district.

The reports of indications are necessarily limited also to a certain number and few telegraphic words, the report for a district comprising several States condensing into four or five lines.

It is not possible often to convey within this limit weather changes clearly indicated as to occur, but notice of which must be omitted for want of space. It would not be difficult to write for each State, and with benefit to the readers, a synopsis with the indications stated in numbers of words equal to the whole number now allowed for those relating to all the States of the Union.

The popular knowledge of the duties of the office and its reasonable success is in no way better evidenced than by the criticisms to which the service is subjected if errors occur in its work. A few years ago the work itself was by many deemed impracticable. In recent criticisms the work has been commented upon adversely on occasions, and it has been stated that it ought never to fail, as the task of successfully forecasting had been proven so simple that any person of fair education ought to be competent to perform it. There has been no work other than that of this office to cause this task to be popularly so considered.

In an instance recently occurring, the service was blamed because, with signals displayed at many stations, there was one at which the signal was not displayed earlier than two hours before the storm; the storm-area taking an unexpected course. Such criticisms are, by the accuracy they imply, a source of satisfaction.

With the view of extending the system of forecasts and premonitions of the office to the coasts of Oregon and California, and the ports of those States bordering upon the Pacific, and west of the Sierra Nevada, the habitual study of the weather-changes over those regions, at the time of each tri-daily report, has been made a part of the duty of the office. The number of stations in those regions is not yet sufficient, nor are the reports from them received with such regularity as to permit

indications to be based thereon for public issue. Map 9 exhibits the districts into which this region has been divided for purposes of this study.

The instruction of officers of the Signal Service to fit them for the various duties of the office has been continued. The especial duties in which the officers on duty are severally engaged, each in his sphere, and each of which duties contributes its shares to the success of the whole, are such as necessarily prepare them for the courses of especial study and practice, and fit them to take charge, in turn, of the separate divisions and sections into which the office-work is divided. A roster for duty becomes in this way possible, and provides at once for the permanent continuance of a work to be prosecuted both by day and at night, by providing for the relief of men wearied in the discharge of such parts of the duty as impose severe physical as well as mental strain by others fresh from duties less burdensome, and insuring the instant filling of vacancies in the cases of the sickness or absence of any officer.

The studies to which reference has been hitherto made and the data condensed for generalization improve each year the material laid daily before the students in the office for consideration.

In the incessant work of the map-room, and in making the computations constantly called for in the course of office duty, important assistance is rendered by the competent and well-taught non-commissioned officers and soldiers on duty in the several divisions. In the matter of arriving at generalizations, it would be impossible often to handle the masses of data which must be considered without the faithful service of these men. While absolute accuracy cannot be expected in work so extensive as that required from this office, and the results of which are demanded for instant publication, there is attained an accuracy sufficient for every practical purpose, and one which each year increases in rigor.

The data which appear in the publications of this office are checked figure by figure five times before the printing. They are, whenever it is practicable, accompanied by a chart, useful in itself, and by the charting the best check upon all the data which have served as its bases. Additional checks are adopted whenever experience has demonstrated a closer accuracy can be had.

The display of cautionary day and night signals, by flags by day and lights by night, has been made systematically, on occasions of supposed especial danger, at the following points, ports and harbors located upon the lakes, the Atlantic and the Gulf coasts:

Alpena, Ashtabula, Atlantic City, Baltimore, Barnegat, Bay City, Belfast, Booth's Bay, Boston, Buffalo, Cape Hatteras, Cape Henry, Cape Lookout, Cape May, Cape Vincent, Charleston, Charlotte, Chatham, Chicago, Clay Banks, Cleveland, Detroit, Duluth, Dunkirk, Eastport, East Tawas, Erie, Escanaba, Fairport, Fall River, Forester, Fort Macon, Frankfort, Galveston, Gloucester, Grand Haven, Green Bay, Highland Light, Horn's Pier, Hyannis, Indianola, Jacksonville, Kenosha, Kewaunee, Key West, Kittyhawk, Lewes, Ludington, Mackinaw City, Marquette, Marblehead, Menomonee, Milwaukee, Mobile, Monroe, New Bedford, Newburyport, New Haven, New London, New Orleans, Newport, New River, New York, Northport, Norfolk, Oswego, Pentwater, Port Austin, Port Eads, Port Huron, Portsmouth, Portland, Me., Racine, Rochester, Rogers City, Sandy Hook, Sandusky, Savannah, Sheboygan, Smithville, South Haven, Saint Mark's, Saint Joseph, Stonington, Sturgeon Bay, Thatcher's Island, Toledo, Traverse City, Tybee Island, Wilmington, and Wood's Holl.

During the year ending June 30, 1878, one thousand nine hundred and

ninety-eight signals have been ordered, counting each separate display at each port a separate signal, in anticipation of one hundred and twelve dangerous storms. Of the total number of signals thus displayed, seventy-five and nine-tenths per cent. have been afterward reported as justified by the occurrence of winds held to warrant them at the points where the signals were displayed, or within the radius of one hundred miles distance of these points, as set forth in the rules of the office. In the cases reported as failures of justification following the display, the winds did not attain, at the port or within the described radius, a violence held to justify the warning. The signal ordered by this office is always cautionary in its character, not announcing that a storm will come, but that the indications are sufficiently threatening to call for caution, both as to going to sea and for preparation for rough weather if vessels are about to sail.

It is one of the most difficult tasks which fall to the office to determine in advance over what ports to be selected, to the exclusion of others, an advancing storm-area will pass, and in such a manner as to be accompanied at these ports with a given wind-velocity. The direction of movement of storm-areas changes sometimes unexpectedly, and ports are then threatened at which, while the signal may be exhibited, it cannot be so shown far enough in advance to avoid the coming danger. Within the same area the winds differ in force at different points. They differ also with different contours of the earth's surface. There is the danger that warnings unnecessarily given may delay the movements of shipping. A heavy responsibility is incurred if the warnings are not given when they ought to be. Time, increasing experience, and increasing facilities will insure improvement.

The occurrence of a storm-area with wind registering a wind-velocity of twenty-five miles per hour on land, indicating, as it frequently does, a wind-velocity of forty-five or fifty miles at a distance of ten or twenty miles from the land, is regarded as the lowest velocity justifying a signal.

There is no work of the office in which it has been felt necessary to progress with more caution than in that relating to the display of cautionary signals. None had ever been shown in the United States when the duty of making such displays devolved upon this office, and it was in debate whether any had ever been shown with practical success elsewhere.

Experience has, however, gone far enough in this country since the duties of such displays have been entered upon, and reasonable success has demonstrated that the plans heretofore in use may be supplemented with advantage to commerce by an additional signal to announce that, although the area of storm-disturbance may not have passed the port or station, and though the wind-velocities may be high, the wind-direction will be northerly or westerly, or off the coast at or near the port at which such supplementary signal may be shown.

On January 1, 1878, an additional cautionary storm-signal, one used for the first time so far as it is known on the coasts of the United States, was ordered to be displayed as occasion may require, at all active signal and display stations of the Signal Service, as follows: The signal will be displayed at and on the regular place and staff, and will consist of *a white flag with a square black center*, shown above *a red flag with a square black center*, by day, or a *white light* shown above a *red light* by night. This signal will be known as the "cautionary off-shore signal," and will indicate, when shown, that while the storm-disturbance is considered at the office of the Chief Signal-Officer as not yet passed for the

port or place at which the signal is displayed, and the winds may yet be high, and there may be danger, the winds are expected to blow from a northern or western direction or "off-shore," at or near the port or place where the signal may be.

The display of this signal will often follow and must be distinguished from the display of the usual "cautionary signal," *i. e.*, a square red flag with a square black center by day, or a red light shown at night—which retains, when shown alone, its usual meaning. The display of either signal is always cautionary.

The "cautionary signal," *i. e.*, a red flag with black square in the center, by day, or a red light by night, calls for caution in view of an approaching storm, and is so "cautionary" with reference to winds blowing from any direction.

The cautionary off-shore signal, *i. e.*, a white flag with black square in the center, shown above a red flag with black square in the center, by day, or a white light shown above a red light by night, is "cautionary" with reference to winds expected to blow from a northern or western direction, or off-shore, at or near the place at which it may be displayed. (Paper 45.)

It is of important utility in the management and for the safety of vessels to be thus preadvised as to the direction in which coming winds will blow.

Of cautionary off-shore signals considered alone, the following percentages of verifications are given: Seventy-six and eight-tenths per cent. fully verified; ninety-three and two-tenths per cent. verified as to direction; seventy-nine per cent. verified as to velocity; four and one-half per cent. were not verified as to either direction or velocity.

An organized plan for subordinate stations at which cautionary signals may be displayed (systems of these stations being managed as subordinate to and in connection with the signal stations of the first class, established at the principal cities and ports of the United States, and immediately controlled from this office) has been put in operation within the period elapsing since the date of the last annual report. These "display" stations are subordinate stations, located at the smaller lake or sea ports, and are classed several together in sections, each section being under the immediate supervision of a sergeant of the Signal Corps, located at a named station at some neighboring principal port. The duties at display stations are limited to the display, upon the receipt of the telegraphic order by day or at night, of the cautionary signals or cautionary off-shore signals.

Since the date of the last annual report stations of this character have been established on Lakes Erie, Ontario, Huron, and Michigan, as follows: *Section one*, established September 16, 1877, controlled from Milwaukee, Wis., consists of stations at Menomonee, Mich., Sturgeon Bay, Horn's Pier, Kewaunee, Sheboygan, Racine, Green Bay, Kenosha, and Manitowoc, Wis. *Section three*, established July 20, 1878, controlled from Detroit, Mich., consists of stations at Ludington, Pentwater, Traverse City, Frankfort, Northport, Saint Joseph, and South Haven, Mich. *Section four*, established August 1, 1878, controlled from Detroit, Mich., consists of stations at Bay City, East Tawas, Forester, Port Austin, Rogers City, and Monroe, Mich. *Section five*, established August 1, 1878, controlled from Cleveland, Ohio, consists of stations at Dunkirk, N. Y., Fairport and Ashtabula, Ohio. *Section six*, established August 1, 1878, controlled from Oswego, N. Y., consists of the station at Cape Vincent, N. Y. Signals ordered for Chicago, Ill., are repeated at New Buffalo, Mich., and those for Rochester, N. Y., at Charlotte, N. Y.

Cautionary signals are displayed at Mackinaw City, Mich., when ordered direct from the central office. On the sea-coast as follows: *Section seven*, established August 20, 1878, controlled from Portland, Me., consists of the stations at Millbridge, Belfast, Deer Island, and Booth Bay, Me., and Portsmouth, N. H. The stations at Millbridge and Deer Island, Me., were discontinued on August 19, 1878, until further orders. *Section eight*, established August 15, 1878, controlled from Boston, Mass., consists of the stations at Chatham, Newburyport, New Bedford, Hyannis, Thatcher's Island, Gloucester, and Fall River, Mass. Signals ordered for New London, Conn., have been repeated at Stonington, Conn., since October 10, 1878, and were repeated from Watch Hill, R. I., from August 15 until September 15, 1878, when the telegraph office at that place was closed for the season. Signal orders for Mobile, Ala., are repeated at Pensacola, Fla. Signals are ordered for Lewes, Del., from the central office, and for Port Eads, La., through the sergeant at New Orleans, La.

The hope entertained at the date of the last annual report that within the year then next ensuing it would be possible to extend the display of signals (at that time limited to that at the principal cities and ports) to all recognized ports on the lakes, on the Gulf coast, and on the sea-coast of the United States, very nearly approaches fulfillment. The warnings of the service have, within the year just passed, and by the adoption of the off-shore signal above referred to, been doubled in utility. The power of displaying these warnings has, by the system of "display stations," been more than doubled.

There are no other coasts so fully guarded by the display of storm-signals as are now those of the United States.

A completeness of work, which a few years ago seemed not to be attainable on the part of the office for many years, is by the experience gained in those duties within the few years passed already accomplished.

If the duties of this office are done and its warnings exhibited at its warning stations as they ought to be, the record of disasters cannot fail to show, by the lessened number of them, the good effects of this watchful care. It is a pleasant thought that the protecting vigilance of the United States is offered in this regard and in all matters pertaining to this duty, equally to the shipping of every foreign people with the shipping of its own.

Attempts have been made to determine definitely and to the satisfaction of the office, by the compilation of statistics, what certain benefits to shipping have followed the displays of cautionary signals. The reports of the observers at stations give instances in which numerous vessels have remained in different ports in recognition of the warnings given. In these cases danger was avoided. In other cases the displays of signals on dangerous coasts have been followed by the making to sea for an offing of all of the vessels in sight of the display. In other instances reported, vessels going to sea in disregard of the warnings have been driven back, have suffered injury, or have been lost. So far as can be judged at this office, a proper attention is paid to its warnings, particularly on the part of the coasting or smaller classes of vessels on the sea-coast, and by shipping generally on the lakes. Especially does this happen at those times of the year recognized by seamen as the stormy seasons. A series of tables of disasters to shipping, compiled for a number of years, have seemed to show that the annual average of disasters occurring at or near points at which cautionary signals have been displayed has been lessened by a considerable percentage for the years during which the displays have been had. The discrimination made by insurance compa-

nies against insurance risks taken for the sea and lake ports and places which have no signal stations exhibits, by the increased pecuniary consideration demanded for such risks, amounting in the aggregate to a very considerable sum, an evidence of appreciation of the value of them.

During the year ending June 30, 1878, four hundred and sixty-eight storm-warnings for Canadian stations were telegraphed from this office to Prof. G. T. Kingston, chief of the Dominion meteorological office at Toronto, Canada.

The plan of exhibiting as widely as possible in the agricultural districts throughout the United States the results of the daily office studies in the form of printed forecasts for the benefit of the agricultural populations has been continued in operation. The effort to cover so wide an extent of territory has made the labor great. The continuance of the work has seemed to be warranted by the favor with which it has been received. It has been considered due to the farming populations that they should have an opportunity to profit by whatever information could be given them. With the active co-operation of the Post-Office Department, with which there is an arrangement for this purpose, six thousand and thirty-nine printed Farmers' Bulletins, on which have appeared daily the reports of this office, have been distributed and displayed in frames daily at as many different cities, villages, and hamlets in different States. There are numerous and especial requests to increase this number. At 1 o'clock a. m. of each day, except Sunday, the midnight report of the office for the ensuing day has been telegraphed during the year ending June 30, 1878, to seventeen centers of distribution, located in the following named cities: Albany, N. Y., 266; Bangor, Me., 160; Boston, Mass., 659; Buffalo, N. Y., 279; Burlington, Iowa, 159; Chicago, Ill., 639; Cincinnati, Ohio, 557; Detroit, Mich., 335; Leavenworth, Kans., 22; Logansport, Ind., 186; Memphis, Tenn., 27; Nashville, Tenn., 98; New York, N. Y., 703; Pittsburgh, Pa., 317; Philadelphia, Pa., 815; Saint Louis, Mo., 371; Washington, D. C., 446. At nine of these stations the bulletins are printed by civilian employés upon the office presses, and under the immediate supervision of the sergeants in charge. At eight stations, the work is wholly done by enlisted men of the Signal Service.

The numbers placed after the names of the cities denote the number of hamlets, post-offices, or railway stations supplied from each city as a center.

These centers have been carefully chosen as in the midst of the denser agricultural populations of the United States, and at points whence the facilities of communication would enable the surrounding districts to be most rapidly supplied.

Arrangements are in progress to establish a station of distribution at Sacramento, Cal., for the farmers of the Sacramento and San Joaquin Valleys.

The telegraphic report of forecast telegraphed from the central office at 1 a. m. of each day, and received at a center of distribution, is at once there printed on bulletin forms provided for that purpose. These are enveloped as rapidly as printed, addressed to each designated post-office within the district to be supplied, and which can be reached by the swiftest conveyance by the hour of 2 p. m. of the date, and are then placed in charge of the Post-Office Department under an arrangement by which each postmaster receiving a bulletin has the order of the Postmaster-General to display it instantly in a frame furnished by this office for that purpose, and to report, in writing, the fact and time of its receipt and of its display, to the Chief Signal-Officer.

The bulletins have reached the different offices and have been dis-

played in each of the frames at the average hour of 11 a. m., averaging thus ten hours from the time the report has left the office of the Chief Signal-Officer until it has appeared bulletined in the midst of the farming populations, and accessible to them in the distant parts of the country.

The information given on these bulletins has a value in addition to the forecasts. Facts relating to the climatology of the different sections are condensed into brief notes, which are published with the telegraphed reports. For instance, each bulletin announces for the geographical district in which it is displayed, and in addition to the forecast for the day, what winds in each month have been found most likely and what least likely to be followed by rain at the stations within each district. This simple foot-note has its effect in increasing the gains and reducing the losses of harvesting. (Paper 40.) These bulletins will improve for the uses for which they are intended as the experience of the office permits the information they exhibit to be supplemented with further data and other rules. With each year the popular knowledge of the uses of the bulletin and some increased interest in and study of meteorology render the farming communities better able to judge of its correctness and to benefit by its contents. It is contemplated, as the work of the office progresses, to add to the bulletin such brief instructions as may be developed in regard to its uses in connection with such local instruments as may be had for local use. Reference has been made in preceding reports to the economy of this work. Careful estimates have shown that if the total cost for each bulletin station at which the bulletin is displayed at each different post-office, hamlet, village, or city were computed to be twenty-eight cents per day, the sum so resulting would meet all the expenses caused by Signal Service. A little saving of any one crop or gain to any interest made on any one day in the vicinity of each station, supposing nothing to be saved on any other day of the year at or near that station, would more than counterbalance the expenditure.

A simple form of instruments combined for farmer's use, to be used by the farmers themselves, has been prepared for issue, and since the date of last report has been distributed to several stations. Brief rules for use accompany each instrument. This instrument, known as the Weather Case or Farmer's Weather Indicator, will supplement with local signs and with the local indications of the several instruments the general indications given in the bulletin reports. It will, it is hoped, enable agricultural populations and others to determine for themselves in advance something as to the character of the coming weather from local indications alone, when added means of information cannot be reached or may fail.

Whenever appropriations at the control of the office shall make it possible to publish, to accompany the Farmers' Bulletin, or in the columns of newspaper journals, graphic weather charts, simply drawn and so explained as to be comprehended as to their meaning by persons of ordinary education without special study, the use, it is to be hoped, of instruments of this character will be found very valuable. The use of the Weather Case alone at isolated places, where other reports or information other than that had from the readings and the use of the instrument itself cannot be had, will with little practice fill a want long felt among the agricultural populations, and often afford to them really valuable results. It cannot fail to turn thought and study in a useful direction.

It is in contemplation, when the amounts of the appropriations for and strength of the service permit, to place such instruments, should expe-

rience warrant, both at the farmers' post-offices now reached by the Farmers' Bulletin and at those others not reached by either the Bulletin, the daily press, or the telegraph, for the uses of the farming populations everywhere.

The river reports, giving the average depths of water in the different great rivers of the interior, and notices of dangerous rises for the benefit of the river commerce and the populations in the river valleys, have been regularly made, telegraphed, bulletined in frames, and also published by the press at the different river ports and cities.

A circular issued from this office on March 15, 1875, and showing the range between high and low water marks on the Western rivers, and the heights at which the river-rises become dangerous along their banks, is believed to have been the first systematic attempt to establish a "danger line" on those rivers. A "danger line" is that imaginary line which passes through points at measured and announced heights above the low-water mark at the different cities and landings, and above which line if the water rises there is danger of injury to property and plantations. This circular was prepared from data collected at this office, and was given, by order of the Secretary of War, a wide circulation through the press and otherwise. The uses of the information thus published have been shown upon the occurrence of the river floods; a reference then had to the circular, in connection with the daily reports, enabling those interested to judge of the probable limits of the rises of the water to be expected at the different places on the river-banks, and of the dangers to be anticipated. This knowledge has made possible many and necessary precautions for safety.

The data had at this office from stations making river-reports, though scanty as compared with those to be desired, permit a foreknowledge of changes likely to happen, and enable useful warnings to be given of coming floods, ice-floods, or of sudden and great rises of the river water-levels. The daily reports are useful also at times of low water, the information they then give permitting river-shipping to be moved with intelligent foreknowledge of the probable depths of water to be found in the river-channels at different points upon the river's course. These reports are especially useful to those for whom they are intended, as having an official character.

The manner in which the river-reports continue to be received by the communities especially concerned, and the official requests of boards of trade and others engaged in river-commerce for the increase of the number of such reports, have given evidence of their usefulness.

In instances attracting attention, the notices of the probable heights floods anticipated or passing would attain, have been followed by preparations made upon the levees to guard against danger. A brief examination of the charts of changes of the river-levels accompanying this and preceding reports, shows that the river-rises to occur at the different localities can be judged of frequently as to the time at which they will occur, and their extent by the conditions existing at points sometimes far distant. Accumulating data render studies of this kind valuable.

In connection with these studies the examination of the daily weather-charts, showing places at which precipitation has occurred or is likely to occur, and the amount of such precipitation, had with the study of the charts of the river-basins, which enable it to be determined what rivers will be affected by precipitation, are found to be of value in furnishing correct prognostications. This subject has been referred to in preceding reports.

The Chief Signal-Officer is confirmed in the opinion before expressed, that with proper study of the river-floods, and with stations properly placed, reporting at times of especial danger, it can be made almost impossible for a flood to follow a river-course without notice given in advance of its coming at the localities threatened. Daily bulletins of river-reports have been regularly displayed during the year at the following-named stations: Augusta, Ga.; Cairo, Ill.; Cincinnati, Ohio; Davenport, Iowa; Dubuque, Iowa; Fort Sully, Dak. (up to and including October 31, 1877); Keokuk, Iowa; La Crosse, Wis.; Leavenworth, Kans.; Louisville, Ky.; Memphis, Tenn.; Morgantown, W. Va.; Nashville, Tenn.; New Orleans, La.; Omaha, Nebr.; Pittsburgh, Pa.; Shreveport, La.; Saint Louis, Mo.; Saint Paul, Minn.; Vicksburg, Miss.; and Yankton, Dak.

Systematic reports of river-observations, carefully made and closely studied, are had daily by telegraph and weekly by mail, on established forms, from the stations above named. Reports of similar daily observations are also had from twenty-three special river-stations named in the record of stations. For certain months of the year in which danger is not anticipated from floods, these reports are forwarded by mail. For the months in which floods more frequently happen, and at any time in any case of especial danger, the reports are telegraphed. The observers are, in fact, a river-guard.

Charts of the changes in the principal Western rivers for the year ending June 30, 1878, and upon which stations reporting to this office have been established, are given in maps 13 to 22.

It will be noted that by the study of such charts, continued from year to year, those seasons in which floods are more likely to occur on any watercourse can be predetermined, and it can be ascertained what amounts of precipitation, occurring in the different river-basins, and under what circumstances, will be followed by floods, and approximately what will be the extent of floods shown in this way to be anticipated. Whenever the facilities of the Signal Service are so far extended as to permit systematic observations to be had of any river-course and telegraphic warnings to be given in instances of danger, the serious losses of property or life caused by floods can be, and with comparatively little expense, guarded against on any river throughout the United States. The occasions occur on the separate streams at long intervals only. The levee systems of the Mississippi and other great rivers can be in no way better guarded themselves, and made in their turn safeguards to the immense agricultural interests they are intended to protect, than by systems of river-report, which will warn of danger in time, and summon, if need be, the strength of the State to watch and strengthen these State constructions.

Steps have been taken to extend the plan of river-reports to the rivers of California and Oregon, the rapid rises and falls of which involve sometimes large grazing interests, as well as those of agriculture and commerce. The attention of this office has, in preceding years, been directed to this subject, and but for the failure of the necessary appropriations, the proper river stations would have been established. The want of the power to so establish them was notably felt in the fall of 1877, when, while all the preparations had been made, the scantiness of the appropriations available made it inexpedient to put the stations in practical operation. The heavy and unusual freshets of the succeeding winter caused losses which might have been prevented. It is considered that serious losses occurring there since the date of the last annual report might have been guarded against, had provision been made in former

appropriations for the establishment of a few stations upon the principal streams liable to overflow. Stations have this year been established at Colusa, Folsom City, Marysville, Oroville, Red Bluff, and Sacramento, Cal., Albany, Eugene City, and Umatilla, Oreg., and the preliminary arrangements have been made for the location of stations at Downieville, Cal., Celilo and "The Dalles," Oreg.

The daily reports of the surface and bottom water-temperatures at designated points upon the lakes and sea-coasts have been continued through the year. These reports are furnished at the request of Prof. Spencer F. Baird, United States Commissioner of Fish and Fisheries, the object had in view being to determine the proper waters in which to place the different varieties of food-fishes. It is necessary, for this purpose, to ascertain the extremes and means for the year of the water-temperatures in the different localities. This series of reports has now continued for five years. Statistics of this kind—the depth of the water in the different streams being, as it is, daily noted—form the basis of a systematic study of pisciculture, in which are considered, by students attached to the commission, both the amount of the water supplies in different channels or basins at the different seasons of the year, and the temperatures to be expected in each. There is no more ready way for furnishing cheap food for the people than by the culture of food-fishes, and every facility for the work within the control of this office is gladly furnished to this end. It is quite possible that the great fisheries on or near the Atlantic coasts, or on the fishing-banks, could be materially aided by the pre-announcement of barometric or other atmospheric changes approaching, were the office informed of the precise nature of the reports to be desired. It is anticipated that under the laws providing for the sea-coast service of the Signal Service, it will, in the near future, be possible to furnish officially series of reports suitable for this purpose from observations taken at points on and near the coast at stations contemplated in existing laws.

The series of reports, being the announcement from day to day of such approaching changes of temperature as would be likely to cause the closing of the canals by freezing, or, as in other cases, would open them, were continued during the days of closing canal navigation of the fall and winter of the past year. The commerce moving upon the canals, as their closing draws near, is sometimes of greater value than at any other portion of the season. These water-routes are then thronged with hundreds of laden barges, each of which must move with reference to the danger of the closing of the routes by freezing. The market rates at the great cities are influenced by the probability that the merchandise or grain thus afloat will reach or fail to reach the points for which it is intended. These reports are received with satisfaction by the canal commerce, and by the commercial associations of cities. They constitute, for the months of November, December, and January, one of the regular issues of the office.

The exhibition of symbol-maps, on which the meteoric conditions are shown by symbols, changing for each report, at the rooms of boards of trade, chambers of commerce, and of commercial associations in the principal cities, and at places of public resort, for the benefit of shipping and other interests, the display of bulletins, the distribution of weather-maps, and the employment of other methods for rapidly diffusing, for public use, the information had at this office, have been continued for the year ending June 30, 1878. The purpose had in view by this regular distribution has been to induce an effort on the part of those examining the different charts and papers to foretell to some extent the

changing weather for themselves. The official reports of the office relate to districts, at special localities in which districts the local indications may point to modified conditions. These local studies are useful also in many ways which space here would fail to describe. The expectation of the office has been well realized in this regard, and in many places there are among the citizens and business men careful students of the data daily symbolized, who use their own judgment to determine to what extent the conditions announced for the district will prevail at the places in which they may be, or consider approaching changes foreshadowed by the symbols upon the chart, but which are yet too remote to be announced as indicated. Investigations of this character ought to be encouraged.

The instruments prepared for local use and before referred to will greatly aid such studies.

The form of the bulletins published for the use of farmers, of those issued for the use of seamen, for the river reports, for the canal reports, and for the other varied interests which the information borne upon them is intended to benefit, change gradually with increasing knowledge and facilities. Each form has, however, its object. The issue of bulletins is closely scrutinized for every station, and the number is reduced to the smallest number which can be wisely used.

The publication of the Monthly Weather Review and of the Weekly Weather Chronicle has been continued during the year. The monthly issues of the Review are given in the appendix. (Papers 28 to 39.)

The scope of the Monthly Review has become extensive with the number of reports received both by telegraph and by mail, all of which are valuable for reference, and a study of which enters necessarily into the study for the preparation of each review. The collection of materials for this paper permits also the study of especial storms, descriptions of or facts relating to which are given in the local journals of the region over which they pass, or in the shipping-news communicated by vessels encountering them at sea. The three charts which accompany each issue of the Review exhibit the uses made of meteorological data. Each of these charts is to some extent the reduction of data first chronicled on two hundred and ten separate study-charts for the month. It will be readily understood how much this monthly reduction simplifies the work of generalization for the year. The Review exemplifies also, to some extent, the consideration of the great mass of data before mentioned as entering upon the files at this office. Each issue of the Review contains, under the head of "Notes and Extracts," a brief summary of current meteorological intelligence, compiled from the publications received at this office, and by which the marked advances in meteorological science are readily brought to the notice of the numerous correspondents co-operating with the service. During the year just past an additional section, under the heading of "International Meteorology," and intended to contain such reports of exceptional storms occurring beyond the limits of the United States as may reach the office up to the date of issue of each Review, has been added to the contents of this paper. The wide circulation given in this paper meets, in part, the popular wish for generalizations prepared by this office, while the receipt of a copy of the Review by each one of the hundreds of the voluntary observers, now its correspondents, is accepted by them as at once a sufficient acknowledgment of, and compensation for, the labor of making their daily reports.

The preparation of the matter for the publication of the "Synopses, Indications, and Facts," commenced in 1872, has been continued. Twen-

ty-seven volumes of the bound daily bulletins, with accompanying charts, had been issued up to June 30, 1878, and other volumes will follow as rapidly as they can be obtained from the printer.

These volumes, issued in sequence, one for each month, contain the records of all the tri-daily telegraphic reports received at the office from the dates at which such records commenced; the tri-daily charts, upon the study of which each report was on that date issued, together with a statement of the "facts" or meteoric conditions which subsequent reports have shown as actually existing during the time and in the district for which each forecast was made. It will be readily noticed that the maps in these volumes, at once condensing and checking the bulletins printed therein, afford a meteorological record as compact as ought to be desired for especial researches, or for generalizations to be based upon continued series of meteorological observations. The volumes themselves are useful for purposes of exchange, and bring to the office publications sent in return exchange, fully equaling their value. They constitute a meteoric record more full, perhaps, than any other now issued.

It was estimated in the last annual report that by the publications of this office, which have been above referred to—by the cautionary signals displayed by day or at night on coasts or at ports in times of probable danger; by the announcement of probable changes of weather in the synopses and indications furnished thrice daily to the press; the Farmers' Bulletin exhibited at so many villages and hamlets in the interior; the river and canal reports made with reference to river and canal interests; the bulletins and data exhibited at all the great cities and ports; the symbol-maps displayed in boards of trade rooms, and rooms of chambers of commerce; the Weekly Chronicle and Monthly Weather Review furnished to agricultural societies, commercial associations, and correspondents of the office; the daily weather maps; the monthly charts; and, finally, the charts condensing the results of years of observation—the information emanating from the office was received in some form daily at not less than one-third of all the households of the United States. It must be considered, in estimating such a distribution, that the distribution is easiest and the readiest modes of communication are found in those districts which, most densely populated, contain the greatest number of households.

As hitherto related in this report, while treating of the subject of international meteorology, the work of the office reaches later, and, by its publications, nearly every prominent establishment in the world. It is considered that it contributes to the world's work material valuable now—to be more so in the future, and sufficient of itself to compensate for the whole cost of this especial service from its commencement.

The different reports of the office, of which mention has thus been made, have been favorably received in the communities for which they have been furnished, and their uses have been acknowledged by communications from commercial associations and by other official action.

The regular daily publication of the reports of forecasts by the press, now continued for eight years without cost to the United States, is considered as an evidence of their usefulness and of the favor with which they are received by the communities for which they are intended.

On the occasion of the transit of Mercury on May 6, 1878, and of the total eclipse of the sun July 29, 1878, a series of special observations was made for the use of the office. The Chief Signal-Officer acknowledges the valuable aid, on the occasion of the total eclipse of the sun, observed at the office station on the summit of Pike's Peak, in the Rocky Mountains, of his assistants, Cleveland Abbe, A. M., Mr. H. T. Crosby, of the

War Department, and Assistant H. H. C. Dunwoody, Acting Signal-Officer. The thanks of the office are due to Rear-Admiral John Rodgers, superintendent United States Naval Observatory, for the courteous loan of instruments used at the time of observation, and to Prof. S. P. Langley, representing the Observatory at the station, for assistance rendered by him. These reports will form a separate paper.

The office is in correspondence, in reference to its duties, with committees appointed for the purpose by the boards of trade and chambers of commerce of the principal cities in the Union, and also with a large number of agricultural societies. (Paper 9.)

Permanent committees to co-operate with this office were last year appointed by boards of trade, chambers of commerce, &c. These committees inspect, in compliance with the official request of the Chief Signal-Officer, the local offices of the service at the places in which the committees may be appointed, and report monthly to this office upon the condition and utility of the service in their vicinities. The boards in this way at once co-operate with this office and share the responsibility for its success.

The resolution under which these committees were established, as adopted by a number of the prominent associations in the United States, is as follows:

*Resolved*, That the meteorological committee of the board of trade (or chamber of commerce) shall be a permanent committee, and that the names of the members, and any changes in membership, be, in each case, formally notified to the Chief Signal-Officer of the Army. The committee will confer with the Chief Signal-Officer and will bring before the board (or chamber) all matters requiring its action, as relating to, or needed for, the improvement of the Signal Service.

The organizations which have adopted this resolution are enumerated in Paper 10. There are rules for the government of these committees, together with the form of reports they are desired to furnish monthly.

The appointment of these committees furnishes at once a board of reference, to which questions of local interest may be referred for their views, and provides an authorized source from which this office may learn of its successes or failures, and be thus enabled to direct its efforts in the several localities. It furnishes also a local supervision by parties interested themselves through their personal interests in the successful discharge of the duties of the service, and who will strive, for this reason, to best advise how that success may be attained.

The services of these committees, faithfully given, have been found to render important aid to the work of the office. The supervision had by them is very necessary, and has had a good effect. Their duties involve a high responsibility, which has been appreciated by the members of the committees.

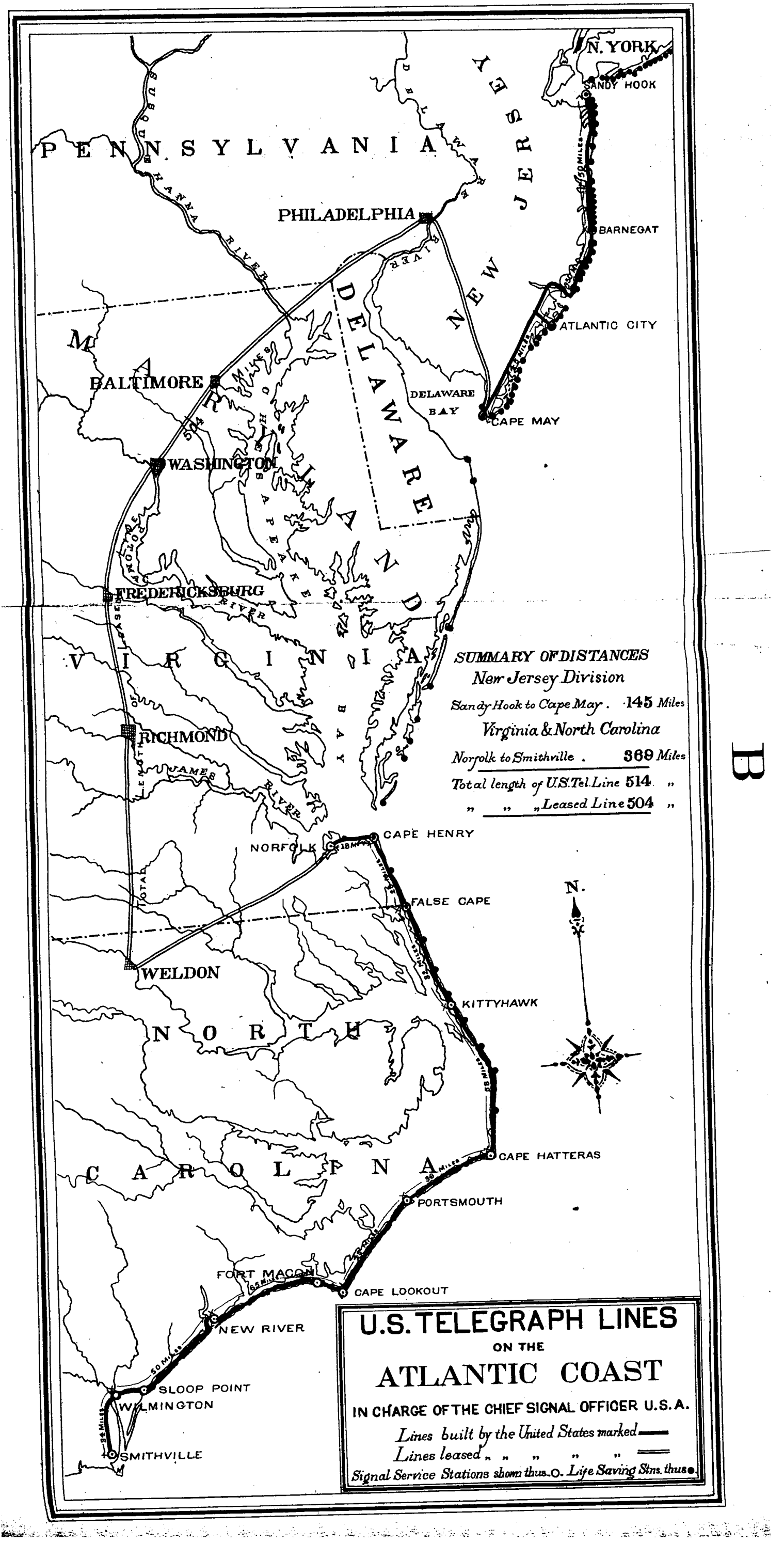
A list of disasters upon the lakes, for the year ending June 30, 1878, compiled by Sergeant S. W. Rhode, Signal Corps, U. S. A., in charge of the Milwaukee station, is given in Paper 41.

Sergeants W. A. Glassford and Isaac A. Reed, Signal Corps, U. S. A., furnish reports upon the Wallingford, Conn., tornado of April 9, 1878. (Papers 43, 44.)

Private H. R. Stockman, Signal Corps, U. S. A., furnishes a report upon the Augusta, Ga., tornado of February 7 and 8, 1878. (Paper 42.)

Paper 8 contains the names of places from which requests have been received for the establishment of signal stations, but at which stations had not been established June 30, 1878.

In the instrument-room of the office five hundred and eighty-four meteorological instruments have been carefully compared with the official



N. YORK
SANDY HOOK
PENNSYLVANIA
NEW JERSEY
PHILADELPHIA
BARNEGAT
ATLANTIC CITY
DELAWARE
MARYLAND
BALTIMORE
DELAWARE BAY
CAPE MAY
WASHINGTON
FREDERICKSBURG
VIRGINIA
RICHMOND
CAPE HENRY
NORFOLK
FALSE CAPE
WELDON
KITTYHAWK
NORTH CAROLINA
CAPE HATTERAS
PORTSMOUTH
FORT MACON
CAPE LOOKOUT
NEW RIVER
SLOOP POINT
WILMINGTON
SMITHVILLE
N.
SUMMARY OF DISTANCES
New Jersey Division
Sandy Hook to Cape May . 145 Miles
Virginia & North Carolina
Norfolk to Smithville . 369 Miles
Total length of U.S. Tel. Line 514 „
„ „ „ Leased Line 504 „
U.S. TELEGRAPH LINES
ON THE
ATLANTIC COAST
IN CHARGE OF THE CHIEF SIGNAL OFFICER U.S.A.
Lines built by the United States marked
Lines leased „ „ „ „ „
Signal Service Stations shown thus ○. Life Saving Stns. thus ●.


B

agent of the Secretary of War, in the control and management of the interior lines now constructed and worked upon the frontier, and connecting as well military posts and stations as the villages and hamlets of the advancing frontier populations, devolve upon the office many cares and the settlement of many and novel questions involving the relations of the United States and the different telegraph companies. In all these matters, the assistance and advice, formerly given the office by the distinguished lawyers, then acting as special assistant to the Attorney-General, the Hon. William Whiting, at one time Solicitor of the War Department, and the Hon. Reverdy Johnson, formerly Attorney-General of the United States, have been of the greatest advantage.

There are few questions which have arisen, or are likely to arise, which fail to find a clew to their settlements in the lucid opinions and instructions prepared by these gentlemen.

With the increase of the population of the country, the multiplicity of the public business, and the habitually greater use of the telegraph in public affairs, it becomes more and more important that the dispatches of the superior civil and military officers should certainly reach the persons to whom they are addressed, and be securely protected from inspection by improper persons. The gravest affairs may be complicated by the delay or the improper revelation of official telegraphic dispatches. The care of the office is always given to this protection when informed that it is desired.

The relations of the office with the different telegraphic companies enables it to secure, in time of need, a rapidity and a certainty of transmission of particular dispatches, which may especially need such action, perhaps not to be had by any other agency. The experience already had in the management of frontier lines, under the novel circumstances in which these existing upon the frontier have been placed, has afforded such suggestions as to plans of working them as to warrant the belief that, as facilities permit, they will compare favorably in the rapidity of their work with those existing wholly within the limits of civilized and settled regions.

The sea-coast service of the Signal Service, in connection with the Life-Saving Service, has been before referred to in this report. The total length of the sea-coast lines constructed by this office is five hundred and forty-three miles. The coast lines are connected with this office by leased wires from Cape May and Norfolk. The telegraphic lines, reaching from Sandy Hook to Cape May, and from Norfolk by the way of Cape Hatteras to Wilmington and the mouth of Cape Fear River, on the most frequented and in some places the most dangerous coasts of the United States, have been continued in operation. The stations upon these lines are occupied, and the telegraphic lines are operated by enlisted men of the Signal Corps. (Map 4.)

The act of Congress requiring this service contemplates the establishment of signal-stations at life-saving stations and light-houses at points along the coast in such manner that the coast and sea in their vicinity may be at once kept under observation, warning of approaching storms be given to vessels within signal distance, and information of disasters and other incidents occurring be rapidly conveyed to the chain of life-saving stations, to light-houses, ports from which aid may come in case of need, and to this office.

These lines and stations are on the sea-coast itself, and in positions whence they command a view of the sea, and where they can have knowledge of disasters to occur from shipwreck. The reports of the weather conditions and of the state of the sea had by them, and not

attainable in any other way, are necessary. Vessels passing in view can be at once warned by signals of coming danger, or be communicated with by signals, and can be aided if in distress. The telegraphic wires connect each station with the War Department.

It is an advantage of the telegraph lines thus managed and worked by the force of the Signal Corps, that the breaking of the wires at inlets or in violent gales need not break the communication along the coast. In cases occurring during years past, messages have been transmitted for weeks together over extensive breaks of wire lines reaching past inlets by means of the usual day and night signals with flags and torches. In many places in the interior it would be possible, by a similar use of the signal modes of the service, to carry on communication over lines broken for considerable distances.

The enlisted men at these stations have been taught to take and report meteorological observations, and, as signal men, are practiced in both the Army and Navy codes, in the use of semaphores, and in that code of permanent flag signals known as the International Code, to enable them to communicate with vessels of any nationality. The service has proven its usefulness in the case of a number of disasters to shipping. Its uses for meteorological purposes are before referred to. In the cases of savings at the time of disasters, it is believed that the values saved have been greater than the whole cost of the lines.

The sea-coast service stations in operation are located at Sandy Hook, Barnegat, Atlantic City, and Cape May, N. J.; Norfolk, Cape Henry, and Station No. 3, Va.; Kittyhawk, Cape Hatteras, Portsmouth, Cape Lookout, Fort Macon, New River, Sloop Point, Wilmington, and Smithville, N. C.

The constant changes occurring in the widths of the numerous inlets, across which the line upon the coast is carried by cables between Cape Hatteras and Wilmington, the character of the outer beach, the only land upon which the lines could be placed, the destruction of portions of the lines and changes in the coast itself, caused by storms, have made the maintenance and operation of the line south of Cape Henry a work of difficulty. In the year just passed large portions of the line have been re-erected, and the line maintained in good condition.

By the use of repeating telegraphic instruments the line is worked habitually, as forming a single circuit, from Smithville, N. C., at the mouth of the Cape Fear River, through Washington, to Sandy Hook, at the entrance to New York Harbor.

It is not necessary to argue at length the importance of a service of this character on our sea-coasts. It is necessary to explain it only. The reasons for its maintenance and the benefits to be expected from it are manifest. The commerce which approaches a coast on which such a service exists, properly conducted, is spared disasters, in comparison with the cost of which the cost of the service is little.

The watch kept by the service and the prompt transmission of a few messages have, in time of danger, saved property amounting to more than the cost of the lines.

Instances occurring since the date of last annual report have called into operation every duty for which these lines and stations were planned, and are cited as proving the propriety both of establishing them and illustrating the manner in which they compensate for the necessary cost.

In the incidents of the year have been communication by signals with vessels of foreign nations and of the United States, with commercial vessels, and the report by telegraph of the numbers or the needs of either, so far as signaled to, or known at, any sea-coast station.

It has been always a source of complaint among seafaring men on all those coasts on which storm-signals have been attempted to be displayed, that, while it might be learned by vessels lying in port and from the display of such signals, with reasonable certainty, whether or not a storm was so impending as to render it not advisable to risk exposure at sea, there was no plan of storm-signals devised or devisable by which it could be communicated to vessels themselves actually at sea, and in sight of the stations, beyond the mere fact that a storm was threatening, from what direction it was to be expected, on or near what coasts it would be dangerous, and whether or not any particular voyage might be continued in safety, or when and where shelter ought to be sought. The fortunate connection had by this office by means of telegraphic lines with all of its sea-coast stations has enabled an important advance to remove these difficulties.

On February 4, 1878, an order was issued by which are announced the stations of the service prepared to hold communication by the international code of flag-signals with vessels of any nation at sea coming within proper signal distance. It is so arranged that any question as to weather changes anticipated so signaled from the vessel to the shore station is immediately transmitted by telegraph to the central office, whence prompt reply is ordered.

This reply, on reaching the coast stations, signaled by flags if need be, to the inquiring vessel. It is possible thus, without landing a boat, to gain any needed information. It does not appear how a system of storm-warning or coast-signaling can be given a greater scope than is arrived at by this process. The instance may be imagined for illustration of a vessel sailing from New York for a southern port, and making inquiries off the Capes of the Delaware whether it will be safe to pass Cape Hatteras, and advised from this office in reply to the inquiry transmitted to this office that a storm at the time is moving near Hatteras and to take shelter at the Delaware Breakwater until the disturbance shall have passed northward. In the occurrences of the year there have been instances in which steamers moving along the coast have conducted their voyages from port to port upon the answers to special inquiries addressed from the ports in which they might be to the office, and some in which such special inquiries have been signaled from the vessel to the station, telegraphed thence to the office, and the telegraphed answer signaled again to the vessel. It requires no comment to show how extensive this practice might be, and how valuable, when proper appropriations and proper appliances may permit such plans of communication to be established along the extent of the coasts of the United States.

On November 21, 1877, the warning-signals of the service were displayed along the Atlantic coast and at Norfolk and Cape Henry thirty-six hours in advance of an expected storm.

On the morning of November 24, 1877, the country was startled with the intelligence of the disastrous wreck of the United States steamer Huron, which had gone ashore near Kittyhawk, soon after midnight. The point where the vessel struck was twelve miles distant from the nearest life-saving station and eight miles from the nearest sea-coast station of the Signal Service.

The first intelligence was had through this station—Kittyhawk—to which it had been brought by men on foot, residents near the locality of the wreck, who had been sent to the station with the intelligence after a part of the crew of the wrecked ship had reached the shore.

The sergeant in charge of the station left immediately for the scene,

carrying restoratives, and to collect such information as would be necessary for the action of the proper authorities. He returned at 4 o'clock in the afternoon, having walked sixteen miles through the sand, with the full report of the wreck and of the number saved. The Kittyhawk station had meanwhile been directed to open what is known as a "wreck-station," that is, a temporary telegraphic station at the scene of the wreck, and to be there prepared to communicate by flag or torch signals, day or night, should any survivors be still remaining on board the wrecked vessel, or with other vessels, should any approach the scene, and to keep this office constantly advised by telegraph of occurrences. In the Signal Service of the United States complete communication by means of signals is very readily established, and at considerable distances. The codes of the service are officially adopted for use, both in the Army and the Navy of the United States, and a single man, mounted or on foot, is able to carry with him, and for great distances, all the apparatus needed for prolonged communication by day or at night. Any message of any character may be transmitted. In obedience to the order above referred to, a station was opened abreast of the wreck before daylight of the 25th. In the mean time, and immediately upon the receipt of the first message at this office, the authorities of the War and Navy Departments and of the life-saving service had been officially notified of the occurrence, and communication had been had with those at Norfolk, the port nearest the scene of disaster, and the wrecking companies located there had been informed. Steamers of the Navy and of the wrecking companies started by sea for the scene as soon as the violence of the gale rendered it safe for them to proceed on this exceptionally dangerous coast, while a small steamer, with medical officers, stores, &c., moved to render assistance by what is known as the "Inland Passage," through a canal from Norfolk, and thence by Albemarle Sound. In the course of the day the vessels of the Navy, arriving outside, and finding it impossible to land through the heavy surf, communicated by signals with the signal station on shore in such way as to be fully informed as to the condition of affairs and to learn that no assistance they could render was required, and to be warned to care for their own safety in a gale then threatening as approaching along the South Carolina coast. They returned accordingly to their anchorage at Norfolk. The departments at Washington were kept constantly advised by telegraph from the wreck-station of the occurrences of the day, orders and communications were transmitted, and the ceaseless inquiries of the relatives of those lost or saved from the wreck were answered immediately from the immediate scene of the disaster. It was the first time in the national history in which, a naval vessel of the United States being wrecked on our coasts, it had been possible to open and keep up such communication with the superior authorities and the authorities of the department to which the vessel belonged. The wreck was so complete that none were saved after the time the messengers first started from the location to carry the intelligence to the signal station. The survivors were reached by the relieving parties without difficulty, and were properly cared for. In considering the occurrence it should be borne in mind that without the sea-coast service of the Signal Service, organized and provided as it is, information could not have been had at Washington or Norfolk, nor could organized aid have arrived on the ground, for many hours after it did in this case actually do so. The exposure, suffering, and difficulty incident to establishing and keeping in communication a telegraphic and signal station, when the instruments are worked on the open beach and in the raging of a gale, must be contemplated in considering the hardships to which the enlisted men of the service sta-

tioned on the sea-coast are exposed. Private A. T. Sherwood was promoted to be corporal for his energetic conduct at the time of this disaster.

On January 30, 1878, the warning signals of the service were again displayed along the Atlantic coast and at Cape May thirteen hours, and at Norfolk nineteen and a half hours, in advance of an expected storm. On the following morning a gale of unusual severity having developed itself, special vigilance was, in view of that fact, enjoined upon the sea-coast stations. At 6.55 p. m., January 31, a telegraphic message from Kittyhawk station, announcing the total loss of the steamer Metropolis, which, with a list of passengers and crew amounting to two hundred and forty-eight in number, had sailed, on January 29, from Philadelphia for a South American port, was received at this office. The disaster had occurred at a point twenty miles distant from the station. The messenger bringing the intelligence had at that moment reached the station at Kittyhawk. The dispatch contained the further announcement that Private William Davis, the assistant at this station, was already in motion, in obedience to the standing order in such cases, to establish a wreck station at the wreck. In less than fifteen minutes this soldier, carrying telegraphic and signal apparatus, well equipped and mounted, was on his way riding through the night and storm to the scene. At Washington and Norfolk the different authorities and parties whose duty it was to render or who could render aid were immediately notified. The occasion was one of such moment that a copy of the dispatch was sent to the President. As in the instance just above recited, relief vessels and parties were ordered to move immediately. At 3.20 a. m. Private Davis had reached the scene of the disaster. At 4 a. m., though impeded by the darkness, he had established his station, opened communication, and forwarded a report by telegraph to this office. At 5 a. m. a full report of all the facts collected up to that hour was forwarded.

At one o'clock the wrecking steamer from Norfolk appeared off the station, and soon after the relief party arrived through the inland passage. The survivors had meanwhile been informed of the steps being taken to provide for them, and constant communication had been kept up between them, the officers of the United States whose duties were called into action by the occurrence, the officers of the ship, the company, the representatives of the press, and inquiring relatives and others interested in different cities throughout the United States. On Friday night the last of the survivors had left the wreck on the relief boat Cygnet, which had moved from Norfolk on receipt of the first official notification from this office.

The wreck station was continued in operation until the sad labors of the burial parties were performed, and until its further maintenance was not needed. It is proper to invite attention to the great rapidity of movement made possible on the part of the forces of the departments on this occasion, and to the fact that by such organized and intelligent movements a wreck occurring on a lonely coast and first notified on Thursday night, the relieving vessels had been in motion on the same night, the facts and names of the survivors had been reported by the press throughout the United States by noon of the succeeding day, while by the succeeding night the last survivors, well provided for, had left the scene. Private William Davis was promoted to be corporal, Signal Corps, U. S. A., for his services on this occasion. (Paper 47.)

On March 6, 1878, what is known as a flying station was established midway between the stations Kittyhawk and Cape Henry. Flying stations are temporary stations, established between regular stations isolated

from each other, and where the length of telegraphic wire, requiring to be kept under constant inspection in order to be in repair, is considerable. A single Signal Service man is stationed at these stations—mounted when need be—charged with keeping in repair a certain number of miles of line, and under standing orders to proceed at once in case of a wreck occurring in his vicinity to open there a wreck station, first notifying the regular stations of the occurrence.

On the morning of March 25 a message was received at this office from Flying Station Number 3, announcing the wreck of the brigantine Nipoti; that the soldier from Flying Station Number 3 had reached the wreck; a station had been opened there as a wreck station, from which he was then communicating with this office in this city, and that the life-boat was on the way and would soon arrive.

In this case there was an instance of a telegraphic station opened at a wreck, and in communication with a central office three hundred and eighteen miles away, before the life-boats, moving from the nearest points, had reached the scene. The movements of the Life-Saving Service on the coasts of the United States are rapid. It was due to the fact that the soldier of the Signal Corps was mounted, lightly equipped, and ready to start at a moment's warning that this feat was possible.

In the instance of this wreck the wrecking steamers, notified from Washington, had reached the scene from Norfolk before the surf, raised by the storm, had fallen sufficiently to permit the wreckers to board the vessel or make fast their hawsers. The vessel was afterward saved.

On February 22, the weather having been rough for the night preceding, there came a message in the early morning from the Cape Hatteras station, announcing that a vessel in sight of that station, but not near the shore, appeared to be in distress, and was showing her colors, Union down, as a signal of distress. There was no life-saving station within many miles—no port near from which assistance could go. It was found impossible to communicate with the vessel by signal from the station—the vessel seeming not to carry any code. Under the rules and standing orders of the office, the facts as communicated to the office were at once communicated to the revenue-cutter Hamilton, Captain Irish, of the United States Revenue Marine, then lying in Norfolk Harbor, signal being made to call the attention of that vessel.

The cutter went to sea almost immediately. Meanwhile a messenger was dispatched along the beach to give notice to the life-boat nearest to the station, in case there should be need of its use, and efforts were continued at the station to attract the attention of those on the vessel, to make them aware that their condition had been noticed, and that steps were being taken for their rescue.

The vessel continued to drift slowly, evidently unmanageable, until in the afternoon it took ground about two miles north of the station. The vessel hung here until late in the afternoon, when it floated off with the rising tide, and drifted slowly in a northeasterly direction until it disappeared from view. During all this time the vessel had not, in any way, recognized the signals made from the sea-coast station. Before daylight the next morning—the morning of 23d—the revenue cutter Hamilton arrived off the station, having traversed the distance of two hundred miles. A heavy surf was rolling in, making a landing almost impracticable, and the morning was foggy. As with the Army and Navy, so in the revenue marine of the United States the Signal Service code is adopted, taught, and used. It was, therefore, easily practicable for any conversation to be carried on between the captain of a cutter lying off the station at sea and the station on land. Captain Irish inquiring

of the sergeant in charge at the station, received full particulars as to the character, the apparent condition of the vessel, the direction in which it had disappeared drifting, and the hour at which it had been last seen. It had at this time been out of sight about sixteen hours, and was, presumably, drifting helplessly with the current in the Gulf Stream. Plotting the course, distance, and presumable location at which the missing ship then was, the United States cutter steamed immediately in search. The next morning—the morning of the 24th—soon after daylight, a vessel was discovered by the lookout on the cutter, helpless, and, upon being boarded, was found to be a schooner, abandoned by its crew, which had been taken off by a passing steamer; the vessel, as subsequent researches showed, which forty-eight hours before had been reported in distress from the signal station. The instance is interesting as exhibiting the quick intercommunication and skillful co-operation of two branches of the United States service. The communication between the vessels of the Revenue Marine and the Signal Service is now so arranged that vessels of the Revenue Marine passing along the "beats" or districts, one of which is assigned to each cutter for its especial service, to aid vessels in distress, signal their numbers and destination from day to day to the signal stations they pass. These numbers, with the course and destination of the vessel, are reported to this office, in order that disasters occurring anywhere in those districts may be at once telegraphed and signaled to the cutter, wherever it may be, that it may move at once to give needed assistance.

On the morning of February 10, 1878, a telegram was received at this office from the Cape Henry signal station, announcing the wreck of the bark Giuseppe Massone, which had stranded near that station. The crew from the life-saving station took prompt action to rescue those on board and part of them were landed. It is the standing order to the signal stations that in all instances where it is at all practicable, a soldier of the Signal Service, fully equipped with signal apparatus, shall at once board stranded vessels, to permit, by the power thus secured of communicating any messages in any words or language whatever between ship and shore, intelligent action to be taken in saving the crew or in providing for the saving of the vessel if there yet remains any hope of such saving. Private T. B. Harrison, of the Signal Corps, was at once ordered on board of the Guiseppe Massone, from the station, and promptly reported to this office at Washington the fact that he was on board of it. The crew, before on the point of deserting the ship, encouraged now by the certainty that they could be warned of increasing danger from the shore, or could call for help and receive it immediately, if the danger should appear to them to increase, remained on board and worked zealously to aid in getting off the vessel, with the powerful appliances of the wrecking steamers, which, notified long before, at the moment the wreck had been first discovered, had already begun to arrive from the port of Norfolk, fifty miles distant. It was largely due to the prompt arrival of these vessels and the perfect co-operation thus made possible by the work of the Signal Service that the vessel was saved. Nearly similar instances occurred at different times in the cases of the Italian bark Francisco Bellagamba and the British steamship Antonio, both of which having stranded in sight of Cape Henry station, the wrecking steamers were notified at Norfolk the moment the vessels were discovered, and reported by telegraph, and both of which were boarded in pursuance of the above order by a soldier of the Signal Corps, who afterward kept up conversation (for this is the service actually rendered by signals) with the shore until such time as the ships were saved. In the case of the

Antonio the soldier was carried off on board of the vessel, compelled for its own safety to steam to sea as soon as it was floated. It has been attempted by these illustrative instances to give some exemplification of the services rendered by the men of the Signal Corps employed on its sea-coast service, aside from their duties of meteorological observation and report, the reports of the sea swell, and the display by day or night of signals, warning against impending storms.

General repairs to the sea-coast telegraph line south of Hatteras were conducted by a repair party, under charge of Lieut. C. A. Booth, assistant signal-officer, until February 2, 1878, when Lieutenant Booth was relieved by Lieut. C. A. Tingle, assistant signal-officer, and the repairs were completed by the latter officer between New River and Wilmington, N. C., the party reaching the last-named place April 13, 1878.

The cable crossing Lynn Haven Bay, between Norfolk and Cape Henry, was injured by an anchor in October, 1877. The cable being so deeply imbedded in the sand as to render it impossible to raise it in order to find the defect, another cable was laid December 5, 1877.

The cables at Hatteras and Ocracoke Inlets have been lengthened, three hundred and fifty-two yards of cable having been added to the length of the former, and six hundred and eleven yards having been added to the length of the latter.

Flying stations were opened on the southern coast at Life-Saving Station No. 3, Va., March 20, 1878; Fort Macon, N. C., April 22, 1878; Sloop Point, N. C., May 27, 1878. The repair-station at New River, N. C., was re-established February 25, 1876. These stations are furnished with the instruments and apparatus necessary for their especial outfits. The soldiers stationed at them patrol the sections of line in their charge twice in each week.

The lines upon the sea-coast have been repaired throughout their entire length, reinsulated with insulators of the best pattern, the supports moved back in places where there had been danger that they would be carried away by the sea-surge in the case of storms; and every precaution has been adopted to render the line sufficiently strong to endure the exposures incident to the gales of winter.

The total number of messages received over the sea-coast lines during the year ending June 30, 1878, was eight thousand eight hundred and forty-eight; total number sent in same period, three thousand two hundred and forty-three, or a total of twelve thousand and ninety-one messages received and sent, which would have cost at regular tariff rates ten thousand two hundred and ten dollars and thirty cents.

The Chief Signal-Officer considers it his duty to urge the maintenance, proper equipment, extension, and rapid working of the sea-coast lines and the sea-coast service. The temper of the nation can well be judged from the experience had in the instances of the Huron and Metropolis disasters in the past year.

There is no thought of any parsimonious economy nor tolerance of delay in the impatience with which a generous people demand that succor shall be given to any imperiled life on the instant without consideration of cost. There is no question of the joy with which every report of successful effort in this direction is received. There is no time for slow-paced messengers when disasters are announced. The lightning must be used.

Whatever the difficulties of maintaining these lines practically on the sea-coast itself, and where the beaches and lines upon them are sometimes swept away together by furious surges, the lines must be maintained.

The saving of a single ship or of a single life compensates the cost of repairs. The progress of electric communication, the rapidity and certainty gained, with improving organization and improved skill, has opened a field of usefulness so wide that it would be criminal to turn from them. The sea-coast lines have improved in structure and utility during the year. If wooden lines fail, as they may on the coast, there is every reason to believe the iron lines will not. Arrangements are now made to substitute iron for wooden supports. The time is not far distant when the possession of a coast not covered by sea-coast telegraphs, not guarded by a sea-coast storm-signal and signal service, and not supplied with the force and means of aid at life-saving stations, will be held as much an evidence of semi-barbarism as is now among civilized nations the holding of any national coast without a system of light-house lights. Foreign commerce will flow toward the safest coast. Domestic commerce will there be more remunerative. The United States have taken the first steps for such protections. So far as is known at this office they do not regret it.

This description has been made thus minute because it is desired to show that a force of trained soldiers doing a land duty on shore, displaying signals hoisted on land though answered from ships; watching, as sentinels, each his special "beat" of sea and shore; telegraphing messages by electric wires to summon aid, or telegraphing them by the same flag and torch signals they use in war when the lines are gone; erecting and keeping up their own wire lines of telegraph; displaying storm warnings by day or at night; making the regular meteorological observations, that the warnings may be ordered; in effect, a regular sentinel force to warn and to aid in any danger, all in strict military subordination to each other by their grades, and all to the central office, are a force of soldiers as usefully employed for purpose of peace, and as ready by training for war, as a force can be kept.

There is devolved upon this office by law the duty of providing all signals to be officially displayed as coast signals, or recoganized as such on the coasts of the United States.

To carry into effect the provisions of this law, there was issued from this office in January last a partial code of danger or distress signals to be used and recognized anywhere on the coasts of the United States, wherever there may be sea-coast stations of the Signal Service, and by official co-operation of the Life-Saving Service, to be organized also at any life-saving station. (Paper 46.) Copies of this code are furnished gratuitously to every vessel, of whatever nationality, taking clearance at any of our principal ports, and to coasting as well as other vessels upon application to this office. It is the aim to permit no ship within the protection of the United States, within its ports or upon its coasts, to be in case of danger or distress without the means of communicating with the land or with the parties whose duty it may be to aid in the rescue.

In pursuance of the acts of Congress, authorizing the construction and operation of telegraphic lines in the interior and upon the frontier, for connecting military posts and stations, and for the protection of the population from Indian and other depredations, officers and enlisted men of the Signal Service have been continued upon these duties. The lines in Arizona, New Mexico, and upon the Texan frontier are nearly completed. The lines in the Northwest, for which provision is made, are pushed rapidly forward. The work of construction has been in large part done by working-parties furnished by the active co-operation of department commanders. A total length of three thousand four hundred

and thirty-nine miles of frontier line is now operated and maintained in the care of officers and enlisted men of the Signal Service. (Map 3.)

The uses of the frontier telegraph lines passing through the Indian country as employed in military operations, against war parties of Indians in motion, as well as their uses in advancing the progress of civilization, by the safety and the sense of protection they give to settlers near the scattered hamlets or military posts, were referred to as follows in the last annual report: "A telegraph line well worked forms one of the most efficient of barriers against the raids of Indian war parties. The country on the frontier through which such lines pass has but few points at which water can be had. The posts occupied by the Army are scattered along the line at intervals of several hundreds of miles. The object in view, with Indian war parties, is to pass between the posts and settlements without disturbing any of them; and they very much dread to leave any danger in their rear, or to so alarm the country as to cause their retreat to be cut off in their return toward the region occupied by their tribe. The existence of the telegraph line enhances both these dangers. It is useless to break it as the parties pass toward the scene of their incursion, for this alarms both the posts or the settlements on both sides of the break, and brings repairmen and guards at once to the point of the break and upon their trail; nor does it stop communication between the posts, for messages may be sent circuitously by other wires perhaps covering hundreds of miles of distance around the point at which the line has been disabled. If the wire is not broken when the trail passes the line, the troops can of course be very readily called upon whenever or wherever the parties may be discovered. But even if the line is passed safely and the trail is not detected, the danger the electric wires cause is not ended. Wherever the party may strike, if the blow falls near any settlement or station connected with the telegraphic network, the alarm becomes in a few hours general. The troops on the line they have just passed know there is a war-party in the field; other troops and other settlements can be aroused. The line of the Indian retreat, the points they must pass to reach water are approximately known, and while the pursuit goes on in the field other forces can occupy the passes and points in advance of the flying tribe. There can be no constructions more important for holding a frontier or protecting the first steps of advancing civilization than the telegraphic lines. In a number of instances occurring in Texas, New Mexico, and Arizona, since the date of the last annual report, the movement of troops and of material, directed by telegraph, upon alarm sent by telegraph from settlements, upon the frontier system of lines, have been so timely as to have attained results which could not, without the rapid action made possible by the lines, have been hoped for. How much of life and property have been saved from attacks thus guarded against, which might else have been made on defenseless communities, can be conjectured only.

From each of the stations on the telegraph lines thus in charge of the Signal Corps, a daily report is had and used, the whole forming a valuable portion of the system of reports each day discussed. There is no reason why the working of the lines, thus doubly useful, should not be economically and successfully conducted. The saving in the cost of these reports, and the sums received for messages, make the lines in part self-supporting.

Aside from the benefits resulting from the connection of military posts and the incidental protection the stations at frontier villages upon the lines give the country through which they pass, thus aiding its development, the meteorological information such lines make available is use-

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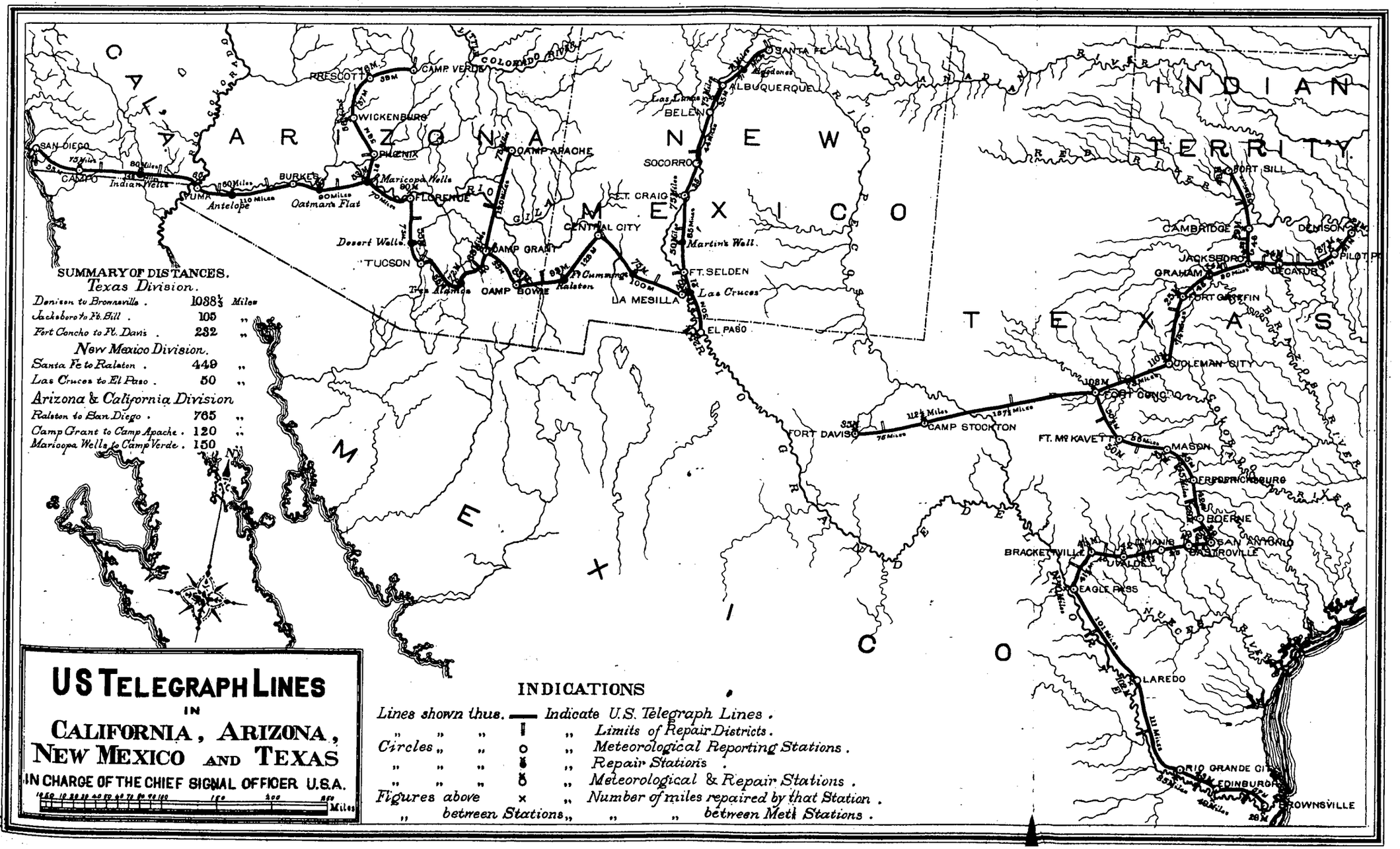
US TELEGRAPH LINES
IN
CALIFORNIA, ARIZONA,
NEW MEXICO AND TEXAS
IN CHARGE OF THE CHIEF SIGNAL OFFICER U.S.A.
Miles
SUMMARY OF DISTANCES.
Texas Division.
Denison to Brownsville . 1088⅓ Miles
Jacksboro to Ft. Sill . 105 „
Fort Concho to Ft. Davis . 232 „
New Mexico Division.
Santa Fe to Ralston . 449 „
Las Cruces to El Paso . 50 „
Arizona & California Division
Ralston to San Diego . 765 „
Camp Grant to Camp Apache . 120 „
Maricopa Wells to Camp Verde . 150 „
INDICATIONS
Lines shown thus. Indicate U.S. Telegraph Lines.
„ „ „ „ Limits of Repair Districts.
Circles „ „ „ Meteorological Reporting Stations.
„ „ „ „ Repair Stations.
„ „ „ „ Meteorological & Repair Stations.
Figures above × „ Number of miles repaired by that Station.
„ between Stations „ „ „ between Met. Stations.
CALIFORNIA
ARIZONA
NEW MEXICO
TEXAS
INDIAN TERRITY
MEXICO
SAN DIEGO
CAMPO
Indian Wells
YUMA
Antelope
BURKES
Oatman's Flat
PRESCOTT
CAMP VERDE
WICKENBURG
PHŒNIX
Maricopa Wells
FLORENCE
Desert Wells
TUCSON
Tres Alamos
CAMP GRANT
CAMP BOWIE
Ft. Cummings
Ralston
CAMP APACHE
CENTRAL CITY
LA MESILLA
FT. SELDEN
Las Cruces
EL PASO
Martin's Well
FT. CRAIG
SOCORRO
BELEN
Las Lunas
ALBUQUERQUE
Algodones
SANTA FE
FORT DAVIS
CAMP STOCKTON
FORT CONCHO
FT. McKAVETT
MASON
FREDERICKSBURG
BOERNE
SAN ANTONIO
BASTROVILLE
D'HANIS
UVALDE
BRACKETTVILLE
EAGLE PASS
LAREDO
RIO GRANDE CITY
EDINBURGH
BROWNSVILLE
COLEMAN CITY
FORT GRAFFIN
GRAHAM
JACKSBORO
DECATUR
CAMBRIDGE
DENISON
PILOT PT.
FORT SILL
RIO COLORADO
LITTLE COLORADO RIVER
RIO GILA
RIO PECOS
RIO GRANDE DEL NORTE
CANADIAN RIVER
RED RIVER
BRAZOS RIVER
COLORADO RIVER
NUECES RIVER
Miles

ful for other duties of the Signal Service. The existence of the lines in the interior of Texas permit warnings to be exhibited on the coast of that State where they were before impracticable. The lines in the Northwest will permit a series of reports not otherwise attainable, the study of which is of the first importance to a proper care for the commerce of the lakes and to other great interests east of the Mississippi.

The force of the Signal Service will not enable it to successfully occupy the lines already contemplated in existing legislation without additional details.

An appropriation made by Congress at its last session, which became available July 1, 1878, has provided for work to be commenced and to be pressed with rapidity upon a telegraphic line extending westward in the vicinity of and covering the northwestern frontier. This line mentioned as necessary in the last annual report of the Chief Signal-Officer is already so progressed that there is reasonable anticipation there will be no point mentioned in the act by which it is provided not accessible by telegraphic communication before the end of the present year. The lines provided by this legislation are of the first importance for the protection and development of this frontier and of the regions through which the lines pass.

The difficulties of procuring the supports and the material and those of the construction have proved to be less than they were anticipated to be. It would be difficult, after the experience of the service in line construction in Texas, New Mexico, and Southern Arizona, to encounter any difficulties which would be held to render such constructions impracticable.

*Arizona Division.*—Second Lieut. Philip Reade, acting signal-officer, remained in immediate charge of the lines in this division until April 1, 1878, when he was relieved by Lieut. C. A. Booth, First Infantry, acting signal-officer, pursuant to Special Orders No. 43, A. G. O., February 28, 1878, and instructions from the Chief Signal-Officer. One hundred and thirty-five miles of line connecting Camp Grant and Camp Apache, Arizona, have been built during the year. Telegraphic communication (between these points) was established in October, 1877. The total length of line now in operation in this division is one thousand and thirty-five miles. There are fifteen stations, from twelve of which meteorological reports are received. The total receipts of the line during the year were $20,038.08, of which amount $11,849.04 were receipts for this line, and $8,189.04 were received to be paid to other lines. The amount of official business not charged for the same period was $8,866.79.

*New Mexican Division.*—Second Lieut. S. C. Vedder, acting signal-officer, remained in charge of the telegraph lines of this division until April 1, 1878, when he was relieved by Lieut. James Allen, Third Cavalry, in compliance with Special Orders No. 43, A. G. O., February 28, 1878, and instructions from the Chief Signal-Officer of the Army. The working party under Lieutenant Vedder's charge completed the extension of the line between La Mesilla, N. Mex., and El Paso, Tex. The line has continued in good working order between Santa Fé, N. Mex., and Ralston, the terminal station of this division. The total receipts of the line for the year ending June 30, 1878, were $8,979.37, of which amount $5,667.54 were receipts for this line, and $3,311.83 were received to be paid to other lines. The amount of official business not charged for the same period was $3,154.76.

*Texas Division.*—First Lieut. George S. Grimes, Second United States Artillery, and acting signal-officer, has been in charge throughout the year of this division of the military telegraph lines.

The following-named stations were in operation June 30, 1877, viz: Denison, Pilot Point, Decatur, Jacksboro', Henrietta, Cambridge, Fort Sill (Idaho), Graham, Fort Griffin, Coleman City, Fort Concho, Fort Stockton, Fort McKavett, Mason, Fredericksburg, Boerne, San Antonio, Castroville, D'Hanis, Uvalde, Brackettville, Eagle Pass, Laredo, Rio Grande City, Edinburg, and Brownsville; in all, twenty-six stations.

Uvalde, Brackettville, Eagle Pass, Laredo, Rio Grande City, Edinburg, and Brownsville; in all, twenty-six stations.

The above-named stations were all open and doing business June 30, 1878, except D'Hanis, which was closed October 20, 1877, the receipts not justifying the expense of its maintenance, and the station proving of no practical value as a repair station.

Stations were established at Fort Davis, Tex., December 24, 1877, and at Santa Maria, Tex., April 25, 1878. Twenty-seven stations were in operation June 30, 1878, of which twenty were in charge of enlisted men of the Signal Corps, and seven of civilians.

Of these twenty-seven stations, thirteen are located at military posts and cantonments.

The following are full reporting stations, from which meteorological reports are telegraphed three times each day to the central office at Washington, D. C., viz: San Antonio, Brownsville, Fort Davis, Denison, Eagle Pass, Fort Griffin, Mason, Fort Sill, Fort Stockton. Under instructions the regular meteorological observations are taken, and recorded, at all other stations and forwarded by mail, at the proper times, to Washington, D. C. These observations are taken at times corresponding to 7.35 a. m., and 4.35 and 11 p. m., Washington mean time. In addition to the regular observations above mentioned, a special report is made, from every station on the line, at the exact time of sunset, and telegraphed at 8 p. m., local time, to the central office in Washington.

The total length of the line in operation in this division June 30, 1877, was one thousand three hundred and forty-five miles. To this has been added during the year seventy miles, carrying the line this distance westward from Fort Stockton to Fort Davis. The work on this extension was begun October 15, 1877, and completed December 24, 1877.

The work of reinsulating the line with improved glass insulators has been in progress. The reinsulation will be completed during the year.

The following-named stations were inspected by the officer in charge during the year: Coleman City, Forts Concho, Stockton, Davis, and McKavett, Mason, Fredericksburg, Boerne, and San Antonio, during the months of September and October, 1877, and Brownsville, Edinburg, and Rio Grande City, in March, 1878.

The aggregate cash receipts from telegraphic tolls on messages transmitted over the lines of this division for the year ending June 30, 1878, were $23,072.97, of which amount $16,957.91 were receipts for this line, and $6,957.91 were received to be paid to other lines. The amount of official business not charged for the same period was $13,022.62.

*Northwestern Division.*—In compliance with the act of Congress approved June 20, 1878, providing for the construction of a military telegraph line from Bismarck to Fort Ellis, via the Missouri and Yellowstone Rivers, connecting Fort Buford, Fort Keogh, and Fort Custer, and from Fort Sully to Fort Keogh via Deadwood, the work of construction was commenced in August, under the supervision of Lieut. A. W. Greely, acting signal-officer, superintendent of construction, and has been pushed forward with energy. It is hoped the posts and places mentioned in the act will be in telegraphic communication with the War Department and with each other by the end of December of the present year. At the

date of this report over six hundred miles of the line have been completed, ready for the transmission of messages.

This rapid work has been made possible by the energetic assistance rendered by the local military authorities, by whom the transportation of material has been largely furnished. The troops at the several posts have performed most of the manual labor of constructing the line. Without such help the small appropriation available would not have furnished the desired telegraphic communication for the designated posts. No paid commercial business has been done over this line.

The money value, at regular government tariff rates, of official messages of the War Department and other free official business transmitted from and to the different offices along the lines in the different divisions during the year, amounted to $25,044.17, an increase of $3,307.16 over that for the previous year. It should be considered, in comparing the receipts and money value of official business for the two years above mentioned, that the rates for all messages, official and commercial, over the military lines, have been very materially reduced during the past year. For instance, the distance that a message may be transmitted over the wires, at the single rate, has been doubled. Notwithstanding this very material reduction, the receipts for this year, as compared with those of last year, show an increase of $1,483.71, or 5 per cent.

With the extension of the lines from Fort Davis to El Paso, Tex., for which arrangements are now being made, and the consequent opening of a great extent of territory, reached only by the military telegraph, affording, as it will, a connection with the New Mexican division through New Mexico to Santa Fe, and with the Arizona and California division through Arizona and Southern California to San Diego, Cal., it is safe to anticipate for the ensuing year a much greater increase in the amount of business than is shown by the comparison of the two years made above.

The many difficulties of administration and execution to be encountered in the construction and working of the lines thus reported were referred to in the last annual report.

The work was at its inception a new one. The country was considered impracticable for telegraphic constructions. The appropriations and the force were small. There were oppositions which were not wise. The mode in which best to construct, maintain, and manage such lines is learned by experience only.

These inconveniences disappear, one by one, as they are encountered. That it is essential for the safety and development of the country, and necessary for the duties of this office, that these lines should exist is not now disputed. The difficulties of working are found to exist only while the lines are new, necessarily yet imperfect in parts, and while the working force is not yet settled or not yet attainable as to the numbers required, and not yet disciplined by practice and experience to the regular, steady, and necessary daily work and the occurrences incident to the maintenance of the lines.

It is not considered often that the difficulties of the construction and repair of these lines extended through sparsely settled Territories, for hundreds of miles without railways, and threatened always by Indians or other hostile forces, are different from, much greater, and not at all to be compared with those of maintaining commercial lines, following railways, existing in the midst of settled civilization, and with every appurtenance at hand at many points along the lines for their instant restoration or repair, if they chance to be damaged.

The difficulties, however, lessen. It is more and more recognized in

each ensuing year that systems of telegraphic lines to be worked at all must be worked as a unit, and that the laws and orders which have so determined are wise.

Illegal and unauthorized interferences are less frequent, nor is it longer necessary often to explain that lines carrying, as they may, commercial or official business of the highest importance from one extreme of the United States to another, ought not by possibility to be interfered with in their working by any subordinate authority. Tests of the accuracy and rapidity of the working of these lines, made comparative with those of other lines under different management, but in country similar in character, have given satisfactory results. When it shall have become possible, as it will with better knowledge of their utility, to place along the lines repair parties, sufficient in number and properly located, and to provide material at depots, so distributed as to be always and easily accessible, there will be no reason why these lines should be at any time disabled for other than very brief periods. The fact that the especial duties of this office require reports from all the lengths of all its lines thrice daily, in the regular and habitual discharge of its daily duties, affords opportunities for and causes an inspection more regular and frequent, perhaps, than that exercised on any lines not under similar supervision. If the use of iron supports succeeds as it is hoped it will, under the tests to which it is this year subjected by the practical use of such supports in lines actually constructed, a great advance in construction will have been made.

The tests made with the telephone at this office and on the sea-coast assure the fact that many posts and stations near main lines may have telegraphic communication over those lines which has been hitherto impossible.

There are no constructions more economical or returning more for either their labor or their money value to the people and the Army of the United States than the electric lines connecting the frontier posts and settlements.

The office is called upon again to recognize the courteous and prompt aid with which the wishes of the Secretary of War have been met on the part of division, department, and district commanders, and the zeal with which the working parties of troops by them detailed have performed their duties.

Unless in the presence of insuperable difficulties, no request for assistance has been made which has failed of attention. It is hoped the aid thus received from Lieut. Gen. P. H. Sheridan, commanding Military Division of the Missouri; Brig. Gen. John Pope, commanding Department of the Missouri; Brig. Gen. A. H. Terry, commanding Department of Dakota; Brig. Gen. E. O. C. Ord, commanding Department of Texas; Brevet Brig. Gen. Edward Hatch, commanding District of New Mexico, and Brevet Brig. Gens. O. B. Wilcox and A. V. Kautz, commanding districts of Department of Arizona, will be justified by the success in the several spheres of their duty the lines may secure to the military operation under their command.

Already the military results foreshadowed as to follow the construction and use of these interior lines begin to be attained, and the reports of officers commanding campaigns evidence at once the wisdom with which they have availed themselves of the added facilities and the success of the operation to which these facilities have under their direction contributed.

The Chief Signal-Officer anticipates the best results to the Signal Service from the recent legislation. There could hardly have been an

act wiser for the interests of the service or more just to the members of it. The favorable action of Congress has left little to be sought for. The difficulties which have hampered the progress of the duty for a decade no longer exist. If its work is permitted to go on as it has been planned, and is fairly sustained, it can hardly fail in continued success. There ought to be just provision for the permanent employment and grades of the officers of the corps. It is hoped there may be no failure in the appropriation for the service of the amounts estimated for this year. They have been estimated with careful economy.

The results of the year past give encouragement for the future. In no year has the advance been more steady and satisfactory. There is no longer question as to the useful preannouncement of meteoric changes. Added to what has been done hitherto, the way seems this year clear to aid in every agricultural interest.

The co-operation of scientific men at home and abroad has been continued. It has made a world-wide study possible. The popular support and the support of the press have been steady and considerate. The field of usefulness widens with each succeeding year. With the ground already covered by the work and the results attained, there is need only to perfect the service in its parts to insure a lasting success.

ALBERT J. MYER,
*Brigadier-General (Brevet Assigned),*
*Chief Signal-Officer, U. S. A.*

Hon. G. W. McCRARY,
*Secretary of War.*

---

PAPER 1.

## COURSE AT FORT WHIPPLE, VIRGINIA.

(*Exclusive of the drills in the arms, with trains or for permanent construction.*)

### OFFICERS.

The course of instruction for officers is both practical and theoretical. The theoretical portion comprises instruction in the following books, viz: The Manual of Signals, The International Code of Flag Signals, Official Danger and Distress Signals, Pope's Practical Telegraphy, Culley's Hand-book of Telegraphy, Loomis's Meteorology, Instructions to Observer Sergeants, the Cipher Manual. The supplementary course of reading comprises in the cases of officers permanently detailed for the full duties of the Signal Service, in addition to especial works from time to time designated: The Practical Uses of Meteorological Reports and Weather Maps, Smithsonian Directions for Meteorological Observations, Buchan's Handy Book of Meteorology, Piddington's Horn Book, Espy's Philosophy of Storms, Fitz Roy's Weather Book, Martin's Rotary Theory of Storms, Ley's Laws of the Winds, Espy's First Meteorological Report, Espy's Fourth Meteorological Report. The practical portion consists of wand practice, which is continued until the officer can read messages at the rate of ten words per minute; practice in the field with flag and torch in general service, homographic, chronosemic, and international codes of flag-signals and various kinds of ciphers, and practice with the heliograph in the General-Service Code.

The ranges for practice are from a few hundred yards to eighteen miles in extent with flag and torch, and extreme long range of thirty-one miles with the heliograph.

The officers have practical instructions in telegraphy (General Service Code) until they can send and receive at the rate of ten words per minute, and are required to make drawings of the various telegraph instruments and electrical batteries in use in the Signal Service.

ENLISTED MEN.

*Instruction No. 36.*

WAR DEPARTMENT,
OFFICE OF THE CHIEF SIGNAL-OFFICER,
*Washington, D. C., April 16, 1878.*

The following course of instructions is prescribed for enlisted men at the School of Instruction of the Signal Service, at Fort Whipple, Va.

Sergeants ordered to Fort Whipple, Va., for change of station, misconduct, or any cause other than "review of theoretical course," will report to the instructor, for wand, for field, and for telegraph practice, and for such duties, as non-commissioned officers, in connection with the course of instruction, as may be necessary.

Sergeants ordered in from station for review of course, candidates for promotion, and recruits will be instructed in the following theoretical and practical course:

Signal Manual, page 15, from "A sign or signal," to page 96; and from "Description of equipments," page 189, to "Semaphore telegraph," page 195; from "Flags on halyards," page 198, to "Distance line," page 199; from "When working at night," page 206, to "Candle bombs," page 207; from "Manual of the kit," page 258, to middle of page 273; from "Field telegraph train," page 378, to "General directions, &c.," page 393; from "Permanent lines" to "General service," pages 399 to 466; International Code of Signals; Loomis' Meteorology, to page 193, omitting articles 125, 126, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, and 369; Official Danger or Distress Signals; Pope's Modern Practice of the Electric Telegraph, chapter I, to page 45; page 57 to page 64, article 103; chapter 6, page 73, to article 122, page 78; chapters 7 and 8; Culley's Hand-book of Practical Telegraphy, Part I, page 1, to article 49, page 18; Part III, page 45, to article 120, page 57; article 130, page 71, to Part IV, page 76; Instructions to Observer Sergeants, entire book; Cavalry Tactics, through school of the company, dismounted.

*Practical Course.*—Wand practice daily for six weeks, or as much longer as necessary; field practice in the immediate vicinity of Fort Whipple, daily, during theoretical course; practical instruction with Marean repeater and telephone; cleaning and setting up batteries; use and construction of all Morse instruments; establishing terminal and intermediate stations; cutting in on line; use and construction of all instruments used on station; method of correcting barometer; finding of dew-point and relative humidity; observation of clouds; cleaning barometer; telegraph practice daily, standard, ten words; practical instruction in splicing cables; forms, records of office, &c.

All men to have four tours of guard duty as non-commissioned officers; twelve days' and four nights' "field-practice" in General Service Code, at long range; three days' practice in International Code, at long range.

Men on guard duty will not be excused from recitations; nor will they be excused from telegraph-practice at hours when not actually on post. Men on duty in the observatory will be excused from company duty as now provided.

Recruits to perform company duty for two months previous to being ordered for theoretical instruction. Instruction during this time not to interfere with military duty.

All enlisted men reporting for duty to be instructed in cavalry tactics, through "school of the company," dismounted.

Flag, torch, train, &c., drills, conducted as heretofore.

A schedule showing hourly occupation, from 9 a. m. to 9 p. m., of each man under instruction will be kept by the instructor.

*Instruction hours.*—Recitations will commence at 9.45 a. m. and continue until all classes have recited. Telegraph practice at such hours between 9 a. m. and 9 p. m. as instructor may direct, each man to have, when practicable, at least two hours' practice daily. Study hours from 9 a. m. until 9 p. m., the time being so divided that each man may have at least three hours for the preparation of his daily lesson. During recitation and study hours the men under instruction will be required to be present at instruction building. The sergeant, or such other enlisted man as may be designated, will have charge of the study-room, and will be responsible to the instructor for the presence and orderly behavior of the classes during study and recitation hours. Instruction on Saturdays will be discontinued.

ALBERT J. MYER,
*Brigadier-General (brevet assigned),*
*Chief Signal-Officer of the Army.*

PAPER 2.

*Table showing the instruction of candidates for the grade of sergeant from July 1, 1877, to June 30, 1878.*

| Name. | Instruction commenced. | Date of promotion. | Remarks. |
|---|---|---|---|
| William U. Simons | July 28, 1877 | Nov. 1, 1877 | In charge of station at New Orleans, La. |
| Samuel C. Emery | July 31, 1877 | Nov. 1, 1877 | In charge of station at Grand Haven, Mich. |
| David Cuthbertson | Aug. 1, 1877 | Nov. 1, 1877 | In charge of station at Cleveland, Ohio. |
| Eugene Peters | Aug. 21, 1877 | Nov. 1, 1877 | On duty as telegraph operator at Contadero, N. Mex Reduced to private. |
| Alexander W. Browne | Aug. 21, 1877 | Nov. 1, 1877 | In charge of station at Punta Rassa, Fla. |
| William A. Glassford | Sept. 8, 1877 | Nov. 1, 1877 | In charge of station at New Haven, Conn. |
| George R. Hancock | Oct. 22, 1877 | Jan. 21, 1878 | In charge of station at La Crosse, Wis. |
| Harry R. Hathaway | Nov. 5, 1877 | Feb. 7, 1878 | In charge of station at Tybee Island, Ga. |
| Charles R. Daw | Nov. 5, 1877 | Jan. 21, 1878 | On duty as assistant at Sandusky, Ohio. Reduced to private. |
| Denis Moore | Nov. 20, 1877 | Jan. 18, 1878 | In charge of station at Atlantic City, N. J. |
| Dudley Brooks | Nov. 20, 1877 | ..... | Temporarily in charge of station at Cape Hatteras, N. C. Dropped from instruction. Promoted corporal June 16, 1878. |
| William A. Massey | Jan. 28, 1878 | May 1, 1878 | In charge of station at Sandusky, Ohio. |
| Frank Greene | Feb. 9, 1878 | May 1, 1878 | In charge of station at Barnegat, N. J. |
| James Cassidy | Feb. 9, 1878 | May 1, 1878 | In charge of station at Pembina, Dak. |
| Joseph H. Bokel | Apr. 22, 1878 | ..... | Still under instruction. |
| Patrick Connor | Apr. 26, 1878 | ..... | Do. |
| Andrew T. Sherwood | May 3, 1878 | ..... | Do. |
| Winfield S. Jewell | May 23, 1878 | ..... | Do. |

PAPER 3.

*Enlisted men instructed for the position of assistant to non-commissioned officers in charge of stations, from July 1, 1877, to June 30, 1878.*

| Name. | Placed under instruction for assistant. | Reported qualified as assistant. | Ordered on station. | Remarks. |
|---|---|---|---|---|
| Thomas A. Donahoe | Apr. 26, 1877 | ..... | July 19, 1877 | On duty as assistant at Smithville, N. C. |
| Charles P. Rowley | Apr. 26, 1877 | ..... | July 18, 1877 | Discharged the service of the United States, April 27, 1878. |
| John P. Finley | Apr. 26, 1877 | ..... | July 18, 1877 | On duty at office of Chief Signal-Officer. |
| Alexander Pollak | Apr. 26, 1877 | July 7, 1877 | July 18, 1877 | Do. |
| Edward F. Reeves | Apr. 26, 1877 | Sept. 22, 1877 | Sept. 22, 1877 | On duty as telegraph operator at Pilot Point, Tex. |
| Thomas T. O'Leary | May 9, 1877 | ..... | July 31, 1877 | On duty as assistant at Norfolk, Va. |
| Paul Daniels | June 3, 1877 | ..... | Aug. 10, 1877 | On duty at office of Chief Signal-Officer. |
| Richard P. Sibley | June 3, 1877 | Sept. 1, 1877 | Sept. 5, 1877 | On duty as assistant at Portland, Or. |
| Rufus Choate | June 3, 1877 | July 28, 1877 | July 31, 1877 | On duty as assistant at Pike's Peak, Colo. |
| Fielder I. Hunter | June 3, 1877 | Aug. 2, 1877 | Aug. 6, 1877 | On duty at office of Chief Signal-Officer. |
| Russell Chapman, jr | June 3, 1877 | ..... | Aug. 7, 1877 | On duty as assistant at Sandy Hook, N. J. |
| Joseph E. Miller | June 3, 1877 | Sept. 1, 1877 | Sept. 5, 1877 | On duty as assistant at Rochester, N. Y. |
| John J. Munroe | July 2, 1877 | ..... | July 12, 1877 | Discharged the service of the United States, March 29, 1878. |
| William Berry | July 2, 1877 | ..... | Aug. 31, 1877 | On duty as assistant at Boston, Mass. |
| Charles F. Guinand | July 2, 1877 | ..... | Sept. 27, 1877 | Discharged the service of the United States, November 19, 1877. |
| J. Ashley Thompson | July 2, 1877 | Sept. 1, 1877 | ..... | On duty at office of Chief Signal-Officer. |
| Richard G. Linthicum | July 2, 1877 | ..... | Oct. 2, 1877 | On duty as assistant at Philadelphia, Pa. |
| John S. Farrar | July 2, 1877 | ..... | Aug. 21, 1877 | On duty as assistant at Cape Henry, Va. |
| Albert T. Coombe | July 2, 1877 | ..... | Sept. 25, 1877 | On duty as assistant at Buffalo, N. Y. |
| Wesley Blake | Aug. 1, 1877 | ..... | Oct. 11, 1877 | On duty as assistant at Pike's Peak, Colo. |
| Wenzel Manderfeld | Aug. 1, 1877 | Sept. 15, 1877 | Sept. 19, 1877 | On duty as telegraph operator at Burke's Station, Ariz. |

*Enlisted men instructed for the position of assistant, &c.*—Continued.

| Name. | Placed under instruction for assistant. | Reported qualified as assistant. | Ordered on station. | Remarks. |
|---|---|---|---|---|
| John A. Murphy | Aug. 1, 1877 | Oct. 6, 1877 | Oct. 18, 1877 | On duty as assistant at Baltimore, Md. (ordered to Fort Whipple, Va.). |
| Albert P. Leavitt | Aug. 1, 1877 | Nov. 3, 1877 | Nov. 3, 1877 | On duty at office of Chief Signal-Officer. |
| John F. Doyle | Aug. 1, 1877 | Oct. 20, 1877 | Oct. 20, 1877 | On duty as assistant at Mount Washington, N. H. |
| William Daly | Aug. 1, 1877 | Oct. 20, 1877 | Oct. 20, 1877 | In charge of station at Portsmouth, N. C. |
| Charles P. Wannall | Aug. 2, 1877 | ..... | ..... | Discharged the service of the United States September 14, 1878. |
| Henry L. Heiskell | Aug. 1, 1877 | Nov. 3, 1877 | Nov. 3, 1877 | On duty at office of Chief Signal-Officer. |
| Arthur Coleman | Aug. 11, 1877 | Nov. 9, 1877 | Nov. 9, 1877 | On duty as assistant at Cape May, N. J. |
| William Davis | Sept. 17, 1877 | Dec. 1, 1877 | Dec. 1, 1877 | Promoted corporal January 31, 1878. In charge of station at Kitty-hawk, N. C. |
| Charles E. Truesdell | Sept. 17, 1877 | Nov. 17, 1877 | Dec. 3, 1877 | On duty as assistant at Savannah, Ga. |
| William Beeler | Sept. 17, 1877 | Dec. 1, 1877 | Dec. 14, 1877 | On duty as assistant at Port Huron, Mich. |
| Samuel Applegate | Sept. 17, 1877 | Nov. 24, 1877 | Dec. 3, 1877 | On duty as assistant at Cincinnati, Ohio. |
| Joseph H. McKenna | Sept. 17, 1877 | Dec. 15, 1877 | Jan. 16, 1878 | On duty as telegraph operator at San Diego, Cal. |
| Thaddeus A. Colné | Sept. 17, 1877 | Dec. 15, 1877 | Jan. 11, 1878 | On duty as assistant at Louisville, Ky. |
| Frederick H. Brandenburg. | Sept. 17, 1877 | Nov. 24, 1877 | Nov. 30, 1877 | On duty as assistant at Chicago, Ill. |
| Fred W. Mixer | Sept. 17, 1877 | Nov. 17, 1877 | Nov. 17, 1877 | On duty as assistant at Albany, N. Y. |
| Courtland R. Browder | Sept. 17, 1877 | ..... | ..... | Discharged the service of the United States October 5, 1877. |
| Joseph Cashel | Sept. 17, 1877 | Nov. 9, 1877 | Nov. 9, 1877 | On duty as assistant at New Orleans, La. |
| Charles L. Stevens | Sept. 17, 1877 | Jan. 5, 1878 | ..... | Discharged the service of the United States March 22, 1878. |
| James McCloskey | Sept. 27, 1877 | Jan. 12, 1878 | Jan. 9, 1878 | In confinement at Fort Duncan, Tex., since March 19, 1878. |
| Edmund I. Falconer | Sept. 27, 1877 | ..... | Jan. 16, 1878 | On duty as telegraph operator at Wickenburg, Ariz. |
| Samuel W. Glenn | Oct. 17, 1877 | ..... | Feb. 23, 1878 | On duty as assistant at Cleveland, Ohio. |
| Aaron H. Bell | Oct. 17, 1877 | Jan. 12, 1878 | Jan. 31, 1878 | On duty as assistant at Atlantic City, N. J. |
| Marion A. Cunningham | Oct. 24, 1877 | ..... | Feb. 14, 1878 | On duty as telegraph operator at Yuma, Ariz. |
| Charles F. Tansill | Nov. 9, 1877 | ..... | Feb. 18, 1878 | On duty as telegraph operator at Fredericksburg, Tex. |
| Edward J. Hamilton | Nov. 12, 1877 | ..... | Mar. 14, 1878 | On duty as assistant at Cape Hatteras, N. C. |
| George H. Thompson | Nov. 13, 1877 | ..... | Feb. 23, 1878 | In charge of station at Fort Macon, N. C. |
| William B. Stockman | Dec. 10, 1877 | Mar. 16, 1878 | Apr. 10, 1878 | On duty as assistant at Philadelphia, Pa. |
| Edward T. Gibson | Dec. 11, 1877 | ..... | ..... | On duty at office of Chief Signal-Officer. |
| John T. Coughlin | Jan. 2, 1878 | ..... | Apr. 9, 1878 | On duty as assistant at Cape Lookout, N. C. |
| John J. McLean | Jan. 2, 1878 | ..... | Apr. 10, 1878 | On duty as assistant at Toledo, Ohio. |
| Horace J. Forman | Jan. 4, 1878 | ..... | ..... | Dropped from instruction. Now on duty as assistant at Cape Lookout, N. C. |
| George W. Scott | Jan. 8, 1878 | ..... | Apr. 10, 1878 | On duty as assistant at Pittsburgh, Pa. |
| John D. Marx | Jan. 9, 1878 | ..... | Apr. 10, 1878 | On duty as assistant at Baltimore, Md. |
| Otto Haltnorth | Jan. 10, 1878 | ..... | Apr. 10, 1878 | On duty as assistant at Kittyhawk, N. C. |
| Jerome Williams | Jan. 18, 1878 | ..... | Apr. 4, 1878 | On duty as telegraph operator at Edinburgh, Tex. |
| John G. Hashagen | Jan. 18, 1878 | ..... | May 2, 1878 | On duty as assistant at New York City. |
| William B. Greene | Jan. 19, 1878 | Apr. 19, 1878 | Apr. 19, 1878 | On duty as assistant at St. Louis, Mo. |
| Walter L. Williams | Jan. 26, 1878 | ..... | ..... | On duty at office of Chief Signal-Officer. |

*Enlisted men instructed for the position of assistant, &c.*—Continued.

| Name. | Placed under instruction for assistant. | Reported qualified as assistant. | Ordered on station. | Remarks. |
|---|---|---|---|---|
| Harry Marsh | Jan. 26, 1878 | Apr. 20, 1878 | Apr. 19, 1878 | On duty as telegraph operator at McKavett, Tex. |
| John J. Murphy | Feb. 6, 1878 | June 22, 1878 | June 25, 1878 | On duty as assistant at Baltimore, Md. |
| Frank M. Neal | Feb. 6, 1878 | May 18, 1878 | June 1, 1878 | On duty as assistant at Memphis, Tenn. |
| Julius G. Linsley | Feb. 6, 1878 | | July 6, 1878 | On duty as assistant at Mount Washington, N. H. |
| James H. Melton | Feb. 6, 1878 | June 8, 1878 | June 12, 1878 | On duty as assistant at Keokuk, Iowa. |
| Norvell H. Cobb | Feb. 6, 1878 | May 18, 1878 | June 1, 1878 | On duty as assistant at Milwaukee, Wis. |
| George A. Smith | Feb. 16, 1878 | May 17, 1878 | May 22, 1878 | On duty as assistant at Wilmington, N. C. |
| Charles M. Newman | Mar. 16, 1878 | | | Still under instruction. |
| Benjamin A. Blandon | Mar. 16, 1878 | | | Do. |
| Jeremiah D. Dinneen | Mar. 16, 1878 | | | Do. |
| David P. Boyd | Mar. 16, 1878 | | | Do. |
| John Daly | Apr. 12, 1878 | | | Do. |
| Rutherford H. Paxton | Apr. 12, 1878 | | | Do. |
| Ossian A. Aldrich | Apr. 18, 1878 | | | Do. |
| Gustav Liebmann | Apr. 18, 1878 | | | Do. |
| George S. Livingston | Apr. 18, 1878 | | | Do. |
| George E. Kelley | Apr. 20, 1878 | | | Do. |
| James K. Sweeney | May 8, 1878 | | | Do. |
| Victor Anderson | May 10, 1878 | | | Do. |
| Robert H. Hereford | May 9, 1878 | | | Do. |
| Edward E. Ellery | May 15, 1878 | | | Do. |
| James E. Hayes | May 14, 1878 | | | Do. |
| Bernard Bunnemeyer | May 22, 1878 | | | Do. |
| Jesse B. Low | May 23, 1878 | | | Do. |
| Lewis M. Pindell | May 23, 1878 | | | Do. |
| George M. Smith | May 24, 1878 | | | Do. |
| John H. Walter | May 24, 1878 | | | Do. |
| John C. Ashton | June 20, 1878 | | | Do. |
| John C. Galloway | June 20, 1878 | | | Do. |
| John H. Null | June 20, 1878 | | | Do. |
| Morris McCarty | June 20, 1878 | | | Do. |
| Joseph H. Fox | June 27, 1878 | | | Do. |
| Charles C. Buck | June 25, 1878 | | | Do. |
| James C. Bushby | June 25, 1878 | | | Do. |
| Thomas H. Wilson | June 25, 1878 | | | Do. |
| James A. Barry | June 27, 1878 | | | Do. |
| Edwin O. Cooke | June 25, 1878 | | | Do. |

## PAPER 4.

*Exhibiting the communications sent from and received at the office of the Chief Signal-Officer (exclusive of telegrams) from July 1, 1877, to June 30, 1878.*

### SENT.

*Division of telegrams and reports for the benefit of commerce and agriculture.*

| | |
|---|---|
| To heads of departments and bureaus | 588 |
| To non-commissioned officers in charge of stations in reference to their duties | 10,436 |
| In reply to application for stations and others similar | 15 |
| To telegraph companies in reference to transmission of weather-reports and the erection of telegraph lines, &c | 208 |
| To boards of trade, chambers of commerce, agricultural societies, &c | 207 |
| To postmasters, in reference to weather-bulletins | 759 |
| To foreign correspondents, relating to this division in general | 780 |
| To foreign correspondents, relating to simultaneous reports | 852 |
| To volunteer observers throughout the United States | 2,211 |
| General and special orders, and circulars, with reference to this division | 9,718 |
| Miscellaneous | 743 |
| Total | 26,517 |

*Signal division.*

| | |
|---|---|
| To heads of departments and bureaus | 215 |
| Relating to duties and discipline at Signal-Service school of instruction, and post of Fort Whipple, Va | 560 |
| Relating to recruiting and enlistment | 417 |
| Answers to applications for enlistment in the Signal Service, United States Army | 370 |
| General and special orders, and circulars, with reference to this division | 2,733 |
| Miscellaneous | 371 |
| Total | 4,666 |

*Property division.*

| | |
|---|---|
| To heads of departments and bureaus | 1,042 |
| To manufacturers and others, in reference to instruments, equipments, &c | 1,486 |
| To non-commissioned officers in charge of stations, and other enlisted men, in reference to property and money accounts | 10,616 |
| In reference to quarterly returns of officers | 2,049 |
| Regarding property transferred to stations | 3,099 |
| Miscellaneous | 5,293 |
| Total | 23,585 |
| Aggregate | 54,768 |

RECEIVED.

*Division of telegrams and reports for the benefit of commerce and agriculture.*

| | |
|---|---|
| From heads of departments and bureaus | 81 |
| Applications for the establishment of new stations | 52 |
| From telegraph companies, in reference to the transmission of weather-reports and the construction of telegraph lines, &c | 736 |
| From non-commissioned officers in charge of stations, in reference to their duties | 11,434 |
| From boards of trade, chambers of commerce, and agricultural societies | 155 |
| From foreign correspondents, relating to simultaneous weather-reports | 5,434 |
| From volunteer observers throughout the United States, relating to observations and reports | 5,390 |
| From foreign correspondents, relating to this division in general | 29 |
| Reports relative to instruction of non-commissioned officers and assistants | 603 |
| Mailed reports from non-commissioned officers in charge of stations | 176,985 |
| From United States naval vessels and stations (received through the Navy Department) | 863 |
| Meteorological charts, abstracts of journals, forms, &c., received from non-commissioned officers in charge of stations | 45,230 |
| From commercial steamship companies | 376 |
| Reports from postmasters throughout the United States, in reference to weather bulletins received and posted by them | 157,014 |
| Miscellaneous | 1,502 |
| Total | 405,885 |

*Signal division.*

| | |
|---|---|
| From heads of departments and bureaus | 321 |
| Relating to duties and discipline at Signal-Service school of instruction and post of Fort Whipple, Va | 652 |
| Relating to instructions in signaling at Fort Whipple, Va., and in different military departments | 203 |
| Relating to recruiting and enlistment | 1,108 |
| Applications for enlistment in the Signal Service, United States Army | 519 |
| Miscellaneous | 625 |
| Total | 3,428 |

*Property division.*

| | |
|---|---|
| From heads of departments and bureaus | 1,277 |
| From manufacturers and others, relating to instruments, equipments, &c | 934 |
| From officers, concerning property, quarterly returns, &c | 1,674 |
| From non-commissioned officers in charge of stations and other enlisted men, relating to property and money accounts | 42,596 |
| Regarding property transferred to stations | 4,147 |
| Miscellaneous | 5,701 |
| Total | 56,329 |
| Aggregate | 465,642 |
| Aggregate sent | 54,768 |
| Aggregate received | 465,642 |
| Aggregate sent and received | 520,410 |

*Table showing the number of cipher-words and messages sent and received by telegraph at the central office, Washington, D. C., from July 1, 1877, to June 30, 1878:*

| | |
|---|---|
| Cipher-words of weather-reports sent | 70,484 |
| Telegraphic messages, other than weather-reports, sent | 7,563 |
| Cipher-words of weather-reports received | 732,338 |
| Cipher-words of special river-reports received | 9,048 |
| Telegraphic messages, other than weather-reports, received | 14,163 |

## PAPER 5.

*Table showing meteorological data furnished from the records of the office of the Chief Signal-Officer of the Army, upon the request of the applicants named, during the fiscal year ending June 30, 1878.*

Prof. G. T. Kingston, superintendent of the meteorological service of the Dominion of Canada, Toronto, Canada, furnished, monthly, from July 1, 1877, to June 30, 1878, with a table of barometric and thermometric means from observations taken at the stations of the Signal Service, United States Army.

Messrs. W. B. Dana & Co., proprietors of the Commercial and Financial Chronicle, New York City, furnished, July 10, 1877, with a statement of amount of rain-fall at Cape Hatteras, North Carolina, from June, 1876, to May, 1877, inclusive.

Messrs. De Ervende, Wed. J. Van Nelle, Rotterdam, Holland, furnished, August 2, 1877, with a table showing amount of rain-fall at Baltimore, Md., Cairo, Ill., Louisville, Ky., and Nashville, Tenn., from January, 1876, to June, 1877.

Mr. W. P. Speakman, Lock No. 4, Washington County, Pennsylvania, furnished monthly, from July 1, 1877, to June 30, 1878, with a record of the stages of water in the Monongahela River at Pittsburgh, Pa.

Commander L. A. Beardslee, U. S. N., furnished August 15, 1877, with a statement of the temperature of the air and mean temperature at Washington, D. C., on January 13 and 27, and March 19, 1875, November 25, 26, and 27, and December 27, 1876, and January 8, 20, and 22, March 8, and May 19, 1877.

Mr. William A. Graham, superintendent national military cemetery, Madison, Tenn., furnished August 23, 1877, with statement of amount of rain-fall at Nashville, Tenn., for June, July, and to include August 14, 1877.

Dr. W. H. Triplette, Washington, D. C., furnished August 29, 1877, with statement of mean monthly barometer and thermometer, monthly amount of rain-fall, prevailing direction of wind, and total monthly movement of wind at Lake City, Fla., from September, 1871, to October, 1874, and at Jacksonville, Fla., from October, 1871, to July, 1877.

Dr. W. Gleitsmann, Asheville, N. C., furnished September 11, 1877, with statement of mean monthly temperature and humidity and amount of rain-fall at Aiken, S. C., from October, 1876, to July, 1877, inclusive.

Lieut. George M. Wheeler, Corps of Engineers, U. S. A., furnished on September 22, 1877, with a record of hourly observations of barometer, corrected for temperature and instrumental error, dry and wet bulb thermometers, and relative humidity, taken at Red Bluff, Cal., between 7 a. m. and 6 p. m., during the month of August, 1877. On December 22, 1877, with record of observations taken at 7 a. m., 2 p. m., and 9 p. m., at Denver, Colo., from the 10th to the 26th of June, 1877. On January 2, 1878, with

record of barometer corrected for temperature, dry and wet bulb thermometers, and relative humidity, at Denver, Colo., from June 1 to 9, and from June 27 to December 1, 1877. On January 18, 1878, with transcript from record of meteorological observations taken at Salt Lake City, Utah, from May 28 to December 3, 1877; at Virginia City, Mont., from May 28 to December 3, 1877, and at Santa Fé, N. Mex., from June 1 to December 18, 1877. On January 21, 1878, with transcript from record of meteorological observations taken at Winnemucca, Nev., from July 1 to November 4, 1877; at Sacramento, Cal., from July 1 to August 5, and from October 19 to 28, 1877, and at Fort Craig, N. Mex., from July 9 to November 15, 1877. On February 5, 1878, record of observations of barometer corrected for temperature, wet and dry bulb thermometers, and relative humidity at Denver, Colo., and Santa Fé, N. Mex., at the hours of 7 a. m., 2 p. m., and 9 p. m., from May 20 to June 1, 1877. On May 4, record of barometer corrected for temperature, dry and wet bulb thermometers, and relative humidity, at Winnemucca, Nev., from November 4 to December 1, 1877, inclusive, at 7 a. m., 2 p. m., and 9 p. m. each day.

Prof. Elias Loomis, Yale College, New Haven, Conn., furnished September 26, 1877, with table showing total movement of wind at stations of Signal Service during the year 1876.

Mr. G. K. Harrown, Milwaukee, Wis., furnished September 28, 1877, with statement showing mean monthly and mean annual barometer from January, 1872, to July, 1877, inclusive, at Breckenridge, Minn., Davenport, Iowa, Denver, Colo., Duluth, Minn., Keokuk, Iowa, Leavenworth, Kans., Omaha, Nebr., San Diego, Cal., San Francisco, Cal., Saint Louis, Mo., and Saint Paul, Minn.; for Dodge City, Kans., from October, 1874, Dubuque, Iowa, from August, 1873, North Platte, Nebr., from October, 1874, and Pike's Peak, Colo., from November, 1873, to include July, 1877. On October 3, with statement showing monthly and annual mean temperature at Breckenridge, Minn., Davenport, Iowa, Denver, Colo., Dodge City, Kans., Dubuque, Iowa, Duluth, Minn., Keokuk, Iowa, Leavenworth, Kans., North Platte, Nebr., Omaha, Nebr., Pike's Peak, Colo., San Diego, Cal., San Francisco, Cal., Saint Louis, Mo., and Saint Paul, Minn., from January, 1872, to July, 1877, inclusive; except Breckenridge, Minn., from May 1, 1872, Dodge City, Kans., from October 1, 1874, Dubuque, Iowa, from August 1, 1873, North Platte, Nebr., from October 1, 1874, and Pike's Peak, Colo., from December 1, 1877. On October 6, with statement showing monthly and annual amounts of rain-fall at stations and for periods mentioned above. On November 13, with statement of prevailing direction of wind, from January, 1872, and monthly maximum and minimum temperatures from January, 1873, to July, 1877, at Breckenridge, Minn., Davenport, Iowa, Denver, Colo., Duluth, Minn., Keokuk, Iowa, Leavenworth, Kans., Omaha, Nebr., San Diego, Cal., San Francisco, Cal., Saint Louis, Mo., and Saint Paul, Minn.; from October, 1874, to July, 1877, at Dodge City, Kans., and North Platte, Nebr.; from July, 1873, to July, 1877, at Dubuque, Iowa, and from November, 1873, to July, 1877, at Pike's Peak, Colo.

Mr. Alfred M. Mayer, South Orange, N. J., furnished on October 13, 1877, with statement showing annual mean barometer, thermometer and humidity, total rain-fall, total movement of wind, prevailing direction of wind, maximum and minimum temperatures and range of temperature from 1871 to 1876, inclusive, at New York City.

Mr. John S. Brayton, collector of the port, Norfolk, Va., furnished October 18, 1877, with record of direction of the wind at Cape Henry, Va., on October 6, 1877.

Messrs. W. B. Dana & Co., proprietors, Commercial and Financial Chronicle, New York City, furnished monthly from October, 1877, to June, 1878, inclusive, with records of total monthly rain-fall, monthly maximum, minimum, and mean temperatures, and any important facts in regard to storms, drought, and frost for each month, at Norfolk, Va., Wilmington, N. C., Charleston, S. C., Augusta, Ga., Savannah, Ga., Montgomery, Ala., Mobile, Ala., Jacksonville, Fla., Saint Mark's, Fla., New Orleans, La., Vicksburg, Miss., Shreveport, La., Memphis, Tenn., Nashville, Tenn., Galveston, Tex., Indianola, Tex., and Corsicana, Tex.

Dr. L. C. Butler, Essex, Vt., furnished October 22, 1877, with statement showing monthly mean temperatures for 1873, 1874 and 1875, and monthly mean barometer, corrected for temperature and instrumental error, monthly range of barometer, mean relative humidity, number of days on which rain or snow fell in each month, and monthly amount of rain-fall and melted snow for the year 1875, at Burlington, Vt. On May 9, 1878, with statement showing monthly mean barometer, thermometer, and humidity, monthly range of barometer, total monthly amount of rain-fall and number of days in each month on which rain or snow fell during the year 1876, at Burlington, Vt.

Prof. A. Guyot, Princeton College, Princeton, N. J., furnished October 22, 1877, with statement showing original readings of barometer, and attached and exposed thermometers at Salt Lake City, Utah, Santa Fé, N. Mex., Virginia City, Mont., Cheyenne, Wyo., and Denver and Pike's Peak, Colo., from July 1 to September 4, 1877, inclusive.

Dr. W. C. Van Bibber, Baltimore, Md., furnished October 30, 1877, with statement showing mean annual temperature, average annual movement of wind, prevailing

direction of wind, and maximum and minimum temperatures at Baltimore, Md., for the years 1872 to 1876, inclusive.

Mr. C. P. Dana, Rock Island, Ill., furnished on November 3, 1877, with a transcript of all meteorological observations taken at the station of the Signal Service at Davenport, Iowa, on October 17, 18, 19 and 20, 1877.

Mr. Henry Gannett, topographer, Washington, D. C., furnished November 8, 1877, with record of original readings of barometer, and attached and exposed thermometers, with instrumental error of barometers used and their elevation above determined points; observations taken at Cheyenne, Wyo., and Salt Lake City, Utah, at 7 a. m., 2 p. m. and 9 p. m. (local time) daily, during months of June, July, August and September, 1877. On January 8, 1878, with record of monthly mean pressure and temperature during months of June, July, August and September, 1872, at Corinne, Utah, and original readings of barometer and attached and exposed thermometers at Salt Lake City, Utah, during the month of October, 1877.

Mr. B. S. Benson, Baltimore, Md., furnished on November 9, 1877, with record of maximum velocity of wind during month, average hourly velocity, total number of miles and prevailing direction of wind during month at Davenport, Iowa, Dubuque, Iowa, Keokuk, Iowa, Dodge City, Kans., and Leavenworth, Kans., from January, 1874, to September, 1877, inclusive.

Mr. John Nichols, civil engineer, Chicago, Ill., furnished November 20, 1877, with charts of oscillations of the Mississippi River, at Davenport, Iowa, for the years 1873, 1874, 1875 and 1876.

Mr. Harrison Johnson, Omaha, Nebr., furnished November 23, 1877, with statement of monthly mean temperature, monthly and annual amounts of rain-fall, maximum and minimum temperature in each month, and monthly range of temperature at Omaha, Nebr., during the years 1874, 1875 and 1876, and to include October, 1877.

Mr. Henry J. Bowditch, Boston, Mass., furnished November 24, 1877, with a record of the tri-daily telegraphic series of observations taken at the Signal Service station of observation at Burlington, Vt., from July 20 to September 30, 1877, inclusive.

Mr. A. S. Packard, jr., secretary of the United States Entomological Commission, Salem, Mass., furnished November 24, 1877, with statement of monthly mean temperature and relative humidity, prevailing direction and total monthly movement of wind at Fort Benton, Mont., from December, 1871, to July, 1876; at Pembina, Dak., from March, 1873, to October, 1877; at Salt Lake City, Utah, from March, 1874, to October, 1877; at Boisé City, Idaho, from July, 1877, to October, 1877; at Yuma, Ariz., from October, 1875, to September, 1877; at Bismarck, Dak., Breckinridge, Minn., Cheyenne, Wyo., Davenport, Iowa, Denver, Colo., Dodge City, Kans., Fort Gibson, Ind. Ter., Fort Sully, Dak., Keokuk, Iowa, Leavenworth, Kans., North Platte, Nebr., Omaha, Nebr., Saint Paul, Minn., Santa Fé, N. Mex., and Yankton, Dak., from January to October, 1877, inclusive.

Mr. O. S. McNeill, Davenport, Iowa, furnished December, 8, 1877, with meteorological summary from December, 1876, to November, 1877, inclusive, monthly amount of rain-fall and greatest daily rain-fall, during the years 1871, 1872, 1873, 1874, 1875, 1876, and to include November, 1877, and means for each season in the year, beginning with December, 1876, and ending with November, 1877, at Davenport, Iowa.

Messrs. Scudder and Carter, New York City, furnished December 11, 1877, with record of direction and velocity of wind and state of weather at New Haven and New London, Conn., at last observation of November 11, and two first morning observations of November 12, 1876.

Dr. C. H. Wilkinson, Galveston, Tex., furnished December 12, 1877, with statement of monthly mean humidity at Galveston, Tex., New Orleans, La., Mobile, Ala., Jacksonville, Fla., Savannah, Ga., and Charleston, S. C., from January, 1875, to November, 1877, inclusive.

Maj. F. U. Farquhar, United States Corps of Engineers, Saint Paul, Minn., furnished December 18, 1877, with record of daily readings of river gauges at Saint Louis, Mo., Keokuk, Iowa, Dubuque, Iowa, La Crosse, Wis., and Saint Paul, Minn., from August 1, 1877, until close of navigation. On April 17, 1878, with statement of monthly rain-fall at La Crosse, Wis., Saint Louis, Mo., Dubuque, Iowa, and Keokuk, Iowa, from July, 1876, to December, 1877, inclusive.

Medical Inspector George Peck, U. S. N., furnished January 3, 1878, with record of monthly mean relative humidity at Key West, Fla., during the years 1872 and 1873.

Mr. W. J. Wilmer, Baltimore, Md., furnished January 10, 1878, with record of daily mean temperature from January, 1872, to December, 1877, at Washington, D. C.

Mr. J. L. McWhorter, chairman of the meteorological committee of the board of trade, Oswego, N. Y., furnished January 28, 1878, with a record of temperature and state of weather at tri-daily telegraphic observations during the months of March and April, 1877, at Signal-Service station of observation at New Orleans, La.

Mr. Speer, No. 34 Warren street, New York City, furnished January 29, 1878, with a record of total number of miles traveled by the wind at Cleveland, Ohio, Toledo, Ohio, Buffalo, N. Y., and New York City, during the twenty-four hours ending 12 m., Decem-

ber 5, 1873, and certified copies of anemometer record sheets from those stations for the same period.

Mr. B. F. Bedortha, Buffalo, N. Y., furnished February 1, 1878, with record of highest velocities attained by the wind on the summit of Mount Washington, N. H., for each month from July, 1873, to December, 1877, inclusive.

Mr. William T. Hallett, New York City, furnished February 4, 1878, with record of monthly mean temperature at Memphis, Tenn., and New York City, for January, February and March, 1876, and October, November and December, 1877.

Mr. E. M. Hunt, corresponding secretary of the New Jersey State Board of Health, Metuchin, N. J., furnished February 16, 1878, with a record of meteorological observations taken at Signal-Service station of observation at Cape May, N. J., during the month of January, 1878.

Mr. L. M. Hoffman, Washington, D. C., furnished February 19, 1878, with a record of direction of wind and state of weather at Washington, D. C., from November 22 to November 27, 1875, inclusive.

Capt. M. R. Brown, Corps of Engineers, U. S. A., Port Eads, South Pass, La., furnished weekly with river reports from New Orleans, La., Vicksburg, Miss., Nashville, Tenn., Cincinnati, Ohio, Pittsburgh, Pa., Louisville, Ky., Cairo, Ill., Yankton, Dak., Leavenworth, Kans., Little Rock, Ark., Shreveport, La., Keokuk, Iowa, and Saint Louis, Mo., from January 1 to June 30, 1878.

Brig. Gen. Benjamin Alvord, Paymaster-General, U. S. A., furnished with record of monthly rain-fall at Corinne, Utah, from July, 1871, to March, 1874, inclusive, and at Salt Lake City, Utah, from March, 1874, to January, 1878, inclusive.

Mr. T. R. Butler, president of the Sixth Avenue Railroad Company, New York City, furnished March 4, 1878, with record of daily maximum and minimum temperatures at Albany, N. Y., during months of January and February, 1877 and 1878, and December, 1876 and 1877.

Mr. J. J. Boyd, Milwaukee, Wis., furnished March 6, 1878, with record of monthly amount of rain-fall at Bismarck, Dak., from October, 1874, to January, 1878, inclusive.

Capt. C. P. Patterson, Superintendent United States Coast Survey, furnished March 6, 1878, with record of daily maximum, minimum, and mean temperatures at Island of Saint Paul, Alaska, from July 1 to September 2, 1876; record of barometer, thermometer, rain-fall, and prevailing direction of wind at same place for July and August, 1876; record of maximum, minimum, and mean temperature at Saint Michaels, Norton Sound, Alaska, from July 1, 1876, to June 30, 1877, and record of barometer, thermometer, rain-fall, and prevailing direction of wind at Saint Michaels from July, 1876, to June, 1877, inclusive.

Mr. C. M. Parks, Washington, D. C., furnished March 8, 1878, with statement of mean barometer, thermometer, and humidity, total rain-fall, maximum and minimum temperature, prevailing direction of wind, total movement of wind, maximum velocity of wind, number of days on which rain or snow fell, and range of temperature, at Salt Lake City, Utah, for each month in the year 1877.

Messrs. Davis & Murphy, contractors, Washington, D. C., furnished March 11, 1878, with record of rain-fall at Washington, D. C., during the months of September, October, November, and December, in the years 1873, 1874, 1875, 1876 and 1877; also, copy of record of Draper's self-registering rain-gauge at office of the Chief Signal-Officer of the Army, Washington, D. C., covering the period from September 1 to December 31, 1877.

Mr. S. J. Gilman, land commissioner, Kansas Pacific Railroad, Salina, Kans., furnished March 14, 1878, with record of monthly amount of rain-fall at Leavenworth, Kans., from September, 1871, to February, 1878, and at Dodge City, Kans., from October, 1874, to February, 1878, inclusive.

Messrs. Bancroft & Co., San Francisco, Cal., furnished March 18, 1878, with record of amount of rain-fall at San Diego, Cal., from November, 1871, to February, 1878.

Dr. C. E. Cady, Philadelphia, Pa., furnished April 1, 1878, with record of daily mean temperature, humidity, and movement of wind from May 15 to 31, 1877, inclusive, and from October 15 to 31, 1877, inclusive; also monthly mean temperature and humidity, and total and mean monthly movement of wind, during the months of June, July, August and September, 1877, at Atlantic City, Barnegat, and Cape May, N. J.

Mr. H. W. Farley, Chicago, Ill., furnished March 27, 1878, with record of prevailing direction of wind and total movement of wind (monthly) at Omaha, Nebr., from January, 1876, to December, 1877, inclusive.

Messrs. Thomas & Bird, Portland, Me., furnished on April 1, 1878, with record of direction and velocity of wind and state of weather at Wood's Holl, Mass., at each observation taken at the Signal-Service station of observation at that point from 11.26 p. m. of February 18 to 12.26 p. m. of February 20, 1878; also, on April 9, 1878, with record of direction and velocity of wind at Wood's Holl, Mass., on February 19, 1878.

Col. S. T. Abert, United States Civil Engineer, Washington, D. C., furnished April 9, 1878, with record of gales on the North Carolina coast during the years 1876 and 1877.

Rear-Admiral R. H. Wyman, U. S. N., Washington, D. C., furnished May 1, 1878, with record of monthly mean barometer at Boston, Mass., New York City, Philadelphia, Pa., and Norfolk, Va., from January, 1871, to March, 1878, and at Washington, D. C., from January, 1871, to April, 1878, inclusive.

Capt. W. S. Stanton, Corps of Engineers, U. S. A., headquarters Department of the Platte, Omaha, Nebr., furnished on May 1, 1878, with record of barometer (original readings and corrected) and attached and exposed thermometers at Cheyenne, Wyo., from July 10 to November 3, 1877, inclusive, at 9.44, 7, and 10.09 a. m., and 2, 2.44, and 9 p. m., each day. On June 13, 1878, with record of wet-bulb thermometer at Cheyenne, Wyo., from July 10 to November 3, 1877, at six daily observations. On June 25, 1878, with record of original readings of barometer and attached and dry and wet bulb thermometers from May 20 to May 25, 1878, inclusive, at each of the seven daily observations taken at the Signal-Service station at Cheyenne, Wyo.

Lieut. Robert London, Fifth United States Cavalry, Fort D. A. Russell, Wyo., furnished, May 1, 1878, with record of mean daily and monthly humidity at Cheyenne, Wyo., and Washington, D. C., from November 1, 1877, to March 31, 1878.

Pennsylvania Railroad Company, Philadelphia, Pa., furnished May 7, 1878, with record of maximum, minimum, and mean temperatures, mean relative humidity, and number of rainy days for each month from January, 1874, to December, 1877, inclusive, at Atlantic City, Barnegat, and Cape May, N. J., and Philadelphia, Pa.

Mr. Wm. H. Condon, Chicago, Ill., furnished, May 9, 1878, with record of direction and velocity of wind at midnight observation of August 9, 1872, at Escanaba, Mich.

Mr. E. M. Hunt, corresponding secretary of the New Jersey State board of health, furnished, May 18, 1878, with a record of observations taken at Signal-Service station at Cape May, N. J., during the month of April, 1878.

Mr. Albert C. Savage, Fremont, Dodge County, Nebraska, furnished, May 24, 1878, with record of total monthly rain-fall at Omaha, Nebr., for each month from September, 1871, to April, 1878, inclusive.

Lieut. D. A. Lyle, Ordnance Corps, United States Army, Sandy Hook, N. J., furnished, May 29, 1878, with record of hourly velocity of wind at Sandy Hook, N. J., on May 7, 8, 10, 11, 13 and 14, 1878.

Mr. John L. Wilson, Easton, Pa. furnished, June 5, 1878, with statement showing annual amounts of rain-fall from 1825 to 1867 at Philadelphia, Norristown, Morrisville, and Easton, Pa., and Lambertville, N. J., and amounts of rain-fall at Philadelphia, Pa., for the years 1871 to 1877, inclusive.

The mayor of Savannah, Ga. (for Commander C. S. Norton, U. S. N., light-house inspector), furnished, June 7, 1878, with record of number of days on which fog was reported at United States Signal-Service station on Tybee Island, Georgia, from June 11, 1874, to April 30, 1878.

Messrs. Gieske & Niemann, Baltimore, Md., furnished, June 11, 1878, with record of monthly amounts of rain-fall at Louisville, Ky., from October, 1871, to May, 1878, inclusive.

Mr. F. C. Brunck, Buffalo, N. Y., furnished, June 19, 1878, with record of mean maximum temperature in the months of January and July, 1871 to 1877, inclusive, at Albany, N. Y., Boston, Mass., Chicago, Ill., Detroit, Mich., Los Angeles, Cal., Milwaukee, Wis., Philadelphia, Pa., San Francisco, Cal., Omaha, Nebr., and Saint Louis, Mo.; also annual mean temperature during the years 1871 to 1877, inclusive, and monthly mean temperature during the months of January, February, July, and August in the same years, and January and February, 1878, at Buffalo, N. Y.

NOTE.—The foregoing table exhibits only the data furnished directly from the central office at Washington. Applications were constantly being made during the year for local data to the observers in charge of the different stations throughout the United States, and which, by direction of the Chief Signal-Officer, were, in most cases, supplied.

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PAPER 6.

*List of publications received during the fiscal year ended June 30, 1878.*

Anales del Ministerio de Fomento de la República Mexicana. Tomo 1. Marzo de 1877.

Astronomische, Magnetische und Meteorologische Beobachtungen an der K. K. Sternwarte zu Prag im Jahre 1876. Von Carl Hornstein. Prag, 1877.

Supplemento alla meteorologia Italiana. Anno 1876. Fascicolo IV. Roma, 1877.

Deutsche Seewarte. Monatliche Übersicht der Witterung. December, 1876-September, 1877.

(Publications of the Egyptian General Staff.) Provinces of the Equator. Summary of letters and reports of His Excellency the Governor-General. Cairo, 1877.

Quarterly Weather Report of the Meteorological Office, London. Part IV, October—December, 1874. Part I, January—March, 1875.
Papers and Proceedings and Report of the Royal Society of Tasmania for 1875.
Tables for the *reduction of meteorological* observations in India. By H. F. Blandford. Calcutta, 1876.
Instructions to *Meteorological Observers in India*, being the first part of the Indian Meteorologists' Vade-Mecum. By Henry F. Blandford. Calcutta, 1876.
Meteorology of India; second part of *Indian Meteorologists'* Vade-Mecum.
Die Monsune und das Klima Indiens. Von Dr. A. Wacikof. Singapore, Juni 1876.
Reports on the Meteorological, Magnetic, and other Observatories of the Dominion of Canada for the year 1876. Ottawa, 1877.
Hourly Readings from the Self-recording Instruments at the Seven Observatories in connection with the Meteorological Office, London. January—September, 1877.
Daily Weather Reports of the Meteorological Office, London. January 1—June 30, 1877, and *July 1—December 31*, 1877.
On the Physical Explanation of the Inequality of the Two Semi-diurnal Oscillations of Barometric Pressure. *By Henry F. Blandford. (Pamphlet.)* Read August 2, 1876.
Report on the Administration of the Meteorological Department of the Government of India in 1875–'76.
Report on the Meteorology of India in 1875. By Henry F. Blandford.
*Results of Meteorological* and Magnetical Observations at Stonyhurst College Observatory for 1876.
*Quarterly Journal of the Meteorological Society*, London. July, 1877, and October, 1877.
Meteorological Observations at *Stations of the Second Order for the year* 1876. Part 1. January—August. London, 1877.
Proceedings of the Belfast Natural History and Philosophical Society for the session of 1876–'77. Belfast, 1877.
Report of the Meteorological Committee of the Royal Society for the Period of Seventeen Months, ending May 31, 1877.
An improved form of Mercurial Barometer. By Richard Eaton Power.,
*Negretti & Zambra's Encyclopædic*, Illustrated and Descriptive Catalogue of Instruments. London ——.
A Treatise on Meteorological Instruments. *By Negretti & Zambra.* London, 1864.
Results of Astronomical Observations made at the Royal Observatory, Cape of Good Hope, during the year 1874, under the direction of Edward James Stone, M. A. Cape Town, 1877.
Tenth Annual Report of the Department of Marine Fisheries for the fiscal year ended June 30, 1877. Ottawa, 1878.
Supplement to the Tenth Annual Report of the Department of Marine and Fisheries, for the fiscal year *ended 30th June*, 1877, being a list of lights on the coasts, rivers, and lakes of the Dominion of Canada, on the 31st day of December, 1877. Ottawa, 1878.
Sunspots and Rain-fall, by Charles Meldrum. (Pamphlet.) Mauritius ——.
Stonyhurst College Observatory —. *Results of Meteorological and Magnetical* Observations, 1877.
Indian Meteorological Memoirs, being occasional discussions and *compilations of meteorological data* relating to India and the neighboring countries, published under the direction of Henry F. Blandford. Vol. 1, Part I. Calcutta, 1876.
*Report of the Vizagapatam and Backergunge* Cyclones of October, 1876. By J. Elliot. Calcutta, 1877.
Astronomical Observations made *at the Royal Observatory*, Edinburgh. By Piazzi Smyth. Vol. XIV, for 1870–'77. Edinburgh, 1877.
Results of Meteorological Observations made at *the Radcliffe Observatory*, Oxford, in the year 1875, under the superintendence of the Rev. Robt. Maine. Oxford, 1876.
Instructions to observers connected with the Meteorological Service of the Dominion of *Canada*. By G. T. Kingston, M. A. Toronto, 1878.
Meteorological Observations at stations of the second order, for the year 1876. *Part II*, Sep—Dec., *with the Annual Summaries*, compiled for the Quarterly Weather Reports, published by direction of the Meteorological Council. London, 1878.
*Journal of the Royal United Service Institution, No. XCV, Vol. XXII*, 1878, and appendix to Vol. XXI. London, 1878.
Magnetic Observations taken during the Transit of Venus Expedition to and from Kerguelen Island. By the Rev. S. J. Perry, F. R. S.
Sussex Meteorology, for the years 1871, '72, '73. By Fred. Ernest Sawyer. (3 pamphlets.)
Why the barometer does not always indicate real vertical pressure. By Robert Tennent. (Pamphlet.)

On the Meteorological Observations made in the Norwegian Deep-Sea Research Expedition, in the summers of 1876 and 1877. By Prof. H. Mohn. (Pamphlet.)

Proceedings of the Literary and Philosophical Society, of Liverpool, during the sixty-sixth session, 1876–'77, No. XXXI.

The Argentine Republic, written in German. By Richard Napp, assisted by several fellow writers, for the Central Argentine Commission, on the Centenary Exhibition at Philadelphia. Buenos Ayres, 1876.

Annual Report upon the Geographical Surveys west of the One hundredth meridian, in California, Nevada, Utah, Colorado, Wyoming, New Mexico, Arizona, and Montana. By Lieut. Geo. M. Wheeler, U. S. A., with Topographical Atlas.

Annual Report of the Smithsonian Institution for 1876.

Report upon United States Geographical Surveys west of the One hundredth meridian, in charge of First Lieut. Geo. M. Wheeler. Vol. IV. Paleontology. Washington, D. C.

Preliminary report upon a reconnaissance through Southern and Southeastern Nevada, made in 1869, by First Lieut. Geo. M. Wheeler. Washington, D. C.

Rules and regulations for the government of the Ordnance Department. Washington, D. C., 1877.

On the Larval Characters and Habits of the Blisterbeetles belonging to the Genera Macrobasis Lec, and Epicauta Fabr., with remarks on other species of the Family Melvoidæ. By Charles V. Riley.

Professional papers of the Engineer Department United States Army, No. 18. Report of the Geological Exploration of the Fortieth Parallel, by Clarence King. Washington, 1877.

American Ephemeris and Nautical Almanac for the years 1878 and 1880.

Annual Report of the Director of the Harvard College Observatory, presented to the visiting committee November 26, 1877. By Prof. Edward C. Pickering (Pamphlet.)

Transactions of the Connecticut Academy of Arts and Sciences. Vol. IV, Part 1. New Haven, 1877.

Meteorological Tables and Climatology of Vermont, with maps showing the rain-fall; also, suggestions and directions about foretelling storms. By Hiram A. Cutting, M. D. Montpelier, 1877.

Annual Report of the Quartermaster-General to the Secretary of War, for the fiscal year ending June 30, 1877.

Annual Report of the Commissary-General to the Secretary of War, for the fiscal year ending June 30, 1877.

Annual Report of the Surgeon-General United States Army, 1877. (Pamphlet.)

Annual Report of the Paymaster-General of the Army, 1877. (Pamphlet.)

Annual Report of the Secretary of War, for the year ending June 30, 1877. (Pamphlet.)

Annual Report of the Register of the Treasury, for the fiscal year ended June 30, 1877. (Pamphlet.)

Annual Report of the Commissioner of Agriculture to the President, November, 1877. (Pamphlet.)

Annual Report of the Commissioner of Internal Revenue, for the fiscal year ended June 30, 1877. (Pamphlet.)

Annual Report of the Postmaster-General of the United States, for the fiscal year ended June 30, 1877. (Pamphlet.)

Twelfth Annual Report of the Iowa Institution for the Education of the Deaf and Dumb, at Council Bluffs, for the years 1876 and 1877. Des Moines, 1877.

Annual Report of the Chief of Engineers for the year 1877. Parts 1 and 2.

Contributions to the History of Medical Education and Medical Institutions in the United States of America, 1876, prepared for the United States Bureau of Education by N. S. Davis. Washington, 1877.

Thirteenth and Fifteenth Annual Reports of the Massachusetts Agricultural College. 1876 and 1878.

Twenty-ninth Annual Report of the Cincinnati Chamber of Commerce and Merchants' Exchange for the year ending August 31, 1877. Cincinnati, 1877.

Annual Report of the Secretary of the Interior on the Operations of the Department for the fiscal year ending June 30, 1877. Washington, 1877.

Meteorological Method. By Wm. Blasius. (Pamphlet.)

List of Light-Houses, Lighted Beacons, and Floating Lights on the.

List of Beacons, Buoys, Monuments, and other day-marks in the First to Thirteenth Light-House Districts. Washington, 1877–'78.

Annual Report of the Light-House Board to the Secretary of the Treasury for the fiscal year ending June 30, 1877.

Proceedings of the Davenport Academy of Natural Sciences. Vol. 2. Part 1.

United States Geographical Surveys West of the 100th Meridian by Lieut. Geo. M. Wheeler, Corps of Engineers, U. S. Army, in charge. Vol. II. Astronomy and Barometric Hypsometry. Washington, 1877.

Report of the *Commissioner of Education for the year 1876.* Washington, 1878.
Twentieth Annual Report of the Corporation of the Chamber of Commerce of the State of N. Y. for the year 1877-'78. N. Y., 1878.
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PAPER 7.

*Showing stations inspected, by whom, and when inspected, during the fiscal year ending June 30, 1878.*

| Station. | Name of inspector. | Date. |
|---|---|---|
| Albuquerque, N. Mex. | First Lieut. A. W. Greely, acting signal-officer | July 20, 1877. |
| Atlantic City, N. J. | Second Lieut. James Allen, acting signal-officer | January 10–15, 1878. |
| | First Lieut. John McClellan, acting signal-officer | June 27–29, 1878. |
| Augusta, Ga | do | Feb. 28–Mar. 1, 1878. |
| Baltimore, Md | Second Lieut. James Allen, acting signal-officer | January 21–25, 1878. |
| Barnegat, N. J | First Lieut. S. C. Vedder, acting signal-officer | May 6, 1878. |
| Belen, N. Mex | First Lieut. A. W. Greely, acting signal-officer | July 21, 1877. |
| Boerne, Tex | First Lieut. George S. Grimes, acting signal-officer | November 28, 1877. |
| Brownsville, Tex | do | March 13, 1878. |
| Cairo, Ill | First Lieut. John McClellan, acting signal-officer | May 28, 29, 1878. |
| Camp Bowie, Ariz | First Lieut. A. W. Greely, acting signal-officer | August 5, 6, 1877. |
| Camp Grant, Ariz | do | August 9, 1877. |
| Campo, Cal | do | Sept. 18, 19, 1877. |
| | Second Lieut. Philip Reade, acting signal-officer | September 20, 1877. |
| Cape May, N. J | First Lieut. John McClellan, acting signal-officer | June 25, 26, 1878. |
| Charleston, S. C | do | February 18–25, 1878. |
| Cheyenne, Wyo | First Lieut. J. A. Buchanan, acting signal-officer | March 13, 14, 1878. |
| Chicago, Ill | do | February 15–17, 1878. |
| Cleveland, Ohio | do | Jan. 31–Feb. 3, 1878. |
| Cincinnati, Ohio | do | June 9–11, 1878. |
| Coleman City, Tex | First Lieut. George S. Grimes, acting signal-officer | October 28, 1877. |
| Concho, Tex | do | November 5, 1877. |
| Corsicana, Tex | First Lieut. John McClellan, acting signal-officer | May 9, 10, 1878. |
| Davenport, Iowa | First Lieut. J. A. Buchanan, acting signal-officer | March 1–3, 1878. |
| Deadwood, Dak | do | May 8, 9, 1878. |
| Denver, Colo | do | April 17, 19, 1878. |
| Detroit, Mich | do | February 8–10, 1878. |
| Dodge City, Kans | do | May 17–18, 1878. |
| Dubuque, Iowa | do | February 27, 28, 1878. |
| Edinburg, Tex | First Lieut. George S. Grimes, acting signal-officer | March 16, 1878. |
| Erie, Pa | First Lieut. J. A. Buchanan, acting signal-officer | January 27–29, 1878. |
| Florence, Ariz | First Lieut. A. W. Greely, acting signal-officer | August 16, 1877. |
| Fredericksburg, Tex | First Lieut. George S. Grimes, acting signal-officer | November 26, 1877. |
| Fort Bayard, N. Mex | First Lieut. A. W. Greely, acting signal-officer | August 2, 3, 1877. |
| Fort Craig, N. Mex | do | July 22, 23, 25, 1877. |
| Fort Selden, N. Mex | do | July 26, 27, 30, 1877. |
| Galveston, Tex | First Lieut. John McClellan, acting signal-officer | May 1–3, 1878. |
| Grand Haven, Mich | First Lieut. J. A. Buchanan, acting signal-officer | February 13, 14, 1878. |
| Indianapolis, Ind | do | May 31–June 3, 1878. |
| Indianola, Tex | First Lieut. John McClellan, acting signal-officer | May 3–5, 1878. |
| Jacksonville, Fla | do | March 20, 1878. |
| Keokuk, Iowa | First Lieut. J. A. Buchanan, acting signal-officer | March 5, 6, 1878. |
| Key West, Fla | First Lieut. John McClellan, acting signal-officer | March 26–29, 1878. |
| Knoxville, Tenn | do | June 3, 4, 1878. |
| La Crosse, Wis | First Lieut. J. A. Buchanan, acting signal-officer | February 21, 22, 1878. |
| La Mesilla, N. Mex | First Lieut. A. W. Greely, acting signal-officer | July 28, 29, 1877. |
| Leavenworth, Kans | First Lieut. J. A. Buchanan, acting signal-officer | May 20–26, 1878. |
| Los Lunas, N. Mex | First Lieut. A. W. Greely, acting signal-officer | July 21, 1877. |
| Louisville, Ky | First Lieut. J. A. Buchanan, acting signal-officer | June 4–6, 1878. |
| Lynchburg, Va | First Lieut. John McClellan, acting signal-officer | February 6–8, 1878. |
| Mason, Tex | First Lieut. George S. Grimes, acting signal-officer | November 25, 1877. |
| Maricopa Wells, Ariz | First Lieut. A. W. Greely, acting signal-officer | August 28, 1877. |
| McKavett, Tex | First Lieut. George S. Grimes, acting signal-officer | November 23, 1877. |
| Melvin Station, Ariz | First Lieut. A. W. Greely, acting signal-officer | August 23, 24, 1877. |
| Memphis, Tenn | First Lieut. John McClellan, acting signal-officer | May 22–25, 1878. |
| Milwaukee, Wis | First Lieut. J. A. Buchanan, acting signal-officer | February 18–20, 1878. |
| Mobile, Ala | First Lieut. John McClellan, acting signal-officer | April 20–22, 1878. |
| Montgomery, Ala | do | April 23, 24, 1878. |
| Nashville, Tenn | do | May 30–June 1, 1878. |
| New Orleans, La | do | April 25–28, 1878. |
| Norfolk, Va | Second Lieut. James Allen, acting signal-officer | July 7–10, 1877. |
| | First Lieut. John McClellan, acting signal-officer | February 3–5, 1878. |
| North Platte, Nebr | First Lieut. J. A. Buchanan, acting signal-officer | March 11, 12, 1878. |
| Omaha, Nebr | do | March 7–10, 1878. |
| Oswego, N. Y | do | June 29–July 6, 1878. |
| Philadelphia, Pa | Second Lieut. James Allen, acting signal-officer | January 29–31, 1878. |
| Phœnix, Ariz | First Lieut. A. W. Greely, acting signal-officer | August 27, 1877. |
| Pike's Peak, Colo | First Lieut. J. A. Buchanan, acting signal-officer | April 28, 29, 1878. |
| Pittsburgh, Pa | do | January 24–26, 1878. |
| Port Huron, Mich | do | February 11, 12, 1878. |
| Prescott, Ariz | First Lieut. A. W. Greely, acting signal-officer | Aug. 20–22, 25, 1877. |
| Punta Rassa, Fla | First Lieut. John McClellan, acting signal-officer | April 3–5, 1878. |
| Rio Grande City, Tex | First Lieut. George S. Grimes, acting signal-officer | March 22, 1878. |
| Saint Louis, Mo | First Lieut. J. A. Buchanan, acting signal-officer | May 27–30, 1878. |
| Saint Mark's, Fla | First Lieut. John McClellan, acting signal-officer | April 16, 17, 1878. |
| Saint Paul, Minn | First Lieut. J. A. Buchanan, acting signal-officer | February 23–25, 1878. |
| Salt Lake City, Utah | do | March 18–22, 1878. |
| San Antonio, Tex | First Lieut. George S. Grimes, acting signal-officer | December 2, 1877. |

PAPER 7.—*Showing stations inspected, by whom, and when inspected, &c.*—Continued.

| Station. | Name of inspector. | Date. |
|---|---|---|
| San Diego, Cal | First Lieut. A. W. Greely, acting signal-officer | Sept. 22–25, 1877. |
| Sandusky, Ohio | First Lieut. J. A. Buchanan, acting signal-officer | February 4, 5, 1878. |
| Santa Fé, N. Mex | First Lieut. A. W. Greely, acting signal-officer | July 11–16, 1877. |
| Savannah, Ga | First Lieut. John McClellan, acting signal-officer | March 2–6, 8, 9, 1878. |
| Shreveport, La | do | May 11–14, 1878. |
| Silver City, N. Mex | First Lieut. A. W. Greely, acting signal-officer | August 3, 1877. |
| Smithville, N. C | Second Lieut. James Allen, acting signal-officer | July 3–5, 1877. |
| Stanwix, Ariz | First Lieut. John McClellan, acting signal-officer | February 14, 15, 1878. |
| Stockton, Tex | First Lieut. A. W. Greely, acting signal-officer | August 29, 1877. |
| Toledo, Ohio | First Lieut. George S. Grimes, acting signal-officer | November 11, 1877. |
| Tres Alamós, Ariz | First Lieut. J. A. Buchanan, acting signal-officer | February 6, 7, 1878. |
| Tucson, Ariz | First Lieut. A. W. Greely, acting signal-officer | August 11, 12, 1877. |
| Tybee Island, Ga | do | August 13–15, 1877. |
| Vicksburg, Miss | First Lieut. John McClellan, acting signal-officer | March 6, 7, 1878. |
| Virginia City, Mont | do | May 18–20, 1878. |
| Wickenburg, Ariz | First Lieut. J. A. Buchanan, acting signal-officer | April 2, 3, 1878. |
| Wilmington, N. C | First Lieut. A. W. Greely, acting signal-officer | August 18, 19, 1878. |
| Wood's Holl, Mass | First Lieut. John McClellan, acting signal-officer | February 11–13, 1878. |
| Yuma, Ariz | Second Lieut. James Allen, acting signal-officer | February 2–4, 1878. |
| | First Lieut. A. W. Greely, acting signal-officer | Aug. 29, 30, Sept. 1, 1877. |
| | Second Lieut. Philip Reade, acting signal-officer | March 8, 1878. |

PAPER 8.

*List of places for which stations have been requested, but not established on June 30, 1878.*

| Place. | Applicant. | Date. |
|---|---|---|
| Muskegon, Mich | Hon. H. H. Holt, Michigan legislature, inclosing petition of 99 citizens. | Jan. 21, 1871 |
| | Board of Trade, Toledo | Jan. 27, 1871 |
| | Board of Trade, Chicago | Feb. 10, 1871 |
| | Hon. T. W. Ferry, United States Senate | Mar. 3, 1871 |
| | Hon. T. W. Ferry, United States Senate; S. H. Wagener, mayor, and 43 others. | Mar. 15, 1875 |
| Manitowoc, Wis | Ryerson, Hills & Co., and 76 others | Feb. 14, 1878 |
| | Hon. P. Sawyer, M. C | Jan. 23, 1871 |
| Huron City, Mich | Hosea Barnes | May 4, 1876 |
| | Board of Trade, Toledo | Jan. 27, 1871 |
| | Board of Trade, Cleveland | Feb. 19, 1871 |
| | Board of Trade, Detroit | Feb. 10, 1871 |
| Mackinac, Mich | Board of Trade, Chicago | Feb. 10, 1871 |
| Richmond, Va | W. G. Turpin | Apr. 3, 1871 |
| Body Island, N. C | Board of Trade, Norfolk, and resolution of general assembly of Virginia. | Apr. 17, 1871 |
| Lewes, Del | Board of Trade, Philadelphia | May 25, 1871 |
| The Parks of Colorado | E. J. Mallett, late consul-general | May 24, 1871 |
| Staten Island | C. Kentgen, jr | June 9, 1871 |
| | do | June 20, 1871 |
| Chambersburg, Pa | Hon. J. Scott, United States Senate | June 12, 1871 |
| | Hon. Simon Cameron, United States Senate | June 12, 1871 |
| Watertown, N. Y | L. L. Pratt | June 21, 1871 |
| | Common Council, forwarded by mayor | June 21, 1873 |
| Xenia, Ohio | Fred. D. Hills | Mar. 9, 1876 |
| Port Hope | C. E. Case | June 30, 1871 |
| Champaign, Ill. (Illinois Industrial University). | Board of Trade, Detroit | July 22, 1871 |
| | Hon. W. C. Flagg, secretary | July 21, 1871 |
| | Hon. J. M. Gregory, president | Feb. 21, 1872 |
| Little Rock, Ark | E. A. Gastman (chairman meteorological committee, Macon County Fruit-Growers' Association). | Aug. 30, 1874 |
| | Hon. J. M. Hanks, M. C | July 26, 1871 |
| | Albert Cohen | July 1, 1872 |
| | A. Van Cleff | May 31, 1873 |
| | Hon. Powell Clayton, United States Senate | Mar. 11, 1874 |
| | do | Feb. 7, 1876 |
| | Hon. S. W. Dorsey, United States Senate | |
| | Hon. W. S. Slemons, M. C | |
| | Hon. L. S. Ganse, M. C | |
| | Hon. T. M. Gunter, M. C | |
| | Hon. W. W. Wilshire, M. C | |
| Niles, Mich | J. B. Fitzgerald, secretary Berrien County Agricultural Society. | July 27, 1871 |

PAPER 8.—*List of places for which stations have been requested, &c.*—Continued.

| Place. | Applicant. | Date. |
|---|---|---|
| Louisiana, Mo | W. Stark and R. E. Pleasants | Aug. 3, 1871 |
| Hot Springs, Ark | J. H. Morton, M. D. | Aug. 2, 1871 |
| | B. F. Kelley, superintendent | Dec. 10, 1877 |
| Janesville, Wis | J. B. Whiting, M. D., and Rock County Agricultural Society. | Aug. 7, 1871 |
| Hillsdale, Mich | Prof. G. McMillan, secretary of Hillsdale College; Hillsdale County Agricultural Society. | Aug. 6, 1871 |
| Metamora, Ill | Edward Kipp, secretary of Woodford County Agricultural Society. | Aug. 8, 1871 |
| Marietta, Ohio | J. W. Andrews, president Marietta College; Washington County Agricultural Society. | Aug. 10, 1871 |
| Mount Pleasant, Pa. (Mount Pleasant Academy). | W. H. McCreery, acting principal | Aug. 11, 1871 |
| Nebraska City, Nebr | H. K. Raymond, secretary Otoe County Farmers' Club | Aug. 14, 1871 |
| Peoria, Ill | L. J. Colton | Aug. 11, 1871 |
| | W. H. Herron, J. C. Proctor, and 80 others | Mar. 7, 1876 |
| Princeton, Ill | L. J. Colton | Aug. 11, 1871 |
| Mount Moosilauk, N. H | Prof. C. H. Hitchcock | Aug. 16, 1871 |
| | A. F. Clough | Aug. 16, 1871 |
| Catasauqua, Pa | Hon. E. McPherson, Clerk United States House of Representatives. | Sept. 11, 1871 |
| Galena, Ill | D. Wilmot Scott, publisher of the Galena Commercial Advertiser. | Sept. 14, 1871 |
| Columbus, Neb | J. O. Shannon, secretary Platte County Agricultural Society. | Sept. 5, 1871 |
| Coburg and Collingwood, Canada. | Oswego Board of Trade, by J. L. McWhorter | Aug. 30, 1871 |
| Springfield, Mo | John E. Werth, for Greene County Agricultural and Mechanical Society. | Sept. 18, 1871 |
| | A. Milton Lapham | Apr. 6, 1877 |
| Mason City, Iowa | T. G. Emsley, secretary Cerro Gordo County Agricultural Society. | Oct. 6, 1871 |
| Orono, Me. (State Agricultural College). | M. C. Fernald, Maine State College of Agriculture | Oct. 19, 1871 |
| | L. Libbey, postmaster | Feb. 17, 1873 |
| Balize, La., Fort Morgan, Ala., and Waco, Tex. | Agents and captains of Morgan Steamship Company | Oct. 31, 1871 |
| Fort Randall, Dak | R. J. Percy, for Missouri Valley Telegraph Company | Nov. 9, 1871 |
| Ann Harbor, Mich. (University of Michigan). | Prof. G. B. Merriman | Nov. 28, 1871 |
| Fountain, Colo | R. F. Long, editor El Paso Ranchman | Dec. 4, 1871 |
| Vineyard Haven, Mass | Prof. J. E. Hilgard, United States Coast Survey; Daniel W. Stevens, and Rev. Thomas Hill. | Dec. 18, 1871 |
| Cape Ann, Mass | Hon. B. F. Butler, M. C | Dec. 19, 1871 |
| Iowa City, Iowa (State University). | John P. Irish | Dec. 14, 1871 |
| | S. J. Kirkwood | Jan. 6, 1873 |
| | A. D. Schenck, first lieutenant Second United States Artillery. | July 3, 1875 |
| Manassas, Va | G. C. Round | Dec. 27, 1871 |
| Quincy, Ill | A. H. Hill, secretary National Board of Trade | Jan. 4, 1872 |
| Dover Point, N. H | John B. Stivens, mayor | Jan. 13, 1872 |
| Wilmington, Del | Board of Trade, Wilmington | Jan. 24, 1872 |
| Additional stations on eastern slope of Lake Michigan. | Hon. H. H. Holt, Michigan legislature | Feb. 11, 1871 |
| Additional stations on mountains of Virginia. | G. C. Wedderburn, secretary Virginia Telegraph Company; L. A. Gobright, Associated Press. | May 17, 1871 |
| Additional stations on western slope of Mississippi Valley | George P. Plant, W. H. Scudder, R. P. Handy, committee of the Merchants' Exchange, Saint Louis. | July 16, 1871 |
| Monomdy Point, Cape Cod Light, Mass. | R. B. Forbes | Nov. 29, 1871 |
| Southwest Pass (Pass à l'Outre,) La. | Thornton A. Jenkins, rear-admiral United States Navy | Mar. 20, 1871 |
| Staunton, Va.; Christianburg, Va.; Bristol, Tenn.; Easton, Pa.; Harrisburg, Pa.; Winchester, Va. | Jed. Hotchkiss, secretary of the Augusta County Fair, Virginia. | Aug. 15, 1871 |
| Towanda, Kans | M. D. Ellis | Feb. 12, 1873 |
| Black Dome, N. C. (Black Mountain). | William Cain | Feb. 12, 1873 |
| Charlotte, N. Y | J. Eaton and 35 others | Feb. 14, 1873 |
| | G. C. Clarkson, mayor, and 15 others | Oct. 27, 1874 |
| | W. H. Newcomb and 22 others | Oct. 27, 1874 |
| Gallitzin and Altoona, on Pennsylvania Central Railroad. | David Peelor | Feb. 17, 1873 |
| Minneapolis, Minn. (University of Minnesota). | William W. Falwell, president | Feb. 21, 1873 |
| Each of the State Agricultural Colleges. | J. B. Bowman, regent of Kentucky University, and others | Feb. 29, 1873 |
| Columbus, Ohio | J. H. Klippart, secretary Ohio State Board of Agriculture. | Mar. 5, 1873 |
| | William McCrary | Jan. 4, 1876 |

PAPER 8.—*List of places for which stations have been requested, &c.*—Continued.

| Place. | Applicant. | Date. |
|---|---|---|
| Columbus, Ohio | Legislature of Ohio, by joint resolution: Tyndall Association of Columbus, Columbus Academy of Medicine, and Board of Education, Columbus. | Feb. 8, 1876 |
| | R. B. Hayes, President of the United States: Tyndall Association of Columbus, by A. H. Tuttle, A. G. Farr, and C. C. Howard. | June 22, 1877 |
| Northfield, Vt. (Norwich University). | Capt. C. A. Curtis | Mar. 15, 1872 |
| Grand Tower, Ill | A. R. Harris, secretary Mutual Aid and Improvement Society, Saint Louis, Mo. | Mar. 21, 1872 |
| Iuka, Miss | Rev. J. T. Freeman, (through Hon. George E. Harris, M. C.). | Mar. 25, 1872 |
| Great Natihalee, (Bald Mountain), N. C. | Charles W. Jenks | Apr. 1, 1872 |
| Deposit, N. Y | G. W. Hanford | Apr. 1, 1872 |
| Hellman Dale, Pa | S. P. Heilman | Apr. 1, 1872 |
| Boonsville, Mo | J. L. Stephens | Apr. 11, 1872 |
| Fort Wayne and New Albany, Ind. | F. C. Johnson, chairman meteorological committee Indiana State Board of Agriculture. | Apr. 12, 1872 |
| Maryland Agricultural College. | A. R. Davis, president of Board of Trustees | Apr. 19, 1872 |
| | do | June 21, 1872 |
| San Antonio, Tex | Thomas G. Williams, H. B. Adams, and others | May 10, 1872 |
| | Frederick Petterson and 52 others | Mar. 16, 1874 |
| | Hon. M. C. Hamilton, United States Senate | Mar. 17, 1874 |
| | Hon. John Hancock, M. C | Apr. 1, 1874 |
| Atlanta, Ga | Hon. John H. James, mayor; Chamber of Commerce | May 10, 1872 |
| | Hon. R. H. Whiteley, M. C.; P. H. Mell, jr., State chemist | Jan. 16, 1877 |
| | P. H. Mell, jr., State chemist | Jan. 22, 1877 |
| | Hon. A. H. Stephens, M. C.; Hon. T. P. Jones, agricultural commissioner of Georgia; George Little, State geologist, and 4 others. | Feb. 8, 1877 |
| | Hon. J. B. Gordon, United States Senate | Feb. 23, 1877 |
| Auburn, Ala. (Agricultural and Mechanical College of Alabama). | William C. Stubbs, John B. Read, W. H. Jennison | May 14, 1872 |
| Racine, Wis | Mayor and Council | May 18, 1872 |
| Ogdensburgh, N. Y | Hon. W. A. Wheeler, M. C | May 25, 1872 |
| Plattsburgh, N. Y | Hon. John Rogers, M. C | May 28, 1872 |
| Sewance, Tenn. (University of the South). | John L. Cooper, (through Prof. Joseph Henry, Smithsonian Institution). | June 10, 1872 |
| | Hon. W. C. Whitthorne; Right Rev. Alexander Gregg, Bishop of Texas; faculty of college, and others. | June 26, 1877 |
| Newark, Del. (Delaware College). | William D. Mackey, secretary of faculty | June 11, 1872 |
| Green Bay, Wis | Hon. P. Sawyer, M. C | June 13, 1872 |
| | do | June 24, 1874 |
| Kenosha, Wis | Wallace Mygatt | June 20, 1872 |
| Warsaw, Ind | Marshall H. Parks | June 24, 1872 |
| Beaver City, Utah | Daniel Tyler | July 8, 1872 |
| New Ulm, Minn | Dr. Alfred Muller | July 10, 1872 |
| Evansville, Ind | F. C. Johnson, P. Hornbrook, surveyor of customs; Thos. P. Britton, president Vanderburgh County Agricultural Society; John Ingle, secretary Vanderburgh Agricultural Society; and Charles H. Butterfield, mayor. | July 13, 1872 |
| | C. H. Butterfield, mayor | Nov. 26, 1873 |
| | H. L. Morrill and citizens of Evansville | Jan. 16, 1874 |
| | T. W. Venemann | May 31, 1875 |
| | J. E. McDonald, United States Senate; B. S. Fuller, M. C.; Thomas M. Brown, M. C.; J. M. Shekelford, and Charles Denby. | Apr. 25, 1878 |
| Aiken, S. C | Hon. F. A. Sawyer, United States Senate, and 16 citizens | July 16, 1872 |
| | John C. Derby | Sept. 2, 1872 |
| Winona, Miss | James Whitall | Mar. 31, 1875 |
| Eutaw, Ala | A. M. Rafter | July 20, 1872 |
| Belfast, Me | W. S. Bird | July 20, 1872 |
| Ithaca, N. Y. (Cornell University). | George E. Brackett | Aug. 6, 1872 |
| | A. D. White, president, and petition of 75 citizens | Aug. 8, 1872 |
| | Farmers' Club of Ithaca | Nov. 18, 1872 |
| | A. D. White, president of faculty of Cornell University | Nov. 22, 1872 |
| | Hon. Roscoe Conkling, United States Senate | Jan. 25, 1873 |
| | P. B. Crandell, corresponding secretary Farmers' Club | Feb. 3, 1875 |
| | E. A. Fuertes, department of engineering | Mar. 17, 1875 |
| | E. A. Fuertes, dean | Apr. 17, 1878 |
| Straits of Mackinac | Z. Hazzard Potter | May 7, 1878 |
| | Roys I. Cram | Aug. 7, 1872 |
| | Chamber of Commerce, Milwaukee | May 5, 1873 |
| | Board of Trade, Buffalo | May 26, 1873 |
| | Board of Trade, Chicago | May 22, 1873 |
| Carthage, Ill | J. L. Hathaway and J. B. Merrill, meteorological committee, Chamber of Commerce, Milwaukee. | Sept. 5, 1874 |
| | L. F. M. Easterday and petition of 105 citizens | Sept. 2, 1872 |

PAPER 8.—*List of places for which stations have been requested, &c.*—Continued.

| Place. | Applicant. | Date. |
|---|---|---|
| Kutztown, Pa. (Keystone State Normal School). | A. R. Horne, principal | Sept. 13, 1872 |
| Pensacola, Fla | S. C. Cobb, president Pensacola Ice Company, M. H. Sullivan, and 27 others. | Oct. 7, 1872 |
| | Thomas C. Watson, commodore of Pensacola Regatta Club. | July 25, 1873 |
| Gainesville, Ga | M. F. Stephenson | Nov. 5, 1872 |
| Chattanooga, Tenn | Steamboatmen's convention assembled at Cairo, Ill | Nov. 17, 1872 |
| | J. M. Pettigrew, president, and J. F. Toof, secretary, Memphis Chamber of Commerce, and 101 others. | Aug. 15, 1875 |
| Some point between Leavenworth and Shreveport. | Steamboatmen's convention assembled at Cairo, Ill. | Nov. 17, 1872 |
| On plains of Western Kansas and regions southward and southwestward. | Kansas State Horticultural Society | Dec. 21, 1872 |
| Dallas, Tex | W. A. Jones & Co., W. C. Conner, and 133 others | Dec. 26, 1872 |
| Oil City and Parker's Landing on the Allegheny River. | Resolution of select council of Pittsburgh, transmitting and approving petition of 46 citizens of Pittsburgh. | Dec. 28, 1872 |
| Greensborough and Brownsville on the Monongahela. | ....do | Jan. 10, 1873 |
| Lawrence, Kans. (University of Kansas). | John Frazer, chancellor | Jan. 16, 1873 |
| | Hon. Stephen A. Cobb, M. C., inclosing petition of Alfred Gray, secretary of State Board of Agriculture. | May 6, 1873 |
| Manchester, N. H | Hon. S. N. Bell, M. C., inclosing resolution of New Hampshire State Agricultural Society. | Jan. 21, 1873 |
| Sandwich, Ill | N. E. Ballou (through Commissioner of Agriculture) | Jan. 22, 1873 |
| Detroit, Minn | Daniel Cony | Feb. 2, 1873 |
| Dayton, Ohio (National Soldiers' Home). | Hon. Isaac Strohen | Feb. 11, 1873 |
| | Thomas L. Neal, president, and Thomas D. Davis, secretary, Montgomery County Medical Society. | Feb. 1, 1875 |
| Palatka, Fla | J. F. Stone (through Secretary of the Navy) | Feb. 17, 1873 |
| Put-in-Bay, Ohio | H. B. West | Mar. 3, 1873 |
| | H. D. Cooke, governor of District of Columbia | July 17, 1873 |
| | Hon. Charles Foster, M. C., G. W. Dane and citizens, farmers, and shipowners of vicinity. | Feb. 21, 1878 |
| Emporia, Kans | Robert Milliken | Mar. 6, 1873 |
| North and west of Galveston, Tex. | Chamber of Commerce (through Hon. John Hancock) | Mar. 6, 1873 |
| Charlottesville, Va. (University of Virginia). | Hon. R. T. W. Duke, M. C | Mar. 2, 1873 |
| Raleigh, N. C | Cotton Exchange, New Orleans, La | Mar. 30, 1873 |
| Columbia, S. C | ....do | Mar. 30, 1873 |
| | Hon. John Alexander, mayor, transmitting resolution of city council. | June 11, 1873 |
| | Hon. F. A. Sawyer, and petition of 58 citizens and resolution of city council. | Aug. 5, 1873 |
| Columbus, Miss | Cotton Exchange, New Orleans, La | Mar. 30, 1873 |
| Pierce City, Mo | E. P. Lingee, president board of education | Apr. 9, 1873 |
| Neshanic Mountain, Somerset County, New Jersey. | J. V. D. Pumyea | Apr. 12, 1873 |
| Bay City, Mich | Hon. N. B. Bradley, M. C | Apr. 27, 1873 |
| | ....do | Feb. 19, 1874 |
| | ....do | June 17, 1874 |
| | W. S. Crosthwaite | Jan. 21, 1875 |
| Vincennes, Ind | W. Hays | June 15, 1873 |
| Springfield, Ill | S. M. Cullom, transmitting petition of governor, State officers, and others. | July 5, 1873 |
| | E. A. Gastman, chairman meteorological committee Macon County Fruit-Growers' Association. | Aug. 30, 1874 |
| | Hon. W. M. Springer, M. C | Jan. 12, 1878 |
| Cedar Keys, Fla | Hon. Albert E. Willard, mayor, and 16 others | July 7, 1873 |
| | D. L. Yulee, Fernandina, Fla | Feb. 7, 1874 |
| Salina, Kans | Freeman Kingman, secretary of Patrons of Husbandry and Farmers' Club. | July 17, 1873 |
| | Hon. W. A. Phillips, M. C | Apr. 2, 1877 |
| Alleghanies in North Carolina | George W. Warren, jr | July 26, 1873 |
| Carthage, Mo | E. P. Searle and 174 others | Aug. 15, 1873 |
| New Berne, N. C | George W. Nason, jr | Sept. 13, 1873 |
| Port Townsend, Wash | J. W. Sweeny, general superintendent of Puget Sound Telegraph Company. | Sept. 30, 1873 |
| | Maj. William G. Morris, special agent Treasury Department. | Mar. 8, 1878 |
| Mineral Point, Wis | Hon. T. O. Howe, United States Senate; M. M. Strong | Dec. 16, 1873 |
| Latitude 40° 30', longitude 74° 42', Somerset County, N. J. | Hon. F. T. Frelinghuysen, United States Senate; citizens of Somerset, Hunterdon, and Middlesex Counties. | Dec. 22, 1873 |
| Carlton, Wis | Edward Bach, farmers and ship-owners of the district | Jan. 10, 1874 |
| | Hon. Philetus Sawyer, M. C.; Edward Bach | Jan. 26, 1874 |
| Fernandina, Fla | Henry Hazen, collector; W. S. Simmons, first lieutenant United States Revenue Marine. | Jan. 17, 1874 |
| | Hon. S. B. Conover, United States Senate; G. Stark, mayor; Isaiah Winch, president of council, and 22 others. | Jan. 19, 1874 |

PAPER 8.—*List of places for which stations have been requested, &c.*—Continued.

| Place. | Applicant. | Date. |
|---|---|---|
| Fernandina, Fla | D. L. Yulee | Feb. 7, 1874 |
| Helena, Ark | Hon. J. L. Alcorn, United States Senate | Feb. 12, 1874 |
| Oakland, Cal. (University of California). | J. West Martin, secretary of board of regents | Feb. 12, 1874 |
| Fayetteville, Ark. (Arkansas Industrial University). | Hon. A. S. Prather, trustee | Feb. 17, 1874 |
| Beatrice, Nebr | Hon. P. W. Hitchcock, United States Senate; A. S. Paddock. | Mar. 3, 1874 |
| One or more stations in Arizona. | Charles Denison, M. D | Mar. 16, 1874 |
| Manistee, Mich | Hon. J. A. Hubbell, M. C.; L. T. Estis | Mar. 18, 1874 |
| Fort Macon, N. C | Hon. J. M. Leach, M. C | Mar. 28, 1874 |
| Gorham, N. H | Elias S. Mason | Mar. 30, 1874 |
| Mason City, Mo | J. F. Benjamin, Brown & Sheppard, E. B. Van Vent, and 33 others. | Mar. 30, 1874 |
| Rockland, Me | Citizens of Rockland, Belfast, &c | Apr. 9, 1874 |
| | E. White and 27 others | Apr. 16, 1874 |
| Rome, Ga | Thomas J. Perry, chairman meteorological committee Rome Agricultural, Horticultural, and Mechanical Fair Association. | Apr. 24, 1874 |
| | ....do | Jan. 21, 1875 |
| | ....do | Dec. 4, 1875 |
| | Hon. W. H. Felton, M. C | Mar. 31, 1876 |
| Kansas City, Mo | Henry A. Hills, secretary Chamber of Commerce, Rome, Ga. | Mar. 16, 1877 |
| Muscatine, Iowa | Thomas S. Case, P. M | May 1, 1874 |
| Syracuse, N. Y | J. P. Walton | May 7, 1874 |
| | N. Graves, mayor; William Kirkpatrick, J. R. Whitlock, and J. B. Hill. | May 9, 1874 |
| Bakersfield, Cal | Hon. R. H. Duell, M. C | May 11, 1874 |
| Palmyra, Wis | A. C. Bratton, M. D.; P. D. McClanahon, M. D | May 14, 1874 |
| Crawfordsville, Ind. (Wabash College). | John C. Minton | May 19, 1874 |
| | Col. H. B. Carrington, U. S. A., chairman military science, Wabash College. | June 6, 1874 |
| Harbor of Refuge, Sand Beach, Lake Huron. | Maj. G. Weitzel, Corps of Engineers | June 11, 1874 |
| Calais, Me | Hon. Eugene Hale, M. C.; Boardman Bros | June 16, 1874 |
| Fort Thompson, Dak | Col. D. S. Stanley | June 18, 1874 |
| Chatawa, Miss. (College of the Redemptionist Fathers). | Alexander W. Gordon | July 13, 1874 |
| Ellsworth, Kans | Hon. W. A. Phillips, M. C | July 14, 1874 |
| | M. W. Henry | July 21, 1874 |
| Mount Lake or Bald Knob, Giles County, Va. | Mrs. H. Haupt | July 21, 1874 |
| Camden, N. J. (the River Iron Works). | Wood, Dialogue & Co | July 29, 1874 |
| Bloomington and Decatur, Ill | E. A. Gastman, chairman meteorological committee Macon County Fruit-Growers' Association. | Aug. 30, 1874 |
| Mount Kearsarge, Warner, N. H. | John Eaton, Commissioner; Hon. N. G. Ordway, Hon. W. E. Chandler. | Oct. 28, 1874 |
| Ceredo, W. Va | S. A. Forbes | Nov. 21, 1874 |
| | Frank Hereford | June 10, 1876 |
| Astoria, Oreg | Hon. J. H. Mitchell, United States Senate | Nov. 29, 1874 |
| | ....do | Jan. 18, 1878 |
| | ....do | Mar. 30, 1878 |
| Pond du Lac, Wis | Hon. C. A. Eldridge, M. C.; J. W. Carney | Dec. 15, 1874 |
| Corpus Christi, Tex | H. Taylor, P. M | Jan. 4, 1875 |
| | ....do | Jan. 15, 1875 |
| | Hon. G. Schleicher, M. C.; William Headon, mayor; R. I. Denney, secretary of city; J. P. Rodney, and 3 others. | Aug. 24, 1876 |
| Lansing, Mich. (Michigan State Agricultural College). | R. C. Kedzie, professor of chemistry, &c | Jan. 12, 1875 |
| Paun, Ill | E. C. Reese, P. M | Jan. 17, 1875 |
| Columbus, Ga | Hon. H. R. Harris, M. C | Jan. 19, 1875 |
| | ....do | Jan. 20, 1876 |
| Salisbury, N. C | Hon. W. M. Robbins, M. C | Jan. 20, 1875 |
| Hartford, Conn | G. H. Kingsbury, chairman meteorological committee Tolland County Agricultural Society. | Jan. 21, 1875 |
| Oshkosh, Wis | T. Floyd Woodworth, M. D | Jan. 22, 1875 |
| Ames, Iowa (Iowa State Agricultural College). | J. K. Macomber, professor of physics | Jan. 23, 1875 |
| Mount Anthony, Bennington, Vt. | G. W. Robinson | Jan. 27, 1875 |
| Pentwater, Mich | Hon. J. A. Hubbell, M. C.; Amos Dresser | Feb. 3, 1875 |
| Fortress Monroe, Va | Hon. James H. Platt, jr., M. C.; —— Phoebus, —— Watkins, and —— Wright. | Feb. 8, 1875 |
| Afton, Iowa | Hon. James W. McDill, M. C.; N. W. Rowell, W. R. Roberts, and 12 others. | Feb. 17, 1875 |
| Mount Pisgah, Bradford County, Pa. | R. Reddington | Mar. 2, 1875 |
| Marysville, Cal | Hon. J. K. Luttrell, M. C.; E. H. Pratt | Mar. 8, 1875 |

PAPER 8.—*List of places for which stations have been requested, &c.*—Continued.

| Place. | Applicant. | Date. |
|---|---|---|
| Jacksonville, Ill | Hon. J. A. Logan, United States Senate; G. V. Black, Samuel H. Martin, and H. G. Whitlock. | Mar. 15, 1875 |
| Ironton, Ohio | Albert Lawson, W. T. McQuigg, and 24 others | Mar. 25, 1875 |
| Isle of Shoals, N. H | John R. Poor, J. Albert Walker, John Walker, and 7 others. | Mar. 25, 1875 |
| Saint Augustine, Fla | *James Whitall* | Mar. 31, 1875 |
| Abingdon, Ill. (Abingdon College). | D. S. Harris, professor of natural sciences | Apr. 1, 1875 |
| Helena, Mont | W. F. Sanders, Col. John Gibbon, Seventh United States Infantry, and 24 others. | Apr. 1, 1875 |
| Cape Vincent, N. Y | M. E. Lee, G. A. Bagley, and 26 others | Apr. 6, 1875 |
| | Sydney Cooper, collector of customs | Mar. 4, 1878 |
| | *D. B. Sackett, U. S. A., and 37 citizens* | Mar. 18, 1878 |
| Hingham, Wis | Charles Rogers and F. A. Balch, meteorological committee Farmers' Club of Hingham. | Apr. 19, 1875 |
| Pilot Point, Tex | G. M. Dinker, T. D. Sullivan, and 128 others | May 3, 1875 |
| Three or four additional stations in the interior of Florida. | John P. Wall, M. D | May 6, 1875 |
| Saint Joseph, Mich | Hon. Thomas W. Ferry, United States Senate; H. W. Napier, A. H. Potter, and 187 others. | May 26, 1875 |
| Lake Charles, La | William Meyer, assistant P. M | June 12, 1875 |
| | D. H. Reese, P. M | Oct. 15, 1877 |
| Tallahassee, Fla | Hon. S. B. Conover, United States Senate, and 41 others | June 12, 1875 |
| Franklin, Idaho | J. Richardson | July 23, 1875 |
| Lenoir, N. C | Clinton A. Cilley (late brevet lieutenant-colonel and acting assistant quartermaster, United States Army). | July 28, 1875 |
| Johnsonville, Tenn., and Decatur, Ala. | J. M. Pettigrew, president, and J. S. Toof, secretary, of the Memphis Chamber of Commerce, and 101 others. | Aug. 15, 1875 |
| Fort Dodge, Iowa | Frederick Hess | Nov. 4, 1875 |
| Friendsville, Ala | *James Pool* | Nov. 6, 1875 |
| Greencastle, Ind. (Asbury University). | Alexander Martin, president | Nov. 18, 1875 |
| | Hon. O. P. Morton, United States Senate; Alexander Martin, D. D., president of university. | Mar. 7, 1876 |
| Block Island, R. I | Nicholas Ball | Nov. 24, 1875 |
| | Hon. H. B. Anthony, United States Senate; Hon. A. E. Burnside, United States Sentate; Hon. B. T. Eames, M. C.; *Hon. L. W. Ballou, M. C.* | Dec. 18, 1875 |
| Danville, Va | J. R. Winston | Dec. 13, 1875 |
| Delaware Breakwater | William Brockie, President Philadelphia Maritime Exchange; James Welsh, President Philadelphia Board of Trade, and 36 others. | Dec. 15, 1875 |
| | J. E. Jouett, captain, U. S. N | Dec. 22, 1875 |
| | William Brockie, President Philadelphia Maritime Exchange, and 29 others. | May 24, 1878 |
| Cape Henlopen | J. E. Jouett, captain, U. S. N | Dec. 22, 1875 |
| Fulton, Ark | *Jay Guy Lewis* | Dec. 28, 1875 |
| Provincetown, Mass | T. N. Stone, M. D.; John W. Davis, and 12 others | Jan. 21, 1876 |
| Silver City, Idaho, Walla Walla, Wash., and Baker City, Oreg. | Hon. T. W. Bennett, Delegate from Idaho | Feb. 9, 1876 |
| Carson City, Nev | Hon. John P. Jones, United States Senate; Hon. William Sharon, United States Senate; Hon. William Woodburn, M. C.; *the governor and numerous other State officials* of Nevada. | Mar. 6, 1876 |
| Madison, Wis. (University of Wisconsin). | *Board of Regents*, by N. B. Van Slyke, chairman executive committee. | Mar. 11, 1876 |
| Pawpaw, Mich | E. E. Rowland | Apr. 3, 1876 |
| Carlisle, Pa | William H. Cooke | May 4, 1876 |
| Fairbury, Nebr | Will W. Watson, civil engineer | May 12, 1876 |
| Sault Ste. Marie, Mich | Samuel B. W. Covell | May 20, 1876 |
| Kelly's Island, Ohio | D. K. Huntington, deputy collector of customs | May 25, 1876 |
| Three Rivers, Mich | John Anable | May 30, 1876 |
| Moffat, Tenn | John Francis | June 29, 1876 |
| University of Missouri | Colonel Rollins, through J. Eaton, Commissioner of Education. | July 17, 1876 |
| Graham, Tex | E. T. Hillard, county judge; W. T. Ditto, clerk district court, and 49 others. | Sept. 17, 1876 |
| Bald Knob, Giles County, Va | William Terry; Mrs. H. Haupt | Dec. 22, 1876 |
| Stowe, Vt | A. C. Stickney, civil engineer | Dec. 22, 1876 |
| Alfred Centre, N. Y. (Alfred University). | H. E. Coon | Jan. 12, 1877 |
| Anchorage, Ky. (Forest Academy). | Col. J. H. Current | Mar. 31, 1877 |
| Charlotte, N. C | Charles R. Jones, secretary of Chamber of Commerce, and 120 others. | Mar. 31, 1877 |
| Monticello, Ia | M. M. Moulton, city marshal; F. I. Tryon, mayor; M. W. Herrick, city attorney. | Apr. 15, 1877 |
| Reed's Landing, Minn | T. B. Wilson & Co | June 25, 1877 |
| Ocracoke, N. C | Thomas L. Tilton, M. F. Nelson, and 17 others, shipmasters, pilots, &c. | June 29, 1877 |

PAPER 8.—*List of places for which stations have been requested, &c.*—Continued.

| Place. | Applicant. | Date. |
|---|---|---|
| Ripon, Wis (Ripon College) | Hon. P. Sawyer; C. A. Kenaston, secretary | July 21, 1877 |
| | Professor C. A. Kenaston | Feb. 5, 1878 |
| Port Eads, La | ....do | Feb. 29, 1878 |
| | E. S. Cothell, resident engineer | July 25, 1877 |
| Cheyenne Wells, Cal | James B. Eads | Feb. 22, 1878 |
| Judsonia, Ark. (Judson University). | L. M. McLane | July 27, 1877 |
| | Hon. A. H. Garland; Professor Hubert M. Skinner | Aug. 18, 1877 |
| Statesville, N. C | William M. Robbins, M. C | Nov. 17, 1877 |
| The Vista, N. Y. (Catskill Mountains). | Professor Samuel E. Rusk | Feb. 6, 1878 |
| Algona, Iowa | P. Dorweiler | Feb. 14, 1878 |
| South Pass (The Jetties), Mississippi River. | Thomas C. Anderson, acting collector of customs, New Orleans. | Mar. 4, 1878 |
| Portsmouth), N. C | J. Abbott, deputy collector | Mar. 18, 1878 |
| Thomasville, Ga | D. S. Brandon | Mar. 18, 1878 |
| Amherst, Mass. (Massachusetts State Agricultural College). | Lt. C. A. L. Totten, Fourth Artillery, acting signal-officer | Mar. 30, 1878 |
| | W. S. Clarke, president | Mar. 30, 1878 |
| Ahnapee, Wis | C. H. Haskins, superintendent Northwestern Telegraph Company. | Apr. 12, 1878 |
| | Hon. T. O. Howe, United States Senante; W. H. Seymour; Charles D. Robinson, and 28 others. | May 23, 1878 |
| Eagle River (north side of Point Keeweenow), Lake Superior. | J. T. Whiting, general agent Lake Superior Transit Company. | May 1, 1878 |
| | Leopold & Austrian, proprietors Lake Superior People's Line of Steamers. | May 2, 1878 |
| Albuquerque, N. Mex | J. W. Thomas, and 25 others | May 3, 1878 |
| "The Jetties," Mississippi River. | J. B. Eustis, United States Senate; James J. Stewart | May 21, 1878 |
| Grayville, Ills | R. W. Townshend, M. C.; J. G. Stokes, M. D | June 7, 1878 |

## PAPER 9.

*List of boards of trade, chambers of commerce, and other organizations, apart from those directly connected with agriculture, which had, on June 30, 1878, appointed permanent committees to confer with the Chief Signal-Officer of the Army.*

| Name of organization. | State. | Committee. |
|---|---|---|
| Chamber of Commerce of New York | New York | Edward Hincken, F. B. Thurber, George W. Blunt, James S. T. Stranahan, James H. Frothingham. |
| Board of Trade, Buffalo | New York | A. Richmond, G. S. Hazard, J. H. Vought. |
| Board of Trade, Detroit | Michigan | Theodore P. Hall, James Flynn, A. G. Hibbard. |
| Board of Trade, Chicago | Illinois | C. D. Hamill, H. W. Rogers, jr., I. N. Ash. |
| Produce Exchange, Toledo | Ohio | E. F. Browne, H. D. Walbridge, S. C. Reynolds. |
| Board of Trade, Boston | Massachusetts | N. Spooner, Thomas Gaffield, J. Cummings, E. H. Sampson, E. Howes. |
| Board of Trade, Milwaukee | Wisconsin | J. L. Hathaway, J. B. Merrill, E. M. Peck. |
| Chamber of Commerce, Duluth | Minnesota | C. M. Cushman, J. B. Culver, C. C. Jones. |
| Board of Trade, Baltimore | Maryland | R. B. Bayard, A. Reid, T. Poultney, jr., W. G. Bowdoin, D. L. Bartlett. |
| Board of Trade, Cleveland | Ohio | R. K. Winslow, R. T. Lyon, J. C. Sage. |
| Chamber of Commerce, Charleston | South Carolina | E. H. Frost, W. P. Hall, F. W. Dawson. |
| Chamber of Commerce, Memphis | Tennessee | B. J. Semmes, T. H. Allen, W. P. Proudfit. |
| Board of Trade, Oswego | New York | J. L. McWhorter, A. H. Failing, W. R. Hosmer. |
| Committee appointed by mayor, Rochester. | New York | G. Schofield, J. Siddons, H. S. Hobard. |
| Board of Trade, Portland | Maine | C. H. Farley, J. S. Bodlow, M. M. Rich. |
| Board of Trade, Philadelphia | Pennsylvania | W. S. Russell, H. Winsor, B. S. Janney, jr. |
| Board of Trade, Mobile | Alabama | Hon. P. Hamilton, Hon. P. Williams, sr., T. Henry, esq. |
| Chamber of Commerce, Wilmington | North Carolina | A. H. Van Bokhelen, G. Harriss, W. L. De Rossett. |
| Board of Trade, Indianapolis | Indiana | E. T. Cox, A. H. Pettit, H. C. Wilson. |
| Chamber of Commerce, Saint Paul | Minnesota | R. O. Sweeney, D. R. Breed, M. N. Kellog. |
| Merchants' Exchange, Saint Louis | Missouri | J. A. Scudder, J. B. Maude, R. M. Scruggs, M. Collins, C. Fink, T. G. Comant. |
| Board of Trade, Davenport | Iowa | J. M. Dalzel, F. W. Angell, C. E. Bolderbecke. |
| Board of Trade, La Crosse | Wisconsin | W. W. Jones, J. I. Lyndes, S. L. Nevins. |
| Cotton Exchange, New Orleans | Louisiana | J. I. Noble, J. J. Stewart, J. Lorber. |
| Chamber of Commerce, New Haven | Connecticut | Hon. H. G. Lewis, J. T. Platt. |

PAPER 9.—*List of boards of trade, chambers of commerce, &c.*—Continued.

| Name of organization. | State. | Committee. |
|---|---|---|
| Chamber of Commerce, Cairo | Illinois | W. P. Halliday, P. Cahl. |
| Board of Trade, Cincinnati | Ohio | D. B. Pierson, J. A. Scarlett, J. Dexter. |
| Board of Trade, Albany | New York | E. A. Durant, jr., J. F. Ames, W. Hailes, J. M. Batterman, H. S. Elmore, J. Taylor. |
| Board of Trade, Dubuque | Iowa | Dr. A. Horr, J. S. Hetherington. |
| Chamber of Commerce, Savannah | Georgia | General J. E. Johnston, General J. F. Gilmer, General H. C. Wayne. |
| Meteorological Committee, Springfield. | Massachusetts | H. C. Lee, E. W. Bond, D. B. Wesson, J. G. Benton, M. C. Stebbins, D. L. Harris, W. W. Colburn, H. Foote, H. G. Stickney, A. C. Stone, E. Ingersoll, L. D. Brooks. |
| Meteorological Committee, Newport | Rhode Island | S. C. Bailey, S. W. Macy, B. Finch, T. Cogeshall, L. P. Clarke, S. H. Norman, S. Powell. |
| Chamber of Commerce, Cincinnati | Ohio | W. S. Munson, A. Erkenbrecher, H. Goepper. |
| Board of Trade, Nashville | Tennessee | J. D. Plunkett. |
| Cotton Exchange, Savannah | Georgia | C. M. Holst, J. M. Barnard, J. B. West. |
| Cotton Exchange, Nashville | Tennessee | J. P. Wheeless. |
| Merchants' Club, Omaha | Nebraska | J. E. Boyd, G. H. Collins, O. H. Ballou, W. Stephens. |
| Chamber of Commerce, San Francisco | California | J. W. Raymond, C. A. Low, W. W. Dodge. |
| Merchants' Union, Jacksonville | Florida | F. Jordan, J. E. Hart, G. C. Wilson. |
| Polytechnic Society of Kentucky, Louisville. | Kentucky | J. L. Smith, J. D. O'Leary, S. G. Stevens. |
| Meteorological Committee, Indianola | Texas | Dr. H. Rosencrans, W. P. Milby, H. J. Huck. |
| Cotton Exchange, Mobile | Alabama | W. H. Gardner, J. A. McCaw, A. Proskauer. |
| Merchants' Exchange, Baltimore | Maryland | W. G. Atkinson, W. G. Loud, O. M. Vesper. |
| Board of Trade, Omaha | Nebraska | W. C. B. Allen, W. J. Broatch, D. S. Barriger. |
| Maritime Exchange, Philadelphia | Pennsylvania | E. K. Stevenson, J. S. Waln, G. W. Griffin. |
| Chamber of Commerce, Los Angeles | California | Dr. J. P. Widney, J. de Barth Shorb, I. W. Lord. |
| Meteorological Committee, Sandusky | Ohio | J. O. Moss, R. B. Hubbard, C. N. Ryan. |
| Cotton Exchange, Norfolk | Virginia | W. H. Peters, G. L. Arps, H. S. Reynolds. |
| Chamber of Commerce, Astoria | Oregon | A. C. Kinney, C. L. Parker, J. H. Robb. |

PAPER 10.

On January 16, 1877, the following resolution was suggested to the different boards of trade, chambers of commerce, and other organizations of a similar character, in communication with this office, for their adoption:

"That the meteorological committee of the board of trade shall be a permanent committee, and that the names of the members and any changes in membership be, in each case, formally notified to the Chief Signal-Officer of the Army. The committee will confer with the Chief Signal-Officer, and will bring before the board all matters requiring its action or relating to aid needed for or improvement of the signal service."

The resolution was adopted and committees appointed as follows:

Mobile Board of Trade:

*Committee.*—Hon. P. Hamilton, Hon. P. Williams, sr., and T. Henry.

Chamber of Commerce of New York:

*Committee.*—Paul N. Spofford, George W. Blunt, Edward Hincken, J. S. T. Stranahan, and James H. Frothingham.

Saint Paul Chamber of Commerce:

*Committee.*—R. O. Sweeney, Rev. D. R. Breed, and M. N. Kellog.

Oswego Board of Trade:

*Committee.*—J. L. McWhorter, A. H. Failing, and W. R. Hosmer.

New Haven Chamber of Commerce:

*Committee.*—Henry G. Lewis and Johnson T. Platt.

Toledo Produce Exchange:

*Committee.*—E. F. Browne, H. D. Walbridge, and S. C. Reynolds.

New Orleans Cotton Exchange:

*Committee.*—John I. Noble, J. J. Stewart, and J. Lorber.

Savannah Cotton Exchange:

*Committee.*—C. M. Holst, J. Gammell, and J. M. Barnard.

Meteorological Committee of City of Rochester:
*Committee.*—George Schofield, John Siddons, and H. S. Hebard.

Merchants' Union of Jacksonville, Fla.:
*Committee.*—F. Jordan, J. E. Hart, and G. C. Wilson.

Polytechnic Society of Kentucky, Louisville:
*Committee.*—J. L. Smith, J. D. O'Leary, and S. G. Stevens.

Cincinnati Board of Trade:
*Committee.*—D. B. Pierson, J. A. Scarlett, and J. Dexter.

Baltimore Board of Trade:
*Committee.*—R. B. Bayard, A. Reid, T. Poultney, jr., W. G. Bowdoin, and D. L. Bartlett.

Chicago Board of Trade:
*Committee.*—C. D. Hamill, H. W. Rogers, jr., I. N. Ash.

Mobile Cotton Exchange:
*Committee.*—W. H. Gardner, J. A. McCaw, and A. Proskauer.

Philadelphia Board of Trade:
*Committee.*—W. S. Russell, H. Winsor, and B. S. Janney, jr.

Milwaukee Chamber of Commerce:
*Committee.*—J. L. Hathaway, J. B. Merrill, and E. M. Peck.

San Francisco Chamber of Commerce:
*Committee.*—J. W. Raymond, C. A. Low, and W. W. Dodge.

Omaha Board of Trade:
*Committee.*—W. C. B. Allen, J. O. Caulfield, Geo. Paterson.

Meteorological Committee of the City of Newport, R. I.:
*Committee.*—S. C. Bailey, Samuel Powell, L. P. Clarke, Benjamin Finch, Thomas Cogeshall, S. W. Macy, and S. H. Norman.

Philadelphia Maritime Exchange:
*Committee.*—Edward K. Stevenson, Jacob S. Waln, and Geo. Griffin.

Detroit Board of Trade:
*Committee.*—Theodore P. Hall, James Flinn, and A. G. Hibbard.

Society of Natural History, San Diego:
*Committee.*—G. W. Barnes, Charles J. Fox, and O. N. Sanford.

Merchants' Exchange of Saint Louis:
*Committee.*—J. A. Scudder, J. B. Maude, R. M. Scruggs, M. Collins, C. Fink, T. G. Conant.

The following rules were transmitted to the above-named committees for their guidance and the form of report desired, marked "Form L":

*Rules for the government of the permanent meteorological committees of boards of trade, chambers of commerce, and other organizations appointed to co-operate with the Chief Signal-Officer of the Army.*

## RESOLUTION.

POWERS OF COMMITTEE ON SIGNAL SERVICE—TRANSACTIONS OF 1877.

* * * * * * *

"*Resolved*, That the meteorological committee of the ——— ——— shall be a permanent committee, and that the names of the members and any changes in membership be, in each case, formally notified to the Chief Signal-Officer of the Army. The committee will confer with the Chief Signal-Officer, and will bring before the ——— ——— all matters requiring its action, or relating to aid needed for or improvement of the Signal Service."

RULE 1. All resolutions, memorials, or propositions of whatever character, relating to the meteorological or Signal Service, which may be brought before the ——— ———, are to be referred to the committee. Upon such reference, the committee will confer

with the Chief Signal-Officer upon the matter in question before making the committee's recommendation of action to the ——— ———, in order that, by interchange of opinion and by statement of facts, a full understanding may be had. It is also requested that, when any action may be taken by the ——— ——— on any of the above-named subjects, the committee will forward a statement or copy of the record direct to this office.

RULE 2. The committee will, from time to time, bring to the notice of the Chief Signal-Officer any improvements or additions to the service, to be of certain benefit to the ——— ——— or to the interests represented by the ——— ———. In such cases it is expected the committee will first examine into and satisfy themelves of the practicability of the undertaking, and that it will be of an actual pecuniary value to the community they represent.

RULE 3. In cases occurring under Rule 2, the committee will, so far as practicable, make an estimate in amount of the pecuniary value hoped to result to the commercial or other interest sought to be benefitted by the addition requested.

RULE 4. The committee will make, either as a body or by a sub-committee, at least once in each month, a careful examination of the local office in the city in which they reside, and report to the Chief Signal-Officer their findings, under their different headings, upon the blanks to be furnished for the purpose.

RULE 5. They will at once bring to the notice of the Chief Signal-Officer any neglect or want of promptness at the station, or any delay in the reports, or in the proper display of signals, or in the posting of bulletins, or of furnishing information to the press, or through other established methods, or any want of courteous and proper conduct on the part of the non-commissioned officers or persons in charge of or at the station, or conduct calculated to bring discredit upon the service of the United States.

RULE 6. The committee will bring to the notice of the Chief Signal-Officer conduct especially entitling the non-commissioned officer or assistants at the station to commendation, carefully specifying in such case the especial matter for which the station is commended. The simple discharge of routine duty in such way as to escape censure is not ground for especial commendation.

RULE 7. The committee will confer fully with the inspectors of the Signal Service at the times of their inspections, and will direct their attention to all matters the committee may consider as worthy of unusual attention. The Chief Signal-Officer relies upon the committees to give the inspectors facilities for such examinations, and such assistance as will enable him to receive, for the Secretary of War, the fullest and most reliable information.

RULE 8. The committee will indicate to the Chief Signal-Officer, for the information of the Secretary of War, what maps, bulletins, or other modes of information can be used to best advantage, and where maps, instruments, &c., can be usefully displayed.

RULE 9. A copy of these rules, together with the names of the local committees and the resolution under which they are appointed, will be kept displayed in each local office.

RULE 10. The committee will endeavor to so arrange with the press, and in other modes of publication, that the information furnished by the office to the press will reach the members of the boards of trade, chambers of commerce, agricultural societies, ship-masters, ship-owners, and the community in as nearly as practicable the wording in which it is dispatched from this office. A neglect of this rule may lead to misapprehension and not unfrequently to disaster.

RULE 11. The committees at sea-ports or at lake-port cities, at river-ports, or representing fishing interests, will especially present the requirements of these different interests as to the coast, fishery, and port services. The committees at interior cities will indicate how agricultural, manufacturing, river, canal, or other cognate interests can be served.

RULE 12. Complaints as to defects at local stations may be addressed to the local committees, and will, in general, be brought to their attention before final action is taken in reference to them.

It is expected that the committee, representing to some extent the Signal Service, will endeavor to protect and advance the service by all proper methods, to this end aiding the non-commissioned officer in charge of local stations by advice or influence, in procuring suitable locations or other facilities for the public business, and by other co-operation for the public service.

RULE 13. The rules of this service require that changes in the details at stations be made from time to time. It is not to be considered as a reflection upon any non-commissioned officer or assistant that he is relieved at one and ordered to another station. Petitions or memorials, &c., requesting the detail of particular persons for particular stations are not encouraged.

OFFICE OF THE CHIEF SIGNAL-OFFICER,
*Washington, D. C.*

(FORM L.)

*Report of permanent committee of* ——— ———.

———, ———, 1877.

The permanent meteorological committee of the ——— ——— has, at the request of the Chief Signal-Officer, examined the office of the Signal Service in this city, and reports its condition as follows:

*Office rooms* ..... { Clean and well kept?
[Yes or no.] { Convenient?

*Instruments* ..... Clean, and in apparent good condition?
[Yes or no.]

*Books and paper* ..... { Neatly kept?
[Yes or no.] { Apparently accurate?

*Office library* ..... Books carefully handled?

*Signals displayed* ..... At
[Names of places or building.]

*Signal display* ..... Considered prompt and useful?
[Yes or no.]

*Flags and lights* ..... Good?
[Yes or no.]

This station was examined without previous notice given.

——— ———.
(Signature of chairman.)

REMARKS.

Under this head to be noted any facts to be more directly brought to the attention of the Chief Signal-Officer in relation to the subjects above.

NOTE.—Letters inviting attention of the Chief Signal-Officer to subjects requiring other than routine action, or which demand especial consideration, are requested to be addressed direct to the Chief Signal-Officer of the Army at Washington, D. C.

PAPER 11.

*List of voluntary observers who have forwarded monthly reports to the Chief Signal-Officer during the year ending June 30, 1878.*

| Name of observer. | Post-office address. | State. |
|---|---|---|
| Albree, George | Pittsburgh, Allegheny County | Pennsylvania. |
| Anderson, Rev. John | Clarksville, Red River County | Texas. |
| Aston, Edward J | Asheville, Buncombe County | North Carolina. |
| Arden, Thomas B | Garrison's, Putnam County | New York. |
| Allan, W. T | Geneseo, Henry County | Illinois. |
| Allison, Dr. John A | Statesville, Iredell County | North Carolina. |
| Abbott, Dr. E. K | Salinas City, Monterey County | California. |
| Armstrong, Rev. G. C | Fayette, Jefferson County | Mississippi. |
| Andrews, Luman | Southington, Hartford County | Connecticut. |
| Ashby, M. V | Afton, Union County | Iowa. |
| Allin, Lucina C | Springfield, Hampden County | Massachusetts. |
| Adriance, C. E | Hector, Schuyler County | New York. |
| Amos, Franklin | Ringgold, Morgan County | Ohio. |
| Agricultural College Farm | New Brunswick, Middlesex County | New Jersey. |
| Adams, Prof. E. W | Goldsborough, Wayne County | North Carolina. |
| Altaffer, J. M | Independence, Montgomery County | Kansas. |
| Albertson, J. L | Macon, Noxubee County | Mississippi. |
| Beans, Thomas J | Moorestown, Burlington County | New Jersey. |
| Breed, J. E | Embarrass, Waupaca County | Wisconsin. |
| Bentley, E. T | Tioga, Tioga County | Pennsylvania. |
| Bateman, J. H | Dover, Kent County | Delaware. |
| Beal, William | Murphy, Cherokee County | North Carolina. |
| Bullard, R | Litchfield, Hillsdale County | Michigan. |
| Barringer, William | Bellefontaine, Logan County | Ohio. |
| Blanchard, O. A | Elmira, Stark County | Illinois. |
| Bell, Joseph | Franklin, Venango County | Pennsylvania. |
| Bowman, Peter | Savannah, Ashland County | Ohio. |
| Bœrner, Prof. Charles G | Vevay, Switzerland County | Indiana. |
| Beall, Dr. and Mrs. R. L | Lenoir, Caldwell County | North Carolina. |
| Brendell, Frederick | Peoria, Peoria County | Illinois. |
| Barker, Ebenezer | Saint Mary's, Camden County | Georgia. |
| Bryant, A. F | Clear Creek, Saunders County | Nebraska. |
| Bartlett, E. B | Vermillion, Oswego County | New York. |
| Beloit College | Beloit, Rock County | Wisconsin. |

*List of voluntary observers, &c.*—Continued.

| Name of observer. | Post-office address. | State. |
|---|---|---|
| Ballou, N. E. | Sandwich, De Kalb County | Illinois. |
| Blodgett, Charles | Howard, Nemaha County | Nebraska. |
| Bulloch, Thomas | Coalville, Summit County | Utah. |
| Blood, Charles F. | Waltham, Middlesex County | Massachusetts. |
| Baker, D. W. C. | Austin, Travis County | Texas. |
| Benedictine Fathers | Saint Meinrad, Spencer County | Indiana. |
| Bomar, Thomas H | Limestone Springs, Spartanburg County | South Carolina. |
| Bower, Dr. William W | Mount Sterling, Brown County | Illinois. |
| Baylies, Mrs. R. H | Independence, Montgomery County | Kansas. |
| Breedon, Jacob | Adrian, Lenawee County | Michigan. |
| Brewster, James | Okalooska, Ouachita County | Louisiana. |
| Child, Dr. A. L | Plattsmouth, Cass County | Nebraska. |
| Clark, Dr. J. T. and Miss E. J | Mount Solon, Augusta County | Virginia. |
| Chandler, Dr. William J | South Orange, Essex County | New Jersey. |
| Carlton, A. Y | Wet Glaze, Camden County | Missouri. |
| Cutting, Hiram A. | Lunenburgh, Essex County | Vermont. |
| Cummings, James | Tarentum, Allegheny County | Pennsylvania. |
| Cheney, William | Minneapolis, Hennepin County | Minnesota. |
| Crosier, Adam | Laconia, Harrison County | Indiana. |
| Crane, George W | Bethel, Clermont County | Ohio. |
| Cutler, J. L. | Quitman, Brooks County | Georgia. |
| Cochrane, Joseph | Havana, Mason County | Illinois. |
| Cooke, Dr. William H | Carlisle, Cumberland County | Pennsylvania. |
| Curtiss, W. W | Rocky Run, Columbia County | Wisconsin. |
| Carlovitz, John | Milton, Santa Rosa County | Florida. |
| Cooke, E. R. | Trenton, Mercer County | New Jersey. |
| Couch, E. D. | Contoocookville, Merrimac County | New Hampshire. |
| Collin, Prof. Alonzo | Mount Vernon, Linn County | Iowa. |
| Chase, Dr. D. H | Louisville, Clay County | Illinois. |
| Curtiss, George G. | Fallston, Harford County | Maryland. |
| Clark, T. A | Weldon, Halifax County | North Carolina. |
| Clark, J. Morton | Arlington, Rush County | Indiana. |
| Chappellsmith, John | New Harmony, Posey County | Do. |
| Colby, Alfred | Amoskeag, Merrimac County | New Hampshire. |
| Child, H. P | Kansas City, Jackson County | Missouri. |
| Chamberlin, S. N | Daytona, Volusia County | Florida. |
| Cline, Frederick P. | Terrell, Kaufman County | Texas. |
| Calhoun, P. B. | Austin, Wilson County | Tennessee. |
| Cook, F. S. | Jersey City, Hudson County | New Jersey. |
| Cornell University | Ithaca, Tompkins County | New York. |
| Colt, Henry H | Nora Springs, Floyd County | Iowa. |
| Cutler, Rev. B. B. | Schroon Lake, Essex County | New York. |
| Caldwell, John W | Clarksville, Montgomery County | Tennessee. |
| Dewhurst, Rev. E. | Mystic, New Haven County | Connecticut. |
| Davis, Mrs. D. D. | Webster, Jackson County | North Carolina. |
| Doak, Miss Julia A. | Tusculum College, Greene County | Tennessee. |
| Dawson, William | Spiceland, Henry County | Indiana. |
| Doton, Hosea | Woodstock, Windsor County | Vermont. |
| Draper, Daniel | Central Park Observatory, New York City | New York. |
| Dunn, William | Emerson, Otoe County | Nebraska. |
| Dickinson, J. P | Guttenberg, Clayton County | Iowa. |
| Davis, Jacob | Rowe, Franklin County | Massachusetts. |
| Dunning, I. S | Denuison, Crawford County | Iowa. |
| Daboll, Solon M | Olivet, Hutchinson County | Dakota Territory. |
| Emery, Josiah | Williamsport, Lycoming County | Pennsylvania. |
| Earlham College | Richmond, Wayne County | Indiana. |
| Ellicott, James F | Saint Inigoes, Saint Mary's County | Maryland. |
| Ellis, Edwin | Ashland, Ashland County | Wisconsin. |
| Edgington, R. P | Stanley, Johnson County | Kansas. |
| Engelstad, R. M | Mount Carmel, Kane County | Utah. |
| Edwards, Daniel | Nile, Allegany County | New York. |
| Eddy, L. | Danville, Boyle County | Kentucky. |
| Emmet, Thomas A | Carmel, Putnam County | New York. |
| Farquhar, Allan | Sandy Springs, Montgomery County | Maryland. |
| Foster, H. | Cleaveland, Bradley County | Tennessee. |
| Fox, Fred. E | Mount Fairview, San Diego County | California. |
| Ferriss, E. J. | Painesville, Lake County | Ohio. |
| Fallon, J. | Lawrence, Essex County | Massachusetts. |
| Foster, R. W | Springfield, Hampden County | Do. |
| Fleming, John | Readington, Somerset County | New Jersey. |
| Fuller, A. N. | Hermosa, La Platte County | Colorado. |
| Fernald, Prof. M. C. | Orono, Penobscot County | Maine. |
| Gardiner, R. H. | Gardiner, Kennebec County | Do. |
| Gilman, R. H | Milford, Kent County | Delaware. |
| Gillingham, C. | Accotink, Fairfax County | Virginia. |
| Gillespie, Dr. S. W | Sterling, Whiteside County | Illinois. |
| Green, H. A. | Atco, Camden County | Georgia. |
| Gray, F. R | Nat'l Deaf and Mute College, Washington | District of Columbia. |
| Gedding, Dr. W. H | Aiken, Aiken County | South Carolina. |
| Gardner, O. A. A | Center Mound, Republic County | Kansas. |
| Grathwohl, John | Blooming Grove, Pike County | Pennsylvania. |
| Glasco, J. M | Gilmer, Upshur County | Texas. |

*List of voluntary observers, &c.*—Continued.

| Name of observer. | Post-office address. | State. |
|---|---|---|
| Goodlander, Harry | Leesburgh, Kosciusko County | Indiana. |
| Green, Dr. J. C | West Chester, Chester County | Pennsylvania. |
| Gleitsmann, Dr. W | Asheville, Buncombe County | North Carolina. |
| Hyde, G. A., and wife | Cleveland, Cuyahoga County | Ohio. |
| Hardy, R. T | Troy, Rensselaer County | New York. |
| Howard, jr., T. T | East Orange, Essex County | New Jersey. |
| Hoskinson, R. M | Port Blakely, Kitsap County | Washington Territory. |
| Harper, George W | Cincinnati, Hamilton County | Ohio. |
| Howard, S. A | Greensborough, Guilford County | North Carolina. |
| Hurlin, Rev. William | Mill Village, Sullivan County | New Hampshire. |
| Hammitt, John W | College Hill, Hamilton County | Ohio. |
| Hayworth, John | Philadelphia, Philadelphia County | Pennsylvania. |
| Harrington, Charles A | Dover Mines, Goochland County | Virginia. |
| Higgins, F. W | Detroit, Wayne County | Michigan. |
| Hyland, William | Baxter Springs, Cherokee County | Kansas. |
| Howard, May | Healdsburg, Sonoma County | California. |
| Hunt, George M | North Argyle, Washington County | New York. |
| Haywood, John, son and daughter | Westerville, Franklin County | Ohio. |
| Harrold, Unate B | Americus, Sumter County | Georgia. |
| Hoadley, James H | Santa Cruz, Santa Cruz County | California. |
| Hubbs, Dr. J. A | Brownsville, Fayette County | Pennsylvania. |
| Hopkins, Dr. H. H | New Market, Frederick County | Maryland. |
| Horne, Dr. C. F | Watertown, Middlesex County | Massachusetts. |
| Hills, F. T | Manchester, Rockingham County | New Hampshire. |
| Hering, C. J | Paramaribo, Colony of Surinam | South America. |
| Harcourt, Jay | Wappinger's Falls, Dutchess County | New York. |
| Hinrichs, Prof. G | Director Iowa Weather Service, Iowa City, Johnson County. | Iowa. |
| Harvard College Observatory | Cambridge | Massachusetts. |
| Ingram, Dr. John | Vineland, Cumberland County | New Jersey. |
| Ingalsbe, Granville | South Hartford, Washington County | New York. |
| Iowa State Agricultural College | Ames, Story County | Iowa. |
| James, John W | Marengo, McHenry County | Illinois. |
| Jennison, H. L | Starkey, Yates County | New York. |
| Jones, Ira B | Neillsville, Clark County | Wisconsin. |
| Kirkpatrick, J. A | Philadelphia, Philadelphia County | Pennsylvania. |
| Keeler, W. F | Mayport, Duval County | Florida. |
| Kauffman, C. C | Green Castle, Franklin County | Pennsylvania. |
| Kedzie, R. C | Lansing, Ingham County | Michigan. |
| Keese, G. P | Cooperstown, Otsego County | New York. |
| Kohler, Edward | Egypt, Lehigh County | Pennsylvania. |
| Keutgen, Charles | Stapleton, Richmond County | New York. |
| Keenan, Mrs. W. E. A | Brookhaven, Lincoln County | Mississippi. |
| Kaucher, William | Oregon, Holt County | Missouri. |
| Kedzie, Prof. W. K | Manhattan, Riley County | Kansas. |
| Lups, Misses C. and J | Manitowoc, Manitowoc County | Wisconsin. |
| Lewis, Miss Blanche L | McMinnville, Warren County | Tennessee. |
| Lewis, James | Kanab, Kane County | Utah. |
| Loud, Prof. Frank H | Colorado College, Colorado Springs, El Paso County. | Colorado. |
| Letton, J. E | Bethel, Bath County | Kentucky. |
| Lincoln, J. R | Boonsboro', Boone County | Iowa. |
| Lines, Dr. L. H | Okahumpka, Sumter County | Florida. |
| Lafferty, John F | Martinsville, Clark County | Illinois. |
| Lapham, A. Milton | Springfield, Greene County | Missouri. |
| Lamberton, W. R | Pelham, Westchester County | New York. |
| Miller, Rev. Frank | Flatonia, Fayette County | Texas. |
| Merriam, G. T | San Louis Rey, San Diego County | California. |
| Metcalf, John G | Mendon, Worcester County | Massachusetts. |
| Moore, C. R | Johnsontown, Northampton County | Virginia. |
| Moulton, J. P | Sebago Lake, Cumberland County | Maine. |
| Mead, S. B | Augusta, Hancock County | Illinois. |
| Mead, E. C | Keswick, Albemarle County | Virginia. |
| Martin, Horace | Corning, Holt County | Missouri. |
| Morelle, Rev. Daniel | Wilmington, New Hanover County | North Carolina. |
| McConnell, E. M | New Castle, Lawrence County | Pennsylvania. |
| Mueller, Dr. R | New Corydon, Jay County | Indiana. |
| Marshall, Gregory | Creaco, Howard County | Iowa. |
| Madlem, W. F | Ephrata, Lancaster County | Pennsylvania. |
| McCready, Miss Lucy A | Fort Madison, Lee County | Iowa. |
| Mathews, J. McD | Hillsborough, Highland County | Ohio. |
| Meriwether, Charles I | Boonsborough, Bedford County | Virginia. |
| McIlvane, Charles J | Kensico, Westchester County | New York. |
| Meehan, Thomas | Germantown, Philadelphia County | Pennsylvania. |
| Maxwell, Samuel A | Lyndon, Whiteside County | Illinois. |
| McGill College | Montreal | Canada. |
| Merritt, jr., J. C | Farmingdale, Queens County | New York. |
| Moorman, C. H | Cloverport, Breckinridge County | Kentucky. |
| Morris, Rev. John | Morriston, Davison County | Dakota. |
| Mount Saint Mary's College | Emmettsburgh, Frederick County | Maryland. |
| Moulton, M. M | Monticello, Jones County | Iowa. |
| McDonough School | Owing's Mills, Baltimore County | Maryland. |

*List of voluntary observers, &c.*—Continued.

| Name of observer. | Post-office address. | State. |
|---|---|---|
| Mackall, jr., B. F | Moorhead, Clay County | Minnesota. |
| Newcomb, G. S | Westborough, Worcester County | Massachusetts. |
| Noll, A. B | Linden, Union County | New Jersey. |
| Niphen, Prof. Francis E | Director Missouri Weather Service, Saint Louis, Saint Louis County. | Missouri. |
| Nettleton, E. S | South Pueblo, Pueblo County | Colorado. |
| Neill, Thomas | Sandusky, Erie County | Ohio. |
| Nason, Rev. Elias | North Billerica, Middlesex County | Massachusetts. |
| Niles, P. H | Kinsley, Edwards County | Kansas. |
| Nixon, J. Sharpe | Chambersburgh, Franklin County | Pennsylvania. |
| Newbegin, Dr. J. S | Anna, Union County | Illinois. |
| Osborn, Ethan | Hennepin, Putnam County | Do. |
| Odgen College | Bowling Green, Warren County | Kentucky. |
| Owsley, Dr. J. B | Jacksonsburgh, Butler County | Ohio. |
| O'Hagan, John | Greenville, Pitt County | North Carolina. |
| Parrick, J. M | North Volney, Oswego County | New York. |
| Pearce, Thomas | Eola, Polk County | Oregon. |
| Quarterman, E. A | Flushing, Queens County | New York. |
| Rodman, Miss Susan | New Bedford, Bristol County | Massachusetts. |
| Rogers, O. P | Marengo, McHenry County | Illinois. |
| Robins, C. E | Summit, Rio Grande County | Colorado. |
| Reynolds, A | Independence, Buchanan County | Iowa. |
| Richardson, C. F | Freehold, Monmouth County | New Jersey. |
| Robertson, Thomas D | Rockford, Winnebago County | Illinois. |
| Robertson, R. S | Fort Wayne, Allen County | Indiana. |
| Runge, C | New Ulm, Austin County | Texas. |
| Rockwell, Charlotte | Colebrook, Litchfield County | Connecticut. |
| Remington, C. V. S | Fall River, Bristol County | Massachusetts. |
| Ring, John J | Banning, San Bernardino County | California. |
| Rotch, William | Fall River, Bristol County | Massachusetts. |
| Seltz, Charles | De Soto, Washington County | Nebraska. |
| Smith, E. Allan | Moriches, Suffolk County | New York. |
| Shriver, E. T | Cumberland, Alleghany County | Maryland. |
| Smith, Dr. William | Cannonsburgh, Washington County | Pennsylvania. |
| Streng, L. H | Grand Rapids, Kent County | Michigan. |
| Soule, Prof. William | Cazenovia, Madison County | New York. |
| Stern, Jacob F | Logan, Harrison County | Iowa. |
| Scott, Thomas G | Forsyth, Monroe County | Georgia. |
| Scott, T. M | Melissa, Collin County | Texas. |
| Stebbins, Geo. H | Fresno, Fresno County | California. |
| Snell, E. S | Amherst, Hampshire County | Massachusetts. |
| Slenker, Elmina P. D | Snowville, Pulaski County | Virginia. |
| Smith, Rev. G. N | Northport, Leelenaw County | Michigan. |
| Saxby, J. T | San Buenaventura, Ventura County | California. |
| Slade, Elisha | Somerset, Bristol County | Massachusetts. |
| Smith, C. J | Hudson, Summit County | Ohio. |
| Sherman, J. M | Hampton, Elizabeth City County | Virginia. |
| Sessions, Lewis | Norfolk, Madison County | Nebraska. |
| Spaulding, John | Wautoma, Waushara County | Wisconsin. |
| Searle, L. B | Bakersville, Mitchell County | North Carolina. |
| Snow, Prof. Frank H | Lawrence, Douglas County | Kansas. |
| Sturtevant, E. T | Biscayne, Dade County | Florida. |
| Spillman, J. J | Pierce City, Lawrence County | Missouri. |
| Stephenson, Dr. M. F | Gainesville, Hall County | Georgia. |
| Stucky, Dr. C. F | Helvetia, Randolph County | Virginia. |
| Straight, Isaac | Walla Walla, Walla Walla County | Washington Territory. |
| Smith, Dr. W | Spartanburgh, Spartanburgh County | South Carolina. |
| Scribner, H. F. J | Strafford, Orange County | Vermont. |
| Smyth, B. B | Great Bend, Barton County | Kansas. |
| Shriver, Howard | Wytheville, Wythe County | Virginia. |
| Siler, Mrs. A | Franklin, Macon County | North Carolina. |
| Sanborn, J. F | Tabor, Fremont County | Iowa. |
| Truman, George S | Genoa, Platte County | Nebraska. |
| Thompson, Rev. Daniel | Arkansas City, Cowley County | Kansas. |
| Tutwiler, H., LL. D | Green Spring, Hale County | Alabama. |
| Tripp, O. H. and L. S | Surry, Hancock County | Maine. |
| Townsend, L. P | Hulmeville, Bucks County | Pennsylvania. |
| Thralls, George R | Houston, Suwannee County | Florida. |
| Townsend, Isaac | Capeville, Northampton County | Virginia. |
| Trowbridge, David | Waterburgh, Tompkins County | New York. |
| Turner, Ernest | Point Pleasant | Louisiana. |
| Trembley, J. B | Oakland, Alameda County | California. |
| Todd, D. P | Naval Observatory, Washington | District of Columbia. |
| University of Wisconsin | Madison, Dane County | Wisconsin. |
| Vanbeckle, J. M | Camden, Camden County | New Jersey. |
| Vermillion, W. W | Frankford, Pike County | Missouri. |
| Valente, A. X | Woodstock, Howard County | Maryland. |
| Watters, Dr. James | Holton, Jackson County | Kansas. |
| Watkins, Prof. A. B | Adams, Jefferson County | New York. |
| West, Silas | Cornish, York County | Maine. |
| Wild, Rev. E. P | Newport, Orleans County | Vermont. |
| Winchell, Prof. and Mrs. N. H | Minneapolis, Hennepin County | Minnesota. |

*List of voluntary observers, &c.*—Continued.

| Name of observer. | Post-office address. | State. |
|---|---|---|
| Walton, J. P | Muscatine, Muscatine County | Iowa. |
| Whitehead, W. A | Newark, Essex County | New Jersey. |
| White, I. H | Cincinnati, Hamilton County | Ohio. |
| Wilber, Benjamin F | West Waterville, Kennebec County | Maine. |
| Williams, Milo G | Urbana, Champaign County | Ohio. |
| Wheaton, Mrs. D. B | Independence, Buchanan County | Iowa. |
| Worth, J. M | Fayetteville, Cumberland County | North Carolina. |
| Wymer, J. H | Judsonia, White County | Arkansas. |
| Wells, J. M | Vernon Center, Oneida County | New York. |
| Woodward, Dr. Augustus J | Otter Creek, Levy County | Florida. |
| Whiting, William H | Geneva Lake, Walworth County | Wisconsin. |
| Wing, Miss Minerva E | West Charlotte, Chittenden County | Vermont. |
| Willis, O. R | White Plains, Westchester County | New Hampshire. |
| Watters, W | Mechanics' Falls, Androscoggin County | Maine. |
| Wylie, William | Mount Forrest, Ontario County | Canada. |
| Whittington, Granville | Mount Ida, Montgomery County | Arkansas. |
| Wolfe, John H | Lebanon, Laclede County | Missouri. |
| Whitney, C. E | Creswell, Marion County | Kansas. |
| Winnipiseogee Lake Cotton and Woolen Manufacturing Company. | Weir's Landing, Belknap County | New Hampshire. |
| | Wolfborough, Carrol County | Do. |
| | Lake Village, Belknap County | Do. |
| | Bristol, Grafton County | Do. |
| | Ashland, Grafton County | Do. |
| Woodworth, Dr. A | Empire City, Cherokee County | Kansas. |
| Worcester Academy | Worcester, Worcester County | Massachusetts. |
| White, T. Baxter | Highlands, Macon County | North Carolina. |
| Young, George R | Penn Yan, Yates County | New York. |
| Yetter, W. G | Catawissa, Columbia County | Pennsylvania. |
| United States Naval Hospital | Mare Island | California. |
| Do | New York | New York. |
| Do | Philadelphia | Pennsylvania. |
| Do | Yokohama | Japan. |

PAPER 12.

*List of military posts from which meteorological reports have been received monthly at the office of the Chief Signal-Officer during the year ending June* 30, 1878.

| Post. | State. | Post. | State. |
|---|---|---|---|
| Adams, Fort | Rhode Island. | Hamilton, Fort | New York. |
| Angel Island | California. | Harney, Camp | Oregon. |
| Alcatraz Island | Do. | Hartsuff, Fort | Nebraska. |
| Abraham Lincoln, Fort | Dakota. | Independence, Fort | Massachusetts. |
| Apache, Camp | Arizona. | Klamath, Fort | Oregon. |
| Baton Rouge Barracks | Louisiana. | Keogh, Fort | Montana. |
| Baker, Camp | Montana. | Larned, Fort | Kansas. |
| Brady, Fort | Michigan. | Lowell, Camp | Arizona. |
| Buford, Fort | Dakota. | Lapwai, Fort | Idaho. |
| Brown, Fort | Texas. | Leavenworth, Fort | Kansas. |
| Benton, Fort | Montana. | Lyon, Fort | Colorado. |
| Bidwell, Camp | California. | Lower Brulé Agency | Dakota. |
| Boise, Fort | Idaho. | McPherson Barracks | Georgia. |
| Benicia Barracks | California. | McPherson, Fort | Nebraska. |
| Brown, Camp | Wyoming. | McKavett, Fort | Texas. |
| Bowie, Camp | Arizona. | McDowell, Camp | Arizona. |
| Barrancas, Fort | Florida. | McHenry, Fort | Maryland. |
| Colville, Fort | Washington. | Monroe, Fort | Virginia. |
| Canby, Fort | Do. | Madison Barracks | New York. |
| Concho, Fort | Texas. | Mojave, Camp | Arizona. |
| Columbus, Fort | New York. | McDermitt, Camp | Nevada. |
| Craig, Fort | New Mexico. | Niagara, Fort | New York. |
| Columbus Barracks | Ohio. | Oglethorpe Barracks | Georgia. |
| Douglass, Camp | Utah. | Porter, Fort | New York. |
| Duncan, Fort | Texas. | Pembina, Fort | Dakota. |
| Davis, Fort | Do. | Preble, Fort | Maine. |
| Ellis, Fort | Montana. | Presidio | California. |
| Foote, Fort | Maryland. | Plattsburg Barracks | New York. |
| Fetterman, Fort | Wyoming. | Point San José | California. |
| Fred Steele, Fort | Do. | Randall, Fort | Dakota. |
| Gaston, Camp | California. | Rice, Fort | Do. |
| Garland, Fort | Colorado. | Ringgold Barracks | Texas. |
| Grant, Camp | Arizona. | Sanders, Fort | Wyoming. |
| Griffin, Fort | Texas. | Sidney Barracks | Nebraska. |
| Hays, Fort | Kansas. | Sill, Fort | Indian Territory. |
| Halleck, Camp | Nevada. | Snelling, Fort | Minnesota. |

*List of military posts, &c.*—Continued.

| Post. | State. | Post. | State. |
|---|---|---|---|
| Stevens, Fort | Oregon. | Verde, Camp | Arizona. |
| Shaw, Fort | Montana. | Wayne, Fort | Michigan. |
| Sully, Fort | Dakota. | Warren, Fort | Massachusetts. |
| Stevenson, Fort | Do. | Wallace, Fort | Kansas. |
| Saint Francis Barracks | Florida. | Wingate, Fort | New Mexico. |
| Sheridan, Camp | Nebraska. | Whipple, Fort | Arizona. |
| Sisseton, Fort | Dakota. | West Point Military Academy | New York. |
| Totten, Fort | Do. | Willet's Point | Do. |
| Townsend, Fort | Washington. | Walla Walla, Fort | Washington. |
| Union, Fort | New Mexico. | Yuma, Fort | California. |

## PAPER 13.

*List of merchant and naval vessels and naval stations from which simultaneous meteorological reports have been received at the office of the Chief Signal-Officer during the year ending June 30, 1878.*

MERCHANT VESSELS.

| Name. | Months for which reports were received. | Line. |
|---|---|---|
| Steamship Alaska | November, 1877 | Pacific Mail Steamship Company. |
| Steamship China | June, 1878 | |
| Steamship City of Panama | July, 1877, and November, 1877, to June, 1878, inclusive. | |
| Steamship City of Peking | September, 1877, to February, 1878, April to June, 1878, both inclusive. | |
| Steamship City of Tokio | August, 1877, to May, 1878, inclusive | |
| Steamship Colima | February to June, 1878, inclusive | |
| Steamship Adriatic | March to June, 1878, inclusive | White Star Line. |
| Steamship Baltic | February, 1878 | |
| Steamship Britannic | March to June, 1878, inclusive | |
| Steamship Celtic | January, February, March, May, and June, 1878 | |
| Steamship Germanic | January to June, 1878, inclusive | |
| Steamship Republic | January and February, 1878 | |
| Steamship Belgic | August, 1877, and October, 1877, to June, 1878, inclusive. | Occidental and Oriental Steamship Company. |
| Steamship Gaelic | July, 1877, to June, 1878, inclusive | |
| Steamship Oceanic | July, 1877, and October, 1877, to June, 1878, inclusive. | |
| Steamship Baltimore | August, 1877, and January, 1878 | North German Lloyd, of Bremen. |
| Steamship Braunschweig | July and August, 1877, and October, 1877, to June, 1878, inclusive. | |
| Steamship Nürnberg | July, 1877, to January, 1878, inclusive | |
| Steamship Ohio | July to December, 1877, and February to April, 1878, both inclusive. | |
| Steamship Illinois | September, October, 1877; March and April, 1878 | American Steamship Company. |
| Steamship Indiana | September, 1877, to June, 1878, inclusive | |
| Steamship Ohio | ....do | |
| Steamship Pennsylvania | October, 1877, to June, 1878, inclusive | |
| Steamship Switzerland | ....do | Red Star Line. |
| Steamship Vaderland | May, 1878 | |
| Steamship Hibernian | ....do | Allan Line. |
| Steamship Nova Scotian | July, August, and September, 1877 | |
| Steamship Scandinavian | November, 1877, to May, 1878, inclusive | |
| Schooner Addie Fuller | July, 1877, to May, 1878, inclusive | British vessels. |
| Steamship Algeria | July to December, 1877, inclusive | |
| Steamship Batavia | July, 1877, to January, 1878, inclusive | |
| Steamship Hibernian | July and August, 1877 | |
| Steamship Othello | ....do | |
| Steamship Peruvian | July to November, 1877, inclusive | |
| Steamship Seino | July to October, 1877, inclusive | |
| Steamship Yorkshire | February to April, 1878, inclusive | |
| Ship Mikado | July, 1877 | |
| Ship Naiad | April and May, 1878 | |
| Bark Maroon | July and August, 1877; January, February, March, May, and June, 1878. | |
| Bark Sorato | July and August, 1877 | |
| Brig Catherine | July to December, 1877, inclusive | |
| Schooner Traveller | July to November, 1877, inclusive | |
| Royal Alice | December, 1877, and January, 1878 | |

*List of merchant and naval vessels, &c.*—Continued.

UNITED STATES NAVAL VESSELS.

| Names. | Months for which reports were received. | Names. | Months for which reports were received. |
|---|---|---|---|
| Adams | July, 1877, to April, 1878, inclusive. | Omaha | July, 1877, to April, 1878, inclusive. |
| Alarm | February, 1878. | Onward | July, 1877, to June, 1878, inclusive. |
| Alaska | June, 1878. | Ossipee | July, 1877, to May, 1878, inclusive. |
| Alert | July to December, 1877, inclusive. | Palos | July, 1877, to June, 1878, inclusive. |
| Alliance | July, 1877, to June, 1878, inclusive. | Pensacola | July to November, 1877, and January to June, 1878, inclusive. |
| Ashuelot | Do. | Plymouth | July, 1877, to June, 1878, inclusive. |
| Canonicus | Do. | Powhatan | July and August, 1877, and November, 1877, to June, 1878, inclusive. |
| Colorado | Do. | Ranger | July, 1877, to June, 1878, inclusive. |
| Constellation | April to June, 1878, inclusive. | Richmond | July to September, 1877, inclusive. |
| Constitution | January to June, 1878, inclusive. | Rio Bravo | July, 1877, to June, 1878, inclusive. |
| Despatch | July, 1877, to June, 1878, inclusive. | Santee | Do. |
| Enterprise | February to June, 1878, inclusive. | Saratoga | July and August, 1877, and November, 1877, to June, 1878, inclusive. |
| Essex | August and September, 1877; November, 1877, to February, 1878, inclusive. | St. Louis | July, 1877, to June, 1878, inclusive. |
| Franklin | July, 1877, to June, 1878, inclusive. | Swatara | July, 1877, and October, 1877, to June, 1878, inclusive. |
| Frolic | July to October, 1877, inclusive. | Supply | February to June, 1878, inclusive. |
| Gettysburg | July to November, 1877, and March to June, 1878, both inclusive. | Tennessee | July, 1877, to June, 1878, inclusive. |
| Guard | November, 1877, to June, 1878, inclusive. | Trenton | Do. |
| Hartford | April to June, 1878, inclusive. | Tuscarora | March to June, 1878, inclusive. |
| Huron | July, 1877. | Vandalia | July, 1877, to June, 1878, inclusive. |
| Kearsarge | July to October, 1877, inclusive. | Wabash | Do. |
| Lackawanna | July, 1877, to January, 1878, inclusive. | Wyoming | July, 1877, to January, 1878, inclusive, and March and April, 1878. |
| Marion | July, 1877, to June, 1878, inclusive. | | |
| Michigan | Do. | | |
| Monocacy | July, 1877, to February, 1878, inclusive, and April, May, and June, 1878. | | |
| Monongahela | July, 1877, to March, 1878, inclusive. | | |
| New Hampshire | July, 1877, to June, 1878, inclusive. | | |

UNITED STATES NAVAL LAND STATIONS.

| | | | |
|---|---|---|---|
| Mare Island, Cal | July, 1877, to June, 1878, inclusive. | Portsmouth, N.H. | July, 1877, to June, 1878, inclusive. |
| Pensacola, Fla | Do. | Yokohama, Japan | Do. |

PORTUGUESE NAVAL VESSELS.

| | | | |
|---|---|---|---|
| Bartholomen Dias | January and February, 1878. | Sado | January to June, 1878, inclusive. |
| India | September, 1877. | Sá da Bandeira | March and April, 1878. |
| Mindello | February, March, and April, 1878. | Tejo | April and May, 1878. |

SUMMARY.

| | |
|---|---|
| Furnished by Pacific Mail Steamship Company | 6 |
| Furnished by the White Star Line | 6 |
| Furnished by the Occidental and Oriental Steamship Company | 3 |
| Furnished by the North German Lloyd of Bremen | 4 |
| Furnished by the American Steamship Company | 4 |
| Furnished by the Red Star Line | 2 |
| Furnished by the Allan Line | 3 |
| Furnished by Capt. James Jorgensen | 1 |
| Furnished by the co-operation of R. H. Scott, esq., F. R. S., secretary of the Meteorological Council, London | 14 |
| Furnished by the United States Navy | 51 |
| Furnished by the Portuguese Navy | 6 |
| Total | 100 |

## PAPER 14.

*Monthly and annual mean pressures—July, 1877, to June, 1878, inclusive. (Reduced to sea-level.)*

| Stations. | 1877. | | | | | | 1878. | | | | | | Annual mean. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | |
| Albany, N. Y. | 29.906 | 29.911 | 30.036 | 30.027 | 30.092 | 30.137 | 30.034 | 29.959 | 29.921 | 29.804 | 29.886 | 29.894 | 29.967 |
| Alpena, Mich | 29.920 | 29.902 | 29.988 | 29.981 | 29.991 | 30.073 | 30.028 | 29.964 | 29.914 | 29.757 | 29.861 | a29.846 | 29.935 |
| Atlantic City, N. J. | 29.963 | 29.959 | 30.075 | 30.043 | 30.120 | 30.168 | 30.062 | 29.962 | 29.981 | 29.832 | 29.921 | 29.933 | 30.002 |
| Augusta, Ga | 30.008 | 29.987 | 30.004 | 30.067 | 30.107 | 30.197 | 30.097 | 29.994 | 30.023 | 29.861 | 29.988 | 30.008 | 30.028 |
| Baltimore, Md | 29.969 | 29.969 | 30.090 | 30.069 | 30.148 | 30.195 | 30.095 | 29.970 | 29.982 | 29.846 | 29.940 | 29.936 | 30.017 |
| Barnegat, N. J | 29.951 | 29.952 | 30.071 | 30.036 | 30.111 | 30.158 | 30.052 | 29.956 | 29.981 | 29.837 | 29.931 | 29.938 | 29.998 |
| Bismarck, Dak | 29.685 | 29.747 | 29.679 | 29.864 | 29.917 | 29.913 | 29.986 | 29.904 | 29.913 | 29.765 | 29.951 | 29.949 | 29.856 |
| Boise City, Idaho | 29.509 | 29.572 | 29.653 | 29.792 | 29.934 | 30.074 | 30.081 | 29.931 | 29.997 | 29.914 | 29.961 | 29.975 | 29.866 |
| Boston, Mass | 29.923 | 29.930 | 30.051 | 30.022 | 30.101 | 30.105 | 30.02 | 29.926 | 29.916 | 29.835 | 29.899 | 29.917 | 29.969 |
| Brackettville, Tex *b* | | | | | | | | | | 29.615 | 29.700 | 29.698 | |
| Breckenridge, Minn | 29.817 | 29.879 | 29.821 | 29.974 | 30.036 | 30.025 | 30.055 | 29.924 | 29.872 | 29.662 | 29.874 | 29.831 | 29.898 |
| Buffalo, N. Y | 29.911 | 29.902 | 30.019 | 29.990 | 30.023 | 30.099 | 30.018 | 29.953 | 29.925 | 29.787 | 29.898 | 29.887 | 29.951 |
| Burlington, Vt | 29.905 | 29.910 | 30.036 | 30.039 | 30.086 | 30.141 | 30.091 | 29.977 | 29.935 | 29.825 | 29.882 | 29.897 | 29.977 |
| Cairo, Ill | 29.995 | 29.993 | 30.033 | 30.039 | 30.110 | 30.155 | 30.097 | 29.978 | 29.967 | 29.798 | 29.956 | 29.949 | 30.006 |
| Cape Hatteras, N. C | 29.945 | 29.923 | 29.958 | 30.003 | 30.037 | 30.157 | 30.082 | 29.988 | 30.033 | 29.859 | 29.992 | 29.987 | 29.997 |
| Cape Henry, Va | 29.977 | 29.968 | 30.044 | 30.053 | 30.099 | 30.168 | 30.064 | 29.970 | 29.990 | 29.831 | 29.945 | 29.948 | 30.005 |
| Cape Lookout, N. C | 30.015 | 29.991 | 30.012 | 30.068 | 30.099 | 30.172 | 30.082 | 29.986 | 30.025 | 29.861 | 29.991 | 29.982 | 30.024 |
| Cape May, N. J | 29.962 | 29.961 | 30.073 | 30.047 | 30.111 | 30.169 | 30.068 | 29.966 | 29.987 | 29.841 | 29.948 | 29.952 | 30.007 |
| Charleston, S. C | 30.033 | 30.007 | 30.009 | 30.075 | 30.104 | 30.201 | 30.101 | 30.026 | 30.053 | 29.904 | 30.036 | 30.017 | 30.047 |
| Cheyenne, Wyo | 30.039 | 30.073 | 29.993 | 29.973 | 29.942 | 29.953 | 29.876 | 29.780 | a29.868 | 29.773 | 29.907 | 30.025 | c29.933 |
| Chicago, Ill | 29.911 | 29.910 | 29.969 | 29.946 | 30.005 | a30.054 | 30.004 | 29.913 | 29.890 | 29.741 | 29.894 | 29.891 | d29.927 |
| Cincinnati, Ohio | 29.903 | 29.878 | 29.950 | 29.953 | 30.031 | 30.106 | 30.025 | 29.917 | 29.919 | 29.752 | 29.908 | 29.893 | 29.936 |
| Cleveland, Ohio | 29.946 | 29.943 | 30.045 | 30.021 | 30.068 | 30.144 | 30.057 | 29.971 | 29.956 | 29.787 | 29.926 | 29.913 | 29.981 |
| Concho, Tex *b* | | | | | | | | | | 29.504 | 29.560 | e29.559 | |
| Corsicana, Tex | 29.958 | 29.954 | 29.945 | 29.973 | 30.100 | 30.152 | 30.087 | 29.937 | 29.918 | 29.772 | 29.903 | 29.892 | 29.966 |
| Davenport, Iowa | 29.941 | 29.952 | 29.986 | 29.993 | 30.066 | 30.087 | 30.059 | 29.960 | 29.901 | 29.743 | 29.901 | 29.908 | 29.958 |
| Deadwood, Dak *f* | | | | | | | g25.302 | g25.218 | g25.292 | g25.187 | g25.340 | | |
| Denison, Tex | 29.951 | 29.951 | 29.957 | 29.979 | 30.122 | 30.150 | 30.071 | 29.926 | 29.909 | 29.764 | 29.888 | 29.881 | 29.962 |
| Denver, Colo | 30.038 | 30.081 | 30.033 | 30.006 | 29.994 | 30.003 | 29.929 | 29.825 | 29.875 | 29.797 | 29.934 | 30.039 | 29.963 |
| Detroit, Mich | 29.906 | 29.886 | 29.986 | 29.960 | 30.009 | 30.093 | 30.016 | 29.944 | 29.918 | 29.750 | 29.893 | 29.888 | 29.937 |
| Dodge City, Kans | 29.529 | 29.552 | 29.553 | 29.640 | 29.758 | 29.783 | 29.715 | 29.573 | 29.543 | 29.405 | 29.498 | 29.537 | 29.590 |
| Dubuque, Iowa | 29.904 | 29.921 | 29.947 | 29.972 | 30.040 | 30.062 | 30.043 | 29.945 | 29.885 | 29.716 | 29.873 | 29.881 | 29.932 |
| Duluth, Minn | 29.854 | 29.887 | 29.896 | 29.961 | 30.021 | 30.026 | 30.060 | 29.860 | 29.913 | 29.728 | 29.865 | 29.889 | 29.922 |
| Eastport, Me | 29.910 | 29.923 | 29.994 | 29.994 | 30.065 | 30.033 | 29.959 | 29.984 | 29.843 | 29.834 | 29.858 | 29.895 | 29.933 |
| Erie, Pa | 29.915 | 29.903 | 30.010 | 29.978 | 30.019 | 30.107 | 30.014 | 29.929 | 29.924 | 29.771 | 29.904 | 29.895 | 29.947 |
| Escanaba, Mich | h29.918 | 29.902 | 29.965 | 29.987 | 30.000 | 30.049 | 30.052 | 29.994 | 29.950 | 29.780 | 29.900 | 29.912 | i29.951 |
| Fort Bayard, N. Mex | | j30.136 | 30.093 | 30.032 | 30.064 | a30.072 | 30.085 | 29.997 | 30.054 | (k) | | | |
| Fort Craig, N. Mex | j29.598 | a29.628 | 29.573 | | | | | | | | | | |
| Fort Gibson, Ind. T | 29.930 | 29.945 | 29.948 | 29.952 | 30.078 | 30.107 | 30.039 | 29.896 | 29.886 | 29.726 | 29.864 | 29.875 | 29.937 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Fort Sully, Dak* | *29.726* | *29.803* | *29.762* | *£29.980* | | | | | | | | | |
| *Galveston, Tex* | *30.006* | *29.985* | *29.943* | *29.990* | *30.114* | *30.156* | *30.102* | *29.968* | *29.963* | *29.828* | *29.952* | *29.929* | *29.995* |
| *Grand Haven, Mich* | *29.915* | *29.933* | *29.987* | *29.955* | *29.996* | *30.074* | *30.014* | *29.943* | *29.935* | *29.748* | *29.899* | *29.905* | *29.942* |
| *Indianapolis, Ind* | *29.931* | *29.926* | *29.997* | *29.983* | *30.038* | *30.007* | *30.022* | *29.917* | *29.912* | *29.746* | *29.904* | *29.896* | *29.947* |
| *Indianola, Tex* | *29.987* | *29.981* | *29.955* | *29.992* | *30.133* | *30.166* | *30.122* | *29.983* | *29.966* | *29.825* | *29.933* | *29.916* | *29.997* |
| *Jacksonville, Fla* | *30.037* | *30.002* | *29.975* | *30.037* | *30.084* | *a30.191* | *30.095* | *29.994* | *30.044* | *29.894* | *30.017* | *29.989* | *d30.030* |
| *Keokuk, Iowa* | *29.889* | *29.908* | *29.949* | *29.946* | *30.020* | *30.066* | *30.019* | *29.905* | *29.856* | *29.714* | *29.856* | *29.856* | *29.916* |
| *Key West, Fla* | *30.012* | *29.996* | *29.950* | *29.977* | *30.017* | *30.094* | *30.072* | *29.995* | *30.025* | *29.920* | *30.023* | *29.998* | *30.007* |
| *Kittyhawk, N. C* | *29.997* | *29.982* | *30.037* | *30.068* | *30.114* | *30.168* | *30.078* | *29.984* | *30.022* | *29.848* | *29.979* | *29.977* | *30.021* |
| *Knoxville, Tenn* | *29.947* | *29.974* | *30.020* | *30.066* | *30.107* | *30.198* | *30.098* | *29.990* | *29.994* | *29.841* | *29.972* | *29.958* | *30.014* |
| *La Crosse, Wis* | *29.883* | *29.905* | *29.922* | *29.971* | *30.029* | *30.038* | *30.031* | *29.939* | *29.875* | *29.699* | *29.864* | *29.861* | *29.918* |
| *La Mesilla, N. Mex* | | *m30.209* | *30.196* | *30.171* | *30.268* | *30.288* | *30.259* | *30.145* | *30.170* | *(k)* | | | |
| *Laredo, Tex b* | | | | | | | | | | *29.668* | *29.755* | *29.744* | |
| Leavenworth, Kans | 29.902 | 29.914 | 29.928 | 29.959 | 30.060 | 30.068 | 30.031 | 29.895 | 29.856 | *29.687* | *29.843* | *29.863* | *29.917* |
| Lead City, Dak *n* | | | | | | | | | | | | *q24.850* | |
| Los Angeles, Cal | 29.859 | 29.900 | 29.852 | 29.932 | 30.009 | 30.005 | 30.066 | 29.998 | 29.939 | 29.902 | 29.917 | 29.901 | 29.945 |
| Louisville, Ky | 29.945 | 29.937 | 29.993 | 30.000 | 30.059 | 30.123 | 30.042 | 29.926 | 29.937 | 29.776 | 29.919 | 29.903 | 29.964 |
| Lynchburg, Va | 29.952 | 29.951 | 30.051 | 30.051 | 30.103 | 30.186 | 30.087 | 29.957 | *a29.973* | 29.816 | 29.929 | 29.925 | *e29.998* |
| Marquette, Mich | 29.835 | 29.894 | 29.930 | 29.971 | 29.973 | 30.023 | 30.006 | 29.899 | 29.854 | 29.771 | 29.877 | 29.898 | 29.910 |
| Memphis, Tenn | 30.001 | 29.997 | 30.021 | 30.043 | 30.118 | 30.161 | 30.093 | 29.977 | 29.974 | 29.829 | 29.964 | 29.942 | 30.010 |
| Milwaukee, Wis | 29.949 | 29.957 | 30.007 | 30.002 | 30.035 | 30.074 | 30.025 | 29.954 | 29.916 | 29.739 | 29.895 | 29.906 | 29.955 |
| Mobile, Ala | 30.009 | 29.994 | 29.966 | 30.036 | 30.122 | 30.181 | 30.116 | 30.000 | 30.019 | 29.879 | 30.018 | 29.970 | 30.026 |
| Montgomery, Ala | 30.011 | 29.987 | 29.989 | 30.056 | 30.127 | 30.197 | 30.117 | 30.007 | 30.021 | 29.869 | 30.002 | 29.963 | 30.029 |
| Morgantown, W. Va | 29.940 | 29.940 | 30.025 | 30.023 | 30.108 | 30.147 | 30.051 | 29.947 | 29.954 | 29.778 | 29.923 | 29.913 | 29.979 |
| Mount Washington, N. H | 30.228 | 30.246 | 30.241 | 30.075 | 29.994 | 29.921 | 29.738 | 29.763 | 29.802 | 29.924 | 30.032 | 30.148 | 30.009 |
| Nashville, Tenn | 29.980 | 29.972 | 30.014 | 30.049 | 30.101 | 30.168 | 30.084 | 29.972 | 29.974 | 29.804 | 29.956 | 29.949 | 30.002 |
| New Haven, Conn | 29.936 | 29.938 | 30.063 | 30.028 | 30.114 | 30.143 | 30.034 | 29.951 | 29.946 | 29.839 | 29.929 | 29.933 | 29.988 |
| New London, Conn | 29.954 | 29.953 | 30.081 | 30.038 | 30.120 | 30.137 | 30.029 | 29.945 | 29.951 | 29.849 | 29.928 | 29.937 | 29.993 |
| New Orleans, La | 30.000 | 29.981 | 29.945 | 30.011 | 30.106 | 30.157 | 30.095 | 29.971 | 29.979 | 29.849 | 29.995 | 29.952 | 30.005 |
| Newport, R. I | 29.944 | 29.948 | 30.067 | 30.026 | 30.111 | 30.119 | 30.008 | 29.924 | 29.933 | 29.836 | 29.910 | 29.931 | 29.980 |
| New York, N. Y | 29.954 | 29.951 | 30.086 | 30.050 | 30.127 | 30.161 | 30.062 | 29.966 | 29.980 | 29.848 | 29.937 | 29.946 | 30.006 |
| Norfolk, Va | 29.985 | 29.980 | 30.059 | 30.072 | 30.118 | 30.189 | 30.088 | 29.983 | 30.014 | 29.849 | 29.970 | 29.970 | 30.023 |
| North Platte, Nebr | 29.455 | 29.516 | 29.484 | 29.626 | 29.745 | 29.772 | 29.737 | 29.587 | 29.543 | 29.363 | 29.500 | 29.519 | 29.571 |
| Olympia, Wash | 30.270 | 29.970 | 29.968 | 30.040 | 29.957 | 29.991 | 29.810 | 29.688 | 29.878 | 29.959 | 30.003 | 30.025 | 29.963 |
| Omaha, Nebr | 29.853 | *a29.878* | 29.863 | 29.948 | 30.036 | 29.996 | 29.981 | 29.878 | 29.823 | 29.653 | 29.819 | 29.825 | *o29.879* |
| Oswego, N. Y | 29.928 | 29.920 | 30.045 | 30.023 | 30.070 | 30.138 | 30.048 | 29.973 | 29.942 | 29.817 | 29.920 | 29.917 | 29.978 |
| Pembina, Dak | 29.817 | 29.885 | 29.846 | 30.009 | 30.050 | 30.022 | 30.100 | 29.976 | 29.927 | 29.713 | 29.899 | 29.852 | 29.925 |
| Philadelphia, Pa | 29.953 | 29.954 | 30.077 | 30.062 | 30.127 | 30.179 | 30.075 | 29.976 | 29.984 | 29.809 | 29.939 | 29.942 | 30.006 |
| Pike's Peak, Col | 30.253 | 30.276 | 30.135 | 29.939 | 29.832 | 29.849 | 29.734 | 29.677 | 29.797 | 29.776 | 29.942 | 30.138 | 29.946 |
| Pioche, Nev *p* | | 29.893 | 29.842 | 29.801 | 29.879 | 29.810 | 29.786 | 29.689 | 29.751 | 29.665 | 29.729 | 29.813 | *q29.787* |
| Pittsburgh, Pa | 29.911 | 29.917 | 30.012 | 29.999 | 30.056 | 30.122 | 30.034 | 29.935 | 29.931 | 29.768 | 29.907 | 29.895 | 29.956 |
| Port Huron, Mich | 29.908 | 29.886 | 29.993 | 29.961 | 30.006 | 30.085 | 30.008 | 29.947 | 29.917 | 29.754 | 29.884 | 29.880 | 29.936 |
| Portland, Me | 29.910 | 29.926 | 30.025 | 30.011 | 30.075 | 30.073 | 29.983 | 29.912 | 29.893 | 29.836 | 29.882 | 29.898 | 29.952 |
| Portland, Oreg | 30.031 | 30.037 | 30.072 | 30.124 | 30.087 | 30.106 | 29.940 | 29.820 | 29.983 | 30.053 | 30.091 | 30.091 | 30.036 |
| Punta Rassa, Fla | 30.025 | 30.009 | *r29.973* | 29.999 | *s30.039* | 30.144 | 30.096 | 30.001 | 30.041 | 29.934 | 30.044 | 30.014 | *t30.027* |
| Red Bluff, Cal | 29.791 | 29.866 | 29.840 | 29.938 | 30.113 | 30.061 | 30.024 | 29.919 | 30.011 | 29.896 | 29.907 | 29.805 | 29.931 |

*a* Thirty days only. *b* Local observations commenced April 1, 1878. *c* One observation missed in March, 1878. *d* One observation missed in December, 1877. *e* Twenty-two days only. *f* Opened December 25, 1877; closed June 1, 1878. *g* Corrected for temperature and instrumental error only. *h* Twenty-four days only. *i* Mean of eleven months and twenty-four days; barometer unserviceable seven days during July, 1877. *j* Twenty-three days only. *k* Local observations discontinued April 10, 1878. *l* Discontinued October 31, 1877. *m* Twenty days only. *n* Opened June 1, 1878. *o* One observation missed in August, 1877. *p* Observations began July 28, 1877. *q* Eleven months only. *r* Twenty-nine days only. *s* Twenty-seven days only. *t* One observation missed in September and three observations missed in November, 1877.

*Monthly and annual mean pressures—July, 1877, to June, 1878, &c.*—Continued.

| Stations. | 1877. | | | | | | 1878. | | | | | | Annual mean. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | |
| Rochester, N. Y | 29.902 | 29.895 | 30.018 | 29.989 | 30.032 | 30.105 | 30.017 | 29.945 | 29.915 | 29.772 | 29.879 | 29.879 | 29.946 |
| Roseburg, Oreg.*a* | ..... | 30.011 | 30.062 | 30.108 | 30.102 | 30.072 | 29.914 | 29.827 | 29.971 | 30.030 | 30.063 | 30.042 | *b*30.018 |
| Sacramento, Cal | 29.821 | 29.900 | 29.852 | 29.976 | 30.113 | 30.055 | 30.047 | 29.961 | 30.026 | 29.898 | 29.913 | 29.834 | 29.950 |
| Salt Lake City, Utah | 29.919 | 29.971 | *c*29.937 | 29.971 | 30.078 | 30.039 | 30.035 | 29.882 | 29.926 | 29.817 | 29.882 | 29.939 | *d*29.950 |
| San Diego, Cal | 29.912 | 29.950 | 29.903 | 29.983 | 30.046 | 30.044 | 30.111 | 30.039 | 30.052 | 29.961 | 29.968 | 29.951 | 29.993 |
| Sandusky, Ohio *e* | ..... | *f*29.925 | 30.023 | 29.998 | 30.048 | 30.129 | 30.041 | 29.970 | 29.950 | 29.782 | 29.921 | 29.915 | *g*29.973 |
| Sandy Hook, N. J | 29.956 | 29.952 | 30.075 | 30.042 | 30.119 | 30.160 | 30.051 | 29.966 | 29.968 | 29.842 | 29.930 | 29.940 | 30.000 |
| San Francisco, Cal | 29.900 | 29.978 | 29.917 | 30.012 | 30.115 | 30.043 | 30.034 | 29.966 | 30.039 | 29.930 | 29.959 | 29.910 | 29.984 |
| Santa Fé, N. Mex | 29.921 | 29.946 | 29.878 | 29.798 | 29.807 | 29.802 | 29.723 | 29.645 | 29.724 | 29.658 | 29.766 | 29.853 | 29.793 |
| Savannah, Ga | 30.034 | 30.007 | 29.999 | 30.063 | 30.096 | 30.197 | 30.096 | 30.001 | 30.047 | 29.884 | 30.011 | 29.994 | 30.036 |
| Shreveport, La | 29.979 | 29.972 | 29.970 | 30.008 | 30.133 | 30.182 | 30.101 | 29.968 | 29.961 | 29.815 | 29.956 | 29.934 | 30.008 |
| Silver City, N. Mex.*h* | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | *i*30.126 | ..... |
| Smithville, N. C | 30.031 | 30.014 | 30.029 | 30.089 | 30.112 | 30.198 | 30.107 | 30.013 | 30.051 | 29.895 | 30.031 | 30.022 | 30.049 |
| Springfield, Mass | 29.928 | 29.867 | 29.997 | 29.965 | 30.043 | 30.063 | 29.966 | 29.890 | 29.870 | 29.769 | 29.849 | 29.859 | 29.922 |
| Saint Louis, Mo | 29.959 | 29.961 | 30.004 | 30.000 | 30.083 | 30.110 | 30.057 | 29.948 | 29.923 | 29.759 | 29.923 | 29.914 | 29.970 |
| Saint Mark's, Fla | 30.019 | 29.995 | 29.964 | 30.023 | 30.092 | 30.178 | 30.106 | 30.003 | 30.038 | 29.891 | 30.013 | 29.975 | 30.025 |
| Saint Michael's, Alaska *a* | ..... | 29.745 | 29.798 | 29.773 | 29.474 | 29.459 | 29.449 | 29.460 | 29.613 | 29.610 | 29.836 | 29.736 | *b*29.632 |
| Saint Paul, Minn | 29.830 | 29.857 | 29.848 | 29.935 | 29.987 | 29.995 | 30.003 | 29.905 | 29.838 | 29.651 | 29.823 | 29.818 | 29.874 |
| Thatcher's Island, Mass | 29.927 | 29.931 | 30.054 | 30.034 | 30.098 | 30.096 | 29.995 | 29.922 | 29.915 | 29.844 | 29.904 | 29.918 | 29.970 |
| Toledo, Ohio | 29.924 | 29.914 | 30.008 | 29.978 | 30.026 | 30.111 | 30.024 | 29.937 | 29.911 | 29.741 | 29.894 | 29.883 | 29.946 |
| Tybee Island, Ga | 30.018 | 29.983 | 29.991 | 30.054 | 30.092 | 30.192 | 30.093 | 30.091 | 30.041 | 29.883 | 30.014 | 29.982 | 30.029 |
| Umatilla, Oreg. *a* | ..... | 30.031 | 30.116 | 30.237 | 30.257 | 30.335 | 30.187 | 29.967 | 30.085 | 30.074 | 30.093 | 30.071 | *b*30.122 |
| Vicksburg, Miss | 30.025 | 30.011 | 30.007 | 30.054 | 30.143 | 30.190 | 30.120 | 29.997 | 29.994 | 29.858 | 30.005 | 29.969 | 30.031 |
| Virginia City, Mont | 29.753 | 29.806 | 29.717 | 29.751 | 29.739 | 29.740 | 29.661 | 29.536 | 29.657 | 29.565 | 29.668 | 29.766 | 29.697 |
| Visalia, Cal | 29.767 | 29.868 | 29.866 | 29.992 | 30.143 | 30.086 | 30.111 | 30.041 | 30.061 | 29.921 | 29.908 | 29.827 | 29.966 |
| Washington, D. C | 29.968 | 29.970 | 30.085 | 30.064 | 30.127 | 30.195 | 30.097 | 29.989 | 30.000 | 29.850 | 29.966 | 29.961 | 30.023 |
| Winnemucca, Nev | 29.948 | 29.989 | 29.977 | 30.017 | 30.093 | 30.032 | 29.939 | 29.869 | 29.953 | 29.870 | 29.932 | 29.969 | 29.970 |
| Wilmington, N. C | 30.014 | 29.994 | 30.016 | 30.073 | 30.099 | 30.185 | 30.087 | 29.997 | 30.029 | 29.863 | 29.995 | 29.987 | 30.028 |
| Wood's Holl, Mass | 29.961 | 29.967 | 30.083 | 30.039 | 30.125 | 30.125 | 30.016 | 29.936 | 29.927 | 29.838 | 29.916 | 29.935 | 29.989 |
| Yankton, Dak | 29.872 | 29.919 | 29.878 | 30.016 | 30.104 | 30.082 | 30.090 | 29.947 | 29.888 | 29.722 | 29.901 | 29.876 | 29.941 |

*a* Observations began July 15, 1877. *b* Eleven months only. *c* Twenty-nine days only. *d* One observation missed in September, 1877.
*e* Observations began August 2, 1877. *f* Thirty days only. *g* Mean of ten months and thirty days. *h* Opened May 16, 1878. *i* Twenty-eight days only.

PAPER 15.

*Monthly and annual mean temperature—July, 1877, to June, 1878, inclusive.*

| Stations. | 1877. | | | | | | 1878. | | | | | | Annual mean. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | |
| | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° |
| Albany, N. Y. | 72.0 | 71.9 | 64.2 | 49.5 | 40.9 | 31.9 | 23.4 | 24.9 | 38.3 | 51.3 | 56.4 | 64.9 | 49.1 |
| Alpena, Mich. | 66.9 | 66.4 | 59.6 | 46.3 | 35.5 | 33.7 | 23.6 | 27.9 | 35.0 | 45.7 | 49.3 | *a* 58.5 | 45.7 |
| Atlantic City, N. J. | 70.9 | 74.5 | 67.0 | 58.8 | 47.4 | 41.8 | 34.0 | 36.9 | 43.7 | 52.2 | 59.1 | 64.7 | 54.2 |
| Augusta, Ga. | 83.6 | 80.8 | 75.2 | 65.9 | 53.9 | 50.2 | 45.6 | 49.8 | 61.9 | 67.3 | 75.3 | 77.5 | 65.6 |
| Baltimore, Md. | 78.7 | 77.6 | 67.9 | 59.7 | 48.4 | 42.5 | 35.7 | 40.7 | 49.3 | 58.7 | 63.5 | 70.1 | 57.7 |
| Barnegat, N. J. | 70.7 | 73.8 | 66.5 | 58.1 | 47.6 | 40.0 | 33.6 | 35.9 | 42.9 | 51.4 | 57.6 | 63.3 | 53.4 |
| Bismarck, Dak. | 70.9 | 69.7 | 60.5 | 42.3 | 28.6 | 29.1 | 17.5 | 27.8 | 40.4 | 47.6 | 50.8 | 66.1 | 45.9 |
| Boise City, Idaho. | 74.9 | 73.9 | 61.0 | 49.0 | 41.1 | 30.9 | 34.3 | 39.7 | 48.0 | 51.2 | 58.8 | 72.3 | 52.9 |
| Boston, Mass. | 69.9 | 70.7 | 63.9 | 51.3 | 43.8 | 36.1 | 28.3 | 31.0 | 39.5 | 47.2 | 55.3 | 64.2 | 50.1 |
| Brackettville, Tex. | | | | | | | | | | *b* 72.3 | 75.8 | 82.8 | |
| Breckenridge, Minn. | 69.5 | 65.9 | 58.5 | 41.9 | 27.0 | 28.3 | 14.7 | 27.4 | 39.2 | 47.6 | 51.2 | 64.9 | 44.8 |
| Buffalo, N. Y. | 70.2 | 71.4 | 64.3 | 52.1 | 40.9 | 36.5 | 26.7 | 28.8 | 38.7 | 50.4 | 53.7 | 63.2 | 49.7 |
| Burlington, Vt. | 72.5 | 71.3 | 64.3 | 49.8 | 41.3 | 30.8 | 20.1 | 24.3 | 35.9 | 50.6 | 56.6 | 65.6 | 48.6 |
| Cairo, Ill. | 79.0 | 77.5 | 70.2 | 61.5 | 46.2 | 50.4 | 39.8 | 44.7 | 57.8 | 64.3 | 68.1 | 73.9 | 61.1 |
| Cape Hatteras, N. C. | 78.5 | 78.3 | 73.3 | 65.5 | 58.2 | 50.7 | 46.1 | 46.1 | 54.5 | 60.7 | 66.8 | 71.1 | 62.5 |
| Cape Henry, Va. | 77.8 | 77.1 | 70.3 | 63.9 | 54.0 | 47.5 | 41.2 | 43.9 | 52.4 | 58.6 | 65.1 | 70.1 | 60.2 |
| Cape Lookout, N. C. | 79.8 | 80.6 | 75.4 | 68.0 | 59.2 | 51.3 | 48.1 | 49.2 | 58.2 | 62.7 | 68.9 | 73.6 | 64.6 |
| Cape May, N. J. | 73.7 | 76.8 | 68.4 | 61.2 | 50.1 | 43.7 | 37.7 | 40.7 | 47.5 | 54.8 | 60.3 | 67.5 | 56.9 |
| Charleston, S. C. | 83.6 | 82.3 | 77.2 | 69.1 | 59.2 | 54.1 | 50.4 | 52.2 | 62.4 | 67.3 | 74.1 | 78.4 | 67.5 |
| Cheyenne, Wyo. | 70.2 | 67.9 | 56.2 | 40.0 | 30.1 | 28.9 | 25.3 | 30.9 | *a* 38.7 | 43.5 | 47.9 | 58.6 | *c* 44.8 |
| Chicago, Ill. | 73.3 | 71.4 | 66.6 | 55.0 | 40.0 | *a* 43.1 | 31.3 | 35.9 | 44.4 | 52.3 | 55.8 | 65.4 | *d* 52.9 |
| Cincinnati, Ohio. | 77.4 | 75.6 | 68.9 | 60.1 | 45.9 | 47.8 | 36.5 | 41.2 | 51.7 | 60.7 | 63.8 | 70.1 | 58.3 |
| Cleveland, Ohio. | 72.3 | 71.7 | 65.2 | 55.8 | 41.5 | 40.7 | 29.9 | 31.4 | 42.4 | 53.6 | 57.1 | 65.1 | 52.2 |
| Concho, Tex. | | | | | | | | | | *b* 66.2 | 73.7 | 78.7 | |
| Corsicana, Tex. | 81.4 | 81.9 | 75.9 | 65.4 | 51.4 | 51.7 | 45.4 | 51.3 | 64.1 | 69.0 | 73.1 | 79.1 | 65.8 |
| Davenport, Iowa. | 75.3 | 72.8 | 67.3 | 53.7 | 37.2 | 42.7 | 30.0 | 36.9 | 48.4 | 55.0 | 57.7 | 68.2 | 53.8 |
| Deadwood, Dak. *e* | | | | | | | 26.2 | 31.8 | 37.3 | 41.6 | 45.9 | | |
| Denison, Tex. | 81.6 | 81.8 | 74.0 | 62.6 | 47.7 | 49.2 | 42.9 | 48.5 | 61.8 | 66.4 | 70.8 | 76.9 | 63.7 |
| Denver, Colo. | 73.8 | 70.9 | 61.9 | 44.7 | 34.8 | 30.0 | 26.1 | 36.2 | 44.3 | 49.9 | 54.9 | 64.3 | 49.3 |
| Detroit, Mich. | 72.5 | 71.6 | 64.6 | 53.8 | 39.2 | 38.3 | 28.0 | 29.9 | 40.9 | 53.3 | 56.0 | 64.9 | 51.1 |
| Dodge City, Kans. | 77.5 | 76.2 | 68.4 | 51.7 | 38.6 | 39.0 | 32.0 | 38.2 | 49.3 | 55.9 | 61.9 | 70.5 | 54.9 |
| Dubuque, Iowa. | 74.7 | 71.9 | 66.3 | 51.7 | 35.2 | 41.6 | 30.0 | 35.0 | 43.8 | 53.8 | 56.3 | 67.2 | 52.3 |
| Duluth, Minn. | 68.1 | 69.2 | 59.1 | 45.5 | 32.8 | 34.1 | 22.2 | 31.8 | 39.4 | 44.3 | 49.5 | 60.2 | 46.3 |
| Eastport, Me. | 60.6 | 61.1 | 57.5 | 45.5 | 39.3 | 29.2 | 22.0 | 26.0 | 32.5 | 41.7 | 49.5 | 54.6 | 43.3 |
| Erie, Pa. | 71.4 | 71.6 | 64.8 | 55.5 | 43.2 | 40.7 | 30.6 | 33.2 | 42.3 | 53.7 | 56.3 | 65.0 | 52.4 |

*a* Thirty days only.
*b* Local observations began April 1, 1878.
*c* One observation missed in March, 1878.
*d* One observation missed in December, 1877.
*e* Opened December 25, 1877, closed June 1, 1878.

*Monthly and annual mean temperature, &c.*—Continued.

| Stations. | 1877. | | | | | | 1878. | | | | | | Annual mean. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | |
| | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° | ° |
| Escanaba, Mich | 68.0 | 66.7 | 58.7 | 45.5 | 34.5 | 33.8 | 22.5 | 27.5 | 35.3 | 44.1 | 48.1 | 59.4 | 45.3 |
| Fort Bayard, N. Mex. *a* | ..... | *b* 72.7 | 64.5 | 53.9 | 41.8 | *c* 35.8 | 34.6 | 37.0 | 45.6 | ..... | ..... | ..... | ..... |
| Fort Craig, N. Mex. *d* | *b* 79.9 | *c* 77.4 | 69.2 | *c* 59.0 | 41.8 | 36.5 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Fort Gibson, Ind. T | 78.2 | 77.1 | 70.5 | 60.5 | 44.3 | 48.0 | 39.2 | 45.4 | 57.3 | 64.4 | 68.5 | 74.9 | 60.7 |
| Fort Sully, Dak | 74.9 | 72.7 | 64.7 | *f* 45.0 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Galveston, Tex | 84.4 | 84.6 | 80.1 | 71.5 | 59.2 | 55.9 | 52.2 | 56.3 | 66.2 | 71.7 | 76.7 | 83.5 | 70.2 |
| Grand Haven, Mich | 70.1 | 68.7 | 63.8 | 52.9 | 39.4 | 42.0 | 31.9 | 34.0 | 42.9 | 52.0 | 53.1 | 62.7 | 51.1 |
| Indianapolis, Ind | 76.1 | 73.5 | 66.5 | 58.6 | 43.1 | 46.8 | 34.7 | 39.5 | 50.3 | 58.8 | 61.9 | 69.8 | 56.6 |
| Indianola, Tex | 84.9 | 85.6 | 81.2 | 70.2 | 60.3 | 56.5 | 52.9 | 58.7 | 68.0 | 73.0 | 77.7 | 83.6 | 71.0 |
| Jacksonville, Fla | 82.4 | 81.0 | 79.4 | 72.0 | 62.7 | *c* 57.3 | 53.3 | 56.7 | 65.4 | 71.3 | 78.2 | 80.4 | *g* 70.0 |
| Keokuk, Iowa | 76.7 | 74.4 | 70.1 | 55.3 | 39.6 | 44.8 | 32.8 | 37.8 | 50.3 | 57.5 | 60.3 | 70.7 | 55.9 |
| Key West, Fla | 84.5 | 85.2 | 84.5 | 80.4 | 74.6 | 68.9 | 66.1 | 69.6 | 73.0 | 77.6 | 80.5 | 84.4 | 77.4 |
| Kittyhawk, N. C | 78.0 | 78.0 | 72.1 | 64.9 | 55.4 | 47.9 | 42.5 | 43.7 | 52.8 | 59.0 | 65.2 | 69.5 | 60.7 |
| Knoxville, Tenn | 78.7 | 74.7 | 67.7 | 58.3 | 46.2 | 45.6 | 37.2 | 40.6 | 54.4 | 60.4 | 65.7 | 70.1 | 58.3 |
| La Crosse, Wis | 74.0 | 71.6 | 65.7 | 49.9 | 35.0 | 39.5 | 27.7 | 37.5 | 47.6 | 54.4 | 56.1 | 68.0 | 52.2 |
| La Mesilla, N. Mex. *h* | ..... | *i* 80.3 | 73.8 | 60.1 | 45.4 | 41.5 | 38.1 | 44.3 | 53.2 | ..... | ..... | ..... | ..... |
| Laredo, Tex. *j* | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 75.6 | 80.3 | 86.7 | ..... |
| Leavenworth, Kans | 76.3 | 75.1 | 67.9 | 54.5 | 39.5 | 44.2 | 33.8 | 40.2 | 50.9 | 58.8 | 62.3 | 70.5 | 56.2 |
| Los Angeles, Cal | 71.1 | 70.1 | 69.8 | 63.4 | 62.1 | 55.3 | 54.1 | 54.6 | 55.8 | 58.0 | 62.0 | 64.7 | 61.7 |
| Louisville, Ky | 78.9 | 76.1 | 69.2 | 61.3 | 47.0 | 48.8 | 37.9 | 42.2 | 52.8 | 61.2 | 64.8 | 71.7 | 59.3 |
| Lynchburg, Va | 82.7 | 79.4 | 71.0 | 62.6 | 51.1 | 46.4 | 37.1 | 44.0 | *c* 54.3 | 62.0 | 66.5 | 71.4 | *k* 60.7 |
| Marquette, Mich | 64.2 | 66.4 | 60.7 | 47.1 | 35.6 | 35.3 | 24.7 | 33.1 | 39.7 | 44.6 | 47.9 | 59.0 | 46.5 |
| Memphis, Tenn | 80.4 | 78.0 | 71.0 | 62.8 | 47.6 | 50.5 | 40.8 | 45.4 | 59.7 | 65.2 | 71.3 | 76.4 | 62.4 |
| Milwaukee, Wis | 69.2 | 69.5 | 63.9 | 50.4 | 35.3 | 37.4 | 26.2 | 32.5 | 40.3 | 50.1 | 53.0 | 62.2 | 49.2 |
| Mobile, Ala | 84.8 | 82.0 | 77.6 | 68.1 | 56.1 | 54.3 | 48.4 | 52.3 | 64.5 | 69.7 | 75.3 | 81.6 | 67.9 |
| Montgomery, Ala | 84.2 | 81.8 | 75.3 | 65.5 | 53.9 | 52.5 | 46.4 | 50.2 | 63.1 | 67.8 | 74.6 | 79.5 | 66.2 |
| Morgantown, W. Va | 75.4 | 72.3 | 65.3 | 57.6 | 44.8 | 43.9 | 32.8 | 38.2 | 47.8 | 57.9 | 60.3 | 66.8 | 55.3 |
| Mount Washington, N. H | 49.2 | 48.9 | 42.4 | 31.6 | 21.4 | 14.4 | 5.7 | 10.2 | 17.5 | 30.0 | 32.8 | 42.7 | 28.9 |
| Nashville, Tenn | 81.1 | 77.4 | 70.6 | 60.9 | 47.3 | 48.2 | 38.8 | 43.4 | 56.2 | 63.3 | 69.2 | 73.4 | 60.8 |
| New Haven, Conn | 74.0 | 73.9 | 65.6 | 55.5 | 46.0 | 39.2 | 31.9 | 34.2 | 43.5 | 52.4 | 58.7 | 66.1 | 53.4 |
| New London, Conn | 70.4 | 72.4 | 64.7 | 53.9 | 44.9 | 38.4 | 31.7 | 33.7 | 41.6 | 50.1 | 57.8 | 63.7 | 51.9 |
| New Orleans, La | 83.7 | 83.1 | 78.4 | 70.2 | 58.3 | 55.5 | 51.0 | 55.5 | 66.4 | 71.5 | 75.5 | 82.0 | 69.3 |
| Newport, R. I | 69.9 | 72.0 | 64.6 | 54.4 | 46.1 | 39.3 | 33.2 | 34.8 | 40.4 | 48.5 | 55.8 | 62.9 | 51.8 |
| New York, N. Y | 74.1 | 74.5 | 66.6 | 56.6 | 46.0 | 39.9 | 32.0 | 34.4 | 43.7 | 52.4 | 58.1 | 65.5 | 53.6 |
| Norfolk, Va | 79.6 | 77.4 | 68.7 | 62.0 | 52.2 | 45.9 | 40.4 | 44.2 | 53.8 | 60.1 | 66.2 | 71.6 | 60.2 |
| North Platte, Nebr | 75.5 | 72.8 | 64.6 | 44.6 | 33.4 | 30.7 | 24.9 | 34.6 | 44.3 | 51.0 | 54.9 | 66.0 | 49.8 |
| Olympia, Wash | 63.4 | 62.5 | *c* 73.2 | 55.6 | 49.1 | 45.8 | 41.1 | 44.1 | 47.5 | 49.1 | 55.2 | 60.4 | 51.3 |
| Omaha, Nebr | 76.0 | 75.2 | 66.0 | 51.1 | 38.3 | 30.2 | 28.9 | 36.9 | 48.1 | 55.0 | 58.5 | 68.4 | *l* 53.2 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Oswego, N. Y.* | *70.5* | *71.3* | *64.3* | *52.9* | *43.2* | *37.2* | *30.5* | *31.5* | *42.0* | *52.0* | *54.4* | *64.0* | *51.1* |
| *Pembina, Dak* | *68.1* | *64.3* | *55.4* | *40.0* | *25.7* | *27.4* | *11.2* | *25.5* | *36.2* | *45.5* | *47.9* | *63.7* | *42.6* |
| *Philadelphia, Pa* | *77.8* | *75.5* | *66.8* | *57.4* | *46.6* | *40.6* | *32.7* | *36.6* | *46.4* | *55.9* | *61.0* | *67.9* | *55.4* |
| *Pike's Peak, Colo* | *39.1* | *39.4* | *30.9* | *17.0* | *6.4* | *7.2* | *1.4* | *2.5* | *10.0* | *12.4* | *19.8* | *30.3* | *18.0* |
| *Pioche, Nev. m* | ..... | *73.9* | *64.4* | *49.1* | *39.2* | *32.9* | *29.5* | *32.7* | *41.8* | *46.7* | *55.4* | *67.5* | *n* 48.5 |
| *Pittsburgh, Pa* | 75.4 | 72.9 | 65.7 | 56.8 | 43.2 | 43.2 | 32.2 | 36.3 | 46.6 | 57.1 | 60.0 | 66.9 | 54.7 |
| *Port Huron, Mich* | 70.0 | 69.8 | 63.2 | 52.1 | 38.3 | 37.2 | 26.5 | 28.7 | 39.7 | 49.9 | 53.5 | 63.1 | 49.3 |
| *Portland, Me* | 68.2 | 68.3 | 63.2 | 49.7 | 43.5 | 34.5 | 26.6 | 31.5 | 38.9 | 48.3 | 56.1 | 63.3 | 49.3 |
| *Portland, Oreg* | 69.4 | 67.8 | 59.9 | 52.7 | 48.8 | 43.0 | 41.7 | 45.7 | 51.5 | 52.1 | 59.0 | 66.0 | 54.6 |
| *Portsmouth, N. C.* | 79.4 | 78.9 | 73.4 | *o* 66.7 | 57.4 | *p* 45.6 | *e* 42.7 | *q* 46.7 | *r* 57.8 | *e* 62.1 | *c* 69.5 | *o* 72.7 | ..... |
| *Punta Rassa, Fla* | 83.3 | 82.9 | *o* 82.5 | 77.9 | *p* 70.1 | 64.9 | 60.4 | 63.4 | 70.1 | 74.8 | 78.4 | 81.4 | *s* 74.2 |
| *Red Bluff, Cal* | 83.4 | 79.5 | 77.1 | 63.8 | 53.6 | 46.9 | 47.2 | 49.9 | 55.3 | 60.3 | 68.0 | 82.2 | 63.9 |
| *Rochester, N. Y* | 72.3 | 70.9 | 64.2 | 51.9 | 40.3 | 36.5 | 26.9 | 28.6 | 40.4 | 52.7 | 56.2 | 65.4 | 50.5 |
| *Roseburg, Oreg. t* | ..... | 67.4 | 59.5 | 51.3 | 48.2 | 41.9 | 43.4 | 47.1 | 50.5 | 50.8 | 56.7 | 63.9 | *n* 52.8 |
| *Sacramento, Cal* | 75.7 | 73.0 | 72.8 | 62.7 | 53.9 | 47.8 | 49.0 | 51.0 | 56.5 | 59.8 | 66.4 | 73.0 | 61.8 |
| *Salt Lake City, Utah* | 78.2 | 76.3 | *o* 65.0 | 51.0 | 40.1 | 31.7 | 30.0 | 37.3 | 46.6 | 49.8 | 56.2 | 69.4 | *u* 52.6 |
| *San Diego, Cal* | 68.9 | 68.5 | 67.9 | 63.6 | 60.1 | 56.2 | 55.0 | 55.5 | 56.3 | 58.2 | 61.6 | 64.2 | 61.3 |
| *Sandusky, Ohio v* | ..... | *c* 74.7 | 66.8 | 56.7 | 42.5 | 41.6 | 32.1 | 33.9 | 43.7 | 54.5 | 58.4 | 65.8 | *n* 51.9 |
| *Sandy Hook, N. J* | 73.9 | 75.4 | 67.3 | 58.1 | 47.3 | 40.8 | 33.5 | 35.1 | 44.4 | 51.8 | 59.4 | 65.7 | 54.4 |
| *San Francisco, Cal* | 59.9 | 58.6 | 61.2 | 58.2 | 56.5 | 52.6 | 53.0 | 53.2 | 55.6 | 55.2 | 57.2 | 58.2 | 56.6 |
| *Santa Fé, N. Mex* | 68.6 | 68.4 | 61.4 | 47.3 | 33.4 | 27.8 | 21.4 | 30.0 | 40.7 | 47.4 | 55.8 | 62.9 | 47.1 |
| *Savannah, Ga* | 83.8 | 81.6 | 76.7 | 68.7 | 59.4 | 55.1 | 51.2 | 53.9 | 63.9 | 69.4 | 76.9 | 78.9 | 68.3 |
| *Shreveport, La* | 81.8 | 82.2 | 75.6 | 65.4 | 51.7 | 51.2 | 46.6 | 50.4 | 64.5 | 69.0 | 73.9 | 79.0 | 65.9 |
| *Silver City, N. Mex. w* | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | *r* 71.9 | ..... |
| *Smithville, N. C* | 80.9 | 79.9 | 74.3 | 66.2 | 57.7 | 50.5 | 46.3 | 48.5 | 58.5 | 63.6 | 69.8 | 74.3 | 64.2 |
| *Springfield, Mass* | 73.7 | 73.3 | 65.1 | 53.0 | 43.9 | 36.2 | 28.6 | 31.0 | 42.2 | 53.1 | 59.2 | 66.3 | 52.1 |
| *Saint Louis, Mo* | 78.4 | 76.0 | 69.8 | 59.6 | 42.3 | 48.0 | 35.8 | 41.1 | 54.2 | 61.6 | 63.5 | 73.2 | 58.6 |
| *Saint Michael's, Alaska t* | ..... | 53.4 | 40.8 | 28.6 | 15.7 | 1.9 | 1.4 | −6.2 | 3.6 | 21.6 | 34.1 | 46.3 | *n* 21.9 |
| *Saint Mark's, Fla* | 81.4 | 78.6 | 77.3 | 68.7 | 57.8 | 53.7 | 47.0 | 52.6 | 61.9 | 68.2 | 73.8 | 78.9 | 66.7 |
| *Saint Paul, Minn* | 73.6 | 72.2 | 64.0 | 46.7 | 32.4 | 33.9 | 22.5 | 31.6 | 44.4 | 51.1 | 55.1 | 66.6 | 49.5 |
| *Thatcher's Island, Mass* | 64.5 | 68.4 | 61.7 | 51.6 | 44.1 | 36.9 | 29.2 | 32.1 | 38.1 | 46.6 | 53.6 | 61.0 | 49.0 |
| *Toledo, Ohio* | 74.4 | 72.9 | 65.7 | 56.3 | 42.4 | 41.2 | 32.7 | 34.0 | 44.9 | 56.5 | 59.9 | 67.3 | 54.0 |
| *Tybee Island, Ga* | 80.0 | 80.2 | 76.7 | 70.0 | 59.0 | 52.6 | 48.5 | 51.0 | 61.4 | 66.6 | 74.1 | 78.3 | 66.5 |
| *Umatilla, Oreg. t* | ..... | 75.0 | 61.5 | 49.7 | 43.6 | 35.2 | 35.2 | 44.4 | 51.6 | 54.9 | 63.0 | 72.1 | *n* 53.3 |
| *Vicksburg, Miss* | 82.4 | 81.1 | 74.0 | 66.0 | 53.3 | 54.1 | 47.7 | 51.3 | 65.1 | 68.9 | 73.9 | 78.4 | 66.3 |
| *Virginia City, Mont* | 65.2 | 65.2 | 51.7 | 39.1 | 28.1 | 24.0 | 23.1 | 27.9 | 37.8 | 39.8 | 45.5 | 58.6 | 42.2 |
| *Visalia, Cal* | 81.6 | 78.7 | 72.1 | 59.7 | 51.1 | 46.8 | 48.3 | 50.3 | 54.6 | 58.8 | 68.5 | 78.2 | 62.4 |
| *Washington, D. C* | 78.0 | 76.1 | 67.0 | 58.6 | 46.7 | 42.7 | 33.7 | 39.8 | 49.6 | 58.4 | 62.8 | 68.9 | 56.9 |
| *Winnemucca, Nev* | 74.9 | 72.0 | 61.8 | 47.4 | 38.2 | 30.3 | 31.5 | 35.3 | 43.5 | 48.4 | 55.4 | 69.0 | 50.6 |
| *Wilmington, N. C* | 80.0 | 78.5 | 72.4 | 65.4 | 57.5 | 50.4 | 46.1 | 51.2 | 59.3 | 63.6 | 68.9 | 72.8 | 63.8 |
| *Wood's Holl, Mass* | 68.2 | 70.9 | 64.6 | 54.7 | 46.5 | 39.8 | 33.0 | 34.5 | 40.5 | 48.7 | 55.8 | 62.2 | 51.6 |
| *Yankton, Dak* | 73.4 | 71.2 | 64.7 | 46.8 | 31.3 | 34.2 | 21.8 | 33.2 | 43.4 | 50.5 | 54.5 | 66.5 | 49.3 |

*a* Local observations commenced August 9, 1877, ceased April 10, 1878.
*b* Twenty-three days only.
*c* Thirty days only.
*d* Local observations commenced July 9, 1877, ceased April 10, 1878.
*e* Twenty-six days only.
*f* Discontinued October 31, 1877.
*g* One observation missed in December, 1877.
*h* Local observations commenced August 2, 1877, ceased April 10, 1878.
*i* Twenty days only.
*j* Local observations began April 1, 1878.
*k* One observation missed in March, 1878.
*l* One observation missed in August, 1877.
*m* Opened July 28, 1877.
*n* Eleven months only.
*o* Twenty-nine days only.
*p* Twenty-seven days only.
*q* Eighteen days only.
*r* Twenty-eight days only.
*s* One observation missed in September and three missed in November, 1877.
*t* Observations commenced July 15, 1877.
*u* One observation missed in September, 1877.
*v* Opened August 2, 1877.
*w* Observations commenced May 16, 1878.

PAPER 16.

*Monthly and annual amounts of rain-fall in inches and hundredths, from July, 1877, to June, 1878, inclusive.*

| Stations. | 1877. | | | | | | 1878. | | | | | | Annual amounts. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | |
| Albany, N. Y. | 4.00 | 4.57 | 1.82 | 7.86 | 2.70 | 0.71 | 4.45 | 4.12 | 2.18 | 3.99 | 3.65 | 4.54 | 44.59 |
| Alpena, Mich. | 3.56 | 7.99 | 1.75 | 13.18 | 3.81 | 1.75 | 0.82 | 2.94 | 1.20 | 2.74 | 3.34 | 4.74 | 47.82 |
| Atlantic City, N. J. | 6.13 | 1.40 | 3.39 | 3.24 | 5.37 | 2.73 | 4.65 | 1.36 | 3.79 | 2.20 | 3.52 | 5.12 | 42.90 |
| Augusta, Ga. | 1.85 | 5.25 | 4.09 | 4.98 | 6.06 | 3.22 | 4.19 | 2.24 | 0.75 | 2.37 | 3.63 | 3.41 | 42.04 |
| Baltimore, Md. | 4.60 | 0.64 | 5.27 | 5.22 | 6.85 | 2.23 | 4.51 | 3.31 | 4.74 | 4.19 | 5.38 | 4.09 | 51.03 |
| Barnegat, N. J. | 5.13 | 1.07 | 3.21 | 7.92 | 8.71 | 2.16 | 5.49 | 1.33 | 4.85 | 1.63 | 4.18 | 6.67 | 52.35 |
| Bismarck, Dak. | 2.52 | 0.35 | 0.11 | 0.94 | 0.40 | 0.69 | 0.00 | 0.26 | 1.46 | 5.71 | 3.15 | 2.78 | 18.37 |
| Boerne, Tex. | 1.36 | 1.79 | 4.35 | a5.09 | 1.35 | 5.82 | (b) | c1.62 | 0.91 | (b) | d3.67 | (e) | ..... |
| Boise City, Idaho. | 0.35 | 0.09 | 0.27 | 0.85 | 2.05 | 0.01 | 1.73 | 2.18 | 1.63 | 0.37 | 1.18 | 0.86 | 11.57 |
| Boston, Mass. | 2.27 | 4.49 | 0.60 | 8.84 | 9.62 | 1.32 | 7.60 | 4.40 | 5.91 | 6.14 | 1.03 | 2.28 | 54.50 |
| Brackettville, Tex. | 3.08 | 0.27 | 2.54 | 0.56 | 0.55 | 3.52 | 0.18 | 0.47 | 2.11 | 1.50 | 6.24 | 5.16 | 26.18 |
| Breckenridge, Minn. | 6.54 | 3.36 | 2.50 | 2.85 | 0.29 | 1.17 | 0.06 | 0.18 | 4.07 | 7.77 | 2.77 | 7.01 | 38.57 |
| Brownsville, Tex. | 0.90 | 1.52 | 0.69 | 3.33 | 1.21 | 6.32 | 3.67 | 0.63 | 4.15 | 1.25 | 2.96 | 0.74 | 27.37 |
| Buffalo, N. Y. | 1.85 | 2.95 | 2.55 | 6.17 | 4.27 | 1.50 | 4.64 | 1.70 | 5.11 | 4.71 | 3.36 | 3.46 | 42.27 |
| Burkes, Arizf. | | | | | | 0.22 | 0.00 | 0.00 | 0.28 | 0.17 | c0.21 | 0.00 | ..... |
| Burlington, Vt. | 4.06 | 4.74 | 3.45 | 6.39 | 2.21 | 1.46 | 7.52 | 0.79 | 1.65 | 3.06 | 3.05 | 2.49 | 40.87 |
| Cairo, Ill. | 5.63 | 1.58 | 3.15 | 3.12 | 4.76 | 4.55 | 3.05 | 1.94 | 2.97 | 5.61 | 4.41 | 4.61 | 45.28 |
| Cambridge, Tex. | 3.52 | 1.32 | 4.40 | 8.19 | 4.35 | 2.92 | (g) | ..... | ..... | ..... | ..... | ..... | ..... |
| Camp Grant, Ariz. | d0.68 | 2.94 | 0.83 | 0.71 | 0.02 | 2.20 | 0.23 | 0.50 | 0.37 | 0.18 | 0.00 | 0.32 | ..... |
| Campo, Cal. | 0.50 | 0.00 | 0.00 | h0.35 | (b) | e2.44 | 1.79 | 5.45 | 1.84 | 5.75 | 0.41 | 0.00 | ..... |
| Camp Verde, Ariz. | 0.70 | 0.41 | 2.08 | 0.43 | 0.05 | 2.23 | 0.14 | 1.12 | 1.84 | 1.75 | (i) | 0.06 | ..... |
| Cape Hatteras, N. C. | 9.80 | 4.18 | 15.41 | 6.17 | 8.38 | 13.38 | 9.43 | 4.72 | 3.86 | 7.38 | 6.81 | 4.47 | 93.99 |
| Cape Henry, Va. | 6.48 | 3.32 | 10.04 | 6.79 | 5.44 | 5.28 | 5.58 | 2.40 | 2.45 | 9.39 | 7.36 | 3.18 | 67.71 |
| Cape Lookout, N. C. | 8.78 | 13.33 | 16.32 | 5.61 | 12.23 | 8.14 | 9.20 | 3.90 | 2.01 | 4.21 | 3.43 | 6.35 | 93.51 |
| Cape May, N. J. | 4.35 | 2.54 | 7.22 | 5.34 | 4.47 | 2.57 | 5.02 | 0.63 | 3.61 | 2.06 | 6.11 | 4.07 | 47.99 |
| Castroville, Tex. | (i) | 0.07 | 0.02 | 1.62 | 1.50 | 5.05 | 1.27 | 2.16 | 0.38 | 1.80 | 4.64 | 2.64 | ..... |
| Charleston, S. C. | 10.21 | 2.21 | 6.30 | 4.87 | 7.02 | 4.22 | 7.83 | 3.15 | 1.94 | 9.08 | 6.32 | 5.47 | 68.62 |
| Cheyenne, Wyo. | 0.43 | 0.83 | 2.02 | 1.99 | 0.17 | 0.33 | 0.08 | 0.13 | 1.16 | 0.19 | 4.46 | 1.71 | 13.50 |
| Chicago, Ill. | 2.98 | 3.06 | 2.02 | 6.51 | 6.08 | 2.75 | 1.31 | 2.12 | 4.39 | 5.57 | 5.22 | 3.02 | 45.03 |
| Cincinnati, Ohio. | 4.25 | 2.26 | 1.66 | 1.85 | 3.49 | 3.35 | 4.33 | 2.33 | 4.03 | 3.05 | 2.53 | 5.03 | 38.16 |
| Cleveland, Ohio. | 3.51 | 3.65 | 1.90 | 3.60 | 2.33 | 1.52 | 4.43 | 2.51 | 5.08 | 2.89 | 3.03 | 2.68 | 37.13 |
| Coleman City, Tex. | 4.20 | 1.17 | 7.08 | 4.33 | 1.89 | 8.42 | 0.40 | 0.60 | 0.03 | 2.64 | 0.72 | 7.90 | 39.38 |
| Concho, Tex. | 0.56 | 2.92 | 5.18 | 1.70 | 1.78 | 2.89 | 0.05 | 1.27 | 0.77 | 3.23 | 0.17 | 3.31 | 23.83 |
| Corsicana, Tex. | 3.50 | 2.85 | 2.33 | 6.81 | 6.21 | 3.96 | 4.41 | 2.85 | 1.52 | 2.92 | 5.75 | 5.42 | 48.53 |
| Davenport, Iowa. | 3.42 | 3.21 | 1.45 | 4.88 | 2.53 | 2.32 | 0.36 | 1.09 | 2.21 | 2.89 | 5.14 | 4.36 | 33.86 |
| Deadwood, Dak. | ..... | ..... | ..... | ..... | ..... | ..... | 0.30 | 1.01 | 3.85 | 8.77 | 7.80 | ..... | ..... |
| Decatur, Tex. | 2.20 | 1.00 | 6.07 | k0.70 | 15.08 | m2.20 | n8.50 | 2.77 | 0.23 | 0.96 | 3.84 | 7.80 | ..... |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Denison, Tex* | *0.74* | *2.34* | *3.90* | *10.74* | *5.01* | *3.99* | *2.07* | *3.79* | *0.61* | *3.71* | *6.71* | *6.58* | *50.19* |
| *Denver, Col* | *0.33* | *1.30* | *0.38* | *2.15* | *0.73* | *0.79* | *0.10* | *0.48* | *1.82* | *0.05* | *2.90* | *2.78* | *13.81* |
| *Detroit, Mich* | *1.57* | *7.29* | *0.39* | *4.72* | *4.10* | *1.49* | *3.04* | *2.58* | *3.34* | *2.06* | *2.77* | *3.36* | *36.71* |
| *Dodge City, Kans* | *1.79* | *4.09* | *0.50* | *3.34* | *0.56* | *4.36* | *0.21* | *1.13* | *1.01* | *1.06* | *4.63* | *2.19* | *24.87* |
| *Dubuque, Iowa* | *2.90* | *3.96* | *0.67* | *5.35* | *3.31* | *2.70* | *0.49* | *1.93* | *2.44* | *4.34* | *4.61* | *4.35* | *37.05* |
| *Duluth, Minn* | *3.57* | *1.48* | *5.67* | *4.92* | *1.05* | *1.95* | *0.55* | *0.32* | *1.34* | *5.18* | *2.83* | *4.81* | *33.67* |
| *Eagle Pass, Tex* | *4.80* | *0.35* | *1.39* | *0.35* | *0.25* | *5.40* | *0.34* | *2.03* | *0.93* | *0.77* | *4.43* | *4.39* | *25.43* |
| *Eastport, Me* | *3.36* | *5.85* | *1.73* | *4.67* | *8.20* | *2.96* | *7.05* | *1.89* | *6.07* | *5.54* | *2.49* | *5.65* | *55.46* |
| *Edinburg, Tex* | *10.23* | *n0.44* | *o0.13* | *(i)* | *(i)* | *(i)* | *(i)* | *(i)* | *(i)* | *(i)* | *8.03* | *1.68* | ..... |
| *El Paso, Tex p* | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | *0.00* | *0.00* | *0.00* | ..... |
| Erie, Pa | 3.48 | 3.31 | 2.27 | 4.55 | 6.27 | 2.27 | 6.20 | 3.41 | 5.41 | 3.18 | 6.31 | 3.35 | 50.01 |
| Escanaba, Mich | 2.66 | 5.19 | 2.70 | 7.19 | 3.78 | 3.53 | 0.31 | 0.89 | 0.78 | 5.13 | 3.99 | 6.49 | 42.64 |
| Florence, Ariz | 0.00 | 0.13 | 0.81 | 0.49 | 0.00 | 2.02 | 0.06 | 1.03 | 1.09 | 1.55 | 0.00 | 0.00 | 7.18 |
| Fort Bayard, N. Mex | *(i)* | 1.02 | 0.86 | 0.63 | 0.10 | 1.01 | 0.03 | 0.49 | 1.05 | 0.40 | *(c)* | ..... | ..... |
| Fort Craig, N. Mex | 2.77 | 1.41 | 1.55 | *(i)* | *(i)* | *(i)* | *(i)* | *(i)* | *(i)* | *(i)* | *(i)* | *(i)* | ..... |
| Fort Davis, Tex *p* | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 0.09 | 1.12 | 2.73 | ..... |
| Fort Gibson, Ind. Ter | 2.89 | 3.78 | 2.21 | 6.36 | 4.19 | 3.00 | 2.79 | 2.40 | 1.44 | 2.83 | 7.52 | 6.61 | 46.02 |
| Fort Griffin, Tex | 2.50 | 2.09 | 2.53 | 7.84 | 4.54 | 4.86 | 0.04 | 0.02 | 0.00 | 1.20 | 2.51 | 9.83 | 37.96 |
| Fort McKavett, Tex | 1.76 | 0.51 | *q*4.91 | 2.03 | 1.49 | 4.26 | 0.05 | 2.23 | *(i)* | 0.32 | 0.75 | 5.72 | ..... |
| Fort Sill, Ind. Ter | 4.49 | 2.50 | 5.98 | 6.86 | 4.65 | 6.97 | 1.91 | 1.83 | 0.35 | 1.85 | 4.06 | 8.86 | 50.31 |
| Fort Sully, Dak | 3.69 | 0.84 | 0.44 | *r*1.11 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Fredericksburg, Tex | *(i)* | 0.19 | 1.09 | 3.93 | 1.50 | 4.79 | 0.61 | 2.15 | 0.79 | 5.13 | 3.66 | 3.89 | ..... |
| Galveston, Tex | 1.89 | 1.27 | 13.85 | 17.39 | 6.77 | 5.86 | 4.66 | 3.88 | 1.03 | 3.50 | 3.90 | 3.47 | 67.47 |
| Graham, Tex | 1.99 | 0.69 | *(s)* | ..... | ..... | ..... | ..... | 0.57 | 0.12 | 1.11 | 5.15 | 8.75 | ..... |
| Grand Haven, Mich | 1.42 | 1.52 | 0.67 | 6.45 | 6.47 | 3.97 | 1.34 | 1.42 | 4.51 | 2.10 | 2.57 | 1.85 | 34.29 |
| Henrietta, Tex *t* | ..... | ..... | ..... | ..... | ..... | ..... | ..... | *(t)* | 0.09 | 1.62 | 8.33 | *(e)* | ..... |
| Indianapolis, Ind | 4.19 | 4.13 | 2.04 | 3.22 | 3.64 | 2.45 | 2.38 | 2.10 | 1.23 | 5.51 | 3.24 | 2.25 | 36.38 |
| Indianola, Tex | 2.02 | 1.98 | 2.29 | 11.75 | 4.83 | 5.92 | 3.71 | 4.17 | 2.51 | 3.52 | 5.39 | 2.70 | 50.79 |
| Jacksboro', Tex | 2.64 | 2.29 | *(i)* | *(i)* | *(i)* | 3.28 | 0.19 | 1.35 | 0.15 | 0.68 | 3.88 | 10.91 | ..... |
| Jacksonville, Fla | 4.82 | 4.82 | 5.15 | 6.75 | 4.49 | 3.32 | 3.14 | 5.32 | 2.37 | 5.38 | 1.52 | 5.03 | 52.11 |
| Keokuk, Iowa | 7.06 | 2.52 | 3.61 | 7.11 | 3.05 | 2.90 | 0.17 | 2.95 | 3.78 | 2.31 | 3.47 | 3.93 | 42.86 |
| Key West, Fla | 2.14 | 5.51 | 5.04 | 5.17 | 5.00 | 1.69 | 5.26 | 4.74 | 2.95 | 1.02 | 2.66 | 5.12 | 46.30 |
| Kittyhawk, N. C | 4.95 | 8.39 | 13.39 | 4.08 | 5.42 | 8.92 | 10.15 | 4.48 | 2.10 | 8.95 | 5.33 | 2.64 | 80.82 |
| Knoxville, Tenn | 2.12 | 2.01 | 7.38 | 3.70 | 6.57 | 2.36 | 2.85 | 1.01 | 2.87 | 4.69 | 2.38 | 5.10 | 43.04 |
| La Crosse, Wis | 5.83 | 5.16 | 1.91 | 3.84 | 3.88 | 1.53 | 0.76 | 0.54 | 1.38 | 2.43 | 2.83 | 3.70 | 33.79 |
| La Mesilla, N. Mex | *(i)* | 0.01 | 0.91 | 0.98 | 0.06 | 0.41 | 0.07 | 0.43 | 0.69 | *(i)* | *(i)* | *(i)* | ..... |
| Laredo, Tex | 1.76 | 0.10 | 0.59 | 0.52 | 0.45 | 4.39 | 0.93 | 1.45 | 3.55 | 1.20 | 3.45 | 2.49 | 20.88 |
| Leavenworth, Kans | 5.34 | 2.85 | 1.95 | 4.87 | 2.44 | 3.18 | 2.34 | 2.94 | 2.35 | 2.86 | 5.28 | 5.27 | 41.67 |
| Los Angeles, Cal | 0.00 | 0.00 | 0.00 | 0.86 | 0.45 | 3.93 | 3.33 | 7.68 | 2.57 | 1.71 | 0.66 | 0.07 | 21.26 |
| Louisville, Ky | 4.19 | 2.70 | 3.02 | 1.81 | 4.49 | 4.19 | 3.25 | 2.25 | 4.06 | 3.53 | 4.50 | 5.34 | 43.33 |
| Lynchburg, Va | 3.43 | 1.77 | 3.71 | 8.64 | 9.65 | 1.97 | 4.15 | 1.79 | 2.99 | 4.96 | 3.87 | 3.51 | 50.44 |
| Maricopa Wells, Ariz *u* | 1.26 | 0.00 | 1.07 | 0.00 | 0.01 | 1.54 | 0.00 | 1.01 | ..... | ..... | ..... | ..... | ..... |
| Marquette, Mich | 5.59 | 1.17 | 3.21 | 4.97 | 4.75 | 1.26 | 1.58 | 1.25 | 1.62 | 3.73 | 1.73 | 8.63 | 39.49 |

*a* Twenty-nine days only.
*b* No observations taken.
*c* Twenty-three days only.
*d* Eighteen days only.
*e* Closed.
*f* Station transferred from Stanwix, Ariz., December 5, 1877.
*g* Discontinued January 5, 1878.
*h* Fifteen days only.
*i* No record.
*j* Observations commenced December 25, 1877; closed June 1, 1878.
*k* Twenty-four days only.
*l* Twenty-seven days only.
*m* Thirty days only.
*n* Twenty-eight days only.
*o* Nineteen days only.
*p* Opened April 1, 1878.
*q* Seventeen days only.
*r* Discontinued October 31, 1877.
*s* Discontinued Sept. 10, 1877; reopened January 23, 1878.
*t* Opened February 2, 1878.
*u* Closed March 14, 1878.
*v* Twenty days only.

*Monthly and annual amounts of rain-fall in inches and hundredths, &c.*—Continued.

| Stations. | 1877. | | | | | | 1878. | | | | | | Annual amounts. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | |
| Mason, Tex | 2.15 | 1.15 | 0.29 | 1.15 | 0.78 | 6.62 | 0.45 | 1.36 | 0.86 | 2.94 | 2.25 | 2.98 | 22.98 |
| Memphis, Tenn | 6.22 | 6.05 | 3.11 | 3.75 | 5.97 | 4.44 | 4.11 | 5.08 | 3.80 | 11.93 | 3.66 | 5.47 | 63.59 |
| Milwaukee, Wis | 2.06 | 6.31 | 0.48 | 7.15 | 4.95 | 3.25 | 1.80 | 3.10 | 3.89 | 5.83 | 4.96 | 4.88 | 48.66 |
| Mobile, Ala | 3.74 | 4.69 | 12.68 | 6.15 | 4.70 | 5.99 | 4.57 | 3.40 | 4.33 | 4.09 | 4.90 | 6.60 | 65.84 |
| Montgomery, Ala | 3.43 | 1.07 | 4.07 | 2.51 | 3.75 | 4.79 | 5.39 | 2.59 | 2.64 | 5.91 | 4.06 | 5.85 | 46.06 |
| Morgantown, W. Va | 5.80 | 4.65 | 2.54 | 3.53 | 4.52 | 1.62 | 3.95 | 1.20 | 3.82 | 2.80 | 2.87 | 4.35 | 41.65 |
| Mount Washington, N. H | 11.27 | 11.11 | 2.79 | 7.75 | 17.55 | 6.01 | 8.54 | 5.88 | 10.66 | 23.41 | 9.28 | 7.67 | 121.92 |
| Nashville, Tenn | 3.25 | 4.16 | 5.40 | 2.61 | 4.93 | 2.49 | 3.34 | 2.11 | 3.48 | 6.88 | 2.33 | 3.28 | 44.26 |
| New Haven, Conn | 2.37 | 5.69 | 1.13 | 10.09 | 7.11 | 1.46 | 6.80 | 6.40 | 4.18 | 5.08 | 3.75 | 2.62 | 56.68 |
| New London, Conn | 3.98 | 4.90 | 1.21 | 6.78 | 5.15 | 0.73 | 5.18 | 1.22 | 2.22 | 1.63 | 0.98 | 2.76 | 36.74 |
| New Orleans, La | 6.41 | 2.54 | 13.21 | 9.15 | 6.58 | 4.96 | 5.36 | 3.50 | 4.63 | 1.51 | 8.11 | 7.35 | 73.31 |
| Newport, R. I | 5.49 | 3.90 | 0.68 | 6.89 | 6.74 | 1.23 | 7.06 | 3.21 | 5.77 | 6.87 | 4.54 | 3.46 | 55.84 |
| New York, N. Y | 3.86 | 2.54 | 1.33 | 7.69 | 5.48 | 0.95 | 4.53 | 3.41 | 4.02 | 1.93 | 3.73 | 2.91 | 42.68 |
| Norfolk, Va | 7.97 | 3.78 | 11.90 | 7.82 | 5.54 | 4.34 | 6.02 | 2.06 | 1.21 | 4.50 | 6.01 | 5.13 | 66.28 |
| North Platte, Nebr | 2.04 | 5.03 | 4.49 | 1.23 | 0.30 | 3.86 | 0.00 | 0.18 | 1.40 | 1.15 | 3.24 | 5.85 | 28.77 |
| Olympia, Wash | 0.24 | 1.64 | 6.64 | 7.00 | 19.88 | 11.73 | 9.82 | 14.20 | 7.90 | 1.21 | 1.36 | 0.24 | 81.86 |
| Omaha, Nebr | 0.96 | 3.13 | 2.05 | 5.86 | 1.36 | 2.14 | 1.13 | 0.14 | 3.09 | 3.97 | 5.77 | 8.48 | 38.08 |
| Oswego, N. Y | 5.89 | 2.19 | 2.83 | 2.37 | 4.04 | 2.34 | 4.16 | 2.98 | 4.05 | 3.42 | 3.69 | 3.28 | 41.24 |
| Pembina, Dak | 1.47 | 0.51 | 1.40 | 0.69 | 0.55 | 1.08 | 0.12 | 0.26 | 4.50 | 5.78 | 2.54 | 3.57 | 22.47 |
| Philadelphia, Pa | 5.53 | 0.66 | 2.74 | 6.52 | 5.14 | 0.83 | 3.94 | 1.64 | 2.89 | 2.55 | 3.29 | 3.66 | 39.39 |
| Phœnix, Ariz | (*a*) | 0.02 | 1.11 | 0.04 | 0.03 | 0.43 | 0.07 | 1.07 | 0.96 | 1.25 | 0.03 | 0.00 | ..... |
| Pike's Peak, Colo | 2.70 | 2.10 | 2.69 | 3.74 | 0.54 | 0.41 | 0.29 | 1.45 | 2.95 | 3.77 | 4.32 | 3.49 | 28.45 |
| Pilot Point, Tex | 1.84 | *b*0.78 | 4.86 | *c*10.42 | 6.33 | *c*0.35 | 0.19 | *d*1.11 | 0.00 | 0.11 | 1.15 | 4.23 | ..... |
| Pioche, Nev | ..... | 0.18 | 0.16 | 0.48 | 0.00 | 0.95 | 0.46 | 1.67 | 0.73 | 1.31 | 1.27 | 0.04 | *f*7.25 |
| Pittsburgh, Pa | 3.98 | 2.10 | 1.90 | 2.76 | 4.48 | 1.69 | 2.52 | 1.14 | 2.42 | 2.60 | 1.76 | 5.18 | 32.53 |
| Port Huron, Mich | 1.59 | 4.03 | 0.28 | 3.96 | 3.93 | 1.11 | 1.41 | 1.53 | 5.17 | 2.88 | 2.41 | 2.90 | 31.20 |
| Portland, Me | 2.81 | 7.90 | 1.11 | 5.56 | 7.84 | 1.20 | 3.83 | 3.28 | 2.19 | 5.60 | 1.16 | 3.13 | 45.61 |
| Portland, Oreg | 0.54 | 1.70 | 3.36 | 5.03 | 12.45 | 6.87 | 6.67 | 12.16 | 6.23 | 1.85 | 2.17 | 0.13 | 59.16 |
| Portsmouth, N. C | 8.74 | 8.22 | 12.74 | *g*5.00 | 5.14 | *h*6.53 | *e*8.70 | *i*3.69 | 1.28 | *j*5.54 | 3.37 | 4.54 | ..... |
| Prescott, Ariz | 1.29 | 0.24 | 2.42 | 1.36 | 0.00 | 2.20 | 0.28 | 2.02 | 0.48 | 2.86 | 0.33 | 0.33 | 13.81 |
| Punta Rassa, Fla | 6.59 | 8.33 | 4.86 | 1.99 | 4.30 | 0.93 | 4.03 | 7.41 | 2.24 | 4.05 | 5.06 | 4.75 | 54.54 |
| Red Bluff, Cal | 0.05 | 0.03 | 0.00 | 1.35 | 3.13 | 3.98 | 20.71 | 16.66 | 4.16 | 2.21 | 0.89 | 0.00 | 53.17 |
| Rio Grande City, Tex | 1.40 | 2.98 | 0.11 | 0.51 | 0.13 | 4.62 | (*a*) | (*a*) | 4.15 | 0.13 | 5.72 | 0.27 | ..... |
| Rochester, N. Y | 4.42 | 2.98 | 2.31 | 3.06 | 5.46 | 1.75 | 8.05 | 4.84 | 4.89 | 3.71 | 2.25 | 1.69 | 45.41 |
| Roseburg, Oreg | ..... | 0.25 | 1.40 | 2.76 | 8.76 | 4.96 | 8.70 | 7.30 | 6.36 | 0.79 | 1.62 | 0.39 | *f*43.29 |
| Sacramento, Cal | 0.00 | 0.00 | 0.00 | 0.73 | 1.07 | 1.43 | 9.26 | 8.04 | 3.09 | 1.07 | 0.17 | 0.00 | 24.86 |
| Salt Lake City, Utah | 0.02 | 0.28 | 0.90 | 2.41 | 1.02 | 1.11 | 1.07 | 3.49 | 2.54 | 2.63 | 2.50 | 0.35 | 18.32 |
| San Antonio, Tex | 2.87 | 0.56 | 2.67 | 5.67 | 1.67 | 7.27 | 1.70 | 2.32 | 0.94 | 2.37 | 6.71 | 4.08 | 38.83 |
| San Diego, Cal | 0.00 | 0.00 | 0.00 | 0.81 | 0.06 | 3.89 | 1.45 | 4.83 | 1.41 | 2.91 | 0.58 | 0.16 | 16.10 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sandusky, Ohio l* | ..... | *h6.28* | *0.73* | *4.39* | *3.41* | *1.53* | *3.39* | *3.06* | *5.33* | *2.32* | *2.96* | *2.61* | *f36.01* |
| *Sandy Hook, N. J* | *5.67* | *4.18* | *2.40* | *7.15* | *6.80* | *0.80* | *6.38* | *3.05* | *5.67* | *1.68* | *6.63* | *4.45* | *54.86* |
| *San Francisco, Cal* | *0.02* | *0.00* | *0.00* | *0.65* | *1.57* | *2.66* | *11.97* | *12.52* | *4.56* | *1.06* | *0.16* | *0.01* | *35.18* |
| *Santa Fé, N. Mex* | *3.54* | *1.72* | *0.96* | *1.32* | *0.70* | *0.63* | *0.21* | *0.89* | *0.73* | *0.22* | *1.01* | *3.18* | *15.11* |
| *Savannah, Ga* | *5.67* | *3.69* | *8.92* | *5.57* | *3.72* | *4.06* | *2.99* | *2.25* | *1.47* | *6.00* | *1.11* | *6.99* | *52.44* |
| *Shreveport, La* | *2.37* | *0.20* | *9.93* | *9.30* | *3.76* | *3.75* | *5.29* | *2.67* | *5.70* | *5.64* | *7.04* | *7.65* | *63.30* |
| *Silver City, N. Mex m* | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | *0.05* | ..... |
| *Smithville, N. C* | *4.51* | *3.78* | *11.87* | *6.84* | *6.56* | *7.05* | *6.90* | *3.36* | *0.87* | *2.13* | *4.30* | *5.61* | *63.78* |
| *Springfield, Mass* | *4.20* | *2.04* | *0.75* | *8.09* | *6.56* | *1.03* | *4.39* | *4.69* | *4.19* | *7.07* | *2.42* | *8.65* | *54.08* |
| *Stanwix, Ariz* | *0.13* | *0.03* | *0.49* | *0.00* | *0.00* | *(n)* | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Saint Louis, Mo | 2.88 | 2.61 | 3.56 | 4.92 | 3.76 | 3.34 | 2.36 | 1.69 | 2.79 | 6.74 | 4.63 | 2.40 | 41.68 |
| Saint Mark's, Fla | 8.72 | 7.90 | 4.78 | 10.61 | 5.78 | 7.79 | 2.95 | 3.07 | 8.65 | 7.65 | 2.41 | 7.24 | 77.55 |
| Saint Michael's, Alaska *o* | ..... | 2.48 | 2.23 | 0.27 | 0.52 | 0.11 | 0.11 | 0.12 | 0.12 | 0.44 | 2.59 | 1.40 | *f*10.39 |
| Stockton, Tex | 0.56 | 0.37 | 3.11 | 0.88 | 0.71 | 1.33 | 0.00 | 1.05 | 2.06 | 0.83 | 0.88 | 2.85 | 14.63 |
| Saint Paul, Minn | 0.52 | 2.83 | 2.56 | 3.62 | 1.24 | 1.42 | 1.00 | 0.67 | 1.24 | 2.43 | 2.33 | 3.58 | 23.44 |
| Thatcher's Island, Mass | 3.65 | 1.86 | 0.51 | 7.15 | 7.57 | 1.37 | 6.21 | 4.99 | 5.12 | 5.29 | 0.93 | 1.52 | 46.17 |
| Toledo, Ohio | 0.99 | 5.85 | 1.06 | 4.62 | 4.88 | 1.61 | 3.47 | 1.59 | 1.05 | 2.29 | 5.24 | 2.01 | 34.66 |
| Tucson, Ariz | 3.04 | 0.02 | 2.44 | 0.46 | 0.00 | 2.91 | 0.22 | 1.00 | 1.77 | 0.52 | 0.00 | 0.65 | 13.03 |
| Tybee Island, Ga | 3.36 | 7.80 | 11.24 | 5.00 | 4.64 | 4.15 | 3.23 | 2.89 | 2.08 | 6.45 | 1.02 | 7.63 | 59.49 |
| Umatilla, Oregon | ..... | 0.02 | 0.59 | 0.68 | 1.92 | 0.64 | 1.14 | 1.26 | 1.72 | 0.01 | 0.36 | 0.02 | *f*8.36 |
| Uvalde, Tex | 1.17 | 0.09 | 1.92 | 0.77 | 1.01 | 6.74 | 0.57 | 1.59 | 2.62 | 2.32 | *p*2.98 | 1.53 | ..... |
| Vicksburg, Miss | 2.95 | 1.14 | 6.94 | 5.00 | 9.03 | 2.86 | 4.10 | 2.49 | 5.24 | 7.13 | 4.57 | 8.81 | 60.26 |
| Virginia City, Mont | 1.79 | 0.23 | 2.70 | 1.39 | 1.19 | 0.14 | 0.45 | 0.62 | 0.91 | 1.83 | 5.13 | 3.78 | 20.16 |
| Visalia, Cal | 0.00 | 0.00 | 0.00 | 0.00 | 0.53 | 0.83 | 3.25 | 3.98 | 1.13 | 0.69 | 0.08 | 0.00 | 10.49 |
| Washington, D. C | 6.50 | 2.74 | 4.93 | 6.50 | 7.18 | 3.22 | 4.77 | 2.54 | 4.31 | 3.32 | 5.27 | 6.33 | 57.61 |
| Wickenburg, Ariz | 0.19 | 0.05 | 1.06 | 0.00 | 0.00 | *h*0.71 | 0.67 | *p*0.60 | 0.51 | 0.80 | 0.35 | 0.05 | ..... |
| Winnemucca, Nev | 0.27 | 0.00 | 0.00 | 0.02 | 0.79 | 0.00 | 0.21 | 0.89 | 1.36 | 0.25 | 1.32 | 0.55 | 5.66 |
| Wilmington, N. C | 9.35 | 10.46 | 20.10 | 6.68 | 4.94 | 7.13 | 7.52 | 4.07 | 2.33 | 2.41 | 4.80 | 4.33 | 84.12 |
| Wood's Holl, Mass | 5.69 | 5.42 | 0.28 | 6.97 | 6.08 | 1.20 | 5.47 | 3.43 | 6.23 | 5.09 | 4.28 | 2.23 | 52.37 |
| Yankton, Dak | 1.17 | 1.16 | 1.23 | 3.66 | 0.54 | 2.46 | 0.20 | 0.27 | 0.93 | 5.14 | 4.04 | 7.83 | 28.63 |
| Yuma, Ariz | 0.50 | 0.06 | 0.00 | 0.00 | 0.00 | 1.23 | 0.00 | 0.06 | 0.13 | 0.02 | 0.00 | 0.00 | 2.00 |

*a* No record.
*b* Twenty-two days only.
*c* Twenty-eight days only.
*d* Twenty-four days only.
*e* Observations commenced July 28, 1877.
*f* Eleven months only.
*g* Twenty-nine days only.
*h* Thirty days only.
*i* Twenty-five days only.
*j* Twenty-seven days only.
*k* Observations commenced July 16, 1877.
*l* Opened August 2, 1877.
*m* Opened May 16, 1878.
*n* Closed December 31, 1877.
*o* Observations commenced July 15, 1877.
*p* Twenty-six days only.

PAPER 17.

*Maximum, minimum, and mean temperatures.*

STATION, ALBANY, N. Y.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 83 | 66 | 81 | 64 | 71 | 60 | 75 | 55 | 48 | 36 | 35 | 17 | 29 | 10 | 25 | 11 | 41 | 14 | 53 | 35 | 64 | 53 | 74 | 51 |
| 2 | 70 | 61 | 80 | 65 | 70 | 53 | 74 | 52 | 56 | 40 | 26 | 12 | 35 | 9 | 19 | 4 | 43 | 20 | 49 | 36 | 71 | 56 | 78 | 51 |
| 3 | 80 | 55 | 84 | 63 | 65 | 52 | 74 | 50 | 48 | 39 | 36 | 17 | 15 | − 7 | 18 | − 6 | 46 | 40 | 57 | 36 | 82 | 60 | 78 | 60 |
| 4 | 78 | 62 | 77 | 60 | 72 | 54 | 68 | 50 | 45 | 35 | 42 | 22 | 30 | − 8 | 25 | − 5 | 43 | 23 | 58 | 33 | 72 | 56 | 79 | 63 |
| 5 | 82 | 59 | 79 | 55 | 78 | 57 | 54 | 39 | 50 | 36 | 53 | 35 | 30 | 10 | 34 | 5 | 41 | 23 | 43 | 34 | 57 | 47 | 69 | 50 |
| 6 | 74 | 59 | 79 | 57 | 69 | 56 | 55 | 39 | 48 | 28 | 46 | 34 | 12 | − 9 | 37 | 13 | 52 | 35 | 45 | 36 | 63 | 45 | 63 | 42 |
| 7 | 79 | 55 | 82 | 62 | 64 | 55 | 57 | 39 | 45 | 30 | 38 | 24 | 10 | −12 | 41 | 24 | 52 | 42 | 47 | 38 | 64 | 42 | 68 | 40 |
| 8 | 83 | 62 | 86 | 63 | 68 | 50 | 57 | 44 | 54 | 37 | 45 | 29 | 22 | −18 | 42 | 22 | 59 | 38 | 54 | 40 | 76 | 52 | 59 | 50 |
| 9 | 75 | 68 | 85 | 63 | 72 | 49 | 58 | 49 | 60 | 39 | 40 | 22 | 34 | 18 | 38 | 22 | 57 | 33 | 58 | 40 | 65 | 48 | 65 | 50 |
| 10 | 78 | 65 | 79 | 64 | 74 | 48 | 61 | 42 | 42 | 28 | 35 | 23 | 37 | 17 | 28 | 20 | 64 | 39 | 50 | 43 | 64 | 45 | 58 | 49 |
| 11 | 77 | 57 | 80 | 61 | 76 | 60 | 58 | 49 | 36 | 29 | 45 | 31 | 42 | 32 | 27 | 12 | 44 | 36 | 57 | 48 | 52 | 41 | 62 | 48 |
| 12 | 79 | 56 | 82 | 59 | 80 | 62 | 58 | 48 | 44 | 28 | 44 | 31 | 40 | 34 | 27 | 4 | 38 | 34 | 62 | 45 | 48 | 40 | 69 | 49 |
| 13 | 74 | 57 | 80 | 59 | 81 | 63 | 54 | 45 | 38 | 28 | 45 | 30 | 36 | 32 | 35 | 23 | 44 | 33 | 53 | 44 | 51 | 39 | 69 | 50 |
| 14 | 73 | 51 | 82 | 62 | 84 | 62 | 57 | 42 | 51 | 28 | 38 | 22 | 40 | 31 | 27 | 4 | 46 | 33 | 55 | 41 | 53 | 37 | 76 | 50 |
| 15 | 81 | 55 | 75 | 67 | 83 | 60 | 64 | 43 | 55 | 42 | 49 | 25 | 42 | 24 | 27 | − 4 | 50 | 32 | 59 | 41 | 56 | 37 | 80 | 58 |
| 16 | 87 | 65 | 78 | 65 | 83 | 70 | 66 | 44 | 61 | 42 | 51 | 34 | 15 | 8 | 34 | 19 | 50 | 29 | 62 | 43 | 60 | 38 | 76 | 62 |
| 17 | 81 | 71 | 78 | 60 | 82 | 62 | 54 | 37 | 51 | 33 | 55 | 32 | 25 | 5 | 37 | 19 | 48 | 36 | 61 | 47 | 65 | 39 | 77 | 59 |
| 18 | 85 | 65 | 76 | 62 | 66 | 50 | 57 | 44 | 47 | 33 | 37 | 18 | 31 | 12 | 34 | − 1 | 46 | 37 | 63 | 45 | 70 | 40 | 71 | 57 |
| 19 | 78 | 70 | 83 | 60 | 68 | 44 | 59 | 42 | 34 | 23 | 42 | 27 | 41 | 24 | 24 | − 7 | 45 | 36 | 72 | 47 | 73 | 45 | 76 | 52 |
| 20 | 83 | 70 | 81 | 61 | 70 | 49 | 44 | 37 | 30 | 19 | 44 | 26 | 40 | 32 | 35 | 6 | 41 | 27 | 63 | 45 | 60 | 50 | 80 | 51 |
| 21 | 78 | 64 | 83 | 60 | 60 | 46 | 44 | 39 | 35 | 17 | 39 | 20 | 42 | 35 | 36 | 32 | 36 | 21 | 59 | 45 | 67 | 49 | 79 | 62 |
| 22 | 82 | 61 | 86 | 62 | 62 | 40 | 44 | 35 | 43 | 28 | 39 | 33 | 40 | 35 | 40 | 34 | 42 | 21 | 63 | 42 | 60 | 45 | 71 | 61 |
| 23 | 82 | 63 | 88 | 63 | 72 | 42 | 55 | 33 | 52 | 37 | 36 | 25 | 36 | 6 | 42 | 34 | 59 | 32 | 57 | 49 | 67 | 42 | 74 | 61 |
| 24 | 81 | 61 | 80 | 70 | 76 | 49 | 66 | 44 | 52 | 38 | 32 | 23 | 27 | 2 | 39 | 32 | 50 | 13 | 62 | 49 | 69 | 47 | 70 | 60 |
| 25 | 86 | 60 | 82 | 69 | 80 | 56 | 58 | 35 | 50 | 42 | 28 | 22 | 39 | 25 | 34 | 28 | 30 | 6 | 70 | 60 | 76 | 55 | 73 | 60 |
| 26 | 89 | 60 | 82 | 66 | 81 | 61 | 38 | 33 | 59 | 42 | 32 | 24 | 41 | 31 | 36 | 21 | 43 | 27 | 68 | 58 | 75 | 57 | 78 | 51 |
| 27 | 92 | 62 | 83 | 63 | 69 | 54 | 41 | 34 | 60 | 47 | 33 | 22 | 42 | 35 | 43 | 31 | 49 | 33 | 72 | 55 | 69 | 53 | 85 | 59 |
| 28 | 78 | 68 | 86 | 65 | 75 | 56 | 51 | 34 | 53 | 42 | 40 | 22 | 37 | 6 | 48 | 34 | 48 | 38 | 63 | 57 | 70 | 50 | 82 | 64 |
| 29 | 84 | 70 | 81 | 67 | 70 | 52 | 64 | 47 | 47 | 32 | 31 | 22 | 21 | 5 | ..... | ..... | 47 | 33 | 70 | 53 | 69 | 49 | 87 | 65 |
| 30 | 83 | 72 | 77 | 63 | 73 | 50 | 52 | 38 | 36 | 26 | 29 | 19 | 12 | 2 | ..... | ..... | 50 | 28 | 58 | 54 | 57 | 50 | 89 | 66 |
| 31 | 82 | 66 | 80 | 54 | ..... | ..... | 44 | 33 | ..... | ..... | 26 | 15 | 22 | 7 | ..... | ..... | 53 | 33 | ..... | ..... | 65 | 52 | ..... | ..... |
| Range | 41° | | 34° | | 44° | | 42° | | 44° | | 43° | | 60° | | 55° | | 58° | | 39° | | 45° | | 40° | |
| Monthly means | 72°.0 | | 71°.9 | | 64°.2 | | 49°.5 | | 40°.9 | | 31°.9 | | 23°.4 | | 24°.9 | | 38°.3 | | 51°.3 | | 56°.4 | | 64°.9 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, ALPENA, MICH.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 74 | 59 | 73 | 68 | 63 | 45 | 72 | 54 | 42 | 33 | 26 | 15 | 32 | 19 | 33 | 25 | 34 | 23 | 47 | 31 | 64 | 48 | 62 | 52 |
| 2 | 66 | 52 | 79 | 62 | 58 | 45 | 56 | 49 | 41 | 35 | 31 | 12 | 23 | 8 | 30 | 16 | 35 | 33 | 54 | 32 | 54 | 46 | 64 | 56 |
| 3 | 67 | 54 | 71 | 55 | 67 | 42 | 67 | 49 | 36 | 29 | 38 | 26 | 26 | 11 | 40 | 9 | 35 | 27 | 51 | 28 | 56 | 43 | 85 | 55 |
| 4 | 70 | 53 | 73 | 47 | 73 | 48 | 68 | 37 | 35 | 28 | 39 | 33 | 24 | 6 | 43 | 23 | 30 | 21 | 54 | 32 | 50 | 36 | 71 | 47 |
| 5 | 80 | 58 | 77 | 49 | 60 | 45 | 46 | 37 | 29 | 24 | 44 | 34 | 11 | 3 | 43 | 23 | 41 | 25 | 53 | 32 | 53 | 41 | 61 | 39 |
| 6 | 65 | 53 | 80 | 60 | 62 | 41 | 57 | 38 | 41 | 23 | 34 | 18 | 10 | 0 | 41 | 34 | 49 | 35 | 49 | 35 | 56 | 40 | 54 | 36 |
| 7 | 75 | 49 | 73 | 63 | 64 | 41 | 53 | 33 | 39 | 26 | 34 | 18 | 13 | − 2 | 54 | 34 | 52 | 34 | 51 | 28 | 64 | 46 | 47 | 40 |
| 8 | 84 | 67 | 80 | 56 | 65 | 47 | 53 | 47 | 38 | 33 | 31 | 23 | 26 | 10 | 37 | 27 | 41 | 29 | 45 | 27 | 50 | 40 | 60 | 39 |
| 9 | 85 | 59 | 73 | 56 | 66 | 53 | 54 | 43 | 33 | 23 | 29 | 23 | 33 | 26 | 27 | 10 | 45 | 38 | 45 | 41 | 54 | 44 | 65 | 41 |
| 10 | 74 | 52 | 76 | 55 | 66 | 60 | 49 | 43 | 34 | 15 | 37 | 27 | 36 | 32 | 21 | 12 | 44 | 38 | 64 | 43 | 44 | 37 | 62 | 43 |
| 11 | 78 | 47 | 74 | 54 | 72 | 61 | 43 | 39 | 41 | 26 | 47 | 32 | 35 | 31 | 25 | 7 | 40 | 35 | 61 | 42 | 42 | 34 | 62 | 44 |
| 12 | 81 | 53 | 69 | 60 | 69 | 60 | 46 | 38 | 45 | 30 | 43 | 25 | 34 | 28 | 34 | 22 | 40 | 35 | 54 | 38 | 44 | 32 | 69 | 45 |
| 13 | 70 | 55 | 68 | 60 | 73 | 57 | 53 | 41 | 44 | 33 | 43 | 27 | 34 | 25 | 31 | 17 | 41 | 36 | 57 | 37 | 49 | 30 | 70 | 47 |
| 14 | 82 | 62 | 63 | 60 | 71 | 58 | 59 | 52 | 51 | 43 | 43 | 22 | 35 | 30 | 31 | 14 | 43 | 34 | 45 | 32 | 52 | 30 | 68 | 45 |
| 15 | 87 | 62 | 75 | 60 | 81 | 64 | 63 | 52 | 48 | 43 | 49 | 38 | 30 | 19 | 32 | 19 | 42 | 28 | 48 | 35 | 49 | 31 | 68 | 49 |
| 16 | 81 | 64 | 78 | 57 | 79 | 57 | 56 | 45 | 50 | 36 | 39 | 31 | 24 | 12 | 36 | 19 | 43 | 38 | 52 | 35 | 60 | 41 | 65 | 56 |
| 17 | 84 | 60 | 83 | 57 | 63 | 47 | 51 | 50 | 47 | 30 | 42 | 33 | 32 | 23 | 32 | 10 | 38 | 30 | 53 | 32 | 56 | 39 | 69 | 51 |
| 18 | 71 | 58 | 79 | 57 | 61 | 43 | 51 | 49 | 34 | 28 | 35 | 30 | 34 | 29 | 25 | 7 | 45 | 28 | 52 | 40 | 49 | 41 | 70 | 46 |
| 19 | 66 | 53 | 73 | 59 | 71 | 50 | 49 | 41 | 31 | 26 | 50 | 35 | 47 | 21 | 30 | 15 | 53 | 35 | 51 | 43 | 51 | 46 | 73 | 46 |
| 20 | 61 | 52 | 73 | 57 | 53 | 43 | 41 | 31 | 40 | 27 | 42 | 38 | 37 | 33 | 38 | 29 | 42 | 28 | 65 | 45 | 72 | 49 | 65 | 46 |
| 21 | 73 | 50 | 74 | 64 | 57 | 39 | 42 | 30 | 43 | 39 | 46 | 37 | 35 | 32 | 36 | 32 | 37 | 30 | 60 | 40 | 60 | 43 | 56 | 47 |
| 22 | 71 | 55 | 75 | 61 | 70 | 43 | 56 | 30 | 41 | 37 | 42 | 38 | 34 | − 3 | 38 | 33 | 44 | 32 | 48 | 40 | 53 | 35 | 56 | 49 |
| 23 | 77 | 55 | 68 | 57 | 75 | 52 | 55 | 37 | 43 | 36 | 41 | 39 | 20 | − 2 | 33 | 26 | 56 | 24 | 51 | 41 | 56 | 42 | 72 | 54 |
| 24 | 78 | 57 | 69 | 63 | 76 | 59 | 59 | 42 | 47 | 43 | 40 | 37 | 33 | 17 | 26 | 21 | 24 | 4 | 54 | 48 | 75 | 51 | 77 | 53 |
| 25 | 81 | 60 | 77 | 59 | 78 | 60 | 46 | 38 | 44 | 42 | 40 | 37 | 31 | 26 | 25 | 18 | 35 | 11 | 57 | 41 | 70 | 51 | 68 | 53 |
| 26 | 83 | 68 | 77 | 57 | 66 | 54 | 43 | 41 | 46 | 43 | 40 | 38 | 31 | 24 | 45 | 17 | 38 | 28 | 55 | 40 | 63 | 47 | 80 | 57 |
| 27 | 77 | 68 | 78 | 63 | 65 | 56 | 47 | 42 | 43 | 37 | 39 | 37 | 31 | 14 | 50 | 28 | 45 | 31 | 59 | 48 | 58 | 44 | 80 | 60 |
| 28 | 78 | 69 | 75 | 56 | 66 | 46 | 51 | 42 | 37 | 29 | 38 | 32 | 15 | 6 | 42 | 28 | 45 | 29 | 65 | 47 | 62 | 39 | 69 | 55 |
| 29 | 82 | 65 | 77 | 58 | 79 | 45 | 51 | 38 | 29 | 21 | 35 | 31 | 31 | 12 | ..... | ..... | 42 | 24 | 59 | 50 | 51 | 37 | 70 | 60 |
| 30 | 79 | 57 | 70 | 50 | 85 | 63 | 46 | 31 | 30 | 20 | 35 | 28 | 27 | 8 | ..... | ..... | 41 | 23 | 65 | 48 | 64 | 43 | 74 | 65 |
| 31 | 74 | 57 | 69 | 52 | ..... | ..... | 44 | 36 | ..... | ..... | 29 | 19 | 29 | 25 | ..... | ..... | 43 | 33 | ..... | ..... | 63 | 44 | ..... | ..... |
| Range | 40° | | 36° | | 46° | | 42° | | 36° | | 38° | | 49° | | 47° | | 52° | | 38° | | 45° | | 49° | |
| Monthly means | 66°.9 | | 66°.4 | | 59°.6 | | 46°.3 | | 35°.5 | | 33°.7 | | 23°.6 | | 27°.9 | | 35°.0 | | 45°.7 | | 49°.3 | | *58°.5 | |

* Thirty days only.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, ATLANTIC CITY, N. J.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 76 | 64 | 75 | 71 | 84 | 73 | 71 | 58 | 56 | 40 | 36 | 18 | 34 | 18 | 41 | 27 | 42 | 34 | 62 | 34 | 63 | 48 | 57 | 53 |
| 2 | 85 | 66 | 73 | 69 | 76 | 61 | 72 | 58 | 66 | 48 | 33 | 23 | 41 | 22 | 32 | 25 | 48 | 34 | 66 | 39 | 72 | 57 | 57 | 55 |
| 3 | 77 | 62 | 75 | 68 | 72 | 53 | 71 | 67 | 54 | 38 | 40 | 20 | 26 | 13 | 31 | 16 | 51 | 44 | 58 | 38 | 67 | 59 | 61 | 52 |
| 4 | 81 | 65 | 82 | 66 | 76 | 52 | 71 | 69 | 53 | 34 | 50 | 37 | 48 | 20 | 37 | 15 | 47 | 30 | 46 | 42 | 66 | 58 | 68 | 53 |
| 5 | 86 | 62 | 80 | 60 | 79 | 52 | 69 | 47 | 61 | 40 | 56 | 49 | 34 | 19 | 39 | 21 | 50 | 24 | 62 | 40 | 61 | 52 | 76 | 54 |
| 6 | 75 | 62 | 85 | 65 | 71 | 67 | 62 | 40 | 58 | 31 | 54 | 37 | 28 | 13 | 47 | 20 | 49 | 39 | 65 | 41 | 71 | 50 | 73 | 45 |
| 7 | 72 | 63 | 81 | 72 | 69 | 65 | 60 | 42 | 48 | 27 | 40 | 30 | 23 | 10 | 43 | 26 | 55 | 43 | 58 | 42 | 67 | 50 | 67 | 51 |
| 8 | 75 | 63 | 82 | 72 | 66 | 58 | 65 | 57 | 62 | 47 | 49 | 33 | 30 | 7 | 46 | 35 | 60 | 42 | 62 | 37 | 74 | 56 | 63 | 58 |
| 9 | 77 | 66 | 78 | 72 | 71 | 54 | 72 | 52 | 67 | 47 | 39 | 25 | 40 | 27 | 59 | 36 | 55 | 33 | 54 | 45 | 60 | 54 | 75 | 61 |
| 10 | 88 | 67 | 86 | 66 | 76 | 54 | 68 | 49 | 53 | 40 | 45 | 25 | 44 | 37 | 47 | 40 | 57 | 36 | 53 | 45 | 69 | 50 | 67 | 57 |
| 11 | 76 | 65 | 86 | 65 | 73 | 66 | 65 | 49 | 46 | 31 | 50 | 35 | 43 | 36 | 40 | 25 | 50 | 42 | 58 | 45 | 60 | 44 | 67 | 51 |
| 12 | 75 | 64 | 83 | 70 | 72 | 67 | 62 | 45 | 52 | 27 | 51 | 31 | 50 | 34 | 37 | 19 | 43 | 40 | 68 | 49 | 58 | 41 | 71 | 50 |
| 13 | 85 | 62 | 83 | 69 | 72 | 68 | 66 | 42 | 53 | 32 | 62 | 42 | 44 | 26 | 44 | 25 | 57 | 42 | 67 | 50 | 58 | 41 | 75 | 50 |
| 14 | 75 | 59 | 80 | 69 | 73 | 63 | 69 | 45 | 57 | 46 | 43 | 31 | 49 | 40 | 40 | 36 | 63 | 43 | 69 | 42 | 57 | 42 | 67 | 56 |
| 15 | 77 | 64 | 79 | 68 | 76 | 70 | 72 | 54 | 61 | 59 | 52 | 34 | 43 | 33 | 39 | 34 | 49 | 37 | 51 | 47 | 49 | 45 | 69 | 54 |
| 16 | 79 | 67 | 80 | 68 | 81 | 67 | 79 | 58 | 61 | 50 | 61 | 44 | 36 | 24 | 46 | 32 | 50 | 33 | 49 | 43 | 64 | 37 | 72 | 61 |
| 17 | 83 | 68 | 80 | 69 | 79 | 69 | 62 | 51 | 58 | 46 | 57 | 37 | 37 | 18 | 44 | 33 | 48 | 38 | 48 | 42 | 63 | 50 | 73 | 63 |
| 18 | 79 | 66 | 83 | 64 | 72 | 58 | 69 | 49 | 53 | 35 | 48 | 37 | 40 | 28 | 43 | 25 | 48 | 35 | 58 | 38 | 67 | 46 | 67 | 60 |
| 19 | 74 | 64 | 81 | 63 | 68 | 55 | 70 | 62 | 44 | 27 | 50 | 35 | 44 | 27 | 34 | 14 | 61 | 34 | 59 | 43 | 69 | 49 | 74 | 56 |
| 20 | 71 | 63 | 78 | 67 | 67 | 58 | 69 | 60 | 41 | 28 | 64 | 38 | 46 | 38 | 43 | 29 | 53 | 37 | 59 | 49 | 57 | 55 | 76 | 56 |
| 21 | 70 | 62 | 79 | 65 | 73 | 52 | 63 | 59 | 47 | 38 | 46 | 42 | 47 | 40 | 50 | 39 | 50 | 30 | 79 | 53 | 77 | 55 | 76 | 62 |
| 22 | 70 | 64 | 82 | 66 | 70 | 46 | 63 | 40 | 53 | 46 | 47 | 33 | 52 | 39 | 47 | 44 | 48 | 35 | 65 | 48 | 70 | 53 | 75 | 63 |
| 23 | 75 | 67 | 82 | 67 | 71 | 48 | 64 | 37 | 55 | 50 | 44 | 38 | 42 | 18 | 47 | 40 | 51 | 39 | 59 | 50 | 76 | 44 | 77 | 59 |
| 24 | 81 | 68 | 84 | 74 | 72 | 57 | 67 | 50 | 55 | 53 | 43 | 32 | 37 | 14 | 47 | 33 | 55 | 29 | 63 | 50 | 65 | 53 | 79 | 62 |
| 25 | 84 | 69 | 85 | 71 | 77 | 58 | 73 | 54 | 55 | 51 | 44 | 25 | 45 | 35 | 46 | 32 | 34 | 10 | 59 | 54 | 69 | 56 | 82 | 63 |
| 26 | 88 | 67 | 86 | 72 | 79 | 61 | 61 | 55 | 58 | 49 | 46 | 34 | 56 | 37 | 43 | 26 | 50 | 24 | 62 | 53 | 82 | 59 | 81 | 63 |
| 27 | 86 | 70 | 87 | 61 | 77 | 66 | 56 | 48 | 54 | 49 | 47 | 41 | 43 | 32 | 56 | 31 | 52 | 32 | 62 | 52 | 81 | 57 | 80 | 64 |
| 28 | 82 | 70 | 87 | 68 | 71 | 69 | 59 | 49 | 54 | 43 | 46 | 34 | 46 | 20 | 51 | 33 | 53 | 47 | 59 | 53 | 74 | 58 | 85 | 69 |
| 29 | 83 | 71 | 85 | 74 | 70 | 65 | 66 | 59 | 51 | 30 | 45 | 32 | 30 | 13 | ..... | ..... | 56 | 42 | 66 | 51 | 76 | 56 | 81 | 69 |
| 30 | 86 | 74 | 86 | 72 | 68 | 59 | 62 | 45 | 33 | 23 | 43 | 35 | 34 | 18 | ..... | ..... | 49 | 34 | 61 | 50 | 73 | 57 | 84 | 67 |
| 31 | 77 | 72 | 82 | 70 | ..... | ..... | 62 | 43 | ..... | ..... | 37 | 25 | 42 | 31 | ..... | ..... | 51 | 39 | ..... | ..... | 58 | 54 | ..... | ..... |
| Range | 29° | | 27° | | 38° | | 42° | | 44° | | 46° | | 49° | | 45° | | 53° | | 45° | | 45° | | 40° | |
| Monthly means | 70°.9 | | 74°.5 | | 67°.0 | | 58°.8 | | 47°.4 | | 41°.8 | | 34°.0 | | 30°.9 | | 43°.7 | | 52°.2 | | 59°.1 | | 64°.7 | |

Maximum, minimum, and mean temperatures—Continued.

STATION, AUGUSTA, GA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 95 | 72 | 92 | 77 | 95 | 73 | 78 | 66 | 73 | 58 | 45 | 24 | 53 | 33 | 55 | 40 | 68 | 35 | 71 | 58 | 85 | 58 | 87 | 64 |
| 2 | 97 | 75 | 91 | 74 | 92 | 73 | 77 | 69 | 77 | 57 | 46 | 28 | 57 | 33 | 58 | 41 | 71 | 43 | 73 | 52 | 89 | 60 | 90 | 66 |
| 3 | 98 | 74 | 91 | 76 | 83 | 62 | 76 | 68 | 64 | 48 | 52 | 27 | 47 | 35 | 55 | 43 | 69 | 51 | 64 | 53 | 87 | 64 | 94 | 67 |
| 4 | 99.5 | 78 | 93 | 73 | 83 | 65 | 83 | 68 | 64 | 42 | 58 | 41 | 53 | 39 | 52 | 38 | 60 | 44 | 62 | 50 | 74 | 62 | 93 | 73 |
| 5 | 97 | 79 | 95 | 72 | 87 | 70 | 72 | 55 | 62 | 50 | 68 | 58 | 44 | 30 | 52 | 39 | 64 | 33 | 71 | 45 | 80 | 58 | 96 | 73 |
| 6 | 93 | 74 | 91 | 71 | 91 | 71 | 69 | 51 | 63 | 47 | 52 | 38 | 43 | 24 | 58 | 32 | 71 | 39 | 77 | 50 | 84 | 53 | 80 | 66 |
| 7 | 89 | 73 | 91 | 74 | 85 | 73 | 73 | 50 | 56 | 40 | 51 | 30 | 39 | 24 | 61 | 45 | 73 | 52 | 77 | 48 | 90 | 60 | 76 | 63 |
| 8 | 90 | 72 | 93 | 74 | 85 | 70 | 78 | 61 | 73 | 50 | 58 | 29 | 37 | 24 | 61 | 50 | 76 | 48 | 75 | 55 | 90 | 63 | 84 | 66 |
| 9 | 94 | 68 | 90 | 73 | 85 | 67 | 74 | 52 | 62 | 48 | 52 | 32 | 43 | 33 | 63 | 43 | 76 | 56 | 69 | 64 | 89 | 69 | 92 | 70 |
| 10 | 95 | 74 | 90 | 71 | 81 | 71 | 77 | 53 | 58 | 44 | 58 | 28 | 56 | 39 | 56 | 45 | 73 | 60 | 80 | 63 | 88 | 63 | 86 | 67 |
| 11 | 93 | 74 | 91 | 71 | 85 | 69 | 75 | 57 | 55 | 38 | 69 | 32 | 57 | 38 | 48 | 34 | 78 | 62 | 83 | 62 | 80 | 56 | 82 | 61 |
| 12 | 90 | 72 | 93 | 72 | 90 | 70 | 72 | 49 | 61 | 35 | 70 | 33 | 57 | 32 | 51 | 29 | 68 | 63 | 81 | 50 | 85 | 55 | 87 | 58 |
| 13 | 92 | 74 | 93 | 71 | 90 | 69 | 75 | 47 | 65 | 34 | 68 | 34 | 64 | 48 | 55 | 33 | 83 | 57 | 86 | 53 | 81 | 59 | 73 | 59 |
| 14 | 93 | 73 | 78 | 69 | 85 | 70 | 70 | 50 | 70 | 36 | 60 | 38 | 54 | 42 | 51 | 42 | 80 | 49 | 85 | 57 | 78 | 62 | 76 | 65 |
| 15 | 92 | 73 | 87 | 69 | 87 | 68 | 80 | 57 | 76 | 52 | 63 | 34 | 54 | 37 | 52 | 46 | 73 | 51 | 84 | 66 | 71 | 57 | 85 | 63 |
| 16 | 90 | 71 | 88 | 68 | 91 | 68 | 80 | 58 | 75 | 53 | 69 | 41 | 54 | 32 | 59 | 44 | 71 | 49 | 72 | 63 | 73 | 52 | 87 | 69 |
| 17 | 77 | 73 | 89 | 66 | 91 | 70 | 81 | 58 | 73 | 51 | 70 | 42 | 56 | 33 | 66 | 37 | 76 | 50 | 73 | 57 | 83 | 62 | 84 | 66 |
| 18 | 88 | 70 | 88 | 65 | 83 | 69 | 83 | 59 | 71 | 46 | 71 | 42 | 60 | 33 | 63 | 44 | 66 | 44 | 76 | 61 | 90 | 65 | 87 | 71 |
| 19 | 85 | 74 | 87 | 71 | 69 | 59 | 82 | 62 | 65 | 47 | 65 | 51 | 59 | 40 | 55 | 37 | 69 | 43 | 74 | 56 | 85 | 68 | 85 | 72 |
| 20 | 86 | 72 | 88 | 65 | 70 | 58 | 76 | 68 | 65 | 49 | 70 | 43 | 63 | 51 | 67 | 39 | 75 | 45 | 78 | 61 | 88 | 68 | 89 | 68 |
| 21 | 87 | 67 | 89 | 66 | 72 | 62 | 74 | 58 | 60 | 50 | 64 | 49 | 61 | 46 | 69 | 54 | 75 | 47 | 89 | 63 | 93 | 70 | 81 | 69 |
| 22 | 88 | 71 | 83 | 68 | 69 | 61 | 70 | 53 | 61 | 54 | 62 | 49 | 57 | 41 | 71 | 56 | 76 | 53 | 88 | 67 | 94 | 73 | 88 | 67 |
| 23 | 90 | 73 | 85 | 70 | 76 | 60 | 70 | 49 | 63 | 56 | 62 | 55 | 59 | 41 | 68 | 51 | 75 | 56 | 85 | 67 | 87 | 70 | 88 | 63 |
| 24 | 92 | 75 | 90 | 71 | 78 | 63 | 72 | 46 | 64 | 53 | 60 | 57 | 55 | 36 | 66 | 42 | 85 | 57 | 79 | 69 | 93 | 72 | 91 | 61 |
| 25 | 92 | 74 | 89 | 70 | 81 | 65 | 69 | 54 | 63 | 43 | 62 | 57 | 59 | 41 | 61 | 40 | 71 | 49 | 83 | 60 | 99 | 75 | 92 | 61 |
| 26 | 96 | 75 | 87 | 71 | 84 | 66 | 65 | 63 | 57 | 45 | 58 | 53 | 66 | 39 | 54 | 35 | 73 | 43 | 83 | 58 | 100 | 77 | 94 | 71 |
| 27 | 97 | 76 | 91 | 73 | 82 | 69 | 74 | 61 | 56 | 38 | 64 | 50 | 71 | 43 | 55 | 39 | 82 | 45 | 83 | 57 | 84 | 73 | 94 | 73 |
| 28 | 99 | 78 | 90 | 73 | 83 | 70 | 77 | 56 | 53 | 38 | 63 | 44 | 63 | 46 | 63 | 35 | 81 | 59 | 78 | 56 | 86 | 70 | 94 | 74 |
| 29 | 100 | 77 | 94 | 73 | 85 | 65 | 76 | 56 | 51 | 34 | 56 | 47 | 56 | 37 | ..... | ..... | 80 | 57 | 79 | 51 | 90 | 64 | 91 | 74 |
| 30 | 100 | 80 | 96 | 74 | 84 | 65 | 70 | 64 | 41 | 26 | 53 | 47 | 51 | 34 | ..... | ..... | 75 | 54 | 85 | 56 | 94 | 66 | 93 | 72 |
| 31 | 95 | 78 | 97 | 73 | ..... | ..... | 79 | 66 | ..... | ..... | 54 | 41 | 50 | 41 | ..... | ..... | 84 | 60 | ..... | ..... | 90 | 70 | ..... | ..... |
| Range | 33° | | 32° | | 37° | | 37° | | 51° | | 47° | | 47° | | 42° | | 52° | | 44° | | 48° | | 38° | |
| Monthly means | 83°.6 | | 80°.8 | | 75°.2 | | 65°.9 | | 53°.9 | | 50°.2 | | 45°.6 | | 49°.8 | | 61°.9 | | 67°.3 | | 75°.3 | | 77°.5 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, BALTIMORE, MD.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 92 | 74 | 78 | 72 | 88 | 72 | 75 | 54 | 58 | 41 | 39 | 22 | 41 | 22 | 37 | 31 | 52 | 39 | 61 | 42 | 79.5 | 52 | 65 | 57 |
| 2 | 85 | 73 | 78 | 67 | 78 | 66 | 74 | 58 | 68 | 50 | 39 | 30 | 42 | 29 | 37 | 30 | 55 | 36 | 63 | 44 | 85 | 58 | 66 | 60 |
| 3 | 84 | 66 | 84 | 68 | 73 | 58 | 76 | 59 | 56 | 44 | 43 | 26 | 32 | 18 | 35 | 20 | 60 | 50 | 61.5 | 45 | 84 | 64 | 75 | 60.5 |
| 4 | 86 | 70 | 82 | 68 | 80 | 58 | 71 | 59 | 56 | 37 | 47 | 30 | 40 | 21 | 38 | 20 | 53 | 35 | 54 | 46 | 79 | 58 | 83 | 64 |
| 5 | 85 | 66 | 83 | 63 | 80 | 59 | 62 | 50 | 58 | 43 | 56 | 41 | 34 | 20 | 42 | 28 | 52 | 32 | 64 | 45 | 65 | 53 | 78 | 58 |
| 6 | 83 | 68 | 89 | 67 | 72 | 64 | 63 | 46 | 54 | 39 | 50 | 39 | 28 | 15 | 46 | 27.5 | 60 | 38 | 59 | 46 | 71 | 50 | 71 | 51 |
| 7 | 83 | 65 | 85 | 70 | 66 | 60 | 62 | 43 | 49 | 34 | 42 | 35 | 22.5 | 11 | 50 | 28 | 72 | 50 | 60.5 | 45 | 74 | 51 | 74 | 55 |
| 8 | 87 | 66 | 92 | 69 | 67 | 56 | 67 | 55 | 64 | 38 | 49 | 32 | 29.5 | 6 | 53 | 38 | 65 | 46 | 65 | 44 | 82 | 64 | 68 | 62 |
| 9 | 91 | 70 | 80 | 72 | 74 | 53 | 69 | 54 | 68 | 55 | 41 | 31 | 37 | 22.5 | 58 | 43 | 65 | 44 | 58 | 48 | 76 | 64 | 75 | 61 |
| 10 | 89 | 73 | 88 | 70 | 76 | 55 | 69 | 49 | 57 | 36 | 46 | 28 | 47.5 | 35.5 | 52 | 42 | 64 | 42 | 59 | 47 | 70 | 53 | 72 | 58 |
| 11 | 85 | 69 | 86 | 67 | 73 | 66 | 63 | 51 | 44 | 36 | 56 | 34 | 46.5 | 39 | 43 | 32 | 68 | 45 | 69 | 55 | 59 | 47 | 71 | 54 |
| 12 | 85 | 66 | 89 | 67 | 74 | 67 | 61 | 48 | 56 | 34 | 55 | 39 | 50 | 39 | 41 | 26 | 45 | 39 | 69 | 51 | 56 | 45 | 74 | 54 |
| 13 | 87 | 65 | 80 | 71 | 74 | 67 | 64 | 45 | 55 | 37 | 63 | 38 | 44 | 33 | 49 | 33.5 | 67 | 38 | 68.5 | 52 | 61 | 45 | 78 | 55 |
| 14 | 81 | 64 | 84 | 69 | 80 | 67 | 73 | 47 | 59 | 35 | 48 | 37 | 49 | 40 | 43 | 33 | 60 | 46 | 67 | 51 | 52 | 46 | 79 | 61 |
| 15 | 88 | 67 | 83 | 71 | 82 | 69 | 74 | 51 | 66 | 43 | 56 | 32 | 45 | 37 | 40 | 31 | 54 | 42 | 55 | 50 | 58 | 43 | 80 | 58 |
| 16 | 91 | 70 | 84 | 66 | 83 | 70 | 80 | 58 | 67 | 49 | 63 | 46 | 40 | 31 | 51 | 35 | 55 | 39 | 57 | 48 | 66 | 47 | 81 | 61 |
| 17 | 88 | 76 | 84 | 67 | 83 | 69 | 68 | 53 | 63 | 46 | 63 | 41 | 38.5 | 27.5 | 52 | 35 | 56 | 44 | 63 | 43 | 59 | 54 | 83 | 67 |
| 18 | 86 | 71 | 86 | 65 | 74 | 60 | 72 | 52 | 56 | 40 | 58 | 39 | 43 | 30 | 48 | 30 | 57 | 41 | 61 | 44 | 69 | 50 | 72 | 61 |
| 19 | 79 | 73 | 86 | 65 | 69 | 56 | 76 | 59 | 47 | 35 | 51 | 36 | 44 | 33 | 36 | 21 | 63 | 42 | 68 | 46 | 70 | 50 | 79 | 58 |
| 20 | 81 | 71 | 88 | 66 | 71 | 57 | 76 | 58 | 48 | 36 | 67 | 37 | 47.5 | 38 | 51 | 31 | 57 | 42 | 72 | 56 | 65 | 57 | 81 | 60 |
| 21 | 83 | 70 | 87 | 67 | 71 | 55 | 60 | 56 | 44 | 31 | 48 | 37 | 47 | 42 | 60 | 37 | 54 | 38 | 79 | 60 | 80 | 56 | 77 | 64 |
| 22 | 85 | 71 | 86 | 67 | 70 | 48 | 58 | 49 | 51 | 38 | 52 | 42 | 53.5 | 41 | 63 | 50 | 56 | 42 | 72 | 57 | 72 | 57 | 78 | 64 |
| 23 | 82 | 73 | 83 | 69 | 73 | 48 | 67 | 41 | 56 | 48 | 50 | 43 | 49 | 22 | 56 | 46 | 65 | 40 | 79 | 55 | 76 | 49 | 74 | 61 |
| 24 | 85 | 71 | 87 | 73 | 76 | 53 | 72 | 47 | 58 | 54 | 47 | 41 | 38 | 18 | 48 | 40 | 61 | 26 | 75 | 56 | 66 | 53 | 82 | 60 |
| 25 | 92 | 72 | 87 | 71 | 76 | 55 | 71 | 51 | 59 | 53 | 47 | 43 | 47.5 | 27 | 47 | 35 | 40 | 21 | 70 | 59 | 76 | 63 | 85 | 65 |
| 26 | 92 | 71 | 89 | 70 | 79 | 60 | 63 | 51 | 61 | 49 | 47 | 40 | 57.5 | 40 | 46 | 31 | 49 | 21 | 74 | 57 | 79 | 65 | 88 | 67 |
| 27 | 93 | 76 | 88 | 67 | 79 | 61 | 54 | 46 | 55 | 44 | 50 | 44 | 44.5 | 37 | 56 | 33 | 69 | 43 | 73 | 56 | 78 | 63 | 92 | 69 |
| 28 | 92 | 74 | 90 | 69 | 78 | 67 | 61 | 51 | 54 | 42 | 54 | 39 | 45 | 31 | 57 | 38 | 66 | 55 | 67 | 57 | 79 | 61 | 88 | 75 |
| 29 | 84 | 74 | 94 | 72 | 79 | 66 | 74 | 54 | 51 | 33 | 50 | 35 | 34 | 19 | ..... | ..... | 60 | 45 | 65 | 55 | 76 | 60 | 88 | 73 |
| 30 | 92 | 73 | 88 | 76 | 75 | 60 | 65 | 50 | 34 | 25 | 44 | 35 | 34 | 19 | ..... | ..... | 51 | 37 | 68 | 52 | 83 | 59 | 86 | 71 |
| 31 | 87 | 73 | 89 | 73 | ..... | ..... | 58 | 47 | ..... | ..... | 41 | 30 | 38 | 26 | ..... | ..... | 49 | 42 | ..... | ..... | 66 | 56 | ..... | ..... |
| Range | 29° | | 31° | | 40° | | 39° | | 43° | | [illegible] | | [illegible].5 | | 43° | | 51° | | 37° | | 42° | | 41° | |
| Monthly means | 78°.7 | | 77°.6 | | 67°.9 | | 59°.7 | | 48°.[illegible] | | 42°.5 | | 35°.7 | | 40°.7 | | 49°.3 | | 58°.7 | | 63°.5 | | 70°.1 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, BARNEGAT, N. J.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 73 | 62 | 73 | 70 | 84 | 71 | 71 | 57 | 53 | 43 | 36 | 21 | 34 | 20 | 42 | 28 | 40 | 33 | 58 | 42 | 60 | 50 | 56 | 50 |
| 2 | 83 | 62 | 72 | 69 | 75 | 62 | 71 | 56 | 65 | 49 | 32 | 26 | 38 | 25 | 31 | 25 | 46 | 32 | 62 | 42 | 63 | 51 | 56 | 53 |
| 3 | 73 | 61 | 75 | 68 | 70 | 57 | 72 | 60 | 53 | 39 | 40 | 22 | 26 | 14 | 27 | 16 | 52 | 42 | 53 | 41 | 70 | 57 | 60 | 52 |
| 4 | 78 | 63 | 80 | 68 | 79 | 56 | 70 | 60 | 51 | 34 | 47 | 27 | 48 | 22 | 35 | 16 | 46 | 32 | 46 | 43 | 67 | 54 | 66 | 53 |
| 5 | 79 | 63 | 80 | 61 | 79 | 57 | 61 | 50 | 59 | 37 | 54 | 47 | 34 | 19 | 38 | 22 | 46 | 26 | 53 | 38 | 60 | 50 | 74 | 52 |
| 6 | 72 | 62 | 85 | 63 | 72 | 65 | 59 | 47 | 58 | 35 | 54 | 38 | 29 | 16 | 44 | 25 | 47 | 37 | 64 | 39 | 67 | 48 | 68 | 47 |
| 7 | 72 | 63 | 80 | 71 | 68 | 65 | 60 | 45 | 47 | 32 | 41 | 31 | 22 | 13 | 43 | 27 | 53 | 41 | 54 | 39 | 63 | 51 | 60 | 51 |
| 8 | 77 | 62 | 84 | 72 | 65 | 62 | 65 | 57 | 62 | 44 | 48 | 31 | 28 | 13 | 46 | 36 | 57 | 42 | 56 | 40 | 69 | 52 | 64 | 56 |
| 9 | 79 | 64 | 84 | 68 | 71 | 56 | 70 | 57 | 67 | 54 | 39 | 29 | 42 | 27 | 55 | 41 | 51 | 36 | 52 | 43 | 57 | 50 | 70 | 58 |
| 10 | 83 | 62 | 79 | 66 | 74 | 57 | 66 | 51 | 54 | 41 | 43 | 23 | 46 | 40 | 44 | 38 | 55 | 35 | 52 | 43 | 69 | 52 | 60 | 55 |
| 11 | 72 | 64 | 84 | 67 | 72 | 60 | 64 | 49 | 45 | 34 | 49 | 33 | 42 | 36 | 38 | 24 | 48 | 38 | 56 | 48 | 59 | 45 | 63 | 50 |
| 12 | 73 | 62 | 84 | 67 | 74 | 67 | 60 | 45 | 51 | 34 | 48 | 35 | 47 | 34 | 35 | 20 | 42 | 38 | 66 | 49 | 61 | 40 | 67 | 51 |
| 13 | 78 | 63 | 82 | 69 | 74 | 68 | 62 | 46 | 49 | 39 | 60 | 37 | 44 | 31 | 45 | 33 | 53 | 39 | 64 | 48 | 57 | 41 | 70 | 53 |
| 14 | 72 | 60 | 82 | 68 | 75 | 67 | 67 | 48 | 57 | 46 | 43 | 31 | 47 | 39 | 38 | 34 | 62 | 42 | 64 | 44 | 56 | 42 | 67 | 56 |
| 15 | 76 | 61 | 81 | 68 | 77 | 69 | 73 | 52 | 62 | 49 | 57 | 31 | 42 | 35 | 38 | 33 | 47 | 37 | 51 | 47 | 49 | 44 | 69 | 52 |
| 16 | 79 | 67 | 82 | 66 | 78 | 69 | 77 | 57 | 66 | 50 | 58 | 40 | 35 | 23 | 42 | 32 | 46 | 36 | 48 | 45 | 59 | 41 | 76 | 59 |
| 17 | 79 | 68 | 82 | 67 | 78 | 69 | 59 | 47 | 59 | 48 | 58 | 35 | 37 | 21 | 44 | 31 | 45 | 39 | 46 | 42 | 60 | 50 | 71 | 61 |
| 18 | 80 | 66 | 82 | 66 | 72 | 59 | 67 | 50 | 53 | 37 | 49 | 39 | 38 | 31 | 42 | 24 | 45 | 37 | 51 | 39 | 68 | 48 | 65 | 58 |
| 19 | 73 | 61 | 80 | 65 | 67 | 56 | 69 | 61 | 43 | 32 | 49 | 36 | 47 | 23 | 27 | 15 | 59 | 38 | 68 | 44 | 65 | 50 | 69 | 55 |
| 20 | 70 | 60 | 78 | 67 | 68 | 52 | 78 | 58 | 39 | 30 | 61 | 40 | 47 | 35 | 42 | 23 | 49 | 38 | 61 | 48 | 56 | 52 | 74 | 59 |
| 21 | 71 | 60 | 80 | 68 | 70 | 54 | 60 | 56 | 46 | 34 | 44 | 38 | 49 | 43 | 47 | 38 | 47 | 33 | 76 | 51 | 74 | 54 | 73 | 60 |
| 22 | 73 | 64 | 82 | 63 | 65 | 49 | 60 | 45 | 53 | 43 | 52 | 36 | 51 | 40 | 46 | 40 | 42 | 37 | 61 | 47 | 67 | 53 | 70 | 62 |
| 23 | 75 | 68 | 84 | 66 | 70 | 50 | 62 | 40 | 54 | 51 | 43 | 36 | 43 | 13 | 43 | 39 | 54 | 38 | 60 | 48 | 68 | 48 | 75 | 58 |
| 24 | 82 | 70 | 82 | 71 | 74 | 53 | 69 | 47 | 55 | 52 | 44 | 34 | 31 | 13 | 43 | 26 | 59 | 28 | 62 | 47 | 63 | 49 | 80 | 61 |
| 25 | 85 | 70 | 81 | 71 | 73 | 56 | 71 | 52 | 56 | 51 | 44 | 29 | 43 | 28 | 48 | 34 | 33 | 15 | 57 | 54 | 73 | 56 | 78 | 62 |
| 26 | 89 | 69 | 81 | 69 | 77 | 60 | 59 | 53 | 56 | 49 | 45 | 34 | 53 | 38 | 43 | 26 | 48 | 22 | 61 | 51 | 81 | 57 | 80 | 63 |
| 27 | 86 | 70 | 84 | 67 | 74 | 65 | 53 | 48 | 55 | 48 | 46 | 44 | 42 | 34 | 54 | 30 | 51 | 38 | 59 | 52 | 80 | 59 | 80 | 63 |
| 28 | 79 | 70 | 85 | 70 | 72 | 68 | 57 | 47 | 55 | 44 | 45 | 37 | 43 | 20 | 50 | 34 | 53 | 46 | 56 | 52 | 69 | 58 | 82 | 63 |
| 29 | 80 | 73 | 87 | 73 | 69 | 64 | 67 | 56 | 51 | 32 | 45 | 34 | 29 | 15 | ..... | ..... | 52 | 43 | 59 | 50 | 73 | 57 | 76 | 66 |
| 30 | 81 | 74 | 84 | 66 | 69 | 62 | 58 | 45 | 33 | 25 | 43 | 37 | 31 | 22 | ..... | ..... | 45 | 35 | 54 | 49 | 66 | 55 | 76 | 67 |
| 31 | 78 | 71 | 84 | 65 | ..... | ..... | 59 | 42 | ..... | ..... | 37 | 24 | 41 | 31 | ..... | ..... | 46 | 37 | ..... | ..... | 57 | 53 | ..... | ..... |
| Range | 29° | | 26° | | 35° | | 38° | | 42° | | 40° | | 40° | | 40° | | 47° | | 38° | | 41° | | 35° | |
| Monthly means | 70°. 7 | | 73°. 8 | | 66°. 5 | | 58°. 1 | | 47°. 6 | | 40°. 0 | | 33. °6 | | 35°. 9 | | 42°. 9 | | 51°. 4 | | 57°. 6 | | 63°. 3 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, BISMARCK, DAK.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 67 | 50 | 75 | 57 | 73 | 42 | 47 | 41 | 37 | 26 | 31 | 2 | 23 | 2 | 34 | 9 | 30 | 21 | 59 | 27 | 66 | 40 | 66 | 50 |
| 2 | 70 | 54 | 81 | 53 | 74 | 44 | 48 | 40 | 32 | 24 | 42 | 17 | 24 | — 1 | 40 | 14 | 42 | 26 | 57 | 33 | 53 | 31 | 56 | 52 |
| 3 | 76 | 55 | 88 | 61 | 83 | 47 | 46 | 30 | 32 | 13 | 41.5 | 12 | 29 | — 4 | 43 | 19 | 41 | 25 | 63 | 30 | 49 | 27 | 69 | 50 |
| 4 | 83 | 62 | 88 | 67 | 72 | 57 | 40 | 29 | 24 | 10 | 28 | 21 | 17 | —10 | 48 | 28 | 52 | 29 | 57 | 44 | 64 | 30 | 72 | 50 |
| 5 | 86 | 66 | 81 | 65 | 75 | 48 | 52 | 25 | 31 | 6 | 25 | 5 | 14 | —10 | 47 | 29 | 55 | 35 | 52 | 37 | 73 | 45 | 72 | 51 |
| 6 | 90 | 65 | 82 | 55 | 86 | 56 | 56 | 32 | 45 | 14 | 39 | 5 | 3 | —19 | 40 | 31 | 54 | 37 | 59 | 39 | 65 | 49 | 66.5 | 51 |
| 7 | 85 | 66 | 78 | 56 | 73 | 62 | 55 | 33 | 44 | 28 | 27 | 17 | 25 | — 4 | 34 | 25 | 53 | 34 | 60 | 42 | 67 | 39 | 74 | 47 |
| 8 | 81 | 51 | 76 | 53 | 74 | 48 | 58 | 42 | 28 | 9 | 27 | 3 | 31 | 5 | 29 | 16 | 46 | 29 | 53 | 39 | 53 | 41 | 76 | 57 |
| 9 | 82 | 61 | 83 | 50 | 78 | 42 | 55 | 36 | 40 | 7 | 49 | 14 | 37 | 12 | 29 | 12 | 40 | 21 | 43 | 36 | 50 | 35 | 74 | 54 |
| 10 | 79 | 55 | 84 | 56 | 92 | 55 | 61 | 31 | 55 | 18 | 56 | 31 | 29 | 4 | 40 | 21 | 46 | 34 | 51 | 30 | 50 | 33 | 77 | 50 |
| 11 | 80 | 48 | 78 | 56 | 81 | 61 | 64 | 42 | 56 | 29 | 48.5 | 28 | 37 | 22 | 42 | 26 | 42 | 34 | 59 | 34 | 48 | 34 | 77 | 53 |
| 12 | 75 | 65 | 72 | 49 | 74 | 52 | 59 | 43 | 56 | 25 | 53 | 27 | 32 | 14 | 27 | 14 | 41 | 35 | 54 | 31 | 55 | 29 | 76 | 53 |
| 13 | 79 | 54 | 77 | 52 | 79.5 | 62 | 56 | 31 | 54 | 34 | 47 | 22 | 24 | 5 | 34 | 25 | 42 | 32 | 57 | 36 | 59 | 32 | 73 | 50 |
| 14 | 84 | 58 | 83 | 51 | 71.5 | 52 | 51 | 33 | 53 | 20 | 47 | 31 | 29 | 1 | 32 | 22 | 55 | 34 | 43 | 34 | 62 | 34 | 67 | 54 |
| 15 | 72 | 59 | 86 | 51 | 60 | 43 | 52 | 30 | 54 | 32 | 55 | 34 | 32 | 5 | 22 | 17 | 44 | 35 | 42 | 38 | 63 | 32 | 73 | 52 |
| 16 | 78 | 55 | 84 | 55 | 57 | 42 | 46 | 32 | 45 | 26 | 45 | 26 | 40 | 3 | 29 | 15 | 51 | 28 | 57 | 37 | 60 | 43 | 77 | 52 |
| 17 | 78 | 59 | 81 | 55 | 65 | 37 | 46 | 34 | 28 | 22 | 39 | 24 | 37 | 11 | 33 | 19 | 56 | 35 | 53 | 45 | 55 | 47 | 80 | 59 |
| 18 | 68 | 51 | 86 | 54 | 72 | 37 | 58 | 34 | 41 | 23 | 49 | 29 | 42 | 9 | 37 | 12 | 59 | 32 | 60 | 39 | 49 | 45 | 84 | 63 |
| 19 | 67 | 48 | 92 | 59 | 74 | 43 | 46 | 30 | 50 | 28 | 36.5 | 26 | 35 | 20 | 50 | 18 | 57 | 32 | 52 | 42 | 52 | 44 | 75 | 56 |
| 20 | 76 | 48 | 92 | 54 | 79 | 33 | 60 | 27 | 47 | 33 | 36 | 25 | 37 | 19 | 43 | 20 | 57 | 39 | 63 | 42 | 61.5 | 42 | 82 | 56 |
| 21 | 79 | 52 | 72 | 44 | 86 | 55 | 66 | 32 | 36 | 26 | 38 | 31 | 36 | 21 | 47 | 22 | 59 | 32 | 53 | 43 | 61.5 | 43 | 82 | 58 |
| 22 | 82 | 60 | 79 | 44 | 66 | 50 | 67 | 28 | 43 | 18 | 36 | 33 | 21 | 8 | 35 | 22 | 72 | 38 | 55 | 41 | 74 | 43 | 84 | 62 |
| 23 | 87 | 66 | 91 | 55 | 69 | 44 | 63 | 32 | 47 | 27 | 35 | 29 | 31.5 | 4 | 30 | 15 | 62 | 38 | 55 | 39 | 64 | 50 | 84 | 62 |
| 24 | 88 | 69 | 75 | 58 | 65 | 43 | 66 | 33 | 44 | 31 | 38 | 27 | 24 | 11 | 34 | 12 | 47 | 33 | 61 | 38 | 61 | 50 | 83 | 63 |
| 25 | 77 | 64 | 85 | 60 | 78 | 37 | 62 | 30 | 44 | 28 | 36 | 21 | 25 | 9 | 40 | 18.5 | 62 | 32 | 62 | 39 | 66 | 46 | 74 | 53 |
| 26 | 80 | 55 | 78 | 57 | 75 | 50 | 55 | 35 | 35 | 22 | 37 | 31 | 40 | 12 | 48 | 28 | 57 | 35 | 70 | 36 | 57 | 44 | 83 | 46 |
| 27 | 75 | 61 | 66 | 42.5 | 74 | 40 | 54 | 34 | 22 | 3 | 32 | 26 | 25 | 6 | 39 | 27 | 35 | 26 | 71 | 42 | 62 | 40 | 92 | 63 |
| 28 | 78 | 57 | 75 | 47 | 78 | 43 | 44 | 27 | 7 | — 6 | 32 | 19 | 23 | 8 | 31 | 22 | 39 | 20 | 70 | 51 | 63 | 47 | 91 | 68 |
| 29 | 84 | 61 | 83 | 49 | 75 | 51 | 46 | 29 | 8 | — 5 | 22 | 14 | 30 | 21 | ..... | ..... | 48 | 30 | 69 | 44 | 65 | 41 | 77 | 58 |
| 30 | 91 | 72 | 87 | 60 | 54 | 41 | 46 | 32 | 20 | — 2 | 25 | 4 | 27 | 20 | ..... | ..... | 57 | 36 | 62 | 41 | 58 | 50 | 69 | 49 |
| 31 | 78 | 63 | 70 | 45 | ..... | ..... | 52 | 28 | ..... | ..... | 26 | 8 | 29 | 23 | ..... | ..... | 51 | 29 | ..... | ..... | 68 | 42 | ..... | ..... |
| Range | 43° | | 49°.5 | | 59° | | 42° | | 62° | | 54° | | 61° | | 41° | | 52° | | 44° | | 47° | | 46° | |
| Monthly means | 70.9° | | 69°.7 | | 60°.5 | | 42°.3 | | 28°.6 | | 29°.1 | | 17°.5 | | 27°.8 | | 40°.4 | | 47°.6 | | 50°.8 | | 66°.1 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, BOISE CITY, IDAHO.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 71 | 44 | 93 | 61 | 88 | 50 | 67 | 43 | 52 | 27 | 36 | 22 | 29 | 8 | 44 | 33 | 48 | 34 | 65 | 37 | 54 | 41 | 70 | 52 |
| 2 | 69 | 57 | 90 | 57 | 88 | 60 | 54 | 36 | 51 | 27 | 39 | 20 | 27 | 7 | 42 | 33 | 52 | 29 | 73 | 44 | 67 | 29 | 73 | 43 |
| 3 | 69 | 54 | 80 | 52 | 86 | 56 | 58 | 28 | 47 | 38 | 38 | 30 | 28 | 8 | 52 | 34 | 56 | 30 | 74 | 45 | 70 | 40 | 78 | 47 |
| 4 | 73 | 52 | 77 | 48 | 87 | 55 | 58 | 49 | 48 | 32 | 35 | 18 | 30 | 10 | 57 | 40 | 53 | 35 | 77 | 47 | 74 | 48 | 84 | 52 |
| 5 | 86 | 57 | 83 | 50 | 80 | 60 | 57 | 48 | 54 | 42 | 34 | 17 | 28 | 9 | 45 | 35 | 47 | 33 | 74 | 43 | 66 | 38 | 86 | 55 |
| 6 | 82 | 57 | 89 | 50 | 73 | 50 | 64 | 40 | 50 | 41 | 34 | 18 | 28 | 10 | 43 | 34 | 47 | 36 | 67 | 43 | 68 | 38 | 87 | 57 |
| 7 | 89 | 52 | 93 | 56 | 72 | 44 | 68 | 43 | 50 | 35 | 37 | 20 | 29 | 10 | 41 | 30 | 43 | 30 | 63 | 40 | 71 | 40 | 89 | 64 |
| 8 | 94 | 57 | 98 | 60 | 81 | 48 | 70 | 44 | 58 | 35 | 37 | 19 | 45 | 22 | 42 | 29 | 45 | 26 | 58 | 39 | 77 | 46 | 92 | 61 |
| 9 | 102 | 60 | 87 | 57 | 90 | 52 | 74 | 45 | 60 | 37 | 54 | 25 | 54 | 36 | 40 | 32 | 46 | 27 | 51 | 27 | 83 | 52 | 87 | 61 |
| 10 | 91 | 63 | 94 | 55 | 91 | 60 | 72 | 42 | 63 | 35 | 52 | 28 | 55 | 35 | 42 | 33 | 49 | 31 | 61 | 30 | 86 | 52 | 84 | 53 |
| 11 | 84 | 58 | 94 | 61 | 68 | 47 | 61 | 48 | 63 | 46 | 47 | 28 | 37 | 29 | 48 | 37 | 50 | 33 | 59 | 46 | 79 | 55 | 84 | 58 |
| 12 | 85 | 52 | 96 | 59 | 58 | 49 | 57 | 32 | 50 | 37 | 47 | 26 | 38 | 21 | 45 | 33 | 54 | 30 | 53 | 36 | 66 | 48 | 76 | 54 |
| 13 | 88 | 54 | 94 | 60 | 55 | 47 | 57 | 33 | 49 | 30 | 43 | 25 | 38 | 17 | 41 | 35 | 55 | 40 | 43 | 28 | 72 | 44 | 76 | 46 |
| 14 | 82 | 57 | 95 | 60 | 60 | 43 | 62 | 33 | 50 | 40 | 40 | 22 | 39 | 20 | 40 | 28 | 56 | 46 | 46 | 23 | 68 | 54 | 79 | 49 |
| 15 | 85 | 48 | 97 | 62 | 66 | 54 | 59 | 30 | 58 | 46 | 45 | 26 | 46 | 20 | 41 | 28 | 67 | 50 | 55 | 24 | 68 | 44 | 87 | 53 |
| 16 | 94 | 55 | 93 | 63 | 65 | 39 | 68 | 34 | 60 | 45 | 46 | 26 | 53 | 38 | 44 | 36 | 62 | 43 | 53 | 30 | 56 | 39 | 83 | 60 |
| 17 | 92 | 66 | 96 | 62 | 72 | 39 | 67 | 40 | 47 | 35 | 54 | 29 | 53 | 34 | 55 | 40 | 67 | 43 | 57 | 29 | 66 | 43 | 85 | 56 |
| 18 | 99 | 63 | 87 | 66 | 80 | 44 | 69 | 39 | 50 | 37 | 48 | 29 | 42 | 28 | 51 | 43 | 68 | 49 | 61 | 29 | 70 | 38 | 83 | 63 |
| 19 | 103 | 72 | 89 | 59 | 84 | 46 | 73 | 42 | 53 | 39 | 43 | 26 | 43 | 32 | 48 | 35 | 62 | 40 | 69 | 41 | 66 | 51 | 89 | 57 |
| 20 | 106 | 74 | 85 | 60 | 84 | 50 | 72 | 41 | 40 | 29 | 45 | 25 | 38 | 24 | 44 | 31 | 71 | 43 | 63 | 48 | 68 | 51 | 96 | 68 |
| 21 | 100 | 73 | 85 | 55 | 68 | 48 | 69 | 44 | 39 | 28 | 45 | 29 | 48 | 24 | 43 | 28 | 73 | 47 | 58 | 41 | 62 | 51 | 85 | 61 |
| 22 | 93 | 68 | 86 | 53 | 67 | 41 | 65 | 42 | 50 | 35 | 41 | 21 | 55 | 36 | 47 | 28 | 70 | 46 | 64 | 39 | 70 | 49 | 94 | 59 |
| 23 | 91 | 62 | 86 | 55 | 68 | 35 | 60 | 42 | 47 | 37 | 42 | 29 | 55 | 36 | 50 | 38 | 73 | 44 | 67 | 37 | 74 | 50 | 87 | 68 |
| 24 | 84 | 58 | 83 | 52 | 69 | 40 | 54 | 43 | 43 | 31 | 39 | 24 | 55 | 36 | 48 | 33 | 75 | 47 | 75 | 43 | 77 | 47 | 78 | 51 |
| 25 | 83 | 55 | 70 | 56 | 73 | 41 | 62 | 49 | 52 | 40 | 35 | 22 | 48 | 32 | 55 | 34 | 61 | 43 | 69 | 42 | 80 | 49 | 84 | 51 |
| 26 | 78 | 54 | 71 | 43 | 68 | 48 | 54 | 38 | 42 | 28 | 37 | 24 | 43 | 29 | 57 | 38 | 54 | 38 | 60 | 48 | 75 | 55 | 87 | 54 |
| 27 | 83 | 51 | 80 | 49 | 70 | 45 | 45 | 33 | 37 | 23 | 35 | 18 | 53 | 38 | 49 | 37 | 58 | 35 | 63 | 45 | 62 | 41 | 88 | 58 |
| 28 | 92 | 63 | 86 | 47 | 75 | 55 | 48 | 26 | 33 | 18 | 33 | 14 | 54 | 37 | 48 | 30 | 55 | 45 | 67 | 43 | 62 | 42 | 73 | 49 |
| 29 | 80 | 57 | 89 | 53 | 65 | 52 | 44 | 23 | 34 | 20 | 35 | 13 | 50 | 34 | ..... | ..... | 54 | 40 | 62 | 45 | 62 | 44 | 68 | 45 |
| 30 | 72 | 46 | 83 | 63 | 62 | 32 | 46 | 21 | 34 | 22 | 29 | 13 | 51 | 42 | ..... | ..... | 50 | 35 | 58 | 34 | 66 | 41 | 79 | 46 |
| 31 | 82 | 50 | 83 | 51 | ..... | ..... | 56 | 27 | ..... | ..... | 28 | 8 | 43 | 35 | ..... | ..... | 58 | 36 | ..... | ..... | 72 | 44 | ..... | ..... |
| Range | 62° | | 55° | | 59° | | 53° | | 45° | | 46° | | 48° | | 29° | | 49° | | 54° | | 57° | | 53° | |
| Monthly means | 74°.9 | | 73°.9 | | 61° | | 49° | | 41°.1 | | 30°.9 | | 34°.3 | | 39°.7 | | 48°.0 | | 51°.2 | | 58°.8 | | 72°.3 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, BOERNE, TEX.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 91 | 73 | 97 | 70 | 93 | 72 | 91 | 69 | 74 | 56 | 55 | 19 | (†) | ..... | (†) | ..... | 76 | 56 | (†) | ..... | (†) | ..... | 86 | 73 |
| 2 | 91 | 73 | 99 | 74 | 96 | 69 | 94 | 67 | 59 | 50 | 51 | 37 | ..... | ..... | ..... | ..... | 70 | 43 | ..... | ..... | ..... | ..... | 87 | 74 |
| 3 | 91 | 73 | 100 | 73 | 92 | 72 | 98 | 72 | 64 | 46 | 64 | 54 | ..... | ..... | ..... | ..... | 70 | 42 | ..... | ..... | ..... | ..... | 89 | 72 |
| 4 | 91 | 71 | 97 | 77 | 92 | 74 | 76 | 56 | 64 | 54 | 75 | 41 | ..... | ..... | ..... | ..... | 70 | 38 | ..... | ..... | ..... | ..... | 86 | 70 |
| 5 | 89 | 73 | 97 | 73 | 92 | 69 | 75 | 58 | 63 | 46 | 50 | 28 | ..... | ..... | ..... | ..... | 70 | 52 | ..... | ..... | ..... | ..... | 85 | 70 |
| 6 | 90 | 72 | 99 | 75 | 84 | 70 | 82 | 62 | 59 | 36 | 54 | 23 | ..... | ..... | 65 | 40 | 70 | 52 | ..... | ..... | ..... | ..... | 88 | 70 |
| 7 | 90 | 71 | 99 | 74 | 86 | 69 | 84 | 57 | 72 | 42 | 57 | 23 | ..... | ..... | 71 | 39 | 75 | 59 | ..... | ..... | ..... | ..... | 85 | 72 |
| 8 | 95 | 76 | 96 | 65 | 88 | 73 | 80 | 59 | 63 | 46 | 61 | 27 | ..... | ..... | 70 | 40 | 72 | 62 | ..... | ..... | ..... | ..... | 79 | 64 |
| 9 | 95 | 74 | 92 | 73 | 90 | 74 | 87 | 52 | 56 | 37 | 59 | 37 | ..... | ..... | 58 | 37 | (*) | ..... | ..... | ..... | ..... | ..... | 86 | 76 |
| 10 | 96 | 74 | 95 | 71 | 91 | 73 | (*) | ..... | 58 | 27 | 65 | 46 | ..... | ..... | 57 | 31 | 71 | 37 | ..... | ..... | ..... | ..... | 93 | 73 |
| 11 | 95 | 70 | 95 | 68 | 90 | 72 | 86 | 58 | 58 | 26 | 68 | 35 | ..... | ..... | 61 | 26 | 73 | 44 | ..... | ..... | 69 | 56 | 86 | 72 |
| 12 | 94 | 72 | 96 | 66 | 89 | 72 | (*) | ..... | 69 | 36 | 64 | 48 | ..... | ..... | 62 | 46 | 80 | 42 | ..... | ..... | 81 | 62 | 87 | 70 |
| 13 | 89 | 73 | 95 | 67 | 90 | 74 | ..... | ..... | 74 | 49 | 68 | 55 | ..... | ..... | 71 | 46 | 78 | 45 | ..... | ..... | (*) | ..... | 90 | 74 |
| 14 | 90 | 71 | 94 | 72 | 92 | 75 | ..... | ..... | 73 | 49 | 67 | 51 | ..... | ..... | 77 | 36 | 76 | 55 | ..... | ..... | 82 | 65 | 97 | 75 |
| 15 | 91 | 75 | 97 | 73 | 92 | 74 | 89 | 71 | 73 | 41 | 63 | 57 | ..... | ..... | 68 | 38 | 71 | 57 | ..... | ..... | (*) | ..... | 93 | 77 |
| 16 | 88 | 73 | 92 | 69 | 88 | 72 | 75 | 61 | 75 | 43 | 68 | 62 | ..... | ..... | 69 | 68 | 77 | 59 | ..... | ..... | ..... | ..... | (*) | ..... |
| 17 | 90 | 73 | 91 | 74 | 88 | 70 | 66 | 60 | 73 | 42 | 69 | 62 | ..... | ..... | 81 | 55 | 79 | 54 | ..... | ..... | 86 | 73 | ..... | ..... |
| 18 | 96 | 71 | 92 | 72 | 81 | 62 | 67 | 55 | 71 | 46 | 68 | 62 | ..... | ..... | 77 | 44 | 72 | 50 | ..... | ..... | 85 | 73 | 95 | 75 |
| 19 | 83 | 74 | 96 | 72 | 81 | 59 | 65 | 48 | 68 | 50 | 69 | 62 | ..... | ..... | 73 | 59 | 62 | 53 | ..... | ..... | 91 | 71 | 96 | 74 |
| 20 | 89 | 63 | 94 | 67 | 84 | 56 | 61 | 45 | 64 | 45 | 69 | 52 | ..... | ..... | 75 | 57 | 68 | 52 | ..... | ..... | 89 | 72 | 95 | 71 |
| 21 | 78 | 63 | 94 | 74 | 87 | 57 | 64 | 41 | 65 | 43 | 66 | 52 | ..... | ..... | 71 | 48 | 76 | 46 | ..... | ..... | 88 | 73 | 93 | 73 |
| 22 | 84 | 55 | 93 | 72 | 87 | 60 | 68 | 37 | 63 | 36 | 69 | 44 | ..... | ..... | 56 | 39 | 78 | 44 | ..... | ..... | 85 | 67 | (†) | ..... |
| 23 | 86 | 63 | 95 | 65 | 86 | 63 | 72 | 40 | 71 | 36 | 66 | 54 | ..... | ..... | 64 | 43 | 75 | 47 | ..... | ..... | 86 | 73 | ..... | ..... |
| 24 | 88 | 58 | 96 | 76 | 84 | 58 | 68 | 49 | 77 | 50 | 68 | 45 | ..... | ..... | 65 | 35 | 79 | 56 | ..... | ..... | 84 | 69 | ..... | ..... |
| 25 | 94 | 60 | 96 | 75 | 84 | 64 | 76 | 60 | 65 | 41 | 68 | 42 | ..... | ..... | 56 | 39 | 79 | 48 | ..... | ..... | 84 | 67 | ..... | ..... |
| 26 | 97 | 64 | 93 | 75 | 87 | 69 | 79 | 52 | 69 | 37 | 67 | 42 | ..... | ..... | 55 | 43 | 70 | 58 | ..... | ..... | 85 | 65 | ..... | ..... |
| 27 | 95 | 77 | 93 | 72 | 92 | 68 | 80 | 49 | 58 | 37 | 59 | 51 | ..... | ..... | 63 | 45 | 82 | 53 | ..... | ..... | (*) | ..... | ..... | ..... |
| 28 | 92 | 78 | 89 | 70 | 91 | 67 | 82 | 62 | 47 | 37 | 51 | 41 | ..... | ..... | 63 | 37 | 79 | 45 | ..... | ..... | 86 | 71 | ..... | ..... |
| 29 | 94 | 75 | 93 | 67 | 92 | 68 | 85 | 65 | 47 | 22 | 44 | 34 | ..... | ..... | ..... | ..... | 79 | 58 | ..... | ..... | 84 | 70 | ..... | ..... |
| 30 | 94 | 75 | 91 | 68 | 89 | 69 | 66 | 58 | 46 | 21 | 45 | 30 | ..... | ..... | ..... | ..... | 79 | 45 | ..... | ..... | 79 | 73 | ..... | ..... |
| 31 | 96 | 77 | 94 | 71 | ..... | ..... | 63 | 57 | ..... | ..... | 47 | 29 | ..... | ..... | ..... | ..... | 72 | 46 | ..... | ..... | 88 | 74 | ..... | ..... |
| Range | 42°.0 | | 35°.0 | | 40°.0 | | ..... | | 56°.0 | | 56°.0 | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | |
| Monthly means | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | |

* No observation taken. † Station closed.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, BOSTON, MASS.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 79 | 63.5 | 70 | 60.5 | 77 | 67 | 78 | 52 | 54 | 37 | 36 | 20 | 35 | 16 | 30 | 16 | 41 | 23 | 43 | 36 | 51 | 43 | 60 | 51 |
| 2 | 76 | 64 | 70 | 60 | 68 | 59 | 82 | 56 | 62 | 43 | 32 | 14 | 36 | 23 | 22 | 10 | 47 | 23 | 45 | 36 | 77 | 45 | 62 | 49 |
| 3 | 83 | 60 | 75 | 63 | 68 | 55 | 59.5 | 56 | 54 | 41.5 | 44 | 16 | 29 | 4.5 | 35 | 4 | 53 | 42 | 52 | 39 | 85 | 56 | 66 | 54 |
| 4 | 73 | 60 | 80 | 62.5 | 75 | 52 | 73 | 56 | 49 | 35 | 50 | 27 | 41 | 3 | 39 | 12 | 45 | 27 | 43 | 37 | 80 | 58 | 81 | 55 |
| 5 | 83 | 59.5 | 81 | 63 | 80 | 59 | 65 | 45 | 57 | 36 | 59 | 37 | 37 | 15 | 40 | 18 | 41 | 22 | 42 | 34 | 72 | 52 | 81 | 54.5 |
| 6 | 73 | 60 | 81.5 | 62 | 66 | 58 | 59 | 39 | 56 | 30 | 59 | 39 | 26 | 10 | 45 | 20 | 51 | 32 | 45 | 37 | 69.5 | 47 | 66 | 48 |
| 7 | 72 | 59 | 81.5 | 65.5 | 59 | 55 | 63 | 37 | 56 | 28 | 39 | 29 | 16 | 1 | 56 | 32 | 67 | 40 | 47 | 36 | 69 | 48 | 72 | 45 |
| 8 | 81 | 61 | 89 | 65.5 | 65 | 53 | 55 | 43 | 61 | 36 | 48 | 29 | 20 | −6 | 55 | 35 | 63 | 41 | 52 | 39 | 72 | 51 | 69.5 | 50 |
| 9 | 79 | 65 | 68 | 64 | 68 | 53 | 59.5 | 50 | 66 | 53 | 37 | 25 | 39 | 15 | 43 | 35 | 48 | 40 | 47 | 40 | 55 | 50 | 63 | 55 |
| 10 | 83 | 67 | 77 | 61 | 76 | 54 | 68 | 51 | 53 | 37 | 34 | 20 | 42 | 28 | 36 | 21 | 71 | 37 | 52.5 | 39 | 70 | 53 | 58 | 50 |
| 11 | 82 | 63.5 | 84 | 59.5 | 80.5 | 58 | 58 | 49 | 39 | 32 | 44 | 26 | 43 | 34 | 30 | 16 | 52 | 33 | 60 | 42 | 58 | 45 | 58 | 49 |
| 12 | 84 | 64.5 | 87 | 62 | 85 | 59 | 58 | 47 | 45 | 28 | 46 | 33 | 46 | 34 | 33 | 9 | 37 | 32 | 52 | 42 | 54 | 41 | 74 | 47 |
| 13 | 79 | 63 | 76 | 66 | 88 | 62 | 61 | 43 | 45 | 31 | 54 | 31 | 46 | 31 | 40 | 23 | 42 | 32 | 56 | 44 | 55 | 38 | 72 | 49 |
| 14 | 73 | 57.5 | 85 | 67 | 79 | 63 | 57 | 39 | 56 | 32 | 41 | 26.5 | 47 | 33 | 35 | 17 | 48 | 36 | 55 | 43 | 56 | 42 | 69 | 52 |
| 15 | 84 | 57 | 77 | 67 | 88 | 65 | 63 | 49 | 65 | 45 | 55 | 26 | 41 | 29 | 35.5 | 12 | 50 | 32 | 60 | 39 | 51 | 43 | 81 | 53 |
| 16 | 80 | 64 | 84 | 66 | 81 | 66 | 69 | 44 | 66 | 52 | 55 | 37 | 31 | 10 | 43 | 23 | 43 | 31 | 51 | 41 | 55 | 42 | 83 | 55 |
| 17 | 81 | 68 | 86 | 66 | 86 | 68 | 61 | 38 | 54 | 42 | 58 | 33 | 27 | 4 | 40 | 23 | 40 | 34 | 50 | 35 | 59 | 42 | 73 | 61 |
| 18 | 89 | 65.5 | 82 | 65 | 71 | 55 | 66 | 40 | 50 | 35 | 41 | 23 | 34 | 18 | 32 | 13 | 40 | 34 | 52 | 40 | 70 | 50 | 67 | 61 |
| 19 | 79 | 69 | 79 | 59 | 66 | 49 | 68 | 48 | 39 | 29 | 50 | 29 | 50 | 25 | 30 | 6 | 51 | 32 | 77 | 41 | 65 | 48 | 76 | 57 |
| 20 | 80 | 68 | 78 | 63 | 74 | 49 | 50 | 42.5 | 38 | 24 | 55 | 33 | 54 | 35 | 36 | 16 | 42 | 29 | 66 | 46 | 55 | 45 | 81 | 59 |
| 21 | 81 | 68.5 | 77 | 63.5 | 73 | 51 | 47 | 42 | 35 | 24 | 37 | 23 | 48 | 38 | 37 | 32 | 35 | 19 | 68 | 49.5 | 56 | 45 | 82 | 62 |
| 22 | 83 | 69 | 80 | 64.5 | 64 | 44 | 43 | 36 | 43 | 31 | 41 | 31 | 51 | 37 | 40 | 31 | 40 | 21 | 69 | 44 | 61 | 50.5 | 65 | 57 |
| 23 | 83 | 69 | 82 | 62.5 | 76 | 45 | 62 | 35 | 49 | 36 | 45 | 27 | 40 | −1 | 40 | 34 | 61 | 32 | 53 | 44 | 61 | 47 | 76 | 60 |
| 24 | 85 | 64 | 91 | 67 | 83 | 53 | 70 | 51 | 45 | 40 | 45 | 26 | 30 | 2 | 47 | 33.5 | 62 | 23 | 50 | 43 | 59 | 49 | 76 | 59 |
| 25 | 91 | 63.5 | 77 | 68 | 83 | 56 | 59.5 | 36 | 48.5 | 43 | 45 | 27 | 52 | 24 | 39 | 29 | 29 | 10 | 72 | 50 | 75.5 | 50 | 76 | 61 |
| 26 | 81 | 62 | 77 | 66 | 82 | 61 | 40 | 34 | 58 | 47 | 47 | 27 | 42 | 33 | 40 | 25 | 47 | 22 | 61 | 50 | 71.5 | 54 | 76.5 | 55 |
| 27 | 64 | 61 | 77 | 64 | 71 | 58 | 50 | 33 | 62 | 50 | 49 | 27 | 49 | 35 | 51 | 32 | 51 | 34 | 58 | 48 | 74 | 56 | 89.5 | 58 |
| 28 | 65 | 60 | 91.5 | 67 | 64 | 57 | 53.5 | 31 | 58 | 44.5 | 45 | 29 | 40 | 12 | 53 | 34 | 49 | 38 | 50 | 47.5 | 75 | 54 | 83 | 65 |
| 29 | 73 | 61.5 | 86 | 69 | 63 | 54.5 | 67 | 41 | 45 | 34 | 45 | 26 | 24 | 6 | ..... | ..... | 47 | 37 | 56 | 46 | 73 | 56 | 81 | 67 |
| 30 | 70 | 63.5 | 80 | 65 | 71 | 47 | 61 | 43.5 | 36 | 29 | 36 | 29 | 23 | 4 | ..... | ..... | 57 | 35 | 51 | 44.5 | 60 | 52.5 | 92 | 69 |
| 31 | 72 | 63 | 83 | 58 | ..... | ..... | 56 | 37 | ..... | ..... | 36 | 21 | 30 | 11 | ..... | ..... | 45 | 37 | ..... | ..... | 55 | 51 | ..... | ..... |
| Range | 34° | | 33°.5 | | 44° | | 51° | | 42° | | 45° | | 60° | | 52° | | 61° | | 43° | | 47° | | 47° | |
| Monthly means | 69°.9 | | 70°.7 | | 63°.9 | | 51°.3 | | 43°.8 | | 36°.1 | | 28°.3 | | 31° | | 39°.5 | | 47°.2 | | 55°.3 | | 64°.2 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, BRACKETTVILLE, TEX.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 100 | 75 | 96 | 72 | 98 | 72 | 92 | 69 | 71 | (*) | 56 | 27 | 47 | 29 | 69 | 39 | 75 | 55 | 74 | 52 | 84 | 68 | 92 | 75 |
| 2 | 97 | 73 | 100 | 73 | 99 | 70 | 98 | 66 | 62 | ..... | 60 | 35 | 60 | 33 | 60 | 38 | 73 | 42 | 72 | 56 | 86 | 71 | 98 | 76 |
| 3 | 97 | 75 | 101 | 71 | 100 | 70 | 104 | 70 | 70 | ..... | 70 | 49 | 60 | 34 | 60 | 29 | 73 | 42 | 78 | 45 | 85 | 64 | 96 | 75 |
| 4 | 97 | 69 | 102 | 74 | 96 | 71 | 82 | 54 | 65 | ..... | 78 | 40 | 56 | 28 | 66 | 32 | 75 | 38 | 76 | 46 | 85 | 46 | 87 | 75 |
| 5 | 97 | 70 | 104 | 73 | 93 | 73 | 80 | 54 | 70 | ..... | 60 | 32 | 50 | 26 | 68 | 41 | 75 | 54 | 81 | 48 | 85 | 51 | 85 | 73 |
| 6 | 97 | 72 | 99 | 73 | 92 | 70 | 85 | 64 | 60 | ..... | 57 | 23 | 50 | 39 | 76 | 52 | 77 | 62 | 80 | 60 | 85 | 62 | 90 | 73 |
| 7 | 100 | 69 | 100 | 74 | 88 | 68 | 95 | 67 | 77 | ..... | 61 | 28 | 50 | 39 | 78 | 40 | 75 | 55 | 77 | 67 | 88 | 71 | 87 | 74 |
| 8 | 103 | 70 | 96 | 66 | 91 | 70 | 86 | 53 | 68 | ..... | 60 | 38 | 53 | 40 | 70 | 43 | 74 | 63 | 83 | 59 | 77 | 62 | 83 | 64 |
| 9 | 106 | 70 | 97 | 69 | 93 | 70 | 90 | 67 | 67 | ..... | 60 | 52 | 60 | 44 | 65 | 37 | 70 | 46 | 81 | 53 | 75 | 60 | 90 | 68 |
| 10 | 105 | 71 | 95 | 67 | 97 | 72 | 88 | 70 | 60 | ..... | 66 | 50 | 61 | 40 | 78 | 31 | 75 | 36 | 88 | 52 | 73 | 62 | 93 | 69 |
| 11 | 95 | 69 | 95 | 66 | 90 | 69 | 89 | 64 | 60 | 45 | 65 | 48 | 61 | 48 | 64 | 35 | 81 | 55 | 79 | 54 | 70 | 61 | 85 | 67 |
| 12 | 104 | 70 | 95 | 67 | 89 | 67 | 87 | 64 | 72 | 40 | 64 | 48 | 60 | 40 | 65 | 51 | 82 | 42 | 82 | 64 | 80 | 66 | 88 | 72 |
| 13 | 97 | 69 | 96 | 69 | 93 | 72 | 89 | 66 | 76 | 56 | 70 | 49 | 58 | 32 | 74 | 47 | 80 | 53 | 78 | 69 | 85 | 60 | 92 | 77 |
| 14 | 97 | 67 | 100 | 71 | 93 | 72 | 89 | 72 | 75 | 52 | 70 | 53 | 62 | 31 | 80 | 39 | 75 | 61 | 84 | 60 | 83 | 66 | 94 | 76 |
| 15 | 99 | 73 | 96 | 67 | 93 | 71 | 89 | 72 | 75 | 43 | 70 | 62 | 60 | 34 | 67 | 40 | 72 | 56 | 91 | 60 | 76 | 59 | 96 | 76 |
| 16 | 92 | 68 | 95 | 69 | 96 | 69 | 85 | 62 | 76 | 48 | 72 | 66 | 63 | 43 | 70 | 42 | 83 | 53 | 86 | 65 | 85 | 68 | 94 | 74 |
| 17 | 92 | 72 | 99 | 72 | 93 | 69 | 72 | 59 | 76 | 55 | 73 | 66 | 63 | 45 | 82 | 53 | 81 | 55 | 94 | 70 | 85 | 75 | 96 | 80 |
| 18 | 96 | 69 | 99 | 72 | 91 | 61 | 75 | 58 | 75 | 59 | 73 | 66 | 71 | 55 | 78 | 49 | 72 | 56 | 90 | 70 | 91 | 76 | 95 | 75 |
| 19 | 102 | 72 | 97 | 70 | 90 | 51 | 65 | 48 | 73 | 52 | 74 | 56 | 66 | 42 | 78 | 64 | 67 | 55 | 83 | 73 | 93 | 61 | 96 | 78 |
| 20 | 94 | 65 | 100 | 71 | 91 | 52 | 70 | 38 | 70 | 48 | 61 | 54 | 70 | 34 | 78 | 57 | 71 | 53 | 90 | 72 | 89 | 72 | 97 | 75 |
| 21 | 85 | 59 | 100 | 73 | 89 | 57 | 71 | 36 | 72 | 43 | 65 | 54 | 63 | 34 | 76 | 48 | 76 | 48 | 85 | 74 | 89 | 78 | 94 | 76 |
| 22 | 93 | 51 | 98 | 70 | 90 | 54 | 73 | 36 | 66 | 45 | 68 | 44 | 68 | 33 | 73 | 52 | 75 | 45 | 95 | 75 | 87 | 77 | 95 | 75 |
| 23 | 97 | 57 | 98 | 73 | 87 | 62 | 76 | 48 | 74 | 46 | 66 | 53 | 67 | 29 | 66 | 44 | 68 | 53 | 86 | 55 | 89 | 76 | 96 | 73 |
| 24 | 97 | 59 | 99 | 74 | 87 | 62 | 72 | 65 | 80 | 54 | 68 | 49 | 71 | 45 | 70 | 44 | 76 | 49 | 85 | 48 | 88 | 71 | 96 | 75 |
| 25 | 93 | 69 | 97 | 73 | 87 | 70 | 70 | 55 | 68 | 39 | 66 | 49 | 71 | 40 | 60 | 53 | 76 | 48 | 86 | 58 | 84 | 73 | 95 | 75 |
| 26 | 100 | 71 | 98 | 73 | 87 | 72 | 85 | 45 | 76 | 35 | 66 | 51 | 76 | 56 | 60 | 45 | 79 | 65 | 85 | 63 | 92 | 70 | 95 | 75 |
| 27 | 99 | 75 | 95 | 71 | 93 | 69 | 86 | (*) | 65 | 40 | 68 | 54 | 73 | 39 | 60 | 45 | 82 | 60 | 86 | 66 | 90 | 59 | 84 | 73 |
| 28 | 96 | 76 | 93 | 68 | 96 | 69 | 85 | ..... | 53 | 38 | 66 | 43 | 73 | 45 | 66 | 42 | 86 | 48 | .79 | 54 | 90 | 69 | 85 | 71 |
| 29 | 93 | 70 | 94 | 62 | 92 | 65 | 84 | ..... | 54 | 28 | 58 | 34 | 69 | 46 | ..... | ..... | 81 | 53 | 83 | 57 | 90 | 72 | 89 | 75 |
| 30 | 96 | 70 | 92 | 67 | 92 | 66 | 79 | ..... | 52 | 26 | 48 | 29 | 66 | 42 | ..... | ..... | 80 | 45 | 85 | 57 | 87 | 76 | 89 | 76 |
| 31 | 95 | 70 | 95 | 71 | ..... | ..... | 68 | ..... | ..... | ..... | 52 | 27 | 70 | 30 | ..... | ..... | 78 | 52 | ..... | ..... | 94 | 77 | ..... | ..... |
| Range | 55°.0 | | 42°.2 | | 40°.0 | | ..... | | ..... | | 55°.0 | | 50°.0 | | 53°.0 | | 50°.0 | | 50°.0 | | 48° | | 34° | |
| Monthly means | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | 72°.3 | | 75°.8 | | 82°.8 | |

*Minimum thermometer broken.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, BRECKENRIDGE, MINN.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 78 | 50 | 75 | 53 | 67 | 39 | 54 | 35 | 39 | 25 | 22 | − 4 | 23 | 3 | 38 | 11 | 52 | 30 | 54 | 29 | 67 | 38 | 69 | 56 |
| 2 | 69 | 59 | 76 | 49 | 71 | 38 | 53 | 42 | 36 | 22 | 37 | 9 | 15 | − 8 | 40 | 8 | 37 | 28 | 56 | 32 | 58 | 36 | 66 | 57 |
| 3 | 77 | 52 | 75 | 55 | 81 | 37 | 47 | 35 | 27 | 16 | 33 | 8 | 25 | − 7 | 43 | 5 | 33 | 20 | 59 | 25 | 39 | 30 | 68 | 52 |
| 4 | 84 | 63 | 86 | 62 | 72 | 52 | 44 | 22 | 25 | 13 | 30 | 25 | 9 | −14 | 41 | 18 | 53 | 20 | 59 | 30 | 58 | 35 | 66 | 48 |
| 5 | 90 | 65 | 84 | 62 | 74 | 42 | 53 | 16 | 26 | 7 | 26 | 12 | 12 | −10 | 49 | 24 | 56 | 28 | 52 | 26 | 72 | 31 | 75 | 42 |
| 6 | 89 | 65 | 81 | 56 | 77 | 45 | 53 | 19 | 45 | 7 | 12 | −10 | − 4 | −21 | 44 | 22 | 53 | 30 | 61 | 29 | 62 | 50 | 66 | 56 |
| 7 | 88 | 67 | 81 | 54 | 80 | 58 | 48 | 37 | 37 | 27 | 30 | 12 | 20 | −13 | 35 | 31 | 58 | 27 | 57 | 43 | 70 | 36 | 71 | 45 |
| 8 | 81 | 64 | 74 | 51 | 67 | 54 | 54 | 33 | 33 | 11 | 21 | − 4 | 33 | 0 | 29 | 18 | 55 | 44 | 53 | 38 | 58 | 34 | 64 | 53 |
| 9 | 80 | 62 | 75 | 52 | 75 | 44 | 53 | 34 | 24 | − 4 | 38 | 10 | 38 | 15 | 29 | 10 | 54 | 43 | 48 | 37 | 52 | 36 | 74 | 50 |
| 10 | 74 | 53 | 83 | 49 | 79 | 48 | 55 | 27 | 42 | 13 | 45 | 28 | 22 | 0 | 30 | 4 | 51 | 43 | 39 | 32 | 47 | 30 | 74 | 52 |
| 11 | 79 | 53 | 79 | 56 | 82 | 57 | 63 | 28 | 42 | 21 | 41 | 18 | 33 | 15 | 36 | 14 | 46 | 33 | 55 | 33 | 46 | 29 | 75 | 55 |
| 12 | 84 | 59 | 71 | 50 | 73 | 54 | 54 | 47 | 48 | 25 | 48 | 17 | 32 | 15 | 33 | 15 | 39 | 30 | 52 | 32 | 52 | 30 | 74 | 52 |
| 13 | 84 | 66 | 77 | 54 | 92 | 70 | 52 | 44 | 44 | 28 | 39 | 17 | 21 | 5 | 36 | 13 | 55 | 34 | 50 | 32 | 57 | 30 | 72 | 49 |
| 14 | 85 | 59 | 79 | 55 | 76 | 54 | 49 | 39 | 46 | 22 | 46 | 25 | 36 | 9 | 34 | 27 | 58 | 30 | 55 | 38 | 62 | 35 | 69 | 55 |
| 15 | 74 | 55 | 85 | 48 | 66 | 49 | 49 | 35 | 53 | 29 | 48 | 25 | 36 | 9 | 30 | 23 | 53 | 34 | 53 | 37 | 64 | 33 | 68 | 55 |
| 16 | 78 | 53 | 86 | 51 | 60 | 39 | 49 | 30 | 48 | 25 | 46 | 21 | 33 | 10 | 27 | 9 | 47 | 34 | 63 | 42 | 63 | 35 | 71 | 53 |
| 17 | 77 | 55 | 83 | 53 | 60 | 36 | 52 | 38 | 30 | 16 | 40 | 24 | 31 | 8 | 30 | − 2 | 47 | 27 | 59 | 46 | 63 | 40 | 78 | 53 |
| 18 | 60 | 51 | 85 | 56 | 71 | 34 | 60 | 36 | 31 | 22 | 36 | 34 | 26 | 21 | 34 | 26 | 61 | 33 | 63 | 47 | 53 | 47 | 80 | 58 |
| 19 | 64 | 50 | 90 | 56 | 74 | 40 | 51 | 32 | 39 | 28 | 38 | 29 | 26 | 17 | 41 | 31 | 54 | 33 | 61 | 44 | 65 | 48 | 79 | 59 |
| 20 | 74 | 44 | 84 | 58 | 70 | 38 | 57 | 24 | 46 | 34 | 34 | 28 | 32 | 17 | 35 | 28 | 49 | 31 | 64 | 41 | 57 | 45 | 73 | 53 |
| 21 | 82 | 49 | 72 | 43 | 86 | 52 | 65 | 29 | 38 | 26 | 42 | 32 | 37 | 11 | 38 | 27 | 54 | 30 | 61 | 43 | 65 | 38 | 80 | 53 |
| 22 | 82 | 50 | 79 | 44 | 69 | 45 | 70 | 28 | 42 | 18 | 49 | 38 | 21 | − 4 | 35 | 27 | 72 | 32 | 65 | 47 | 59 | 51 | 80 | 51 |
| 23 | 83 | 54 | 86 | 44 | 69 | 34 | 64 | 28 | 46 | 34 | 49 | 32 | 29 | − 6 | 32 | 26 | 50 | 30 | 51 | 39 | 67 | 53 | 84 | 63 |
| 24 | 84 | 57 | 82 | 56 | 69 | 53 | 64 | 35 | 46 | 33 | 40 | 26 | 19 | 9 | 36 | 25 | 36 | 21 | 53 | 43 | 64 | 49 | 86 | 65 |
| 25 | 90 | 62 | 85 | 53 | 66 | 40 | 53 | 38 | 34 | 28 | 42 | 32 | 21 | 7 | 39 | 18 | 52 | 26 | 56 | 38 | 61 | 45 | 72 | 58 |
| 26 | 87 | 65 | 72 | 60 | 69 | 41 | 51 | 44 | 32 | 26 | 40 | 31 | 38 | 10 | 45 | 24 | 60 | 28 | 61 | 34 | 55 | 41 | 78 | 49 |
| 27 | 80 | 61 | 68 | 48 | 64 | 40 | 57 | 28 | 26 | 8 | 35 | 29 | 18 | 0 | 53 | 30 | 37 | 26 | 66 | 36 | 58 | 43 | 89 | 54 |
| 28 | 77 | 58 | 76 | 54 | 74 | 37 | 46 | 27 | 11 | − 1 | 33 | 24 | 21 | − 7 | 47 | 29 | 41 | 19 | 71 | 42 | 65 | 48 | 85 | 66 |
| 29 | 89 | 50 | 80 | 41 | 90 | 52 | 40 | 24 | 15 | − 1 | 29 | 19 | 25 | 13 | ..... | ..... | 50 | 25 | 74 | 43 | 67 | 41 | 83 | 67 |
| 30 | 87 | 66 | 84 | 60 | 56 | 42 | 46 | 22 | 12 | 6 | 26 | 12 | 25 | 19 | ..... | ..... | 49 | 31 | 62 | 44 | 68 | 44 | 71 | 52 |
| 31 | 80 | 62 | 71 | 49 | ..... | ..... | 50 | 20 | ..... | ..... | 30 | 11 | 36 | 17 | ..... | ..... | 48 | 29 | ..... | ..... | 78 | 56 | ..... | ..... |
| Range | 46° | | 49° | | 58° | | 54° | | 57° | | 59° | | 59° | | 55° | | 53° | | 49° | | 49° | | 47° | |
| Monthly means | 69°.5 | | 65°.9 | | 58°.5 | | 41°.9 | | 27° | | 28°.3 | | 14°.7 | | 27°.4 | | 39°.2 | | 47°.6 | | 51°.2 | | 64°.9 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, BROCKVILLE, CANADA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 79.7 | 66.1 | 88.6 | 57.2 | 70.3 | 55.6 | 78.7 | 62.5 | 45.0 | 31.1 | 39.7 | 10.5 | 30.7 | 6.4 | 18.8 | − 0.7 | 22.7 | 6.3 | 49.6 | 35.1 | 65.6 | 44.1 | 76.6 | 50.1 |
| 2 | 76.6 | 60.7 | 86.8 | 67.3 | 69.6 | 47.1 | 76.1 | 50.1 | 55.6 | 36.1 | 25.7 | 5.9 | 31.6 | − 2.2 | 17.8 | 2.9 | 39.5 | 14.7 | 49.1 | 34.1 | 65.7 | 49.1 | 80.1 | 54.0 |
| 3 | 78.4 | 54.2 | 82.6 | 68.3 | 65.9 | 43.7 | 55.6 | 41.6 | 46.6 | 32.1 | 36.6 | 22.5 | 10.5 | −11.7 | 24.2 | 0.3 | 45.5 | 32.0 | 56.6 | 32.1 | 74.3 | 55.2 | 78.6 | 61.2 |
| 4 | 84.8 | 56.3 | 76.2 | 57.0 | 70.6 | 51.1 | 65.6 | 50.1 | 47.0 | 27.0 | 40.6 | 28.1 | 22.8 | 8.0 | 31.7 | 3.4 | 35.5 | 18.7 | 51.6 | 35.1 | 63.6 | 50.1 | 77.6 | 62.2 |
| 5 | 73.6 | 60.6 | 79.3 | 52.7 | 68.6 | 53.1 | 54.5 | 35.1 | 48.2 | 25.0 | 49.4 | 36.6 | 18.8 | −16.6 | 34.7 | 18.1 | 39.1 | 15.7 | 43.6 | 36.1 | 53.6 | 48.1 | 65.6 | 44.1 |
| 6 | 77.9 | 57.2 | 80.2 | 54.1 | 64.6 | 45.1 | 55.7 | 36.2 | 31.7 | 17.8 | 41.6 | 20.0 | − 6.7 | −20.7 | 36.6 | 24.0 | 52.6 | 33.1 | 45.6 | 36.1 | 58.6 | 40.1 | 61.6 | 35.1 |
| 7 | 81.6 | 50.6 | 84.0 | 63.8 | 68.7 | 48.5 | 58.8 | 39.6 | 43.6 | 29.6 | 32.7 | 11.6 | − 4.6 | −23.0 | 44.6 | 31.6 | 52.6 | 37.1 | 46.6 | 37.6 | 64.6 | 43.1 | 55.6 | 34.1 |
| 8 | 79.3 | 60.2 | 81.2 | 59.7 | 71.1 | 49.1 | 58.6 | 47.1 | 49.6 | 33.1 | 37.5 | 29.1 | 16.9 | −25.7 | 42.6 | 29.0 | 53.1 | 33.1 | 49.6 | 35.1 | 71.6 | 51.0 | 58.6 | 44.1 |
| 9 | 78.1 | 65.8 | 83.6 | 61.2 | 73.3 | 43.8 | 60.7 | 43.1 | 45.6 | 25.0 | 31.6 | 15.7 | 33.7 | 15.9 | 40.6 | 18.8 | 56.6 | 29.1 | 62.6 | 39.1 | 63.6 | 51.1 | 70.6 | 44.1 |
| 10 | 77.7 | 59.3 | 78.9 | 59.3 | 76.6 | 44.6 | 63.5 | 39.1 | 28.7 | 17.8 | 32.7 | 15.7 | 35.0 | 29.9 | 24.8 | 15.7 | 57.6 | 34.1 | 58.6 | 49.1 | 64.6 | 45.0 | 70.6 | 46.1 |
| 11 | 75.2 | 54.3 | 79.4 | 60.2 | 81.6 | 58.2 | 59.5 | 46.1 | 38.5 | 24.0 | 41.6 | 29.1 | 39.6 | 33.1 | 16.9 | 0.3 | 41.5 | 28.3 | 55.6 | 46.1 | 50.5 | 40.1 | 66.6 | 47.1 |
| 12 | 76.9 | 55.5 | 81.2 | 56.7 | 80.5 | 61.2 | 55.6 | 43.1 | 43.6 | 29.0 | 41.6 | 31.6 | 37.6 | 33.1 | 30.4 | 5.4 | 36.6 | 30.1 | 59.1 | 37.1 | 46.6 | 37.9 | 74.1 | 47.6 |
| 13 | 68.9 | 50.6 | 75.6 | 61.8 | 82.6 | 61.2 | 51.6 | 43.5 | 36.5 | 21.8 | 42.6 | 27.0 | 34.7 | 30.0 | 32.7 | 12.6 | 36.6 | 32.1 | 57.6 | 40.1 | 50.6 | 32.1 | 74.6 | 49.1 |
| 14 | 75.6 | 46.6 | 83.6 | 56.2 | 82.5 | 55.2 | 56.7 | 46.5 | 50.6 | 29.1 | 34.7 | 15.7 | 33.7 | 29.1 | 20.8 | 3.4 | 39.6 | 32.1 | 52.7 | 36.1 | 52.6 | 37.1 | 81.7 | 53.3 |
| 15 | 81.0 | 59.9 | 80.5 | 59.0 | 88.6 | 54.5 | 54.6 | 50.1 | 59.6 | 40.1 | 44.1 | 25.9 | 31.6 | 12.0 | 22.8 | − 0.7 | 42.6 | 30.1 | 53.6 | 34.6 | 57.6 | 35.1 | 78.6 | 54.1 |
| 16 | 88.6 | 65.2 | 72.6 | 61.9 | 82.6 | 68.3 | 62.6 | 41.1 | 55.6 | 40.1 | 44.9 | 29.3 | 13.9 | − 2.7 | 31.7 | 1.3 | 53.4 | 31.0 | 58.6 | 42.6 | 62.6 | 35.1 | 72.6 | 60.1 |
| 17 | 79.6 | 66.8 | 74.8 | 61.5 | 82.6 | 51.0 | 53.7 | 34.1 | 52.6 | 37.1 | 42.6 | 23.9 | 17.1 | 2.4 | 37.6 | 19.8 | 51.6 | 32.1 | 63.0 | 44.1 | 65.6 | 36.1 | 68.6 | 56.2 |
| 18 | 81.6 | 64.2 | 80.5 | 56.2 | 66.6 | 42.1 | 53.6 | 39.1 | 47.6 | 29.3 | 26.7 | 14.7 | 23.9 | 6.4 | 20.8 | − 1.2 | 51.5 | 35.1 | 67.6 | 38.1 | 66.6 | 40.1 | 74.6 | 50.1 |
| 19 | 75.6 | 64.7 | 86.0 | 61.2 | 68.6 | 43.1 | 61.6 | 45.1 | 31.7 | 20.0 | 43.6 | 21.9 | 42.6 | 12.6 | 27.2 | − 4.7 | 48.6 | 34.1 | 63.8 | 42.2 | 73.6 | 42.1 | 74.6 | 49.1 |
| 20 | 77.6 | 59.2 | 80.6 | 58.2 | 68.6 | 55.2 | 46.6 | 32.1 | 30.7 | 16.7 | 43.6 | 30.1 | 40.6 | 29.1 | 31.7 | 15.7 | 40.2 | 26.0 | 66.4 | 40.1 | 64.6 | 50.1 | 78.6 | 54.1 |
| 21 | 73.1 | 55.2 | 83.6 | 51.1 | 59.6 | 45.1 | 39.7 | 27.6 | 34.7 | 17.8 | 31.7 | 24.0 | 39.6 | 33.3 | 33.7 | 22.9 | 33.7 | 17.8 | 58.8 | 45.2 | 63.6 | 47.1 | 81.5 | 59.2 |
| 22 | 80.1 | 57.3 | 86.6 | 54.1 | 62.1 | 38.1 | 48.5 | 31.6 | 41.6 | 26.0 | 34.7 | 29.0 | 36.6 | 31.7 | 41.6 | 31.0 | 39.6 | 21.8 | 50.9 | 34.1 | 60.6 | 38.1 | 68.6 | 60.2 |
| 23 | 84.6 | 59.2 | 91.6 | 62.2 | 70.7 | 49.1 | 48.7 | 30.1 | 45.6 | 38.1 | 32.7 | 26.0 | 33.7 | − 6.6 | 38.6 | 31.1 | 50.6 | 32.2 | 59.7 | 46.1 | 66.6 | 47.1 | 71.9 | 59.9 |
| 24 | 83.1 | 55.2 | 77.6 | 68.3 | 75.4 | 51.5 | 61.6 | 40.6 | 43.6 | 37.1 | 28.5 | 21.9 | 25.7 | − 6.5 | 36.6 | 29.1 | 44.1 | 5.0 | 72.6 | 52.1 | 70.6 | 46.1 | 73.6 | 59.2 |
| 25 | 89.5 | 60.2 | 83.6 | 67.5 | 78.1 | 63.2 | 41.6 | 32.1 | 45.6 | 38.1 | 27.7 | 22.9 | 31.2 | 13.7 | 31.2 | 21.0 | 28.7 | 4.6 | 66.6 | 51.1 | 70.5 | 53.1 | 72.6 | 54.1 |
| 26 | 88.6 | 66.4 | 84.7 | 62.2 | 77.6 | 57.2 | 37.6 | 28.1 | 52.6 | 41.1 | 32.7 | 24.2 | 34.7 | 17.9 | 40.2 | 17.8 | 40.6 | 18.3 | 64.6 | 48.4 | 72.6 | 52.8 | 72.6 | 42.1 |
| 27 | 83.6 | 65.3 | 85.0 | 62.0 | 67.1 | 41.6 | 42.4 | 29.8 | 50.8 | 40.6 | 36.6 | 26.0 | 35.9 | 22.9 | 41.1 | 26.0 | 50.6 | 33.1 | 75.6 | 46.1 | 65.6 | 49.1 | 75.5 | 60.2 |
| 28 | 82.5 | 65.3 | 86.5 | 66.8 | 72.9 | 47.5 | 52.6 | 25.6 | 43.5 | 34.1 | 37.6 | 27.1 | 32.4 | − 6.4 | 43.6 | 19.3 | 42.5 | 33.0 | 64.6 | 50.1 | 66.4 | 49.1 | 80.7 | 63.1 |
| 29 | 88.1 | 66.3 | 84.6 | 62.2 | 66.6 | 40.5 | 55.6 | 40.1 | 37.5 | 29.1 | 36.6 | 24.0 | 15.7 | − 6.9 | ..... | ..... | 43.6 | 28.1 | 64.6 | 54.1 | 63.6 | 44.1 | 87.5 | 61.6 |
| 30 | 86.5 | 66.3 | 78.6 | 56.2 | 77.6 | 51.1 | 51.5 | 36.1 | 33.7 | 26.0 | 28.2 | 20.8 | 9.0 | − 6.7 | ..... | ..... | 49.1 | 28.1 | 66.6 | 49.1 | 63.6 | 44.0 | 91.6 | 62.2 |
| 31 | 79.5 | 62.2 | 73.1 | 59.2 | ..... | ..... | 43.6 | 36.1 | ..... | ..... | 22.8 | 12.7 | 14.7 | 0.4 | ..... | ..... | 48.7 | 35.0 | ..... | ..... | 75.6 | 49.1 | ..... | ..... |
| Range | 42°.9 | | 40°.5 | | 50°.5 | | 57°.9 | | 42°.9 | | 43°.5 | | 68°.3 | | 49°.3 | | 53°.0 | | 43°.5 | | 43°.5 | | 57°.5 | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, BROWNSVILLE, TEX.*

| Day of month. | 1877. July | | August. | | September. | | October. | | November. | | December. | | 1878. January. | | February. | | March. | | April. | | May. | | June. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 92 | 82 | 96 | 85 | 94 | 75 | 90 | 70 | 86 | 67 | 52 | 43 | 58 | 38 | 71 | 61 | 79 | 64 | 73 | 64 | 84 | 69 | 91 | 79 |
| 2 | 92 | 83 | 98 | 83 | 96 | 78 | 95 | 72 | 65 | 57 | 69 | 48 | 58 | 46 | 65 | 47 | 79 | 56 | 68 | 61 | 83 | 72 | 92 | 78 |
| 3 | 92 | 85 | 101 | 86 | 94 | 76 | 95 | 71 | 71 | 56 | 71 | 57 | 64 | 42 | 57 | 37 | 75 | 48 | 78 | 59 | 90 | 74 | 90 | 77 |
| 4 | 94 | 82 | 99 | 86 | 93 | 79 | 86 | 75 | 77 | 61 | 72 | 62 | 54 | 38 | 62 | 37 | 74 | 52 | 76 | 53 | 80 | 62 | 91 | 77 |
| 5 | 95 | 76 | 100 | 87 | 94 | 77 | 86 | 65 | 74 | 60 | 66 | 43 | 54 | 39 | 70 | 39 | 75 | 64 | 78 | 55 | 81 | 55 | 95 | 76 |
| 6 | 92 | 87 | 97 | 85 | 85 | 76 | 90 | 76 | 64 | 50 | 57 | 35 | 58 | 49 | 76 | 59 | 78 | 68 | 79 | 65 | 86 | 68 | 91 | 75 |
| 7 | 95 | 75 | 95 | 85 | 91 | 73 | 92 | 77 | 82 | 57 | 62 | 37 | 61 | 56 | 77 | 54 | 78 | 66 | 76 | 69 | 85 | 74 | 91 | 76 |
| 8 | 98 | 74 | 95 | 78 | 92 | 76 | 85 | 72 | 71 | 56 | 67 | 48 | 46 | 40 | 80 | 60 | 80 | 68 | 89 | 70 | 93 | 74 | 91 | 78 |
| 9 | 95 | 75 | 97 | 83 | 93 | 77 | 87 | 70 | 60 | 45 | 69 | 54 | 57 | 44 | 65 | 45 | 76 | 56 | 95 | 68 | 81 | 64 | 95 | 79 |
| 10 | 95 | 75 | 91 | 79 | 95 | 78 | 83 | 70 | 62 | 42 | 68 | 61 | 61 | 49 | 66 | 41 | 78 | 47 | 97 | 63 | 82 | 65 | 95 | 79 |
| 11 | 94 | 74 | 93 | 84 | 93 | 79 | 85 | 62 | 68 | 39 | 68 | 62 | 70 | 46 | 66 | 47 | 83 | 58 | 81 | 63 | 84 | 66 | 93 | 78 |
| 12 | 92 | 74 | 93 | 80 | 93 | 80 | 87 | 66 | 72 | 52 | 66 | 57 | 72 | 59 | 74 | 59 | 83 | 63 | 82 | 67 | 87 | 67 | 91 | 77 |
| 13 | 93 | 73 | 95 | 83 | 95 | 80 | 89 | 74 | 75 | 66 | 70 | 61 | 60 | 49 | 79 | 58 | 80 | 57 | 85 | 72 | 87 | 72 | 94 | 80 |
| 14 | 92 | 74 | 95 | 83 | 95 | 74 | 92 | 77 | 82 | 65 | 75 | 62 | 61 | 39 | 77 | 55 | 78 | 56 | 90 | 72 | 91 | 71 | 93 | 81 |
| 15 | 92 | 79 | 96 | 83 | 94 | 74 | 89 | 77 | 79 | 63 | 75 | 63 | 63 | 42 | 72 | 50 | 73 | 65 | 89 | 73 | 85 | 72 | 94 | 81 |
| 16 | 91 | 81 | 95 | 84 | 88 | 75 | 90 | 80 | 77 | 60 | 78 | 66 | 68 | 52 | 77 | 53 | 73 | 62 | 85 | 72 | 90 | 75 | 94 | 82 |
| 17 | 94 | 77 | 96 | 85 | 96 | 77 | 87 | 73 | 78 | 56 | 77 | 63 | 68 | 51 | 78 | 58 | 80 | 54 | 90 | 72 | 87 | 77 | 95 | 80 |
| 18 | 94 | 79 | 97 | 76 | 90 | 72 | 75 | 69 | 82 | 63 | 78 | 63 | 77 | 62 | 81 | 57 | 77 | 58 | 86 | 70 | 92 | 77 | 96 | 80 |
| 19 | 94 | 80 | 95 | 85 | 87 | 64 | 77 | 60 | 80 | 65 | 77 | 65 | 75 | 56 | 74 | 65 | 71 | 58 | 83 | 73 | 96 | 75 | 98 | 77 |
| 20 | 88 | 80 | 96 | 83 | 90 | 64 | 75 | 56 | 74 | 55 | 72 | 68 | 73 | 64 | 84 | 68 | 70 | 58 | 87 | 73 | 95 | 75 | 93 | 77 |
| 21 | 91 | 76 | 97 | 81 | 87 | 63 | 71 | 59 | 73 | 55 | 77 | 56 | 65 | 46 | 78 | 59 | 76 | 53 | 88 | 75 | 88 | 80 | 102 | 77 |
| 22 | 89 | 72 | 98 | 84 | 87 | 66 | 75 | 56 | 74 | 52 | 76 | 57 | 66 | 46 | 81 | 58 | 80 | 57 | 88 | 76 | 89 | 78 | 98 | 73 |
| 23 | 90 | 78 | 96 | 84 | 88 | 65 | 79 | 55 | 78 | 62 | 72 | 59 | 68 | 44 | 72 | 50 | 77 | 53 | 91 | 73 | 90 | 78 | 97 | 75 |
| 24 | 93 | 79 | 97 | 86 | 89 | 67 | 82 | 69 | 80 | 65 | 72 | 55 | 73 | 51 | 72 | 45 | 79 | 60 | 84 | 54 | 88 | 76 | 95 | 78 |
| 25 | 92 | 84 | 97 | 85 | 87 | 76 | 88 | 75 | 71 | 54 | 72 | 51 | 75 | 59 | 71 | 60 | 79 | 62 | 84 | 59 | 86 | 74 | 93 | 77 |
| 26 | 94 | 85 | 95 | 84 | 89 | 74 | 84 | 65 | 71 | 55 | 72 | 58 | 74 | 63 | 72 | 60 | 77 | 66 | 84 | 62 | 88 | 72 | 91 | 76 |
| 27 | 93 | 85 | 93 | 86 | 91 | 72 | 84 | 63 | 73 | 52 | 68 | 65 | 74 | 58 | 65 | 49 | 88 | 68 | 82 | 64 | 90 | 66 | 96 | 77 |
| 28 | 94 | 83 | 93 | 84 | 89 | 66 | 83 | 73 | 53 | 49 | 68 | 53 | 69 | 56 | 72 | 48 | 83 | 60 | 82 | 69 | 90 | 73 | 93 | 80 |
| 29 | 93 | 83 | 87 | 79 | 90 | 64 | 88 | 77 | 55 | 42 | 55 | 43 | 75 | 51 | ..... | ..... | 86 | 70 | 79 | 63 | 90 | 76 | 93 | 77 |
| 30 | 93 | 84 | 86 | 79 | 91 | 67 | 87 | 78 | 50 | 42 | 52 | 36 | 71 | 54 | ..... | ..... | 80 | 63 | 84 | 61 | 88 | 78 | 93 | 79 |
| 31 | 93 | 83 | 90 | 82 | ..... | ..... | 82 | 74 | ..... | ..... | 52 | 39 | 72 | 45 | ..... | ..... | 82 | 58 | ..... | ..... | 89 | 80 | ..... | ..... |
| Range | 26° | | 25° | | 33° | | 40° | | 47° | | 43° | | 39° | | 47° | | 41° | | 44° | | 41° | | 29° | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, BUFFALO, N. Y.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 76 | 65 | 89 | 61 | 71 | 57 | 77 | 65 | 47 | 39 | 29 | 24.5 | 33 | 19.5 | 26 | 20 | 35 | 21 | 42 | 33.5 | 57 | 51.5 | 76 | 51 |
| 2 | 67 | 61 | 83 | 71 | 62 | 52 | 77 | 56.5 | 54 | 42 | 31 | 21 | 33 | 10 | 22 | 10 | 52 | 28.5 | 43 | 36.5 | 74 | 51.5 | 80 | 60.5 |
| 3 | 72 | 60 | 76 | 63 | 66 | 46.5 | 77 | 51 | 44 | 35 | 39.5 | 25 | 22 | 6.5 | 28 | 4 | 48 | 33 | 57 | 38 | 69.5 | 51 | 78 | 65.5 |
| 4 | 70 | 57.5 | 74.5 | 58.5 | 71 | 61 | 70 | 49 | 49 | 33 | 47 | 31.5 | 28.5 | 16 | 30 | 15 | 34 | 23 | 56 | 37 | 51.5 | 48 | 69 | 59 |
| 5 | 70 | 58.5 | 73 | 55 | 71 | 58 | 53.5 | 41 | 52 | 26 | 54 | 35 | 27 | 12 | 29.5 | 20.5 | 45 | 27 | 48 | 37.5 | 54 | 45 | 59 | 46 |
| 6 | 75 | 59 | 75.5 | 64 | 65 | 56.5 | 55 | 43 | 36 | 24 | 38.5 | 28 | 16 | 9.5 | 44.5 | 24 | 52.5 | 41 | 51 | 38 | 54.5 | 48 | 59 | 43 |
| 7 | 77 | 52 | 77.5 | 70.5 | 64.5 | 55 | 58 | 35.5 | 51 | 32 | 38 | 25.5 | 13 | 3 | 53.5 | 35 | 51 | 36 | 45 | 36 | 68 | 48 | 68 | 42.5 |
| 8 | 76 | 67 | 79 | 68 | 66 | 54 | 60 | 49.5 | 57 | 40 | 38.5 | 28.5 | 26 | 10 | 43 | 33 | 59 | 37 | 58 | 39 | 70 | 52.5 | 52.5 | 46.5 |
| 9 | 72 | 65.5 | 76 | 67.5 | 72.5 | 50 | 60 | 49 | 55 | 29 | 31 | 26.5 | 41 | 26 | 35 | 21 | 67 | 42 | 58 | 44.5 | 56 | 48 | 62 | 45.5 |
| 10 | 70 | 60 | 72.5 | 63.5 | 74 | 56 | 64 | 48 | 30 | 24 | 43 | 28 | 43 | 37 | 28 | 18 | 68.5 | 49 | 63 | 44 | 52 | 44 | 65 | 49 |
| 11 | 72 | 58.5 | 75 | 61.5 | 77 | 63.5 | 55 | 46.5 | 43 | 25 | 44 | 38.5 | 38 | 32 | 20 | 10 | 51 | 37.5 | 51 | 44.5 | 47 | 38 | 59 | 52 |
| 12 | 72 | 63 | 75 | 61.5 | 81 | 66 | 48 | 43 | 45 | 36.5 | 49 | 31.5 | 36 | 33 | 30 | 19 | 55 | 36 | 51 | 43 | 44.5 | 37 | 60 | 50 |
| 13 | 74 | 58 | 73 | 62 | 79 | 67 | 59 | 43 | 50 | 31.5 | 52.5 | 31 | 37 | 31 | 33.5 | 23 | 44 | 33.5 | 47 | 40 | 46 | 37 | 64 | 53.5 |
| 14 | 75 | 54 | 73 | 63 | 84 | 61 | 65 | 55 | 58 | 44.5 | 41 | 26 | 38 | 30.5 | 31 | 14 | 40 | 35 | 54.5 | 40 | 52 | 33 | 77 | 55.5 |
| 15 | 80 | 61 | 77 | 60 | 82 | 67 | 66 | 54.5 | 55 | 48 | 48.5 | 37 | 34 | 23 | 31 | 22.5 | 42 | 36 | 54 | 38 | 53 | 37.5 | 78 | 55 |
| 16 | 85 | 67 | 74 | 59 | 73 | 66 | 64 | 52 | 51 | 44 | 46 | 40 | 23 | 11 | 32 | 25.5 | 53 | 35 | 60 | 41 | 57 | 36 | 71 | 63 |
| 17 | 73 | 65 | 74 | 62 | 73 | 54 | 59 | 48 | 54 | 41.5 | 48 | 35 | 35 | 16 | 34 | 27 | 43.5 | 37 | 63.5 | 40.5 | 64 | 42 | 63.5 | 57 |
| 18 | 79 | 69 | 76.5 | 67 | 63 | 51.5 | 59 | 50 | 44 | 30 | 43 | 23 | 42 | 30 | 27 | 13 | 45 | 34 | 71 | 46 | 63 | 43 | 70 | 53 |
| 19 | 71 | 65.5 | 76.5 | 68 | 66 | 48 | 54 | 46 | 33 | 29 | 51 | 42 | 45 | 36 | 31 | 8 | 42 | 36 | 62 | 52 | 70 | 54 | 67.5 | 51.5 |
| 20 | 68 | 61.5 | 81 | 62 | 68 | 55 | 47.5 | 38.5 | 38.5 | 22 | 46 | 36 | 45 | 38 | 43 | 30 | 42 | 32 | 63 | 47 | 76 | 55 | 76 | 53.5 |
| 21 | 69 | 57 | 83.5 | 59 | 60 | 50 | 44 | 39 | 49.5 | 26 | 50 | 33 | 43 | 35 | 46 | 39 | 36 | 30 | 53 | 45 | 58 | 48 | 73 | 61 |
| 22 | 79 | 57 | 87 | 64 | 66 | 39 | 50 | 35 | 48.5 | 40.5 | 48 | 40.5 | 35 | 24 | 51 | 36 | 41 | 32.5 | 56 | 45 | 58 | 43 | 66 | 58 |
| 23 | 82 | 62.5 | 85.5 | 71 | 69.5 | 50 | 59 | 46 | 51 | 42 | 46 | 40 | 25 | 3 | 37 | 33 | 46 | 32.5 | 79 | 46 | 67.5 | 43.5 | 60.5 | 58 |
| 24 | 78 | 60 | 77 | 66 | 72 | 58 | 60 | 55.5 | 56 | 46.5 | 43 | 37 | 37 | 12 | 34 | 30 | 45 | 7 | 78.5 | 60 | 66.5 | 53 | 64 | 59 |
| 25 | 78 | 68.5 | 74 | 66.5 | 73 | 65 | 59 | 39 | 57 | 45 | 39 | 34 | 45 | 35.5 | 31 | 24 | 32 | 8 | 62 | 48 | 61 | 55 | 68.5 | 58 |
| 26 | 80 | 71.5 | 75 | 64 | 72.5 | 64 | 41.5 | 37 | 54.5 | 46 | 40 | 33.5 | 39 | 33 | 34 | 22.5 | 38 | 29.5 | 60 | 48.5 | 61 | 55 | 81 | 58 |
| 27 | 82 | 73 | 79 | 68 | 79 | 56 | 45 | 38 | 48 | 41 | 41 | 34.5 | 36 | 30 | 36 | 32 | 47 | 35 | 65 | 48.5 | 60.5 | 53 | 75 | 66 |
| 28 | 81 | 71.5 | 81 | 66 | 73 | 62 | 61 | 41 | 43 | 33 | 44 | 33 | 31 | 9.5 | 38 | 33 | 45 | 35 | 66 | 52 | 59 | 48 | 82 | 63 |
| 29 | 79 | 73 | 76 | 71 | 74 | 52 | 61 | 46 | 34 | 23 | 35 | 29 | 25 | 11.5 | ..... | ..... | 41 | 31 | 64.5 | 53.5 | 59 | 45 | 86.5 | 63 |
| 30 | 85 | 67 | 73.5 | 62 | 74 | 60 | 49 | 40 | 30 | 20 | 30 | 26.5 | 24 | 12 | ..... | ..... | 49.5 | 28 | 56 | 46.5 | 62.5 | 47 | 92 | 67.5 |
| 31 | 82 | 62 | 73 | 60.5 | ..... | ..... | 50 | 41 | ..... | ..... | 30 | 19 | 22 | 14 | ..... | ..... | 51 | 36 | ..... | ..... | 71.5 | 45 | ..... | ..... |
| Range | 33° | | 34° | | 45° | | 42° | | 38° | | 35° | | 42° | | 49°.5 | | 61°.5 | | 45°.5 | | 43° | | 49°.5 | |
| Monthly means | 70°.2 | | 71°.4 | | 64°.3 | | 52°.1 | | 40°.9 | | 36°.5 | | 20°.7 | | 28°.8 | | 38°.7 | | 50°.4 | | 53°.7 | | 63°.2 | |

*Maximum, minimum, and mean temperatures—Continued.*

STATION, BURKE'S, ARIZ.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | | | | | | | | | | | | | (‡) | | 72 | 38 | (‡) | | 81 | 55 | 96 | 70 | 91 | 64 |
| 2 | | | | | | | | | | | | | | | 71 | 38 | | | 87 | 50 | 95 | 59 | 95 | 65 |
| 3 | | | | | | | | | | | | | | | 73 | 37 | | | 88 | 62 | 95 | 65 | 100 | 60 |
| 4 | | | | | | | | | | | | | | | 71 | 37 | 79 | 46 | 88 | 63 | 100 | 59 | 101 | 69 |
| 5 | | | | | | | | | | | | | | | 71 | 46 | 78 | 50 | 86 | 60 | 100 | 70 | 100 | 67 |
| 6 | | | | | | | | | | | | | | | 71 | 35 | 76 | 46 | 85 | 55 | 95 | 70 | (‡) | |
| 7 | | | | | | | | | | | 73 | 30 | | | 70 | 46 | 79 | 57 | 90 | 58 | 90 | 67 | | |
| 8 | | | | | | | | | | | 68 | 54 | | | 67 | 38 | 67 | 41 | 88 | 65 | 96 | 62 | | |
| 9 | | | | | | | | | | | 73 | 39 | 68 | 39 | 69 | 40 | 69 | 47 | 80 | 65 | 101 | 60 | | |
| 10 | | | | | | | | | | | 77 | 42 | 66 | 39 | 68 | 35 | 72 | 38 | 86 | 59 | (‡) | | 103 | 74 |
| 11 | | | | | | | | | | | 75 | 47 | 66 | 48 | 71 | 40 | 76 | 38 | 90 | 60 | | | 102 | 75 |
| 12 | | | | | | | | | | | 77 | 55 | 61 | 40 | 72 | 39 | 79 | 44 | 86 | 60 | | | 99 | 73 |
| 13 | | | | | | | | | | | 78 | 47 | 66 | 42 | 70 | 47 | 83 | 44 | 84 | 60 | | | 100 | 65 |
| 14 | | | | | | | | | | | 70 | 50 | (‡) | | 69 | 37 | 85 | 45 | 74 | 60 | 98 | 71 | (‡) | |
| 15 | | | | | | | | | | | (‡) | | | | 71 | 49 | 88 | 49 | (‡) | | 96 | 60 | | |
| 16 | | | | | | | | | | | | | | | 76 | 54 | 92 | 50 | | | 95 | 63 | 103 | 70 |
| 17 | | | | | | | | | | | 70 | 46 | 69 | 52 | 79 | 45 | 90 | 50 | 75 | 45 | 87 | 66 | 102 | 70 |
| 18 | | | | | | | | | | | (‡) | | 68 | 40 | 77 | 45 | 70 | 63 | 77 | 45 | 90 | 52 | 101 | 65 |
| 19 | | | | | | | | | | | | | 70 | 40 | 76 | 60 | 80 | 48 | 81 | 41 | 90 | 62 | 104 | 65 |
| 20 | | | | | | | | | | | | | 71 | 39 | 75 | 52 | 87 | 54 | 68 | 50 | (‡) | | 107 | 66 |
| 21 | | | | | | | | | | | | | (‡) | | 72 | 47 | 86 | 62 | 56 | 52 | | | 109 | 68 |
| 22 | | | | | | | | | | | | | | | 71 | 53 | 80 | 61 | 74 | 42 | | | 106 | 81 |
| 23 | | | | | | | | | | | 65 | 40 | | | 70 | 42 | 82 | 46 | 81 | 46 | | | 105 | 78 |
| 24 | | | | | | | | | | | (‡) | | | | 68 | 44 | 86 | 51 | 88 | 55 | 86 | 70 | 107 | 69 |
| 25 | | | | | | | | | | | | | 70 | 43 | (‡) | | 79 | 54 | 89 | 56 | 96 | 64 | 108 | 75 |
| 26 | | | | | | | | | | | | | 68 | 36 | | | 70 | 53 | 90 | 60 | 104 | 74 | 109 | 74 |
| 27 | | | | | | | | | | | | | 70 | 36 | | | 79 | 54 | 87 | 65 | 101 | 74 | 109 | 77 |
| 28 | | | | | | | | | | | | | 73 | 41 | | | 67 | 53 | 95 | 67 | 95 | 71 | (‡) | |
| 29 | | | | | | | | | | | | | 74 | 45 | | | 71 | 58 | 98 | 63 | 90 | 63 | | |
| 30 | | | | | | | | | | | | | 75 | 47 | | | 74 | 53 | 99 | 62 | 90 | 64 | | |
| 31 | | | | | | | | | | | | | 72 | 39 | | | 76 | 53 | | | 90 | 65 | | |
| Range | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

*Station opened December 7, 1877.

†From December 7, 1877, to June 30, 1878, the readings given are the highest and lowest temperatures observed daily.

‡No observations taken.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, BURLINGTON, VT.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min | Max. | Min. |
| 1 | 81 | 66 | 84 | 59 | 69 | 56 | 76 | 60 | 50 | 37 | 34 | 12 | 33 | 7 | 19 | 7 | 22 | 6 | 43 | 33 | 63 | 48 | 76 | 52 |
| 2 | 75 | 64 | 81 | 66 | 69 | 48 | 73 | 54 | 53 | 37 | 26 | 4 | 28 | 6 | 12 | — 1 | 43 | 15 | 45 | 33 | 69 | 54 | 83 | 52 |
| 3 | 78 | 56 | 84 | 66 | 63 | 51 | 58 | 53 | 49 | 37 | 36 | 20 | 10 | — 5 | 22 | — 4 | 46 | 39 | 50 | 38 | 80 | 60 | 80 | 62 |
| 4 | 79 | 60 | 84 | 63 | 71 | 53 | 66 | 53 | 44 | 34 | 42 | 33 | 26 | 5 | 28 | 12 | 43 | 23 | 52 | 35 | 72 | 55 | 81 | 64 |
| 5 | 83 | 57 | 84 | 58 | 73 | 55 | 55 | 42 | 52 | 34 | 52 | 38 | 27 | — 3 | 33 | 11 | 41 | 17 | 39 | 33 | 56 | 46 | 68 | 48 |
| 6 | 76 | 59 | 76 | 57 | 65 | 47 | 56 | 40 | 41 | 25 | 52 | 26 | 2 | —13 | 36 | 21 | 50 | 35 | 42 | 34 | 62 | 45 | 59 | 42 |
| 7 | 80 | 52 | 78 | 61 | 65 | 49 | 61 | 37 | 48 | 28 | 34 | 17 | — 5 | —17 | 45 | 29 | 54 | 43 | 41 | 35 | 67 | 41 | 60 | 37 |
| 8 | 79 | 64 | 75 | 60 | 69 | 52 | 58 | 37 | 52 | 38 | 44 | 32 | 20 | —17 | 45 | 34 | 60 | 38 | 51 | 39 | 78 | 52 | 54 | 46 |
| 9 | 81 | 67 | 80 | 62 | 70 | 48 | 59 | 49 | 61 | 29 | 43 | 18 | 32 | 17 | 37 | 19 | 56 | 32 | 62 | 40 | 65 | 56 | 65 | 49 |
| 10 | 77 | 66 | 77 | 64 | 75 | 49 | 61 | 48 | 33 | 23 | 44 | 17 | 44 | 28 | 22 | 13 | 53 | 38 | 56 | 47 | 61 | 49 | 62 | 47 |
| 11 | 77 | 57 | 77 | 62 | 78 | 49 | 60 | 48 | 37 | 29 | 42 | 32 | 36 | 31 | 15 | 7 | 41 | 29 | 59 | 50 | 55 | 41 | 64 | 50 |
| 12 | 80 | 57 | 82 | 61 | 81 | 62 | 54 | 42 | 41 | 32 | 38 | 29 | 43 | 32 | 26 | 3 | 45 | 36 | 55 | 43 | 48 | 39 | 68 | 53 |
| 13 | 67 | 55 | 75 | 64 | 84 | 67 | 57 | 40 | 39 | 29 | 43 | 28 | 43 | 29 | 33 | 14 | 42 | 35 | 50 | 42 | 52 | 37 | 73 | 52 |
| 14 | 76 | 47 | 83 | 62 | 78 | 60 | 55 | 44 | 51 | 31 | 27 | 18 | 43 | 31 | 17 | 1 | 38 | 31 | 48 | 40 | 50 | 41 | 80 | 50 |
| 15 | 77 | 47 | 79 | 64 | 85 | 60 | 63 | 49 | 56 | 46 | 48 | 27 | 39 | 16 | 32 | — 1 | 41 | 32 | 51 | 41 | 56 | 38 | 83 | 56 |
| 16 | 84 | 63 | 75 | 63 | 84 | 69 | 61 | 43 | 61 | 46 | 50 | 31 | 16 | — 3 | 39 | 11 | 50 | 30 | 60 | 40 | 60 | 41 | 77 | 63 |
| 17 | 86 | 70 | 75 | 63 | 82 | 62 | 54 | 36 | 54 | 35 | 50 | 25 | 22 | — 5 | 39 | 20 | 54 | 37 | 57 | 46 | 66 | 38 | 75 | 62 |
| 18 | 84 | 65 | 76 | 59 | 66 | 53 | 58 | 36 | 49 | 34 | 30 | 17 | 34 | 13 | 22 | 2 | 47 | 33 | 67 | 41 | 66 | 41 | 75 | 57 |
| 19 | 77 | 64 | 79 | 58 | 68 | 52 | 57 | 44 | 36 | 26 | 41 | 27 | 40 | 22 | 23 | — 3 | 45 | 33 | 59 | 46 | 72 | 49 | 79 | 51 |
| 20 | 83 | 64 | 78 | 57 | 71 | 53 | 49 | 32 | 36 | 24 | 41 | 28 | 46 | 35 | 32 | 15 | 39 | 21 | 67 | 39 | 63 | 53 | 83 | 56 |
| 21 | 78 | 63 | 79 | 54 | 58 | 48 | 48 | 34 | 41 | 23 | 42 | 24 | 51 | 38 | 37 | 29 | 29 | 15 | 59 | 48 | 62 | 51 | 83 | 61 |
| 22 | 81 | 55 | 84 | 59 | 60 | 43 | 45 | 35 | 43 | 29 | 37 | 30 | 45 | 38 | 39 | 34 | 36 | 19 | 57 | 38 | 59 | 43 | 75 | 61 |
| 23 | 84 | 62 | 86 | 62 | 71 | 42 | 49 | 38 | 51 | 39 | 37 | 27 | 39 | — 5 | 47 | 35 | 55 | 31 | 58 | 47 | 61 | 42 | 77 | 59 |
| 24 | 84 | 58 | 77 | 67 | 74 | 52 | 56 | 38 | 50 | 37 | 29 | 25 | 26 | — 5 | 40 | 31 | 50 | 10 | 67 | 51 | 71 | 44 | 73 | 62 |
| 25 | 90 | 68 | 81 | 68 | 79 | 62 | 60 | 31 | 50 | 41 | 32 | 24 | 36 | 20 | 37 | 23 | 27 | 8 | 72 | 57 | 74 | 55 | 71 | 54 |
| 26 | 91 | 68 | 84 | 63 | 78 | 62 | 38 | 26 | 57 | 46 | 36 | 25 | 39 | 22 | 39 | 23 | 45 | 25 | 66 | 56 | 73 | 57 | 71 | 49 |
| 27 | 83 | 64 | 83 | 63 | 62 | 45 | 40 | 25 | 58 | 49 | 35 | 25 | 40 | 29 | 47 | 30 | 47 | 33 | 72 | 57 | 66 | 55 | 85 | 57 |
| 28 | 82 | 69 | 86 | 69 | 70 | 45 | 52 | 25 | 55 | 45 | 36 | 23 | 37 | 4 | 48 | 21 | 42 | 33 | 64 | 56 | 68 | 56 | 82 | 66 |
| 29 | 87 | 69 | 83 | 65 | 65 | 46 | 65 | 47 | 54 | 32 | 31 | 25 | 20 | — 1 | ..... | ..... | 42 | 33 | 69 | 54 | 66 | 52 | 90 | 64 |
| 30 | 85 | 69 | 83 | 57 | 74 | 53 | 51 | 36 | 37 | 29 | 29 | 18 | 9 | — 4 | ..... | ..... | 47 | 29 | 62 | 54 | 65 | 45 | 94 | 66 |
| 31 | 79 | 59 | 75 | 52 | ..... | ..... | 47 | 33 | ..... | ..... | 20 | 16 | 13 | — 1 | ..... | ..... | 45 | 31 | ..... | ..... | 76 | 51 | ..... | ..... |
| Range | 39° | | 34° | | 43° | | 51° | | 38° | | 48° | | 68° | | 52° | | 54° | | 39° | | 43° | | 57° | |
| Monthly means | 72°.5 | | 71°.3 | | 64°.3 | | 49°.8 | | 41°.3 | | 30°.8 | | 20°.1 | | 24°.3 | | 35°.9 | | 50°.6 | | 56°.6 | | 65°.6 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, CAIRO, ILL.*

| Day of month. | 1877. July. | | 1877. August. | | 1877. September. | | 1877. October. | | 1877. November. | | 1877. December. | | 1878. January. | | 1878. February. | | 1878. March. | | 1878. April. | | 1878. May. | | 1878. June. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 89 | 76 | 87 | 74 | 76 | 68 | 82 | 66 | 51 | 45 | 33 | 21 | 46 | 31 | 40 | 33 | 61 | 41 | 62 | 45 | 80 | 60 | 85 | 65 |
| 2 | 91 | 74 | 89 | 74 | 73 | 64 | 82 | 65 | 53 | 44 | 40 | 22 | 43 | 33 | 38 | 30 | 62 | 52 | 65 | 44 | 79 | 66 | 87 | 73 |
| 3 | 91 | 75 | 84 | 71 | 73 | 58 | 81 | 67 | 57 | 35 | 49 | 30 | 39 | 32 | 37 | 31 | 52 | 41 | 61 | 50 | 74 | 59 | 88 | 75 |
| 4 | 92 | 77 | 83 | 66 | 76 | 63 | 72 | 49 | 62 | 41 | 61 | 39 | 35 | 20 | 41 | 30 | 49 | 36 | 62 | 46 | 70 | 51 | 82 | 67 |
| 5 | 94 | 77 | 83 | 68 | 73 | 63 | 61 | 42 | 58 | 35 | 55 | 38 | 33 | 17 | 51 | 31 | 63 | 39 | 70 | 46 | 72 | 51 | 73 | 61 |
| 6 | 93 | 79 | 86 | 68 | 74 | 63 | 68 | 50 | 42 | 25 | 42 | 34 | 29 | 17 | 56 | 39 | 65 | 53 | 66 | 51 | 79 | 58 | 73 | 62 |
| 7 | 88 | 75 | 87 | 70 | 75 | 62 | 61 | 55 | 56 | 33 | 53 | 31 | 27 | 11 | 51 | 41 | 72 | 56 | 70 | 50 | 78 | 66 | 76 | 64 |
| 8 | 92 | 75 | 85 | 68 | 77 | 61 | 67 | 52 | 54 | 44 | 50 | 31 | 37 | 17 | 51 | 43 | 74 | 61 | 67 | 60 | 73 | 64 | 75 | 62 |
| 9 | 91 | 74 | 84 | 70 | 72 | 64 | 72 | 51 | 44 | 38 | 48 | 31 | 47 | 30 | 45 | 35 | 69 | 63 | 77 | 60 | 73 | 54 | 69 | 63 |
| 10 | 88 | 75 | 84 | 67 | 74 | 65 | 64 | 48 | 46 | 32 | 59 | 39 | 42 | 32 | 38 | 31 | 65 | 57 | 64 | 49 | 68 | 52 | 69 | 57 |
| 11 | 82 | 68 | 87 | 71 | 76 | 63 | 63 | 46 | 51 | 28 | 64 | 45 | 45 | 32 | 39 | 26 | 68 | 49 | 71 | 46 | 70 | 50 | 78 | 58 |
| 12 | 83 | 66 | 84 | 73 | 80 | 64 | 69 | 50 | 57 | 33 | 65 | 46 | 51 | 34 | 53 | 31 | 72 | 53 | 78 | 57 | 64 | 49 | 73 | 64 |
| 13 | 84 | 66 | 84 | 67 | 83 | 67 | 75 | 56 | 61 | 38 | 62 | 49 | 47 | 40 | 50 | 42 | 68 | 50 | 81 | 62 | 52 | 47 | 75 | 62 |
| 14 | 87 | 67 | 79 | 66 | 85 | 69 | 76 | 58 | 61 | 51 | 56 | 38 | 44 | 37 | 49 | 41 | 67 | 49 | 78 | 62 | 60 | 44 | 76 | 68 |
| 15 | 90 | 71 | 80 | 63 | 81 | 71 | 77 | 58 | 61 | 49 | 65 | 39 | 41 | 34 | 51 | 43 | 63 | 45 | 72 | 59 | 65 | 51 | 78 | 68 |
| 16 | 83 | 69 | 83 | 64 | 82 | 70 | 80 | 61 | 65 | 41 | 66 | 53 | 46 | 29 | 60 | 42 | 71 | 52 | 80 | 57 | 73 | 52 | 84 | 71 |
| 17 | 85 | 70 | 85 | 66 | 76 | 60 | 70 | 66 | 64 | 47 | 66 | 59 | 54 | 32 | 57 | 45 | 57 | 45 | 83 | 64 | 73 | 57 | 78 | 68 |
| 18 | 82 | 70 | 84 | 63 | 66 | 51 | 71 | 67 | 56 | 40 | 68 | 56 | 55 | 35 | 53 | 37 | 58 | 40 | 74 | 65 | 86 | 64 | 74 | 65 |
| 19 | 76 | 65 | 85 | 67 | 68 | 51 | 70 | 59 | 59 | 38 | 69 | 54 | 50 | 42 | 63 | 41 | 65 | 45 | 78 | 66 | 78 | 64 | 82 | 65 |
| 20 | 73 | 63 | 87 | 67 | 76 | 56 | 65 | 57 | 62 | 52 | 67 | 48 | 52 | 46 | 60 | 52 | 71 | 50 | 73 | 61 | 84 | 67 | 83 | 67 |
| 21 | 75 | 62 | 86 | 70 | 78 | 56 | 57 | 47 | 57 | 47 | 64 | 53 | 47 | 43 | 59 | 52 | 75 | 50 | 80 | 62 | 78 | 64 | 79 | 67 |
| 22 | 80 | 62 | 71 | 66 | 78 | 57 | 59 | 40 | 49 | 42 | 67 | 57 | 52 | 38 | 55 | 46 | 72 | 54 | 77 | 69 | 71 | 64 | 78 | 61 |
| 23 | 81 | 69 | 74 | 66 | 80 | 62 | 65 | 42 | 51 | 41 | 61 | 58 | 44 | 28 | 51 | 39 | 78 | 53 | 75 | 63 | 84 | 68 | 80 | 62 |
| 24 | 80 | 71 | 79 | 64 | 76 | 64 | 66 | 46 | 51 | 40 | 64 | 57 | 58 | 34 | 45 | 36 | 70 | 52 | 67 | 56 | 82 | 72 | 83 | 65 |
| 25 | 86 | 72 | 81 | 64 | 80 | 65 | 61 | 52 | 54 | 43 | 60 | 54 | 60 | 48 | 47 | 32 | 56 | 41 | 68 | 53 | 82 | 69 | 86 | 70 |
| 26 | 81 | 71 | 85 | 69 | 81 | 66 | 67 | 58 | 47 | 42 | 55 | 48 | 58 | 38 | 48 | 33 | 72 | 46 | 64 | 54 | 76 | 65 | 87 | 72 |
| 27 | 86 | 69 | 88 | 71 | 77 | 65 | 72 | 51 | 48 | 36 | 53 | 46 | 53 | 44 | 51 | 33 | 69 | 62 | 59 | 51 | 77 | 61 | 89 | 72 |
| 28 | 87 | 73 | 89 | 71 | 81 | 64 | 72 | 55 | 41 | 32 | 52 | 43 | 53 | 35 | 58 | 34 | 62 | 44 | 63 | 49 | 80 | 60 | 86 | 73 |
| 29 | 87 | 72 | 91 | 74 | 84 | 65 | 63 | 54 | 33 | 21 | 49 | 45 | 51 | 34 | ..... | ..... | 55 | 42 | 72 | 50 | 84 | 67 | 77 | 73 |
| 30 | 86 | 73 | 91 | 75 | 84 | 66 | 61 | 50 | 31 | 17 | 46 | 38 | 45 | 32 | ..... | ..... | 67 | 47 | 76 | 54 | 82 | 68 | 85 | 71 |
| 31 | 89 | 74 | 92 | 73 | ..... | ..... | 62 | 49 | ..... | ..... | 41 | 35 | 36 | 32 | ..... | ..... | 55 | 45 | ..... | ..... | 80 | 65 | ..... | ..... |
| Range | 32° | | 29° | | 34° | | 42° | | 48° | | 48° | | 49° | | 37° | | 42° | | 39° | | 42° | | 32° | |
| Monthly means | 79°.0 | | 77°.5 | | 70°.2 | | 61°.5 | | 46°.2 | | 50°.4 | | 39°.8 | | 44°.7 | | 57°.8 | | 64°.3 | | 68°.1 | | 73°.9 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, CAMBRIDGE, TEX.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 99 | 73 | 97 | 73 | 101 | 72 | 90 | 68 | 58 | 50 | 49 | 15 | 46 | 24 | | | | | | | | | | |
| 2 | 99 | 73 | 100 | 73 | 101 | 69 | 92 | 64 | 57 | 39 | 50 | 26 | 46 | 24 | | | | | | | | | | |
| 3 | 98 | 72 | 99 | 74 | 75 | 61 | 90 | 67 | 65 | 38 | 59 | 26 | 45 | 27 | | | | | | | | | | |
| 4 | 97 | 72 | 95 | 71 | 71 | 60 | 68 | 41 | 64 | 45 | 59 | 26 | 35 | 18 | | | | | | | | | | |
| 5 | 97 | 72 | 97 | 73 | 71 | 63 | 74 | 43 | 65 | 35 | 52 | 29 | 37 | 10 | | | | | | | | | | |
| 6 | 99 | 72 | 101 | 74 | 80 | 57 | 79 | 43 | 54 | 27 | 49 | 23 | ..... | (†) | | | | | | | | | | |
| 7 | 102 | 72 | 98 | 68 | 84 | 57 | (*) | (*) | 65 | 39 | 55 | 30 | | | | | | | | | | | | |
| 8 | 102 | 76 | 88 | 67 | 84 | 66 | ..... | ..... | 63 | 41 | 56 | 25 | | | | | | | | | | | | |
| 9 | 105 | 70 | 95 | 63 | 85 | 64 | ..... | ..... | 53 | 28 | 57 | 34 | | | | | | | | | | | | |
| 10 | 103 | 71 | 99 | 66 | 87 | 61 | 79 | 43 | 52 | 23 | 60 | 33 | | | | | | | | | | | | |
| 11 | 94 | 64 | 100 | 68 | (*) | (*) | 85 | 43 | 60 | 29 | 66 | 39 | | | | | | | | | | | | |
| 12 | 95 | 65 | 98 | 72 | ..... | ..... | 85 | 64 | 63 | 36 | 67 | 37 | | | | | | | | | | | | |
| 13 | 97 | 69 | 95 | 73 | ..... | ..... | 83 | 65 | 74 | 36 | 64 | 48 | | | | | | | | | | | | |
| 14 | 98 | 73 | (*) | (*) | ..... | ..... | 79 | 62 | 74 | 44 | 67 | 41 | | | | | | | | | | | | |
| 15 | 100 | 74 | 90 | 63 | 98 | 61 | 78 | 61 | 70 | 39 | 67 | 41 | | | | | | | | | | | | |
| 16 | 101 | 73 | 90 | 61 | 94 | 69 | 78 | 50 | 70 | 39 | 67 | 55 | | | | | | | | | | | | |
| 17 | 100 | 74 | 93 | 68 | 93 | 59 | 62 | 52 | 72 | 42 | 71 | 55 | | | | | | | | | | | | |
| 18 | 98 | 69 | 95 | 65 | 77 | 50 | 59 | 52 | 72 | 42 | 70 | 59 | | | | | | | | | | | | |
| 19 | 95 | 64 | 94 | 66 | 77 | 50 | (*) | (*) | 67 | 49 | 70 | 50 | | | | | | | | | | | | |
| 20 | 97 | 64 | 92 | 70 | 82 | 50 | ..... | ..... | 59 | 48 | (*) | (*) | | | | | | | | | | | | |
| 21 | 83 | 56 | 92 | 64 | 86 | 55 | 58 | 41 | 55 | 42 | 67 | 53 | | | | | | | | | | | | |
| 22 | 90 | 56 | 85 | 60 | 86 | 56 | 62 | 36 | 55 | 33 | 60 | 49 | | | | | | | | | | | | |
| 23 | 91 | 56 | 87 | 54 | 88 | 58 | 69 | 41 | 63 | 34 | 63 | 46 | | | | | | | | | | | | |
| 24 | 95 | 66 | 96 | 68 | 88 | 58 | 68 | 49 | 62 | 34 | (*) | (*) | | | | | | | | | | | | |
| 25 | 92 | 66 | 99 | 71 | 86 | 62 | 74 | 49 | 57 | 37 | ..... | ..... | | | | | | | | | | | | |
| 26 | 92 | 65 | 96 | 75 | 84 | 62 | 77 | 48 | 56 | 34 | 65 | 36 | | | | | | | | | | | | |
| 27 | 90 | 70 | 97 | 73 | 90 | 63 | 78 | 49 | 55 | 35 | 65 | 36 | | | | | | | | | | | | |
| 28 | 90 | 69 | 98 | 68 | 91 | 65 | (*) | (*) | 41 | 24 | 49 | 38 | | | | | | | | | | | | |
| 29 | 92 | 70 | 97 | 71 | 91 | 64 | ..... | ..... | 32 | 20 | 49 | 30 | | | | | | | | | | | | |
| 30 | 91 | 70 | 98 | 70 | 91 | 64 | ..... | ..... | 35 | 15 | 49 | 27 | | | | | | | | | | | | |
| 31 | 95 | 75 | 99 | 72 | ..... | ..... | 78 | 47 | ..... | ..... | 36 | 26 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Range | 46°.0 | | ..... | | ..... | | ..... | | 59°.0 | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | |
| Monthly means | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | |

* No observations taken.

† Station closed January 5, 1878.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, CAMP GRANT, ARIZ.*

*(Highest and lowest observed readings of exposed thermometer.)*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | (*) | | 87 | 76 | 91 | 78 | 80 | 68 | 65 | 51 | 62 | 32 | 45 | 28 | 51 | 40 | 46 | 36 | 56 | 39 | 71 | 61 | 81 | 55 |
| 2 | | | 79 | 72 | 83 | 81 | 78 | 66 | 69 | 50 | 48 | 39 | 33 | 26 | 49 | 39 | 56 | 35 | 67 | 40 | 74 | 56 | 81 | 57 |
| 3 | | | 86 | 74 | 75 | 69 | 78 | 67 | 75 | 56 | 48 | 38 | 40 | 24 | 58 | 34 | 63 | 40 | 70 | 44 | 78 | 54 | 86 | 59 |
| 4 | | | 89 | 71 | 78 | 70 | 78 | 67 | 64 | 48 | 45 | 32 | 47 | 26 | 58 | 38 | 68 | 52 | 72 | 55 | 81 | 56 | 85 | 60 |
| 5 | | | 89 | 71 | 81 | 65 | 79 | 66 | 69 | 52 | 48 | 25 | 46 | 27 | 46 | 42 | 64 | 50 | 78 | 65 | 85 | 66 | 88 | 62 |
| 6 | | | 90 | 70 | 83 | 73 | 78 | 65 | 71 | 61 | 57 | 31 | 46 | 31 | 53 | 38 | 58 | 45 | 67 | 56 | 77 | 59 | 84 | 63 |
| 7 | | | 93 | 73 | 84 | 73 | 78 | 67 | 66 | 59 | 62 | 33 | 51 | 32 | 50 | 39 | 63 | 50 | 61 | 52 | 80 | 55 | 81 | 59 |
| 8 | | | 95 | 75 | 86 | 65 | 80 | 65 | 64 | 53 | 51 | 34 | 54 | 37 | 46 | 34 | 45 | 35 | 66 | 49 | 84 | 60 | 85 | 66 |
| 9 | | | 93 | 83 | 85 | 75 | 81 | 65 | 66 | 58 | 49 | 35 | 58 | 36 | 42 | 35 | 49 | 37 | 65 | 53 | 84 | 63 | 85 | 66 |
| 10 | | | 93 | 77 | 84 | 73 | 81 | 67 | 68 | 54 | 53 | 37 | 59 | 38 | 49 | 39 | 54 | 34 | 70 | 54 | 78 | 60 | 90 | 65 |
| 11 | | | 95 | 81 | 78 | 69 | 78 | 68 | 71 | 48 | 52 | 43 | 41 | 37 | 52 | 35 | 56 | 38 | 75 | 54 | 83 | 56 | 84 | 66 |
| 12 | | | 95 | 82 | 78 | 66 | 75 | 60 | 57 | 46 | 57 | 38 | 45 | 32 | 52 | 37 | 63 | 40 | 72 | 52 | 79 | 67 | 86 | 63 |
| 13 | | | 93 | 78 | 70 | 66 | 69 | 55 | 54 | 42 | 60 | 53 | 47 | 30 | 53 | 39 | 69 | 44 | 67 | 53 | 82 | 60 | 90 | 62 |
| 14 | | | 88 | 82 | 70 | 60 | 58 | 50 | 62 | 40 | 61 | 51 | 51 | 32 | 52 | 44 | 71 | 60 | 59 | 48 | 81 | 61 | 88 | 67 |
| 15 | 93 | 81 | 88 | 73 | 76 | 57 | 61 | 51 | 66 | 46 | 56 | 52 | 52 | 35 | 58 | 43 | 75 | 52 | 63 | 40 | 81 | 58 | 75 | 67 |
| 16 | 90 | 80 | 85 | 72 | 82 | 66 | 60 | 50 | 71 | 43 | 57 | 50 | 56 | 37 | 59 | 49 | 75 | 59 | 60 | 37 | 77 | 58 | 81 | 61 |
| 17 | 92 | 80 | 86 | 75 | 82 | 71 | 62 | 57 | 67 | 54 | 60 | 43 | 49 | 40 | 65 | 41 | 72 | 59 | 51 | 36 | 71 | 55 | 89 | 61 |
| 18 | 91 | 80 | 80 | 70 | 83 | 73 | 63 | 54 | 51 | 41 | 55 | 41 | 52 | 33 | 64 | 50 | 60 | 45 | 63 | 36 | 70 | 48 | 90 | 64 |
| 19 | 91 | 79 | 85 | 72 | 84 | 71 | 65 | 59 | 61 | 42 | 43 | 36 | 54 | 34 | 54 | 45 | 63 | 43 | 71 | 48 | 75 | 50 | 76 | 63 |
| 20 | 91 | 79 | 88 | 75 | 85 | 72 | 68 | 53 | 63 | 39 | 51 | 36 | 58 | 33 | 54 | 40 | 65 | 51 | 65 | 50 | 74 | 58 | 88 | 64 |
| 21 | 86 | 76 | 89 | 70 | 84 | 74 | 71 | 57 | 66 | 50 | 51 | 34 | 52 | 38 | 40 | 39 | 66 | 51 | 58 | 45 | 75 | 57 | 92 | 70 |
| 22 | 89 | 76 | 90 | 74 | 81 | 69 | 71 | 60 | 67 | 46 | 53 | 35 | 56 | 32 | 48 | 40 | 78 | 55 | 60 | 45 | 74 | 52 | 91 | 75 |
| 23 | 86 | 68 | 90 | 70 | 83 | 71 | 70 | 57 | 68 | 46 | 54 | 40 | 62 | 39 | 63 | 35 | 61 | 50 | 65 | 40 | 71 | 56 | 92 | 70 |
| 24 | 82 | 71 | 90 | 77 | 79 | 66 | 64 | 53 | 69 | 47 | 54 | 44 | 60 | 42 | 57 | 46 | 71 | 47 | 75 | 48 | 74 | 57 | 89 | 68 |
| 25 | 81 | 70 | 92 | 73 | 76 | 63 | 67 | 62 | 66 | 42 | 43 | 35 | 56 | 44 | 52 | 44 | 69 | 50 | 75 | 50 | 77 | 54 | 92 | 75 |
| 26 | 83 | 68 | 92 | 76 | 80 | 63 | 70 | 60 | 68 | 44 | 44 | 30 | 53 | 31 | 56 | 40 | 55 | 45 | 76 | 51 | 82 | 61 | 85 | 72 |
| 27 | 86 | 73 | 94 | 73 | 82 | 69 | 72 | 63 | 59 | 42 | 43 | 31 | 57 | 42 | 62 | 44 | 65 | 38 | 70 | 50 | 85 | 60 | 92 | 66 |
| 28 | 89 | 76 | 95 | 77 | 83 | 66 | 69 | 62 | 44 | 33 | 39 | 32 | 62 | 40 | 45 | 34 | 45 | 34 | 77 | 51 | 82 | 59 | 91 | 70 |
| 29 | 89 | 74 | 94 | 76 | 75 | 70 | 73 | 64 | 48 | 26 | 38 | 79 | 60 | 42 | ..... | ..... | 46 | 33 | 86 | 54 | 83 | 58 | 91 | 69 |
| 30 | 87 | 71 | 91 | 82 | 77 | 64 | 73 | 57 | 52 | 28 | 41 | 31 | 62 | 38 | ..... | ..... | 55 | 39 | 82 | 58 | 79 | 54 | 95 | 68 |
| 31 | 87 | 76 | 91 | 77 | ..... | ..... | 65 | 54 | ..... | ..... | 44 | 31 | 54 | 45 | ..... | ..... | 52 | 38 | ..... | ..... | 82 | 62 | ..... | ..... |
| Range | ..... | | 25° | | 34° | | 31° | | 49° | | 37° | | 38° | | 31° | | 45° | | 50° | | 37° | | 40° | |
| Monthly means | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | |

* No observations taken.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, CAMPO, CAL.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | ..... | 40 | 95 | 40 | 92 | 61 | 86 | 44 | (*) | (*) | ( ) | ( ) | 47 | 30 | 61 | 25 | 60 | 38 | 71 | 36 | 69 | 44 | 71 | 38 |
| 2 | ..... | 39 | 96 | 47 | 95 | 57 | 81 | 34 | ..... | ..... | ..... | ..... | 47 | 20 | 59 | 47 | 64 | 40 | 76 | 34 | 82 | 45 | 76 | 33 |
| 3 | ..... | 37 | 95 | 47 | 91 | 45 | 83 | 33 | ..... | ..... | ..... | ..... | 57 | 13 | 63 | 40 | 71 | 40 | 70 | 33 | 82 | 43 | 77 | 36 |
| 4 | ..... | 48 | 94 | 45 | 97 | 48 | 83 | (†) | ..... | ..... | ..... | ..... | 62 | 27 | 64 | 25 | 59 | 32 | 65 | 40 | 88 | 34 | 75 | 40 |
| 5 | (*) | (*) | 94 | 45 | 92 | 48 | 86 | ..... | ..... | ..... | ..... | ..... | 53 | 39 | 54 | 37 | 64 | 37 | 64 | 38 | 81 | 39 | 75 | 42 |
| 6 | ..... | ..... | 95 | 49 | 91 | 49 | 81 | ..... | ..... | ..... | ..... | ..... | 60 | 36 | 55 | 25 | 63 | 33 | 70 | 48 | 68 | 40 | 65 | 52 |
| 7 | ..... | ..... | 97 | 44 | 91 | 44 | 89 | ..... | ..... | ..... | ..... | ..... | 61 | 28 | 51 | 39 | 54 | 44 | 70 | 45 | 68 | 44 | 71 | 47 |
| 8 | ..... | ..... | 100 | 48 | 98 | 44 | 87 | ..... | ..... | ..... | ..... | ..... | 63 | 28 | 51 | 39 | 56 | 29 | 62 | 48 | 75 | 33 | 78 | 47 |
| 9 | ..... | ..... | 96 | 51 | 100 | 48 | 86 | ..... | ..... | ..... | ..... | ..... | 66 | 33 | 57 | 41 | 65 | 25 | 69 | 49 | 85 | 39 | 82 | 44 |
| 10 | ..... | 37 | 98 | 55 | (*) | (*) | 86 | ..... | ..... | ..... | ..... | ..... | 58 | 27 | 58 | 30 | 64 | 26 | 73 | 51 | 84 | 41 | 77 | 41 |
| 11 | 95 | 56 | 96 | 59 | ..... | ..... | 70 | ..... | ..... | ..... | ..... | ..... | 57 | 35 | 59 | 27 | 64 | 35 | 69 | 48 | 80 | 40 | 76 | 45 |
| 12 | 97 | 60 | 98 | 56 | ..... | ..... | 61 | ..... | ..... | ..... | 65 | (†) | 55 | 39 | 54 | 42 | 68 | 32 | 60 | 49 | 78 | 39 | 75 | 42 |
| 13 | 98 | 54 | 100 | 54 | ..... | ..... | 63 | ..... | ..... | ..... | 71 | ..... | 59 | 33 | 49 | 39 | 67 | 33 | 51 | 43 | 76 | 39 | 68 | 53 |
| 14 | 92 | 56 | 99 | 54 | ..... | ..... | 64 | ..... | ..... | ..... | 55 | ..... | 54 | 42 | 58 | 38 | 76 | 37 | 51 | 38 | 75 | 39 | 73 | 49 |
| 15 | 92 | 49 | 98 | 55 | ..... | ..... | 70 | ..... | ..... | ..... | 56 | ..... | 56 | 47 | 57 | 36 | 79 | 39 | 48 | 39 | 76 | 47 | 73 | 52 |
| 16 | 94 | 50 | 90 | 53 | ..... | ..... | (*) | ..... | ..... | ..... | 66 | ..... | 62 | 33 | 59 | 49 | 80 | 38 | 46 | 36 | 65 | 49 | 77 | 54 |
| 17 | (*) | (*) | 95 | 51 | 96 | 40 | ..... | ..... | ..... | ..... | (*) | (*) | 53 | 40 | 62 | 36 | 65 | 36 | 57 | 36 | 72 | 48 | 77 | 45 |
| 18 | ..... | ..... | 95 | 48 | 90 | 46 | ..... | ..... | ..... | ..... | ..... | ..... | 64 | 28 | 56 | 38 | 55 | 48 | 62 | 32 | 77 | 45 | 80 | 47 |
| 19 | ..... | ..... | 94 | 47 | 91 | 44 | ..... | ..... | ..... | ..... | ..... | ..... | 66 | 28 | 54 | 44 | 70 | 43 | 58 | 42 | 73 | 36 | 84 | 45 |
| 20 | ..... | ..... | 96 | 41 | 90 | 48 | ..... | ..... | ..... | ..... | ..... | ..... | 64 | 30 | 57 | 29 | 77 | 36 | 46 | 41 | 52 | 39 | 87 | 47 |
| 21 | 97 | 78 | 94 | 35 | 83 | 36 | ..... | ..... | ..... | ..... | ..... | ..... | 61 | 35 | 52 | 44 | 57 | 40 | 52 | 35 | 53 | 41 | 85 | 44 |
| 22 | 102 | 64 | 94 | 37 | 78 | 33 | ..... | ..... | ..... | ..... | ..... | ..... | 68 | 31 | 60 | 29 | 61 | 45 | 60 | 34 | 63 | 33 | 79 | 39 |
| 23 | 95 | 62 | 91 | 40 | 76 | 31 | ..... | ..... | ..... | ..... | ..... | ..... | 62 | 33 | 63 | 31 | 71 | 42 | 71 | 33 | 70 | 36 | 87 | 41 |
| 24 | 91 | 59 | 93 | 42 | 79 | 33 | ..... | ..... | ..... | ..... | ..... | ..... | 61 | 33 | 58 | 40 | 63 | 35 | 64 | 43 | 78 | 39 | 92 | 42 |
| 25 | 88 | 56 | 95 | 47 | 88 | 35 | ..... | ..... | ..... | ..... | ..... | ..... | 53 | 41 | 66 | 42 | 53 | 43 | 65 | 45 | 81 | 47 | 87 | 42 |
| 26 | 87 | 48 | 93 | 47 | (*) | (*) | ..... | ..... | ..... | ..... | ..... | ..... | 59 | 27 | 57 | 36 | 54 | 42 | 69 | 44 | 86 | 46 | 91 | 39 |
| 27 | 89 | 42 | 91 | 39 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 67 | 28 | 51 | 42 | 55 | 42 | 71 | 44 | 76 | 41 | 87 | 37 |
| 28 | 94 | 43 | 93 | 39 | 96 | Blank | ..... | ..... | ..... | ..... | ..... | ..... | 62 | 30 | 47 | 39 | 45 | 38 | 83 | 40 | 66 | 44 | 83 | 38 |
| 29 | 91 | 51 | 92 | 45 | 94 | 49 | ..... | ..... | ..... | ..... | 49 | (†) | 69 | 31 | ..... | ..... | 55 | 41 | 82 | 46 | 64 | 42 | 82 | 43 |
| 30 | 85 | 39 | 92 | 44 | 88 | 42 | ..... | ..... | ..... | ..... | 46 | 40 | 59 | 30 | ..... | ..... | 53 | 41 | 76 | 39 | 63 | 36 | 95 | 45 |
| 31 | 87 | 38 | 93 | 50 | ..... | ..... | ..... | ..... | ..... | ..... | 57 | 30 | 59 | 35 | ..... | ..... | 65 | 42 | ..... | ..... | 63 | 45 | ..... | ..... |
| Range | ..... | ..... | 65° | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 56° | ..... | 41° | ..... | 55° | ..... | 51° | ..... | 55° | ..... | 62° | ..... |
| Monthly means | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |

* No observations taken.

† Minimum thermometer broken.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, CAMP VERDE, ARIZ.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 99 | 58 | 98 | 62 | 104 | 71 | 89 | 59 | 64 | 30 | 59 | 23 | 40 | 27 | 62 | 27 | 58 | 33 | 66 | 45 | (*) | ..... | (*) | ..... |
| 2 | 101 | 58 | 102 | 67 | 98 | 69 | 87 | 55 | 66 | 29 | 53 | 24 | 41 | 27 | 58 | 26 | 65 | 32 | 73 | 39 | ..... | ..... | ..... | ..... |
| 3 | 100 | 57 | 97 | 70 | 92 | 73 | 86 | 53 | 69 | 35 | 49 | 30 | 42 | 18 | 64 | 26 | 70 | 34 | 77 | 42 | ..... | ..... | ..... | ..... |
| 4 | 103 | 64 | 97 | 80 | 95 | 64 | 86 | 53 | 68 | 37 | 50 | 24 | 46 | 17 | 62 | 27 | 67 | 35 | 75 | 44 | ..... | ..... | ..... | ..... |
| 5 | 104 | 78 | 98 | 70 | 95 | 65 | 86 | 49 | 69 | 32 | 55 | 20 | 46 | 21 | 60 | 44 | 66 | 36 | 85 | 45 | ..... | ..... | ..... | ..... |
| 6 | 103 | 72 | 100 | 66 | 96 | 63 | 86 | 50 | 70 | 33 | 56 | 18 | 49 | 21 | 60 | 26 | 69 | 35 | 74 | 52 | ..... | ..... | 88 | 54 |
| 7 | 108 | 80 | 100 | 70 | 94 | 72 | 85 | 51 | 69 | 41 | 59 | 21 | 50 | 22 | 60 | 38 | 65 | 41 | 83 | 48 | ..... | ..... | 89 | 53 |
| 8 | 99 | 78 | 103 | 67 | 97 | 62 | 87 | 49 | 66 | 38 | 50 | 35 | 52 | 22 | 60 | 20 | 60 | 25 | 76 | 53 | ..... | ..... | 91 | 56 |
| 9 | 98 | 75 | 103 | 74 | 97 | 62 | (*) | (*) | 69 | 35 | 62 | 31 | 56 | 25 | 57 | 30 | 60 | 28 | 76 | 53 | ..... | ..... | 95 | 56 |
| 10 | 100 | 73 | 103 | 76 | 94 | 65 | ..... | ..... | 69 | 34 | 60 | 29 | 55 | 26 | 57 | 20 | 62 | 27 | 76 | 41 | ..... | ..... | 95 | 58 |
| 11 | 93 | 76 | 98 | 68 | 86 | 65 | ..... | ..... | 73 | 34 | 61 | 31 | 56 | 33 | 60 | 22 | 67 | 33 | 82 | 41 | ..... | ..... | 92 | 60 |
| 12 | 93 | 76 | 101 | 71 | 74 | 64 | ..... | ..... | 60 | 38 | 60 | 30 | 50 | 25 | 60 | 31 | 70 | 34 | 74 | 46 | ..... | ..... | 97 | 59 |
| 13 | 101 | 70 | 103 | 70 | 76 | 62 | ..... | ..... | 64 | 36 | 65 | 32 | 52 | 23 | 48 | 29 | 74 | 37 | 73 | 54 | ..... | ..... | 92 | 56 |
| 14 | 100 | 70 | 102 | 73 | 79 | 49 | 67 | 47 | 63 | 30 | 69 | 44 | 55 | 26 | 58 | 27 | 76 | 38 | 61 | 49 | ..... | ..... | 93 | 56 |
| 15 | 102 | 74 | 100 | 74 | 85 | 52 | 57 | 40 | 69 | 32 | 61 | 51 | 56 | 23 | 63 | 40 | 81 | 38 | 64 | 42 | ..... | ..... | 85 | 62 |
| 16 | 97 | 77 | 88 | 70 | 90 | 54 | 67 | 38 | 72 | 33 | 58 | 45 | 61 | 34 | 66 | 44 | 83 | 41 | 45 | 36 | ..... | ..... | 88 | 56 |
| 17 | 103 | 77 | 84 | 70 | 93 | 56 | 69 | 41 | 70 | 35 | 60 | 35 | 51 | 35 | 70 | 32 | 82 | 42 | 55 | 32 | ..... | ..... | 91 | 57 |
| 18 | 100 | 76 | 90 | 69 | 92 | 60 | 73 | 40 | 66 | 38 | 57 | 45 | 57 | 29 | 68 | 32 | 62 | 51 | 64 | 36 | ..... | ..... | 94 | 59 |
| 19 | 85 | 76 | 95 | 68 | 93 | 60 | 70 | 48 | 67 | 31 | 57 | 40 | 58 | 30 | 60 | 43 | 72 | 42 | 72 | 39 | ..... | ..... | 93 | 59 |
| 20 | 100 | 75 | 101 | 65 | 95 | 60 | 72 | 40 | 66 | 30 | 57 | 39 | 58 | 27 | 61 | 33 | 76 | 41 | 55 | 48 | ..... | ..... | 96 | 65 |
| 21 | 88 | 78 | 100 | 57 | 91 | 63 | 73 | 40 | 64 | 28 | 58 | 32 | 58 | 28 | 61 | 43 | 72 | 48 | 50 | 39 | ..... | ..... | 98 | 62 |
| 22 | 98 | 75 | 98 | 60 | 89 | 52 | (*) | (*) | 64 | 27 | 56 | 31 | 55 | 28 | 56 | 27 | 70 | 55 | 65 | 41 | ..... | ..... | 94 | 63 |
| 23 | 98 | 71 | 101 | 58 | 86 | 50 | ..... | ..... | 67 | 30 | 59 | 28 | 61 | 29 | 60 | 26 | 75 | 42 | 70 | 41 | ..... | ..... | 94 | 62 |
| 24 | 81 | 73 | 99 | 62 | 83 | 46 | ..... | ..... | 69 | 31 | 53 | 34 | 60 | 34 | 62 | 32 | 76 | 45 | 75 | 44 | ..... | ..... | 95 | 56 |
| 25 | 95 | 72 | †102 | 60 | 84 | 46 | ..... | ..... | 66 | 29 | 42 | 30 | 59 | 35 | 67 | 38 | 74 | 49 | 76 | 43 | ..... | ..... | 92 | 56 |
| 26 | 95 | 76 | 98 | 63 | 84 | 48 | 75 | 41 | 66 | 30 | 45 | 29 | 60 | 28 | 66 | 35 | 65 | 43 | 77 | 45 | ..... | ..... | 98 | 64 |
| 27 | 95 | 68 | 101 | 60 | 90 | 50 | 75 | 41 | 57 | 31 | 44 | 24 | 59 | 23 | 66 | 46 | 65 | 35 | 78 | 49 | ..... | ..... | 99 | 65 |
| 28 | 101 | 68 | 103 | 60 | 91 | 48 | 70 | 38 | 53 | 31 | 41 | 27 | 64 | 30 | 52 | 38 | 50 | 34 | 82 | 46 | ..... | ..... | 103 | 68 |
| 29 | 100 | 64 | 104 | 64 | 84 | 58 | 69 | 36 | 59 | 21 | 46 | 24 | 62 | 29 | ..... | ..... | 55 | 38 | 87 | 48 | ..... | ..... | 99 | 60 |
| 30 | 96 | 73 | 102 | 62 | 87 | 56 | 58 | 46 | 59 | 24 | 46 | 24 | 66 | 23 | ..... | ..... | 57 | 42 | 86 | 50 | ..... | ..... | 99 | 58 |
| 31 | 100 | 58 | 104 | 66 | ..... | ..... | 59 | 31 | ..... | ..... | 44 | 31 | 62 | 30 | ..... | ..... | 68 | 38 | ..... | ..... | ..... | ..... | ..... | ..... |
| Range | ..... | ..... | ..... | ..... | 58°.0 | ..... | ..... | ..... | 52°.0 | ..... | 51°.0 | ..... | 49°.0 | ..... | 50°.0 | ..... | 58° | ..... | 55° | ..... | ..... | ..... | ..... | ..... |
| Monthly means | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |

NOTE.—The temperatures from July 1 to August 24, inclusive, are the highest and lowest *observed* daily.

* No observations taken.

† Station supplied with maximum and minimum thermometers August 25, 1877.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, CAPE HATTERAS, N. C.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 82 | 74 | 80 | 73 | 84 | 75 | 73 | 69 | 65 | 58 | 37 | 30 | 39 | 32 | 51 | 44 | 52 | 42 | 62 | 49 | 66 | 61 | 62 | 58 |
| 2 | 83 | 76 | 81 | 74 | 80 | 70 | 73 | 69 | 77 | 64 | 41 | 36 | 54 | 30 | 46 | 39 | 59 | 45 | 54 | 51 | 73 | 60 | 66 | 58 |
| 3 | 83 | 77 | 84 | 75 | 74 | 68 | 77 | 72 | 69 | 53 | 44 | 36 | 47 | 34 | 43 | 39 | 58 | 54 | 57 | 50 | 75 | 66 | 66 | 59 |
| 4 | 87 | 71 | 79 | 74 | 75 | 64 | 79 | 68 | 63 | 53 | 59 | 34 | 60 | 43 | 40 | 35 | 58 | 45 | 58 | 39 | 75 | 68 | 78 | 62 |
| 5 | 79 | 73 | 78 | 71 | 80 | 69 | 68 | 59 | 72 | 50 | 65 | 56 | 43 | 32 | 42 | 35 | 45 | 38 | 61 | 44 | 70 | 59 | 76 | 68 |
| 6 | 79 | 72 | 81 | 65 | 82 | 74 | 63 | 58 | 66 | 49 | 67 | 42 | 36 | 29 | 44 | 35 | 59 | 39 | 60 | 52 | 66 | 59 | 68 | 58 |
| 7 | 75 | 69 | 84 | 76 | 80 | 72 | 65 | 58 | 65 | 50 | 47 | 38 | 35 | 26 | 54 | 40 | 61 | 53 | 60 | 49 | 73 | 60 | 67 | 60 |
| 8 | 74 | 69 | 84 | 76 | 73 | 66 | 73 | 64 | 73 | 64 | 49 | 39 | 49 | 29 | 58 | 49 | 65 | 52 | 57 | 49 | 78 | 66 | 75 | 64 |
| 9 | 81 | 68 | 84 | 74 | 71 | 66 | 71 | 63 | 72 | 64 | 45 | 41 | 54 | 47 | 59 | 47 | 57 | 50 | 64 | 53 | 76 | 66 | 76 | 68 |
| 10 | 82 | 74 | 83 | 74 | 75 | 65 | 67 | 60 | 66 | 51 | 53 | 39 | 62 | 45 | 60 | 50 | 66 | 53 | 66 | 60 | 72 | 62 | 76 | 67 |
| 11 | 82 | 73 | 85 | 75 | 79 | 72 | 68 | 58 | 51 | 45 | 58 | 43 | 48 | 43 | 51 | 41 | 67 | 56 | 68 | 58 | 67 | 59 | 71 | 62 |
| 12 | 78 | 72 | 84 | 76 | 81 | 70 | 61 | 56 | 51 | 43 | 55 | 47 | 46 | 39 | 41 | 35 | 66 | 58 | 64 | 56 | 71 | 54 | 73 | 62 |
| 13 | 77 | 71 | 84 | 76 | 81 | 73 | 62 | 51 | 56 | 43 | 62 | 43 | 60 | 39 | 51 | 40 | 63 | 57 | 68 | 60 | 68 | 55 | 68 | 62 |
| 14 | 81 | 66 | 85 | 74 | 78 | 72 | 64 | 54 | 61 | 50 | 57 | 36 | 63 | 46 | 51 | 43 | 65 | 55 | 65 | 58 | 67 | 55 | 69 | 59 |
| 15 | 81 | 66 | 81 | 72 | 81 | 72 | 68 | 59 | 65 | 53 | 59 | 35 | 47 | 41 | 47 | 44 | 55 | 47 | 68 | 57 | 66 | 50 | 67 | 61 |
| 16 | 82 | 75 | 84 | 73 | 79 | 71 | 72 | 60 | 65 | 57 | 63 | 54 | 43 | 39 | 46 | 42 | 54 | 44 | 66 | 53 | 63 | 49 | 74 | 61 |
| 17 | 83 | 74 | 80 | 72 | 80 | 70 | 69 | 64 | 64 | 53 | 62 | 49 | 46 | 39 | 51 | 42 | 62 | 50 | 53 | 47 | 66 | 54 | 77 | 69 |
| 18 | 83 | 74 | 82 | 70 | 76 | 68 | 68 | 63 | 61 | 51 | 59 | 53 | 48 | 41 | 51 | 39 | 53 | 46 | 52 | 47 | 63 | 56 | 77 | 68 |
| 19 | 84 | 76 | 80 | 72 | 72 | 67 | 75 | 61 | 51 | 47 | 62 | 55 | 53 | 42 | 40 | 33 | 56 | 46 | 58 | 47 | 68 | 59 | 71 | 63 |
| 20 | 80 | 69 | 79 | 68 | 72 | 67 | 76 | 61 | 57 | 48 | 61 | 52 | 61 | 47 | 57 | 36 | 63 | 50 | 65 | 54 | 72 | 62 | 71 | 61 |
| 21 | 79 | 74 | 79 | 71 | 71 | 66 | 74 | 68 | 62 | 54 | 58 | 53 | 61 | 51 | 59 | 49 | 54 | 49 | 74 | 60 | 74 | 66 | 77 | 64 |
| 22 | 83 | 74 | 79 | 74 | 69 | 64 | 72 | 57 | 64 | 59 | 56 | 53 | 54 | 48 | 61 | 55 | 54 | 46 | 72 | 60 | 70 | 59 | 80 | 74 |
| 23 | 84 | 76 | 83 | 69 | 70 | 64 | 61 | 52 | 67 | 62 | 55 | 52 | 52 | 36 | 58 | 52 | 65 | 46 | 73 | 64 | 65 | 56 | 76 | 68 |
| 24 | 85 | 77 | 84 | 75 | 75 | 68 | 65 | 51 | 67 | 59 | 53 | 50 | 49 | 33 | 52 | 44 | 63 | 46 | 72 | 64 | 74 | 62 | 77 | 67 |
| 25 | 86 | 78 | 86 | 76 | 76 | 72 | 69 | 57 | 62 | 52 | 53 | 49 | 61 | 48 | 47 | 42 | 48 | 39 | 72 | 65 | 80 | 68 | 80 | 69 |
| 26 | 87 | 77 | 84 | 75 | 78 | 71 | 71 | 64 | 65 | 57 | 59 | 52 | 56 | 45 | 45 | 39 | 56 | 39 | 71 | 60 | 80 | 66 | 81 | 75 |
| 27 | 88 | 78 | 82 | 75 | 79 | 73 | 65 | 60 | 62 | 49 | 55 | 51 | 61 | 47 | 45 | 39 | 67 | 52 | 74 | 63 | 75 | 69 | 82 | 75 |
| 28 | 85 | 80 | 82 | 74 | 77 | 69 | 64 | 58 | 60 | 53 | 54 | 51 | 62 | 42 | 51 | 37 | 68 | 62 | 72 | 63 | 73 | 66 | 82 | 75 |
| 29 | 86 | 73 | 84 | 72 | 75 | 68 | 73 | 60 | 55 | 47 | 60 | 51 | 43 | 35 | ..... | ..... | 62 | 53 | 69 | 60 | 75 | 60 | 79 | 73 |
| 30 | 85 | 78 | 84 | 76 | 72 | 69 | 72 | 65 | 47 | 32 | 61 | 43 | 54 | 37 | ..... | ..... | 62 | 49 | 73 | 62 | 77 | 69 | 81 | 72 |
| 31 | 82 | 77 | 84 | 76 | ..... | ..... | 68 | 62 | ..... | ..... | 43 | 39 | 62 | 49 | ..... | ..... | 67 | 60 | ..... | ..... | 73 | 58 | ..... | ..... |
| Range | 22° | | 21° | | 20° | | 28° | | 45° | | 37° | | 37° | | 28° | | 30° | | 35° | | 31° | | 24° | |
| Monthly means | 78°.5 | | 78°.3 | | 73°.3 | | 65°.5 | | 58°.2 | | 50°.97 | | 46°.1 | | 46°.1 | | 54°.5 | | 60°.7 | | 66°.8 | | 71°.1 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, CAPE HENRY, VA.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 94 | 74 | 77 | 73 | 94 | 72 | 73 | 64 | 59 | 55 | 39 | 28 | 40 | 30 | 47 | 39 | 49 | 41 | 60 | 46 | 72 | 56 | 65 | 58 |
| 2 | 90 | 77 | 77 | 72 | 78 | 66 | 73 | 67 | 78 | 58 | 39 | 36 | 47 | 31 | 41 | 37 | 63 | 41 | 63 | 47 | 86 | 62 | 64 | 58 |
| 3 | 93 | 72 | 74 | 72 | 75 | 64 | 74 | 69 | 58 | 47 | 45 | 29 | 41 | 29 | 37 | 34 | 65 | 54 | 59 | 47 | 85 | 66 | 72 | 59 |
| 4 | 88 | 73 | 84 | 72 | 75 | 62 | 75 | 64 | 56 | 47 | 58 | 33 | 58 | 37 | 37 | 31 | 55 | 39 | 50 | 44 | 84 | 69 | 78 | 59 |
| 5 | 82 | 70 | 83 | 69 | 78 | 63 | 65 | 58 | 67 | 49 | 65 | 55 | 39 | 30 | 44 | 43 | 49 | 37 | 62 | 43 | 70 | 58 | 76 | 68 |
| 6 | 81 | 72 | 87 | 68 | 75 | 64 | 67 | 57 | 63 | 44 | 63 | 49 | 36 | 22 | 50 | 31 | 68 | 39 | 62 | 46 | 71 | 52 | 68 | 57 |
| 7 | 76 | 69 | 84 | 73 | 77 | 67 | 63 | 58 | 55 | 42 | 49 | 34 | 30 | 21 | 51 | 35 | 71 | 57 | 63 | 46 | 84 | 58 | 71 | 56 |
| 8 | 78 | 65 | 88 | 73 | 68 | 63 | 71 | 63 | 70 | 55 | 56 | 34 | 37 | 21 | 61 | 46 | 65 | 47 | 61 | 49 | 88 | 67 | 76 | 61 |
| 9 | 94 | 68 | 77 | 73 | 73 | 63 | 70 | 63 | 71 | 59 | 45 | 34 | 47 | 35 | 61 | 46 | 52 | 45 | 55 | 51 | 77 | 65 | 76 | 63 |
| 10 | 93 | 73 | 85 | 72 | 74 | 60 | 70 | 55 | 61 | 45 | 54 | 29 | 49 | 45 | 62 | 45 | 62 | 46 | 58 | 52 | 72 | 58 | 80 | 68 |
| 11 | 77 | 70 | 84 | 73 | 75 | 71 | 69 | 58 | 48 | 43 | 65 | 41 | 49 | 39 | 50 | 34 | 71 | 50 | 67 | 53 | 67 | 56 | 74 | 60 |
| 12 | 76 | 70 | 85 | 70 | 78 | 71 | 64 | 54 | 54 | 43 | 60 | 45 | 51 | 37 | 38 | 31 | 63 | 52 | 71 | 52 | 65 | 55 | 74 | 55 |
| 13 | 83 | 69 | 91 | 74 | 77 | 68 | 68 | 56 | 55 | 40 | 67 | 44 | 53 | 35 | 52 | 33 | 78 | 51 | 71 | 55 | 59 | 55 | 75 | 60 |
| 14 | 78 | 69 | 86 | 71 | 75 | 71 | 72 | 51 | 61 | 43 | 55 | 40 | 51 | 44 | 45 | 40 | 72 | 51 | 59 | 53 | 58 | 54 | 75 | 58 |
| 15 | 81 | 66 | 83 | 70 | 80 | 68 | 78 | 55 | 68 | 43 | 63 | 37 | 51 | 39 | 43 | 40 | 55 | 47 | 56 | 53 | 56 | 50 | 76 | 61 |
| 16 | 93 | 73 | 85 | 68 | 77 | 69 | 81 | 60 | 67 | 55 | 66 | 51 | 44 | 36 | 49 | 39 | 59 | 42 | 54 | 49 | 63 | 48 | 76 | 58 |
| 17 | 92 | 73 | 86 | 71 | 80 | 68 | 67 | 59 | 60 | 50 | 72 | 47 | 46 | 34 | 54 | 35 | 60 | 49 | 50 | 46 | 62 | 55 | 87 | 67 |
| 18 | 87 | 73 | 86 | 68 | 73 | 67 | 71 | 58 | 61 | 47 | 61 | 50 | 50 | 33 | 51 | 36 | 55 | 47 | 52 | 44 | 65 | 54 | 72 | 65 |
| 19 | 88 | 73 | 84 | 71 | 68 | 67 | 82 | 60 | 50 | 43 | 53 | 47 | 52 | 32 | 39 | 28 | 62 | 45 | 60 | 43 | 67 | 55 | 74 | 65 |
| 20 | 78 | 70 | 81 | 73 | 68 | 65 | 79 | 65 | 50 | 43 | 61 | 48 | 56 | 43 | 60 | 30 | 63 | 47 | 80 | 55 | 67 | 60 | 85 | 64 |
| 21 | 77 | 70 | 87 | 71 | 73 | 64 | 81 | 61 | 57 | 49 | 52 | 47 | 55 | 45 | 65 | 39 | 52 | 42 | 79 | 61 | 84 | 65 | 80 | 60 |
| 22 | 78 | 72 | 80 | 69 | 67 | 59 | 64 | 55 | 60 | 53 | 49 | 47 | 58 | 44 | 72 | 47 | 48 | 41 | 73 | 59 | 72 | 62 | 79 | 68 |
| 23 | 79 | 72 | 82 | 69 | 70 | 58 | 69 | 53 | 62 | 57 | 51 | 47 | 50 | 31 | 61 | 46 | 66 | 36 | 85 | 67 | 73 | 52 | 75 | 58 |
| 24 | 89 | 74 | 83 | 72 | 74 | 60 | 72 | 49 | 67 | 56 | 48 | 45 | 38 | 27 | 49 | 42 | 77 | 44 | 80 | 69 | 72 | 59 | 80 | 64 |
| 25 | 87 | 76 | 88 | 73 | 75 | 68 | 72 | 50 | 67 | 52 | 49 | 44 | 55 | 33 | 49 | 41 | 48 | 31 | 71 | 56 | 76 | 65 | 86 | 65 |
| 26 | 89 | 78 | 84 | 71 | 75 | 70 | 65 | 59 | 68 | 54 | 51 | 47 | 59 | 43 | 43 | 35 | 44 | 35 | 77 | 60 | 84 | 68 | 91 | 68 |
| 27 | 90 | 73 | 85 | 73 | 76 | 72 | 62 | 56 | 64 | 44 | 51 | 45 | 53 | 41 | 50 | 37 | 77 | 48 | 67 | 57 | 78 | 67 | 95 | 73 |
| 28 | 93 | 74 | 88 | 72 | 73 | 66 | 71 | 54 | 61 | 46 | 48 | 45 | 54 | 38 | 60 | 38 | 70 | 54 | 68 | 58 | 76 | 64 | 88 | 71 |
| 29 | 87 | 75 | 93 | 74 | 73 | 67 | 79 | 56 | 53 | 40 | 50 | 46 | 39 | 29 | ..... | ..... | 58 | 49 | 66 | 58 | 78 | 65 | 82 | 69 |
| 30 | 88 | 78 | 87 | 75 | 72 | 67 | 70 | 61 | 40 | 30 | 50 | 39 | 44 | 29 | ..... | ..... | 53 | 45 | 71 | 60 | 88 | 65 | 83 | 72 |
| 31 | 82 | 73 | 84 | 74 | ..... | ..... | 72 | 58 | ..... | ..... | 42 | 37 | 55 | 43 | ..... | ..... | 52 | 45 | ..... | ..... | 66 | 58 | ..... | ..... |
| Range | 29° | | 25° | | 36° | | 33° | | 48° | | 44° | | 38° | | 44° | | 47° | | 42° | | 40° | | 40° | |
| Monthly means | 77°.8 | | 77°.1 | | 70°.3 | | 63°.9 | | 54°.0 | | 47°.5 | | 41°.0 | | 43°.9 | | 52°.4 | | 58°.6 | | 65°.1 | | 70°.1 | |

*Maximum, minimum, and mean temperatures*—Continued

STATION, CAPE LOOKOUT, N. C.

| Day of month. | 1877. July. | | August. | | September. | | October. | | November. | | 1878. December. | | January. | | February. | | March. | | April. | | May. | | June. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 83 | 75 | 83 | 72 | 86 | 74 | 76 | 68 | 70 | 59 | 41 | 29 | 44 | 33 | 53 | 46 | 56 | 44 | 63 | 51 | 70 | 63 | 68 | 58 |
| 2 | 84 | 76 | 86 | 73 | 83 | 72 | 77 | 69 | 78 | 69 | 43 | 34 | 54 | 40 | 50 | 41 | 62 | 50 | 63 | 49 | 75 | 65 | 70 | 59 |
| 3 | 84 | 74 | 86 | 73 | 84 | 67 | 78 | 70 | 70 | 51 | 45 | 33 | 47 | 35 | 44 | 40 | 62 | 56 | 64 | 56 | 78 | 68 | 75 | 61 |
| 4 | 84 | 74 | 83 | 74 | 79 | 65 | 80 | 74 | 67 | 50 | 60 | 39 | 62 | 47 | 47 | 38 | 58 | 48 | 59 | 50 | 77 | 68 | 81 | 71 |
| 5 | 80 | 75 | 82 | 72 | 83 | 70 | 74 | 58 | 71 | 66 | 66 | 58 | 47 | 34 | 47 | 32 | 51 | 38 | 63 | 44 | 71 | 54 | 83 | 71 |
| 6 | 80 | 73 | 85 | 74 | 85 | 73 | 69 | 57 | 69 | 46 | 67 | 42 | 39 | 28 | 47 | 34 | 63 | 49 | 62 | 54 | 73 | 58 | 73 | 62 |
| 7 | 79 | 73 | 85 | 76 | 83 | 71 | 68 | 53 | 68 | 45 | 47 | 36 | 33 | 26 | 55 | 39 | 65 | 55 | 64 | 47 | 75 | 66 | 69 | 61 |
| 8 | 78 | 72 | 85 | 76 | 78 | 65 | 75 | 67 | 73 | 66 | 53 | 41 | 43 | 27 | 60 | 51 | 65 | 55 | 63 | 51 | 76 | 68 | 79 | 65 |
| 9 | 83 | 72 | 85 | 75 | 76 | 64 | 73 | 64 | 73 | 66 | 52 | 37 | 58 | 39 | 60 | 52 | 63 | 53 | 65 | 61 | 82 | 68 | 80 | 71 |
| 10 | 85 | 70 | 86 | 75 | 79 | 65 | 74 | 60 | 67 | 46 | 55 | 35 | 57 | 39 | 59 | 52 | 69 | 53 | 66 | 62 | 76 | 66 | 80 | 66 |
| 11 | 84 | 78 | 87 | 75 | 86 | 75 | 73 | 59 | 50 | 42 | 57 | 51 | 52 | 44 | 54 | 42 | 67 | 60 | 69 | 60 | 76 | 59 | 74 | 61 |
| 12 | 82 | 73 | 86 | 75 | 82 | 75 | 65 | 52 | 55 | 39 | 59 | 46 | 49 | 36 | 47 | 33 | 68 | 60 | 67 | 56 | 74 | 58 | 79 | 68 |
| 13 | 83 | 71 | 87 | 78 | 80 | 71 | 66 | 53 | 67 | 45 | 62 | 49 | 59 | 45 | 54 | 45 | 66 | 59 | 68 | 62 | 70 | 58 | 74 | 68 |
| 14 | 87 | 69 | 87 | 73 | 82 | 72 | 68 | 57 | 64 | 50 | 57 | 45 | 62 | 49 | 51 | 44 | 67 | 58 | 70 | 61 | 69 | 58 | 79 | 65 |
| 15 | 84 | 76 | 82 | 70 | 82 | 73 | 73 | 60 | 68 | 57 | 59 | 43 | 50 | 44 | 49 | 42 | 60 | 48 | 68 | 62 | 62 | 50 | 73 | 62 |
| 16 | 85 | 76 | 86 | 76 | 87 | 72 | 77 | 62 | 68 | 60 | 61 | 55 | 46 | 38 | 48 | 44 | 61 | 48 | 64 | 54 | 65 | 47 | 81 | 62 |
| 17 | 85 | 77 | 83 | 70 | 86 | 72 | 73 | 63 | 68 | 56 | 61 | 54 | 47 | 38 | 55 | 43 | 64 | 55 | 62 | 50 | 74 | 61 | 81 | 72 |
| 18 | 84 | 77 | 84 | 71 | 80 | 68 | 72 | 66 | 67 | 52 | 61 | 51 | 49 | 39 | 55 | 39 | 59 | 46 | 60 | 48 | 70 | 60 | 76 | 69 |
| 19 | 84 | 76 | 80 | 72 | 75 | 68 | 77 | 64 | 53 | 46 | 55 | 50 | 56 | 40 | 42 | 34 | 60 | 46 | 65 | 48 | 72 | 60 | 74 | 67 |
| 20 | 83 | 72 | 83 | 68 | 74 | 69 | 78 | 69 | 57 | 47 | 57 | 49 | 60 | 40 | 61 | 41 | 64 | 55 | 69 | 61 | 75 | 67 | 75 | 64 |
| 21 | 82 | 73 | 82 | 71 | 74 | 67 | 77 | 68 | 65 | 47 | 59 | 52 | 62 | 51 | 63 | 55 | 60 | 54 | 76 | 61 | 76 | 67 | 81 | 69 |
| 22 | 82 | 73 | 83 | 73 | 73 | 64 | 70 | 58 | 66 | 61 | 58 | 52 | 57 | 49 | 62 | 56 | 62 | 48 | 76 | 61 | 72 | 65 | 81 | 74 |
| 23 | 84 | 76 | 83 | 73 | 73 | 63 | 65 | 52 | 67 | 61 | 57 | 53 | 54 | 39 | 60 | 54 | 64 | 48 | 77 | 66 | 72 | 63 | 81 | 67 |
| 24 | 87 | 78 | 85 | 77 | 77 | 63 | 68 | 53 | 68 | 60 | 53 | 50 | 55 | 33 | 54 | 47 | 66 | 54 | 72 | 66 | 78 | 67 | 81 | 69 |
| 25 | 87 | 76 | 85 | 74 | 79 | 71 | 72 | 57 | 66 | 57 | 56 | 49 | 62 | 52 | 55 | 46 | 54 | 44 | 72 | 65 | 79 | 70 | 83 | 69 |
| 26 | 85 | 78 | 87 | 74 | 79 | 70 | 72 | 64 | 66 | 58 | 63 | 50 | 57 | 49 | 49 | 37 | 55 | 48 | 73 | 64 | 80 | 72 | 84 | 73 |
| 27 | 87 | 79 | 86 | 76 | 77 | 74 | 66 | 59 | 65 | 51 | 57 | 47 | 61 | 51 | 49 | 38 | 67 | 52 | 77 | 65 | 78 | 70 | 87 | 73 |
| 28 | 89 | 80 | 87 | 78 | 80 | 69 | 71 | 57 | 64 | 53 | 54 | 46 | 61 | 45 | 56 | 38 | 65 | 60 | 74 | 65 | 79 | 70 | 86 | 77 |
| 29 | 90 | 72 | 90 | 76 | 73 | 67 | 77 | 66 | 55 | 47 | 63 | 50 | 46 | 37 | ..... | ..... | 71 | 56 | 70 | 59 | 83 | 69 | 81 | 71 |
| 30 | 87 | 76 | 86 | 75 | 76 | 69 | 74 | 66 | 48 | 31 | 55 | 40 | 58 | 37 | ..... | ..... | 63 | 52 | 74 | 65 | 83 | 69 | 84 | 71 |
| 31 | 88 | 77 | 87 | 80 | ..... | ..... | 71 | 63 | ..... | ..... | 47 | 39 | 62 | 53 | ..... | ..... | 67 | 61 | ..... | ..... | 74 | 62 | ..... | ..... |
| Range | 21° | | 22° | | 24° | | 28° | | 47° | | 38° | | 36° | | 31° | | 33° | | 33° | | 36° | | 29° | |
| Monthly means | 79°.8 | | 80°.6 | | 75°.4 | | 68°.0 | | 50°.2 | | 51°.3 | | 48°.1 | | 49°.2 | | 58°.2 | | 62°.7 | | 68°.9 | | 73°.6 | |

*STATION, CAPE MAY, N.J.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 79 | 68 | 79 | 70 | 84 | 74 | 75 | 57 | 54 | 47 | 35 | 26 | 35 | 22 | 44 | 31 | 47 | 39 | 53 | 43 | 64 | 51 | 60 | 53 |
| 2 | 82 | 73 | 73 | 68 | 75 | 65 | 76 | 60 | 66 | 52 | 35 | 31 | 44 | 29 | 33 | 29 | 52 | 39 | 56 | 46 | 70 | 60 | 62 | 55 |
| 3 | 77 | 68 | 77 | 68 | 70 | 62 | 75 | 64 | 55 | 45 | 46 | 31 | 29 | 18 | 36 | 24 | 55 | 48 | 54 | 44 | 72 | 62 | 71 | 55 |
| 4 | 77 | 69 | 77 | 69 | 78 | 62 | 72 | 60 | 54 | 45 | 54 | 42 | 47 | 24 | 34 | 20 | 49 | 35 | 49 | 45 | 67 | 61 | 68 | 57 |
| 5 | 80 | 68 | 81 | 64 | 77 | 68 | 61 | 54 | 61 | 51 | 58 | 54 | 35 | 24 | 37 | 30 | 48 | 32 | 56 | 43 | 62 | 56 | 71 | 56 |
| 6 | 83 | 68 | 86 | 69 | 73 | 65 | 58 | 50 | 60 | 39 | 60 | 40 | 29 | 22 | 43 | 32 | 54 | 45 | 55 | 48 | 66 | 54 | 65 | 53 |
| 7 | 77 | 64 | 81 | 74 | 70 | 65 | 65 | 47 | 51 | 36 | 45 | 36 | 23 | 17 | 49 | 39 | 59 | 49 | 55 | 45 | 66 | 59 | 68 | 53 |
| 8 | 79 | 63 | 84 | 73 | 65 | 59 | 67 | 58 | 64 | 48 | 47 | 41 | 37 | 16 | 53 | 45 | 61 | 50 | 59 | 46 | 75 | 60 | 65 | 60 |
| 9 | 80 | 69 | 78 | 72 | 70 | 56 | 67 | 58 | 66 | 56 | 41 | 35 | 45 | 33 | 55 | 44 | 56 | 45 | 56 | 50 | 69 | 57 | 69 | 62 |
| 10 | 82 | 68 | 84 | 72 | 74 | 63 | 69 | 59 | 57 | 41 | 49 | 34 | 50 | 40 | 51 | 41 | 58 | 44 | 60 | 50 | 64 | 56 | 70 | 60 |
| 11 | 79 | 66 | 84 | 73 | 74 | 67 | 65 | 54 | 45 | 39 | 53 | 44 | 43 | 38 | 43 | 30 | 60 | 44 | 60 | 53 | 57 | 50 | 66 | 55 |
| 12 | 81 | 66 | 83 | 73 | 74 | 67 | 58 | 51 | 51 | 39 | 48 | 40 | 43 | 38 | 44 | 26 | 50 | 44 | 59 | 50 | 54 | 49 | 69 | 55 |
| 13 | 79 | 66 | 81 | 66 | 76 | 69 | 61 | 52 | 53 | 39 | 52 | 44 | 48 | 35 | 48 | 38 | 59 | 44 | 61 | 50 | 56 | 43 | 72 | 59 |
| 14 | 79 | 65 | 80 | 71 | 76 | 68 | 69 | 56 | 58 | 49 | 45 | 37 | 51 | 42 | 42 | 38 | 54 | 46 | 62 | 50 | 55 | 46 | 72 | 59 |
| 15 | 77 | 67 | 79 | 71 | 77 | 69 | 72 | 60 | 62 | 49 | 51 | 42 | 44 | 37 | 42 | 32 | 47 | 43 | 54 | 51 | 49 | 43 | 71 | 62 |
| 16 | 79 | 67 | 81 | 72 | 81 | 69 | 70 | 62 | 64 | 56 | 52 | 47 | 39 | 27 | 47 | 32 | 53 | 41 | 51 | 46 | 61 | 45 | 72 | 63 |
| 17 | 79 | 70 | 85 | 72 | 77 | 69 | 66 | 53 | 62 | 53 | 55 | 47 | 44 | 22 | 50 | 41 | 50 | 41 | 55 | 44 | 61 | 54 | 80 | 65 |
| 18 | 79 | 71 | 84 | 71 | 72 | 61 | 67 | 58 | 56 | 42 | 51 | 38 | 45 | 37 | 46 | 29 | 48 | 40 | 60 | 44 | 65 | 46 | 70 | 61 |
| 19 | 74 | 69 | 83 | 72 | 70 | 54 | 70 | 63 | 42 | 36 | 51 | 36 | 50 | 38 | 38 | 20 | 55 | 44 | 62 | 48 | 68 | 54 | 76 | 58 |
| 20 | 73 | 69 | 84 | 71 | 70 | 54 | 72 | 63 | 47 | 31 | 53 | 45 | 50 | 45 | 48 | 36 | 51 | 46 | 65 | 54 | 60 | 56 | 76 | 65 |
| 21 | 79 | 67 | 84 | 73 | 75 | 54 | 65 | 61 | 49 | 28 | 50 | 40 | 52 | 43 | 53 | 45 | 51 | 39 | 67 | 57 | 73 | 56 | 76 | 65 |
| 22 | 74 | 69 | 82 | 71 | 70 | 54 | 63 | 49 | 55 | 47 | 48 | 35 | 47 | 41 | 53 | 49 | 55 | 43 | 65 | 54 | 64 | 55 | 76 | 66 |
| 23 | 75 | 68 | 81 | 70 | 72 | 60 | 63 | 51 | 59 | 53 | 46 | 39 | 47 | 24 | 55 | 46 | 57 | 44 | 72 | 57 | 69 | 54 | 72 | 64 |
| 24 | 82 | 69 | 82 | 74 | 75 | 62 | 67 | 57 | 60 | 56 | 43 | 38 | 43 | 21 | 46 | 39 | 58 | 34 | 64 | 58 | 65 | 57 | 76 | 65 |
| 25 | 82 | 70 | 85 | 75 | 77 | 66 | 66 | 57 | 63 | 54 | 47 | 39 | 50 | 42 | 43 | 37 | 35 | 22 | 62 | 57 | 70 | 59 | 79 | 68 |
| 26 | 86 | 70 | 85 | 75 | 77 | 65 | 63 | 58 | 59 | 54 | 47 | 34 | 52 | 42 | 41 | 32 | 47 | 31 | 67 | 55 | 72 | 60 | 83 | 70 |
| 27 | 84 | 72 | 86 | 75 | 77 | 67 | 60 | 50 | 58 | 51 | 49 | 43 | 48 | 41 | 50 | 37 | 60 | 45 | 67 | 56 | 72 | 61 | 84 | 70 |
| 28 | 85 | 70 | 88 | 75 | 74 | 70 | 60 | 50 | 56 | 48 | 51 | 35 | 49 | 28 | 56 | 42 | 57 | 52 | 66 | 55 | 75 | 64 | 85 | 72 |
| 29 | 86 | 69 | 88 | 75 | 74 | 65 | 67 | 59 | 53 | 34 | 47 | 34 | 29 | 18 | ..... | ..... | 56 | 45 | 65 | 54 | 71 | 57 | 80 | 73 |
| 30 | 87 | 71 | 85 | 76 | 71 | 57 | 65 | 51 | 34 | 26 | 44 | 37 | 39 | 25 | ..... | ..... | 53 | 39 | 64 | 54 | 73 | 57 | 81 | 69 |
| 31 | 79 | 72 | 85 | 74 | ..... | ..... | 62 | 50 | ..... | ..... | 39 | 27 | 44 | 38 | ..... | ..... | 52 | 45 | ..... | ..... | 59 | 53 | ..... | ..... |
| Range | 24° | | 24° | | 30° | | 29° | | 40° | | 34° | | 36° | | 36° | | 39° | | 29° | | 32° | | 32° | |
| Monthly means | 73°.7 | | 76°.8 | | 68°.4 | | 61°.2 | | 50°.1 | | 43°.7 | | 37°.7 | | 40°.7 | | 47°.5 | | 54°.8 | | 60°.3 | | 67°.5 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, CASTROVILLE, TEX.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | (*) | | †97 | ‡88 | †95 | ‡85 | †90 | ‡85 | †73 | ‡68 | †50 | 23 | †49 | 28 | †60 | 41 | †74 | 58 | †71 | 53 | §76 | 67 | 90 | 75 |
| 2 | | | 98 | 89 | 96 | 80 | 95 | 82 | 63 | 60 | 49 | 43 | 53 | 35 | 53 | 42 | 72 | 48 | 70 | 58 | 81 | 69 | 90 | 74 |
| 3 | | | 100 | 90 | 96 | 85 | 95 | 85 | 66 | 62 | 62 | 52 | 51 | 35 | 53 | 38 | 71 | 40 | 76 | 48 | (‖) | ..... | 92 | 72 |
| 4 | | | 98 | 90 | 96 | 82 | 79 | 75 | 67 | 62 | 72 | 40 | 46 | 29 | 63 | 32 | 70 | 40 | 74 | 43 | ..... | ..... | 89 | 73 |
| 5 | | | 97 | 89 | 94 | 77 | 75 | 70 | 65 | 60 | 52 | 36 | 44 | 25 | 65 | 35 | 73 | 47 | 81 | 43 | 83 | 50 | 87 | 72 |
| 6 | | | 100 | 89 | 87 | 80 | 86 | 73 | 61 | 53 | 52 | 26 | 45 | 35 | 66 | 48 | 69 | 63 | 81 | 51 | 84 | 57 | 90 | 73 |
| 7 | | | 93 | 90 | 88 | 80 | 85 | 77 | 68 | 59 | 55 | 25 | 38 | 34 | 71 | 45 | 75 | 60 | 68 | 65 | 86 | 71 | 85 | 73 |
| 8 | | | 92 | 83 | 94 | 84 | 85 | 77 | 64 | 60 | 59 | 31 | 49 | 36 | 70 | 42 | 75 | 62 | 79 | 62 | 81 | 68 | 81 | 65 |
| 9 | | | 96 | 83 | 93 | 85 | 87 | 78 | 60 | 44 | 55 | 46 | 58 | 46 | 60 | 37 | 60 | (‖) | 82 | 59 | 80 | 65 | 85 | 66 |
| 10 | | | 94 | 83 | 94 | 84 | 85 | 77 | 55 | 43 | 63 | 45 | 51 | 44 | 57 | 33 | 73 | 49 | 76 | 55 | 76 | 67 | 94 | 73 |
| 11 | | | 95 | 83 | 91 | 82 | 88 | 76 | 58 | 47 | 62 | 39 | 60 | 44 | 42 | 28 | 73 | 60 | 79 | 58 | 67 | 63 | 83 | 71 |
| 12 | | | 95 | 85 | 91 | 83 | 87 | 76 | 71 | 51 | 60 | 49 | 60 | 45 | 59 | 47 | 79 | 45 | 77 | 62 | 78 | 63 | 90 | 72 |
| 13 | | | (‖) | ..... | 92 | 85 | 87 | 80 | 77 | 65 | 65 | 58 | 55 | 35 | 70 | 43 | 77 | 47 | 75 | 68 | 84 | 67 | 95 | 77 |
| 14 | | | ..... | ..... | 93 | 85 | 89 | 80 | 74 | 57 | 65 | 56 | 54 | 30 | 75 | 39 | 75 | 57 | 83 | 67 | 79 | 64 | 94 | 76 |
| 15 | | | 84 | 78 | 94 | 80 | 90 | 82 | 72 | 56 | 66 | 58 | 57 | 35 | 64 | 41 | 69 | 60 | 83 | 63 | 77 | 63 | 94 | 79 |
| 16 | | | 92 | 84 | 93 | 83 | 75 | 70 | 72 | 53 | 70 | 65 | 58 | 36 | 68 | 35 | 78 | 57 | 84 | 62 | 88 | 63 | 93 | 77 |
| 17 | | | 94 | 84 | 93 | 79 | 71 | 68 | 72 | 56 | 72 | 64 | 65 | 40 | 75 | 53 | 79 | 54 | 87 | 70 | 87 | 73 | 95 | 80 |
| 18 | | | 96 | 84 | 85 | 72 | 71 | 69 | 73 | 64 | 70 | 63 | 61 | 54 | 74 | 47 | 73 | 51 | 83 | 68 | 89 | 62 | 97 | 78 |
| 19 | | | 95 | 85 | 86 | 70 | 69 | 62 | 68 | 55 | 67 | 65 | 65 | 42 | 72 | 61 | 64 | 58 | 82 | 71 | 91 | 62 | (‖) | ..... |
| 20 | | | 97 | 88 | (‖) | ..... | 65 | 60 | 65 | 51 | 59 | 54 | 63 | 38 | 75 | (‖) | 69 | 56 | 82 | 72 | 89 | 73 | ..... | ..... |
| 21 | | | 95 | 85 | 82 | 72 | 68 | 59 | 68 | 53 | 64 | 54 | 60 | 36 | 73 | 50 | 75 | 50 | 81 | 73 | 89 | 74 | ..... | ..... |
| 22 | | | 95 | 86 | 87 | 74 | 68 | 62 | 64 | 49 | 70 | 46 | 60 | 34 | 60 | 44 | 72 | 47 | 85 | 73 | 88 | 76 | 98 | 72 |
| 23 | | | 96 | 87 | 86 | 75 | 70 | 67 | 70 | 54 | 65 | 54 | 63 | 32 | 62 | 43 | (‖) | (‖) | 80 | 59 | 89 | 75 | 93 | 71 |
| 24 | | | 97 | 85 | 85 | 76 | 69 | 68 | 75 | 63 | 66 | 47 | 66 | 37 | (‖) | (‖) | 64 | ..... | 80 | 49 | 88 | 72 | 96 | 76 |
| 25 | | | 97 | 87 | 87 | 76 | 75 | 70 | 55 | 49 | 66 | 45 | 60 | 45 | ..... | ..... | 64 | ..... | 83 | 51 | 87 | 71 | 94 | 76 |
| 26 | | | 95 | 87 | 90 | 80 | 77 | 67 | 72 | 55 | 67 | 46 | 76 | 51 | 49 | ..... | 73 | 61 | 84 | 55 | 90 | 63 | 96 | 76 |
| 27 | | | 95 | 85 | 92 | 82 | 80 | 68 | 60 | 48 | 55 | 53 | 67 | 42 | 60 | 40 | 83 | 64 | 83 | 73 | 85 | 61 | 92 | 76 |
| 28 | | | 90 | 86 | 92 | 79 | 81 | 73 | 46 | 34 | 55 | 44 | 66 | 39 | 63 | 43 | 81 | 48 | 73 | 62 | 87 | 68 | (‖) | ..... |
| 29 | | | 92 | 82 | 90 | 85 | 84 | 79 | 45 | 32 | 46 | 35 | 67 | 39 | ..... | ..... | 81 | 53 | 74 | 54 | 87 | 74 | 92 | 74 |
| 30 | | | 93 | 80 | 90 | 80 | 72 | 69 | 43 | 31 | 47 | 32 | 63 | 49 | ..... | ..... | 79 | 49 | 83 | (‖) | 84 | 76 | 92 | 76 |
| 31 | | | 90 | 84 | ..... | ..... | 73 | 68 | ..... | ..... | 47 | 31 | 65 | 33 | ..... | ..... | 75 | 50 | ..... | ..... | 90 | 76 | ..... | ..... |
| Range | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

* No record for July, 1877. † Highest observed readings; maximum thermometer not in use. ‡ Lowest observed readings; minimum thermometer not in use. Readings of minimum thermometer commenced December 1, 1877. § Readings of maximum thermometer began May 1, 1878. ‖ No observations taken.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, CHARLESTON, S. C.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 90 | 77 | 88 | 77 | 91 | 79 | 78 | 67 | 74 | 63 | 48 | 33 | 51 | 36 | 55 | 45 | 63 | 44 | 70 | 60 | 77 | 62 | 84 | 64 |
| 2 | 93 | 78 | 89 | 73 | 92 | 76 | 77 | 72 | 80 | 64 | 48 | 33 | 55 | 43 | 57 | 47 | 66 | 53 | 65 | 52 | 83 | 67 | 84 | 66 |
| 3 | 94 | 80 | 86 | 74 | 84 | 69 | 78 | 73 | 64 | 54 | 55 | 37 | 56 | 39 | 50 | 42 | 70 | 56 | 63 | 58 | 83 | 69 | 85 | 71 |
| 4 | 95 | 80 | 87 | 74 | 82 | 72 | 80 | 72 | 64 | 52 | 63 | 51 | 63 | 44 | 53 | 39 | 58 | 47 | 63 | 50 | 83 | 72 | 89 | 75 |
| 5 | 90 | 81 | 88 | 76 | 84 | 73 | 73 | 60 | 67 | 56 | 66 | 60 | 46 | 35 | 52 | 41 | 53 | 41 | 68 | 46 | 75 | 57 | 90 | 75 |
| 6 | 84 | 74 | 90 | 75 | 87 | 75 | 69 | 56 | 65 | 52 | 63 | 42 | 45 | 31 | 56 | 41 | 69 | 48 | 76 | 54 | 80 | 58 | 79 | 70 |
| 7 | 84 | 73 | 92 | 79 | 91 | 77 | 70 | 58 | 66 | 44 | 50 | 36 | 42 | 31 | 61 | 48 | 71 | 55 | 71 | 55 | 85 | 65 | 79 | 66 |
| 8 | 85 | 73 | 93 | 80 | 84 | 74 | 81 | 63 | 72 | 65 | 59 | 40 | 46 | 30 | 65 | 55 | 65 | 56 | 73 | 60 | 83 | 69 | 86 | 68 |
| 9 | 91 | 73 | 92 | 79 | 79 | 68 | 72 | 64 | 71 | 54 | 53 | 40 | 55 | 40 | 63 | 53 | 70 | 58 | 67 | 65 | 87 | 70 | 87 | 73 |
| 10 | 92 | 77 | 91 | 74 | 82 | 73 | 73 | 60 | 61 | 45 | 56 | 40 | 57 | 45 | 61 | 50 | 69 | 60 | 78 | 64 | 82 | 66 | 88 | 74 |
| 11 | 91 | 79 | 89 | 74 | 87 | 76 | 76 | 61 | 55 | 43 | 67 | 45 | 55 | 41 | 50 | 39 | 74 | 63 | 76 | 64 | 81 | 62 | 83 | 66 |
| 12 | 86 | 76 | 91 | 78 | 90 | 78 | 70 | 56 | 60 | 41 | 63 | 47 | 54 | 40 | 48 | 32 | 74 | 64 | 75 | 56 | 79 | 63 | 87 | 70 |
| 13 | 87 | 74 | 91 | 77 | 84 | 71 | 70 | 57 | 63 | 44 | 69 | 48 | 64 | 47 | 56 | 43 | 76 | 62 | 80 | 60 | 74 | 67 | 79 | 66 |
| 14 | 92 | 76 | 87 | 75 | 83 | 71 | 74 | 60 | 68 | 49 | 60 | 48 | 60 | 46 | 52 | 45 | 77 | 57 | 80 | 64 | 75 | 66 | 74 | 67 |
| 15 | 91 | 76 | 90 | 73 | 85 | 74 | 77 | 63 | 70 | 59 | 63 | 46 | 54 | 39 | 51 | 47 | 66 | 58 | 74 | 68 | 72 | 56 | 79 | 67 |
| 16 | 92 | 76 | 89 | 76 | 84 | 75 | 77 | 66 | 72 | 59 | 69 | 52 | 53 | 39 | 57 | 46 | 66 | 52 | 75 | 63 | 67 | 53 | 84 | 70 |
| 17 | 90 | 77 | 89 | 76 | 86 | 75 | 78 | 65 | 73 | 56 | 67 | 51 | 56 | 41 | 63 | 46 | 74 | 57 | 69 | 57 | 80 | 66 | 83 | 74 |
| 18 | 89 | 78 | 84 | 75 | 86 | 72 | 77 | 64 | 67 | 52 | 68 | 51 | 58 | 43 | 62 | 49 | 63 | 49 | 66 | 59 | 75 | 65 | 87 | 75 |
| 19 | 89 | 77 | 84 | 72 | 72 | 65 | 76 | 69 | 62 | 52 | 60 | 51 | 62 | 49 | 53 | 40 | 63 | 48 | 71 | 58 | 75 | 67 | 84 | 72 |
| 20 | 87 | 75 | 85 | 71 | 75 | 64 | 80 | 71 | 63 | 53 | 61 | 48 | 69 | 56 | 64 | 44 | 72 | 50 | 78 | 63 | 80 | 72 | 80 | 71 |
| 21 | 83 | 75 | 85 | 75 | 74 | 67 | 80 | 63 | 66 | 60 | 65 | 55 | 64 | 53 | 64 | 59 | 69 | 55 | 84 | 67 | 83 | 71 | 84 | 70 |
| 22 | 86 | 74 | 84 | 73 | 72 | 63 | 71 | 54 | 69 | 62 | 60 | 53 | 58 | 45 | 67 | 55 | 71 | 57 | 83 | 69 | 82 | 72 | 89 | 74 |
| 23 | 89 | 79 | 89 | 76 | 77 | 65 | 70 | 53 | 67 | 61 | 64 | 58 | 58 | 45 | 62 | 53 | 65 | 50 | 81 | 70 | 79 | 72 | 86 | 68 |
| 24 | 91 | 79 | 90 | 76 | 78 | 68 | 71 | 56 | 63 | 54 | 62 | 56 | 55 | 41 | 62 | 48 | 83 | 59 | 77 | 71 | 88 | 74 | 90 | 72 |
| 25 | 93 | 77 | 89 | 78 | 80 | 69 | 76 | 63 | 64 | 51 | 66 | 57 | 58 | 48 | 59 | 43 | 70 | 54 | 81 | 64 | 94 | 76 | 90 | 75 |
| 26 | 95 | 77 | 87 | 76 | 83 | 70 | 73 | 65 | 64 | 54 | 61 | 53 | 65 | 44 | 53 | 40 | 66 | 51 | 81 | 65 | 93 | 78 | 87 | 77 |
| 27 | 97 | 78 | 87 | 77 | 78 | 71 | 73 | 63 | 68 | 52 | 61 | 51 | 67 | 53 | 53 | 44 | 76 | 55 | 82 | 64 | 88 | 71 | 89 | 77 |
| 28 | 98 | 80 | 88 | 77 | 82 | 71 | 72 | 61 | 60 | 53 | 61 | 50 | 61 | 52 | 63 | 43 | 72 | 64 | 79 | 61 | 83 | 72 | 90 | 78 |
| 29 | 100 | 81 | 88 | 75 | 84 | 67 | 74 | 66 | 57 | 38 | 62 | 51 | 54 | 43 | ..... | ..... | 74 | 60 | 77 | 57 | 84 | 69 | 86 | 78 |
| 30 | 95 | 80 | 91 | 76 | 79 | 67 | 81 | 65 | 42 | 30 | 57 | 47 | 63 | 45 | ..... | ..... | 70 | 62 | 79 | 63 | 85 | 70 | 89 | 75 |
| 31 | 90 | 78 | 91 | 78 | ..... | ..... | 78 | 69 | ..... | ..... | 51 | 44 | 60 | 51 | ..... | ..... | 83 | 66 | ..... | ..... | 86 | 70 | ..... | ..... |
| Range | 27° | | 22° | | 29° | | 28° | | 50° | | 36° | | 39° | | 35° | | 42° | | 38° | | 41° | | 26° | |
| Monthly means | 83°.6 | | 82°.3 | | 77°.2 | | 69°.1 | | 59°.2 | | 54°.1 | | 50°.4 | | 52°.2 | | 62°.4 | | 67°.3 | | 74°.1 | | 78°.4 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, CHARLOTTETOWN, PRINCE EDWARD ISLAND.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 72.0 | 53.1 | 70.7 | 50.4 | 67.4 | 57.9 | 66.0 | 52.0 | 43.7 | 35.4 | 32.5 | 16.3 | 25.1 | 20.6 | 13.8 | −11.1 | 21.0 | 7.1 | 36.9 | 31.6 | 41.4 | 35.9 | 73.0 | 46.8 |
| 2 | 70.7 | 52.4 | 74.7 | 55.9 | 69.7 | 61.9 | 60.3 | 46.2 | 46.0 | 32.1 | 23.8 | 14.4 | 27.5 | 13.6 | 12.8 | − 1.2 | 20.7 | 8.1 | 35.9 | 31.1 | 44.9 | 33.3 | 73.0 | 52.1 |
| 3 | 67.0 | 54.6 | 75.2 | 57.7 | 69.4 | 57.4 | 50.1 | 46.1 | 55.2 | 39.9 | 33.9 | 16.2 | 22.2 | 10.6 | 21.0 | − 6.0 | 42.1 | 17.2 | 33.9 | 31.1 | 50.9 | 33.4 | 73.5 | 53.1 |
| 4 | 70.7 | 50.9 | 76.0 | 59.7 | 68.9 | 53.5 | 60.0 | 47.5 | 43.0 | 34.1 | 35.1 | 24.4 | 20.1 | 9.1 | 28.0 | −13.4 | 41.7 | 25.1 | 37.0 | 31.4 | 62.8 | 42.7 | 77.1 | 57.0 |
| 5 | 71.7 | 47.3 | 72.7 | 57.4 | 71.1 | 54.9 | 64.3 | 47.0 | 42.5 | 28.4 | 43.2 | 27.1 | 37.9 | 17.4 | 25.3 | 13.6 | 28.9 | 18.2 | 39.9 | 32.4 | 67.1 | 42.3 | 71.9 | 55.4 |
| 6 | 79.5 | 56.9 | 73.1 | 55.9 | 68.7 | 48.9 | 50.7 | 41.6 | 49.1 | 27.1 | 52.0 | 36.8 | 21.7 | 0.0 | 29.2 | 13.1 | 27.9 | 13.4 | 36.9 | 33.1 | 56.4 | 48.3 | 60.3 | 49.6 |
| 7 | 65.7 | 51.1 | 69.7 | 53.9 | 68.7 | 44.9 | 47.2 | 36.1 | 35.8 | 23.3 | 38.0 | 17.1 | 1.9 | − 8.0 | 34.0 | 14.6 | 38.8 | 24.4 | 36.8 | 32.1 | 53.9 | 45.0 | 55.6 | 44.2 |
| 8 | 72.7 | 51.2 | 68.7 | 59.9 | 66.0 | 45.2 | 49.0 | 37.6 | 49.8 | 31.1 | 33.2 | 18.7 | −4.4 | −12.0 | 36.4 | 7.2 | 39.8 | 32.1 | 41.0 | 29.6 | 58.8 | 49.6 | 68.2 | 44.3 |
| 9 | 68.8 | 56.8 | 68.8 | 56.4 | 68.1 | 52.4 | 52.0 | 37.5 | 56.2 | 36.1 | 32.0 | 25.1 | 25.5 | − 9.5 | 34.9 | 17.1 | 36.7 | 24.8 | 44.9 | 27.6 | 62.8 | 48.1 | ..... | ..... |
| 10 | 70.8 | 60.1 | 66.2 | 53.9 | 66.7 | 49.4 | 50.9 | 44.1 | 37.0 | 27.1 | 29.3 | 13.1 | 30.9 | 21.1 | 23.2 | 11.6 | 42.3 | 19.8 | 57.2 | 30.6 | 55.0 | 45.9 | ..... | ..... |
| 11 | 73.0 | 61.9 | 70.6 | 57.9 | 72.6 | 50.2 | 52.1 | 45.8 | 34.0 | 28.1 | 29.1 | 12.1 | 38.4 | 29.1 | 28.9 | 12.1 | 21.2 | 12.1 | 44.6 | 29.1 | 60.0 | 45.3 | ..... | ..... |
| 12 | 71.1 | 63.1 | 73.6 | 57.0 | 77.1 | 58.1 | 51.0 | 47.1 | 35.2 | 31.1 | 32.7 | 26.6 | 36.0 | 27.6 | 13.9 | 1.5 | 21.9 | 13.0 | 53.2 | 32.0 | 60.0 | 42.5 | ..... | ..... |
| 13 | 76.0 | 60.3 | 65.8 | 59.8 | 75.7 | 57.9 | 50.8 | 44.1 | 34.1 | 27.1 | 28.6 | 23.1 | 36.0 | 27.2 | 30.4 | 6.7 | 30.0 | 12.0 | 40.0 | 32.2 | 46.4 | 38.0 | ..... | ..... |
| 14 | 64.5 | 55.9 | 73.1 | 61.4 | 62.0 | 49.9 | 48.0 | 39.6 | 42.5 | 21.2 | 31.1 | 12.6 | 36.2 | 21.5 | 9.9 | − 1.0 | 37.7 | 26.6 | 38.1 | 34.8 | 43.5 | 36.5 | ..... | ..... |
| 15 | 69.7 | 53.3 | 77.1 | 63.4 | 59.8 | 45.9 | 50.8 | 40.1 | 50.1 | 40.1 | 31.1 | 5.5 | 38.8 | 30.8 | 16.4 | − 2.2 | 28.5 | 19.2 | 37.0 | 32.1 | 51.0 | 37.3 | ..... | ..... |
| 16 | 76.7 | 58.1 | 74.7 | 65.4 | 69.9 | 53.2 | 44.3 | 37.6 | 53.7 | 43.1 | 38.5 | 16.1 | 32.2 | − 2.5 | 21.4 | − 6.0 | 26.2 | 19.0 | 40.0 | 29.6 | 53.4 | 37.0 | 70.0 | 51.3 |
| 17 | 79.1 | 58.0 | 74.7 | 61.9 | 74.0 | 59.9 | 44.5 | 38.1 | 52.3 | 42.1 | 34.3 | 10.1 | 3.4 | − 6.9 | 23.4 | − 7.0 | 41.3 | 19.2 | 45.0 | 27.4 | 52.9 | 39.7 | 69.1 | 53.1 |
| 18 | 74.5 | 61.6 | 72.2 | 60.7 | 69.3 | 55.4 | 47.8 | 41.3 | 43.0 | 39.1 | 27.0 | 16.6 | 16.7 | − 1.8 | 26.8 | 2.0 | 35.7 | 24.8 | 44.3 | 25.6 | 49.8 | 35.2 | 65.2 | 53.7 |
| 19 | 80.2 | 62.2 | 74.6 | 60.4 | 63.7 | 49.8 | 54.4 | 39.1 | 40.1 | 33.0 | 34.1 | 12.5 | 32.1 | 15.0 | 6.1 | −11.6 | 39.2 | 32.6 | 42.7 | 32.1 | 54.3 | 37.1 | 69.2 | 55.2 |
| 20 | 74.3 | 64.8 | 74.7 | 59.6 | 62.3 | 49.3 | 47.0 | 31.6 | 35.0 | 31.1 | 35.3 | 19.6 | 37.1 | 26.4 | 19.2 | −13.8 | 35.0 | 27.1 | 47.8 | 33.3 | 57.4 | 33.5 | 72.6 | 54.3 |
| 21 | 74.7 | 65.0 | 71.0 | 54.1 | 60.2 | 52.4 | 44.4 | 31.1 | 33.1 | 29.7 | 21.7 | 15.2 | 37.4 | 26.6 | 28.8 | 5.9 | 28.5 | 13.6 | 46.1 | 34.5 | 60.0 | 42.1 | 78.3 | 56.1 |
| 22 | 75.2 | 65.4 | 76.0 | 55.9 | 54.0 | 48.7 | 44.6 | 33.1 | 35.1 | 25.5 | 26.1 | 19.3 | 40.4 | 31.8 | 21.9 | 3.0 | 22.5 | 12.1 | 45.9 | 28.4 | 54.7 | 43.2 | 82.3 | 59.3 |
| 23 | 76.2 | 61.5 | 78.9 | 58.9 | 60.8 | 45.1 | 46.5 | 34.4 | 37.5 | 25.5 | 29.2 | 23.5 | 36.4 | 32.1 | 35.1 | 18.1 | 38.0 | 14.1 | 38.4 | 26.8 | 49.4 | 42.4 | 80.9 | 59.2 |
| 24 | 63.5 | 56.0 | 76.2 | 58.4 | 63.6 | 49.9 | 45.7 | 31.8 | 39.4 | 33.1 | 32.4 | 26.8 | 34.4 | 5.1 | 37.9 | 34.1 | 35.1 | 31.5 | 45.4 | 28.7 | 56.0 | 42.5 | 68.1 | 55.4 |
| 25 | 62.6 | 51.9 | 66.9 | 56.8 | 66.2 | 55.4 | 41.9 | 30.1 | 40.2 | 29.4 | 32.1 | 30.1 | 23.9 | 3.8 | 38.4 | 32.4 | 45.0 | 21.9 | 58.3 | 37.6 | 61.9 | 45.5 | 70.1 | 56.6 |
| 26 | 65.7 | 47.3 | 66.5 | 57.9 | 69.8 | 56.8 | 37.0 | 30.1 | 40.0 | 29.8 | 33.3 | 30.4 | 34.7 | 10.4 | 34.8 | 26.6 | 34.5 | 21.2 | 67.0 | 39.2 | 57.0 | 44.1 | 63.9 | 57.6 |
| 27 | 65.3 | 44.9 | 67.3 | 58.4 | 61.7 | 46.6 | 38.4 | 30.6 | 50.4 | 33.1 | 35.1 | 25.1 | 37.6 | 22.4 | 35.9 | 24.2 | 40.0 | 26.1 | 67.9 | 46.1 | 65.0 | 44.2 | 67.3 | 56.1 |
| 28 | 67.7 | 55.9 | 75.2 | 61.9 | 58.8 | 43.1 | 39.7 | 32.4 | 51.4 | 42.6 | 34.1 | 22.4 | 32.0 | 19.6 | 40.0 | 19.1 | 41.8 | 32.1 | 57.6 | 42.1 | 62.0 | 45.2 | 75.2 | 56.6 |
| 29 | 69.2 | 60.2 | 71.6 | 63.2 | 62.1 | 49.5 | 51.1 | 34.1 | 44.0 | 32.1 | 34.3 | 22.0 | 20.7 | 1.1 | ..... | ..... | 34.9 | 30.9 | 54.0 | 40.4 | 60.4 | 42.2 | 85.0 | 59.6 |
| 30 | 73.7 | 61.0 | 68.4 | 58.9 | 57.8 | 42.6 | 51.1 | 38.6 | 36.5 | 31.3 | 30.1 | 27.1 | 6.3 | − 4.0 | ..... | ..... | 35.1 | 29.9 | 52.8 | 38.0 | 61.8 | 41.7 | 83.2 | 65.7 |
| 31 | 67.9 | 54.1 | 72.7 | 55.7 | ..... | ..... | 44.0 | 34.1 | ..... | ..... | 30.3 | 25.1 | 10.9 | − 6.0 | ..... | ..... | 38.4 | 32.6 | ..... | ..... | 69.6 | 41.1 | ..... | ..... |
| Range | 35°.3 | | 28°.5 | | 34°.5 | | 35°.9 | | 35°.0 | | 46°.5 | | 52°.4 | | 53°.8 | | 37°.9 | | 42°.3 | | 36°.3 | | ..... | ..... |
| Monthly means | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | ..... |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, CHATHAM, NEW BRUNSWICK.*

| Day of month. | 1877. July. Max. | July. Min. | August. Max. | August. Min. | September. Max. | September. Min. | October. Max. | October. Min. | November. Max. | November. Min. | December. Max. | December. Min. | 1878. January. Max. | January. Min. | February. Max. | February. Min. | March. Max. | March. Min. | April. Max. | April. Min. | May. Max. | May. Min. | June. Max. | June. Min. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 70.9 | 51.0 | 80.3 | 47.0 | 65.3 | 52.4 | 78.1 | 50.8 | 40.1 | 30.0 | 27.4 | 7.3 | 27.2 | 8.5 | 12.4 | −15.7 | 22.2 | 0.2 | 33.2 | 26.9 | 41.5 | 34.2 | 86.1 | 48.2 |
| 2 | 74.3 | 57.0 | 88.1 | 53.8 | 71.3 | 58.5 | 61.3 | 44.0 | 44.1 | 23.4 | 22.2 | 1.7 | 19.5 | 7.8 | 19.4 | −10.5 | 28.6 | − 0.3 | 37.1 | 28.6 | 62.5 | 34.8 | 78.4 | 51.0 |
| 3 | 75.3 | 48.6 | 77.9 | 55.2 | 67.3 | 50.0 | 53.3 | 40.5 | 54.8 | 38.1 | 28.4 | 5.8 | 9.4 | − 2.6 | 33.6 | − 5.3 | 35.3 | 17.9 | 39.5 | 33.0 | 53.3 | 39.0 | 82.7 | 53.0 |
| 4 | 77.3 | 45.0 | 80.7 | 57.5 | 67.1 | 46.8 | 62.8 | 46.0 | 40.1 | 32.1 | 37.7 | 13.9 | 14.9 | −11.4 | 33.3 | 16.1 | 33.6 | 26.7 | 36.5 | 31.8 | 49.3 | 39.0 | 84.1 | 59.4 |
| 5 | 87.3 | 44.0 | 73.1 | 55.4 | 76.3 | 43.2 | 62.8 | 43.5 | 42.1 | 24.7 | 35.1 | 16.1 | 38.8 | 14.9 | 33.4 | 15.9 | 29.2 | 12.9 | 35.3 | 32.0 | 70.8 | 36.0 | 78.4 | 60.2 |
| 6 | 71.3 | 55.0 | 70.3 | 50.0 | 67.1 | 43.0 | 54.3 | 35.3 | 47.3 | 21.9 | 55.3 | 30.1 | 16.3 | −16.3 | 40.5 | 17.9 | 37.5 | − 3.9 | 34.8 | 31.2 | 63.5 | 51.1 | 64.5 | 48.3 |
| 7 | 69.1 | 47.6 | 64.3 | 56.2 | 70.3 | 38.0 | 53.1 | 27.4 | 42.3 | 19.9 | 30.4 | 11.9 | − 2.5 | −30.7 | 39.3 | 14.8 | 39.1 | 30.0 | 36.1 | 30.2 | 59.7 | 46.8 | 60.5 | 41.0 |
| 8 | 81.5 | 42.2 | 63.3 | 56.0 | 70.5 | 39.2 | 53.3 | 27.5 | 66.3 | 22.9 | 32.2 | 11.7 | − 2.5 | −33.3 | 45.5 | 11.9 | 42.9 | 34.0 | 40.1 | 29.6 | 54.1 | 41.5 | 63.5 | 35.5 |
| 9 | 79.7 | 58.0 | 68.4 | 52.6 | 73.8 | 43.2 | 59.3 | 32.0 | 60.3 | 33.1 | 30.4 | 19.2 | 7.4 | −25 | 34.4 | 13.8 | 46.4 | 27.7 | 57.1 | 24.3 | 54.5 | 39.8 | 54.3 | 48.1 |
| 10 | 80.1 | 59.0 | 62.8 | 49.5 | 78.3 | 41.8 | 50.5 | 38.0 | 34.4 | 20.0 | 20.4 | 4.8 | 30.0 | −11.4 | 15.2 | 0.7 | 45.5 | 21.7 | 63.8 | 24.9 | 50.7 | 40.1 | 58.8 | 42.8 |
| 11 | 81.5 | 59.0 | 68.3 | 52.8 | 81.3 | 50.0 | 53.9 | 46.5 | 32.4 | 19.2 | 24.2 | − 0.7 | 33.6 | 21.9 | 26.0 | 3.0 | 29.8 | 10.9 | 41.1 | 26.4 | 63.2 | 38.0 | 52.5 | 46.5 |
| 12 | 81.1 | 60.0 | 76.3 | 56.8 | 84.3 | 51.5 | 51.3 | 47.0 | 34.1 | 16.9 | 28.4 | 18.1 | 32.4 | 24.2 | 19.4 | −11.2 | 37.4 | 7.0 | 41.1 | 31.7 | 58.9 | 35.5 | 61.5 | 45.0 |
| 13 | 78.2 | 58.4 | 79.3 | 58.2 | 82.3 | 55.0 | 48.3 | 40.4 | 33.2 | 17.3 | 27.3 | 13.9 | 34.4 | 17.9 | 29.4 | 3.8 | 32.5 | 12.2 | 36.0 | 30.2 | 48.5 | 38.1 | 73.1 | 45.2 |
| 14 | 79.3 | 56.5 | 69.9 | 58.5 | 68.3 | 47.0 | 54.3 | 36.0 | 41.3 | 11.9 | 29.4 | 1.4 | 32.9 | 9.5 | 22.4 | − 8.9 | 30.6 | 21.9 | 47.2 | 32.0 | 49.1 | 31.0 | 79.7 | 40.0 |
| 15 | 82.3 | 53.2 | 74.1 | 62.5 | 66.8 | 50.5 | 56.3 | 35.1 | 55.1 | 38.0 | 23.2 | − 5.3 | 35.8 | 21.7 | 29.6 | −16.6 | 30.5 | 18.3 | 41.6 | 35.5 | 58.5 | 27.9 | 81.5 | 51.0 |
| 16 | 89.9 | 52.8 | 68.3 | 58.0 | 77.3 | 46.0 | 46.1 | 30.5 | 54.3 | 38.0 | 39.8 | 12.3 | 23.2 | − 6.6 | 31.2 | −10.9 | 43.4 | 5.7 | 50.1 | 29.4 | 54.5 | 34.7 | 74.2 | 51.4 |
| 17 | 88.5 | 58.9 | 75.3 | 58.5 | 85.3 | 58.0 | 48.5 | 32.4 | 49.9 | 34.7 | 17.6 | 5.5 | 5.4 | −13.4 | 33.8 | −11.6 | 46.1 | 24.7 | 44.7 | 25.1 | 62.7 | 39.1 | 73.5 | 53.7 |
| 18 | 86.3 | 65.0 | 79.3 | 55.5 | 68.3 | 46.0 | 59.3 | 34.0 | 40.7 | 33.6 | 24.2 | 8.5 | 16.0 | −12.4 | 22.2 | 3.5 | 32.4 | 23.9 | 50.5 | 20.9 | 63.7 | 32.0 | 76.5 | 54.3 |
| 19 | 85.8 | 62.0 | 84.3 | 54.8 | 65.8 | 42.0 | 59.1 | 31.7 | 34.9 | 30.6 | 33.1 | 4.8 | 32.4 | 9.9 | 22.2 | − 5.6 | 37.8 | 26.1 | 47.1 | 31.5 | 65.5 | 33.9 | 74.8 | 53.2 |
| 20 | 82.1 | 67.8 | 80.5 | 57.1 | 63.8 | 42.5 | 47.5 | 26.7 | 32.6 | 22.9 | 35.3 | 14.0 | 36.9 | 20.9 | 31.4 | −15.9 | 36.3 | 17.9 | 60.2 | 30.5 | 62.5 | 35.8 | 84.5 | 50.5 |
| 21 | 84.9 | 63.5 | 80.3 | 46.6 | 69.3 | 42.4 | 49.9 | 20.9 | 34.4 | 17.8 | 22.4 | 3.0 | 36.3 | 27.1 | 30.6 | 0.0 | 27.2 | 6.2 | 53.8 | 36.8 | 58.1 | 44.7 | 81.3 | 58.2 |
| 22 | 86.1 | 61.8 | 84.3 | 51.2 | 57.1 | 43.2 | 39.3 | 29.8 | 34.4 | 9.6 | 21.4 | − 2.3 | 33.6 | 28.4 | 21.9 | −13.9 | 25.3 | − 3.3 | 53.3 | 33.1 | 50.1 | 43.0 | 72.3 | 53.0 |
| 23 | 84.1 | 57.0 | 89.3 | 55.5 | 66.3 | 36.8 | 45.2 | 28.0 | 45.3 | 17.7 | 31.2 | 4.8 | 37.3 | 26.2 | 32.4 | 16.9 | 41.3 | 13.7 | 51.3 | 24.3 | 51.4 | 42.2 | 64.5 | 52.2 |
| 24 | 73.3 | 51.2 | 79.5 | 56.5 | 73.3 | 43.0 | 46.3 | 22.4 | 41.5 | 23.5 | 32.9 | 16.1 | 26.2 | − 0.8 | 37.5 | 31.0 | 30.1 | 23.9 | 43.9 | 25.7 | 53.1 | 42.8 | 69.5 | 58.0 |
| 25 | 70.4 | 48.0 | 72.3 | 51.8 | 58.3 | 52.5 | 38.3 | 25.9 | 43.3 | 24.8 | 33.9 | 18.4 | 24.2 | − 0.8 | 41.5 | 19.9 | 35.2 | 18.3 | 72.5 | 37.5 | 52.1 | 45.0 | 68.4 | 55.0 |
| 26 | 74.1 | 45.0 | 66.3 | 56.0 | 61.1 | 54.0 | 43.8 | 22.9 | 37.1 | 28.0 | 42.3 | 24.0 | 25.2 | − 3.2 | 38.9 | 27.7 | 36.7 | 14.9 | 74.1 | 39.5 | 61.3 | 45.0 | 67.4 | 55.0 |
| 27 | 78.3 | 42.8 | 70.3 | 56.8 | 59.5 | 42.1 | 44.1 | 25.9 | 52.1 | 30.8 | 40.3 | 20.2 | 28.6 | 5.8 | 44.1 | 19.9 | 42.5 | 17.9 | 65.6 | 43.2 | 71.5 | 42.9 | 81.1 | 49.8 |
| 28 | 79.5 | 54.0 | 79.1 | 61.8 | 62.3 | 34.0 | 42.8 | 24.9 | 53.3 | 38.1 | 38.7 | 12.5 | 27.4 | 3.7 | 44.1 | 19.2 | 44.5 | 23.9 | 68.1 | 40.6 | 66.3 | 43.2 | 82.5 | 49.8 |
| 29 | 89.3 | 62.4 | 75.5 | 59.0 | 64.3 | 44.8 | 50.3 | 20.9 | 38.5 | 31.0 | 41.1 | 17.4 | 10.5 | − 7.1 | ..... | ..... | 36.5 | 28.0 | 52.4 | 41.9 | 62.3 | 42.0 | 93.7 | 60.2 |
| 30 | 71.3 | 66.4 | 66.8 | 55.9 | 66.8 | 34.3 | 49.3 | 34.1 | 35.2 | 19.9 | 26.2 | 19.9 | 12.4 | −18.5 | ..... | ..... | 36.1 | 29.0 | 45.0 | 36.1 | 72.6 | 43.9 | 94.3 | 63.2 |
| 31 | 78.7 | 52.4 | 78.1 | 49.8 | ..... | ..... | 45.1 | 27.8 | ..... | ..... | 25.0 | 18.4 | 21.4 | −18.6 | ..... | ..... | 34.4 | 29.6 | ..... | ..... | 81.1 | 39.0 | ..... | ..... |
| **Range** | 47°.7 | | 43°.3 | | 51°.3 | | 57°.2 | | 56°.7 | | 60°.6 | | 72°.1 | | 62°.1 | | 50°.3 | | 53°.2 | | 53°.2 | | 58°.8 | |
| **Monthly means** | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, CHEYENNE, WYO.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 79 | 47 | 87 | 44 | 69 | 49 | 71 | 37 | 31 | 14 | 37 | 24 | 22 | − 2 | 36 | 27 | 39 | 29 | 48 | 28 | 51 | 37 | 77 | 42 |
| 2 | 86 | 44 | 85 | 55 | 56 | 49 | 77 | 39 | 40 | 20 | 47 | 28 | 23 | − 9 | 39 | 19 | 39 | 23 | 47 | 35 | 47 | 30 | 63 | 42 |
| 3 | 93 | 46 | 86 | 51 | 62 | 47 | 51 | 26 | 41 | 18 | 47 | 24 | 24 | 4 | 43 | 21 | 53 | 24 | 53 | 29 | 52 | 28 | 65 | 35 |
| 4 | 91 | 53 | 88 | 60 | 60 | 46 | 58 | 27 | 34 | 17 | 25 | 12 | 21 | − 8 | 51 | 29 | 58 | 28 | 65 | 32 | 70 | 38 | 68 | 38 |
| 5 | 96 | 53 | 88 | 58 | 67 | 42 | 50 | 29 | 41 | 19 | 24 | 8 | 21 | 3 | 46 | 27 | 60 | 30 | 68 | 34 | 71 | 45 | 65 | 41 |
| 6 | 96 | 61 | 78 | 53 | 77 | 46 | 54 | 35 | 45 | 25 | 45 | 21 | 26 | 5 | 45 | 20 | 52 | 25 | 68 | 37 | 60 | 33 | 64 | 44 |
| 7 | 89 | 59 | 82 | 46 | 72 | 48 | 61 | 34 | 37 | 23 | 44 | 23 | 42 | 11 | 41 | 24 | 60 | 27 | 64 | 35 | 41 | 31 | 63 | 38 |
| 8 | 75 | 63 | 79 | 46 | 58 | 44 | 66 | 39 | 31 | 19 | 37 | 24 | 40 | 22 | 31 | 20 | (*) | (*) | 59 | 22 | 58 | 30 | 70 | 39 |
| 9 | 84 | 54 | 91 | 51 | 77 | 40 | 60 | 26 | 42 | 15 | 32 | 33 | 44 | 22 | 31 | 15 | 28 | 15 | 33 | 21 | 52 | 30 | 76 | 42 |
| 10 | 85 | 51 | 89 | 54 | 83 | 49 | 72 | 32 | 55 | 28 | 36 | 35 | 47 | 33 | 35 | 6 | 27 | 13 | 48 | 19 | 69 | 31 | 74 | 44 |
| 11 | 89 | 58 | 79 | 55 | 83 | 44 | 69 | 40 | 54 | 26 | 64 | 28 | 37 | 22 | 43 | 22 | 32 | 22 | 65 | 38 | 69 | 41 | 76 | 50 |
| 12 | 89 | 57 | 78 | 49 | 74 | 50 | 54 | 38 | 32 | 31 | 51 | 26 | 30 | 10 | 46 | 23 | 38 | 20 | 70 | 31 | 55 | 30 | 75 | 45 |
| 13 | 90 | 56 | 77 | 48 | 67 | 49 | 55 | 34 | 38 | 30 | 51 | 19 | 27 | 4 | 42 | 21 | 45 | 28 | 53 | 30 | 58 | 31 | 74 | 48 |
| 14 | 91 | 57 | 77 | 49 | 58 | 45 | 37 | 28 | 48 | 26 | 51 | 25 | 37 | 4 | 38 | 22 | 56 | 21 | 44 | 28 | 55 | 37 | 77 | 47 |
| 15 | 79 | 43 | 79 | 48 | 69 | 39 | 38 | 32 | 51 | 32 | 35 | 29 | 39 | 5 | 40 | 20 | 53 | 35 | 44 | 30 | 57 | 43 | 68 | 42 |
| 16 | 85 | 43 | 81 | 48 | 60 | 34 | 53 | 27 | 54 | 34 | 50 | 28 | 46 | 13 | 45 | 19 | 60 | 31 | 61 | 24 | 66 | 36 | 60 | 48 |
| 17 | 79 | 61 | 81 | 51 | 68 | 27 | 52 | 30 | 49 | 33 | 48 | 31 | 49 | 23 | 50 | 24 | 63 | 29 | 47 | 26 | 52 | 31 | 74 | 47 |
| 18 | 89 | 50 | 84 | 46 | 73 | 38 | 43 | 27 | 36 | 23 | 49 | 24 | 39 | 28 | 51 | 28 | 63 | 30 | 40 | 29 | 51 | 32 | 78 | 47 |
| 19 | 77 | 45 | 80 | 54 | 77 | 40 | 39 | 31 | 46 | 16 | 43 | 22 | 38 | 22 | 53 | 28 | 60 | 31 | 61 | 29 | 52 | 33 | 68 | 49 |
| 20 | 79 | 46 | 73 | 53 | 81 | 38 | 51 | 25 | 43 | 24 | 43 | 18 | 33 | 20 | 37 | 22 | 60 | 30 | 63 | 26 | 53 | 31 | 74 | 44 |
| 21 | 86 | 44 | 74 | 45 | 76 | 46 | 56 | 26 | 37 | 18 | 34 | 19 | 40 | 18 | 42 | 17 | 61 | 28 | 50 | 32 | 53 | 40 | 82 | 46 |
| 22 | 90 | 48 | 79 | 45 | 73 | 44 | 61 | 30 | 44 | 32 | 36 | 18 | 47 | 31 | 33 | 19 | 70 | 30 | 47 | 33 | 66 | 42 | 81 | 48 |
| 23 | 86 | 48 | 85 | 48 | 76 | 42 | 56 | 34 | 50 | 32 | 51 | 17 | 45 | 33 | 33 | 15 | 62 | 36 | 53 | 31 | 63 | 39 | 79 | 48 |
| 24 | 80 | 50 | 88 | 49 | 69 | 38 | 56 | 32 | 34 | 32 | 45 | 18 | 40 | 26 | 45 | 9 | 66 | 30 | 57 | 29 | 60 | 39 | 70 | 52 |
| 25 | 82 | 54 | 87 | 55 | 72 | 40 | 57 | 32 | 42 | 25 | 41 | 20 | 44 | 17 | 44 | 10 | 69 | 37 | 67 | 27 | 63 | 34 | 77 | 48 |
| 26 | 84 | 53 | 79 | 47 | 75 | 36 | 36 | 35 | 28 | 22 | 34 | 29 | 42 | 24 | 57 | 33 | 52 | 40 | 70 | 32 | 68 | 38 | 75 | 46 |
| 27 | 76 | 45 | 80 | 47 | 68 | 34 | 36 | 26 | 14 | 5 | 26 | 13 | 42 | 28 | 58 | 23 | 42 | 26 | 71 | 35 | 71 | 43 | 84 | 48 |
| 28 | 87 | 44 | 82 | 51 | 81 | 40 | 33 | 15 | 20 | − 6 | 21 | 5 | 45 | 27 | 43 | 28 | 26 | 22 | 62 | 30 | 73 | 42 | 86 | 53 |
| 29 | 90 | 52 | 91 | 52 | 79 | 38 | 30 | 22 | 22 | −12 | 16 | Zero | 36 | 22 | ..... | ..... | 43 | 22 | 70 | 38 | 76 | 47 | 69 | 52 |
| 30 | 87 | 53 | 88 | 58 | 65 | 34 | 31 | 12 | 37 | 4 | 18 | − 8 | 41 | 17 | ..... | ..... | 48 | 23 | 60 | 28 | 69 | 41 | 60 | 44 |
| 31 | 81 | 45 | 75 | 49 | ..... | ..... | 36 | 3 | ..... | ..... | 21 | −10 | 41 | 26 | ..... | ..... | 46 | 21 | ..... | ..... | 73 | 38 | ..... | ..... |
| Range | 53° | | 47° | | 56° | | 74° | | 67° | | 74° | | 58° | | 52° | | | | 52° | | 48° | | 51° | |
| Monthly means | 76°.2 | | 67°.9 | | 50°.2 | | 40°.0 | | 30°.1 | | 28°.9 | | 25°.3 | | 30°.9 | | †38°.7 | | 43°.5 | | 47°.9 | | 58°.6 | |

* No observations taken.

† Thirty days only.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, CHICAGO, ILL.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 80 | 67 | 82 | 74 | 70 | 60 | 72 | 65 | 48 | 35 | 31 | 24 | 37 | 30 | 35 | 27 | 57 | 36 | 57 | 36 | 65 | 50 | 77 | 58 |
| 2 | 80 | 64 | 76 | 70 | 67 | 53 | 70 | 63 | 45 | 34 | 35 | 22 | 31 | 24 | 34 | 32 | 61 | 42 | 74 | 41 | 69 | 53 | 77 | 63 |
| 3 | 85 | 65 | 74 | 61 | 74 | 52 | 80 | 58 | 44 | 30 | 49 | 30 | 36 | 22 | 34 | 21 | 51 | 35 | 46 | 40 | 58 | 46 | 78 | 65 |
| 4 | 82 | 68 | 73 | 66 | 77 | 54 | 58 | 44 | 50 | 38 | 52 | 37 | 33 | 7 | 38 | 17 | 46 | 33 | 53 | 39 | 54 | 40 | 65 | 56 |
| 5 | 87 | 65 | 85 | 59 | 70 | 59 | 60 | 37 | 46 | 29 | 44 | 34 | 25 | 4 | 46 | 28 | 57 | 37 | 58 | 44 | 56 | 43 | 63 | 56 |
| 6 | 73 | 64 | 85 | 66 | 68 | 62 | 64 | 39 | 41 | 32 | 38 | 25 | 13 | 4 | 50 | 37 | 56 | 45 | 47 | 38 | 66 | 50 | 73 | 57 |
| 7 | 86 | 66 | 81 | 66 | 68 | 61 | 58 | 51 | 45 | 32 | 42 | 24 | 21 | −1 | 52 | 38 | 54 | 42 | 52 | 38 | 63 | 50 | 67 | 53 |
| 8 | 91 | 74 | 86 | 64 | 70 | 55 | 59 | 49 | 46 | 39 | 34 | 27 | 35 | 20 | 40 | 33 | 62 | 45 | 56 | 43 | 67 | 49 | 65 | 56 |
| 9 | 89 | 73 | 81 | 61 | 73 | 59 | 60 | 44 | 41 | 33 | 39 | 24 | 45 | 22 | 33 | 26 | 62 | 52 | 68 | 49 | 59 | 46 | 58 | 52 |
| 10 | 75 | 65 | 77 | 60 | 68 | 60 | 54 | 46 | 43 | 30 | 51 | 36 | 42 | 37 | 30 | 25 | 57 | 49 | 60 | 44 | 54 | 42 | 65 | 53 |
| 11 | 75 | 58 | 81 | 67 | 67 | 64 | 50 | 36 | 46 | 30 | 52 | 38 | 44 | 35 | 36 | 21 | 59 | 47 | 65 | 46 | 52 | 41 | 65 | 50 |
| 12 | 80 | 61 | 82 | 66 | 72 | 63 | 53 | 41 | 55 | 24 | 61 | 39 | 45 | 33 | 41 | 28 | 50 | 42 | 63 | 45 | 50 | 40 | 63 | 52 |
| 13 | 80 | 63 | 80 | 63 | 76 | 64 | 75 | 51 | 58 | 37 | 47 | 37 | 39 | 34 | 39 | 34 | 44 | 41 | 55 | 42 | 52 | 38 | 67 | 56 |
| 14 | 86 | 68 | 70 | 61 | 82 | 65 | 75 | 55 | 57 | 47 | 52 | 34 | 40 | 34 | 37 | 33 | 46 | 39 | 48 | 43 | 50 | 45 | 71 | 60 |
| 15 | 90 | 67 | 75 | 59 | 82 | 68 | 75 | 63 | 57 | 44 | 59 | 40 | 34 | 25 | 41 | 34 | 62 | 40 | 50 | 43 | 60 | 43 | 72 | 62 |
| 16 | 82 | 71 | 78 | 59 | 86 | 61 | 63 | 55 | 53 | 40 | 58 | 38 | 39 | 30 | 49 | 35 | 53 | 43 | 52 | 42 | 60 | 45 | 72 | 63 |
| 17 | 86 | 63 | 76 | 62 | 67 | 53 | 67 | 61 | 50 | 31 | 55 | 44 | 47 | 32 | 43 | 34 | 44 | 37 | 59 | 46 | 55 | 48 | 68 | 58 |
| 18 | 82 | 64 | 81 | 62 | 69 | 44 | 70 | 56 | 42 | 31 | 62 | 43 | 43 | 36 | 46 | 30 | 46 | 36 | 73 | 52 | 60 | 50 | 73 | 57 |
| 19 | 70 | 59 | 81 | 64 | 72 | 51 | 60 | 49 | 45 | 31 | 64 | 57 | 49 | 36 | 46 | 33 | 58 | 37 | 73 | 56 | 73 | 55 | 78 | 62 |
| 20 | 68 | 57 | 81 | 66 | 72 | 56 | 50 | 46 | 51 | 39 | 67 | 55 | 42 | 39 | 52 | 40 | 45 | 37 | 69 | 53 | 67 | 58 | 76 | 59 |
| 21 | 76 | 57 | 85 | 66 | 66 | 58 | 49 | 43 | 55 | 45 | 54 | 49 | 39 | 35 | 45 | 36 | 45 | 38 | 60 | 48 | 58 | 49 | 80 | 63 |
| 22 | 81 | 62 | 72 | 64 | 73 | 55 | 63 | 38 | 46 | 39 | 53 | 45 | 37 | 22 | 39 | 36 | 48 | 36 | 67 | 48 | 60 | 47 | 65 | 57 |
| 23 | 81 | 65 | 70 | 60 | 82 | 56 | 66 | 46 | 51 | 41 | 57 | 49 | 34 | 13 | 42 | 34 | 68 | 38 | 71 | 58 | 75 | 56 | 73 | 55 |
| 24 | 80 | 70 | 78 | 55 | 82 | 63 | 64 | 50 | 50 | 45 | 59 | 49 | 49 | 29 | 40 | 33 | 58 | 28 | 64 | 53 | 78 | 64 | 74 | 56 |
| 25 | 82 | 72 | 81 | 60 | 81 | 64 | 61 | 52 | 50 | 42 | 50 | 42 | 42 | 33 | 36 | 30 | 46 | 25 | 62 | 48 | 74 | 61 | 83 | 65 |
| 26 | 88 | 72 | 84 | 63 | 75 | 66 | 56 | 52 | 49 | 40 | 44 | 39 | 43 | 30 | 42 | 29 | 61 | 39 | 54 | 42 | 70 | 54 | 82 | 70 |
| 27 | 86 | 71 | 89 | 63 | 75 | 66 | 63 | 53 | 40 | 33 | 46 | 39 | 38 | 32 | 51 | 34 | 60 | 40 | 48 | 43 | 60 | 52 | 77 | 62 |
| 28 | 84 | 71 | 84 | 68 | 70 | 62 | 73 | 51 | 33 | 19 | 44 | 41 | 32 | 26 | 55 | 36 | 40 | 34 | 56 | 45 | 60 | 52 | 82 | 70 |
| 29 | 80 | 66 | 79 | 68 | 83 | 63 | 65 | 42 | 19 | 14 | 43 | 38 | 33 | 23 | ..... | ..... | 49 | 36 | 64 | 49 | 60 | 54 | 84 | 72 |
| 30 | 78 | 66 | 79 | 62 | 86 | 66 | 52 | 35 | 30 | 14 | 40 | 35 | 36 | 27 | ..... | ..... | 42 | 35 | 73 | 52 | 55 | 49 | 85 | ..... |
| 31 | 85 | 66 | 89 | 67 | ..... | ..... | 53 | 37 | ..... | ..... | 39 | 33 | 34 | 28 | ..... | ..... | 47 | 36 | ..... | ..... | 70 | 54 | ..... | ..... |
| Range | 34° | | 34° | | 42° | | 45° | | 44° | | 45° | | 50° | | 38° | | 43° | | 39° | | 40° | | 35° | |
| Monthly means | 73°.3 | | 71°.4 | | 66°.6 | | 55°.0 | | 40°.0 | | *43°.1 | | 31°.3 | | 35°.9 | | 44°.4 | | 52°.3 | | 55°.8 | | 65°.4 | |

* Thirty days only.

*Maximum, minimum, and mean temperatures* — Continued.

STATION, CINCINNATI, OHIO.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 89 | 77 | 91 | 71 | 83 | 63 | 84 | 62 | 55 | 39.5 | 31 | 26 | 45.5 | 35 | 37.5 | 32 | 62 | 35 | 59 | 42.5 | 78 | 55 | 80 | 56 |
| 2 | 86 | 70 | 90 | 77 | 71 | 57 | 82 | 60 | 55 | 44 | 38 | 28 | 39 | 26 | 37 | 30 | 64 | 50 | 62 | 42.5 | 80 | 58 | 86 | 59 |
| 3 | 88 | 78 | 85 | 69 | 73 | 54 | 81 | 60 | 53 | 38 | 48 | 27 | 38 | 22 | 33 | 28 | 54 | 39 | 65 | 45.5 | 73 | 58 | 84 | 70 |
| 4 | 87 | 74 | 82 | 66 | 76 | 56 | 72 | 51 | 60 | 36 | 57 | 39 | 37 | 20 | 35 | 26 | 42 | 35 | 64 | 46.5 | 65 | 51 | 83 | 63 |
| 5 | 90 | 70 | 84 | 65 | 73 | 63 | 61 | 43 | 57 | 36 | 54.5 | 38 | 26 | 9 | 43 | 18 | 59 | 33 | 61 | 43.5 | 66 | 49 | 74 | 54 |
| 6 | 81 | 69 | 86 | 63 | 72 | 62 | 65 | 41 | 43 | 27 | 39 | 31 | 22 | 9 | 50 | 28 | 62 | 46.5 | 59 | 45.5 | 72 | 47 | 73 | 58 |
| 7 | 86 | 67 | 87 | 72 | 75 | 59 | 69 | 48 | 51 | 32 | 48 | 29 | 19 | 9 | 56 | 32 | 69 | 56 | 59 | 39 | 78 | 61 | 74 | 53 |
| 8 | 92 | 68 | 88 | 74 | 75 | 56 | 64 | 55 | 59 | 45 | 40 | 35 | 33 | 1 | 50 | 44 | 72 | 56 | 68 | 49.5 | 73 | 61 | 70 | 59 |
| 9 | 86 | 76 | 84 | 69 | 77 | 59 | 69 | 47 | 53 | 36 | 40 | 27 | 45 | 31 | 48 | 42 | 74 | 56 | 75 | 57 | 69 | 54 | 68 | 55 |
| 10 | 88 | 72 | 82 | 67 | 77 | 66 | 63 | 50 | 41 | 31 | 53 | 35 | 46 | 38 | 42 | 27 | 69 | 58 | 66 | 54 | 61 | 49 | 70 | 52 |
| 11 | 82 | 67 | 82 | 63 | 75 | 65 | 60 | 46 | 46 | 27 | 61 | 40 | 41.5 | 35 | 36 | 22 | 67 | 53.5 | 66 | 49 | 60 | 44 | 71 | 54 |
| 12 | 82 | 63 | 86 | 71 | 77 | 64 | 62 | 38 | 55 | 29 | 64 | 38 | 45 | 33 | 49 | 30 | 60 | 52 | 72 | 55.5 | 56 | 43 | 70 | 56 |
| 13 | 86 | 64 | 81 | 67 | 80 | 67 | 73 | 53 | 60 | 29 | 58 | 43 | 45 | 37 | 50 | 37 | 61 | 49 | 67 | 55 | 57 | 42 | 75 | 57 |
| 14 | 85 | 65 | 78 | 65 | 82 | 63 | 74 | 50 | 67 | 38 | 51 | 34 | 45 | 37 | 51 | 38 | 54 | 45 | 66 | 52 | 58 | 47 | 81 | 57 |
| 15 | 92 | 70 | 73 | 64 | 83 | 67 | 75 | 49 | 62 | 57 | 59 | 33 | 39 | 34 | 49 | 36.5 | 56 | 40 | 67 | 54.5 | 62 | 44 | 84 | 64 |
| 16 | 84 | 72 | 78 | 61 | 83 | 69 | 75 | 53 | 61 | 51 | 60 | 53 | 41 | 33.5 | 55 | 37.5 | 65 | 45 | 70 | 46.5 | 58 | 50 | 82 | 72 |
| 17 | 85 | 71 | 81 | 61 | 74 | 59 | 76 | 53 | 64 | 51 | 63 | 57 | 52 | 33 | 49 | 41 | 49 | 43 | 71 | 52 | 62 | 50 | 72 | 65 |
| 18 | 75 | 69 | 81 | 63 | 66 | 50 | 77 | 58 | 58 | 38 | 67 | 57 | 56 | 35 | 41 | 34 | 51 | 42 | 75 | 58 | 76 | 50 | 77 | 61 |
| 19 | 75 | 66 | 85 | 63 | 71 | 50 | 69 | 66 | 51 | 35 | 67 | 54 | 56 | 33 | 52 | 29 | 61 | 35 | 73.5 | 59 | 80 | 65 | 79 | 61 |
| 20 | 74 | 65 | 84 | 65 | 74 | 53 | 70 | 56 | 60 | 41 | 67 | 45 | 55 | 47 | 58 | 47 | 58 | 43.5 | 76 | 64 | 84.5 | 67 | 81 | 62 |
| 21 | 75 | 61 | 87 | 65 | 71 | 55 | 56 | 43 | 56 | 50 | 65 | 45 | 49 | 44 | 64 | 50 | 62 | 41 | 79 | 56 | 74 | 60 | 72 | 57 |
| 22 | 82 | 64 | 86 | 69 | 75 | 54 | 58 | 40 | 55 | 49 | 61 | 54 | 44 | 35 | 56 | 44 | 60 | 39 | 80 | 64.5 | 71 | 55 | 60 | 53 |
| 23 | 85 | 68 | 80 | 68 | 80 | 55 | 67 | 43 | 55 | 48 | 64 | 48 | 36 | 21 | 49 | 39.5 | 71 | 41 | 79 | 65 | 78 | 60 | 76 | 57 |
| 24 | 84 | 71 | 79 | 68 | 80 | 60 | 67 | 44.5 | 56 | 51 | 65 | 57 | 53 | 26 | 46 | 33 | 62 | 29 | 72 | 56 | 82 | 70 | 82 | 58 |
| 25 | 89 | 74 | 80 | 62 | 82 | 62 | 65 | 52 | 54 | 49 | 60 | 57 | 50 | 44 | 41 | 34 | 39 | 24 | 66 | 53 | 77 | 66 | 86 | 62 |
| 26 | 89 | 74 | 84 | 63 | 83 | 64 | 61 | 55 | 52 | 45 | 58 | 46 | 50 | 35.5 | 43 | 29 | 62 | 31 | 60 | 52 | 78 | 63 | 87 | 67 |
| 27 | 85 | 71 | 87 | 65 | 80 | 64 | 68 | 57 | 48 | 42 | 51 | 45 | 56 | 39 | 51 | 32.5 | 73 | 54 | 58 | 49 | 76 | 56 | 86 | 73 |
| 28 | 90 | 75 | 89 | 67 | 82 | 64 | 71 | 50 | 42 | 34 | 50 | 44 | 42 | 32 | 56 | 34 | 64 | 41 | 59 | 51 | 75 | 56 | 90 | 70 |
| 29 | 87 | 77 | 89 | 69 | 84 | 64 | 67 | 55 | 34 | 20 | 51 | 45 | 36 | 25 | ..... | ..... | 53 | 34 | 71 | 51 | 82 | 55 | 89 | 74 |
| 30 | 89 | 73 | 87 | 72 | 86 | 62 | 60 | 48 | 26 | 14 | 45 | 36 | 38 | 29 | ..... | ..... | 64 | 40 | 75 | 54 | 73 | 59 | 89 | 72 |
| 31 | 89 | 74 | 91 | 67 | ..... | ..... | 59 | 49 | ..... | ..... | 40 | 32 | 38 | 30 | ..... | ..... | 56 | 41 | ..... | ..... | 76 | 51 | ..... | ..... |
| Range | 31° | | 30° | | 36° | | 46° | | 53° | | 41° | | 56° | | 46° | | 50° | | 41° | | 42°.5 | | 38° | |
| Monthly means | 779.4 | | 759.6 | | 689.9 | | 609.1 | | 459.9 | | 479.8 | | 389.5 | | 419.2 | | 519.7 | | 609.7 | | 639.8 | | 709.1 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, CLEVELAND, OHIO.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 82.5 | 70 | 87.5 | 68 | 68 | 62 | 85 | 62 | 64 | 37 | 27 | 23 | 35 | 25 | 36 | 25 | 47 | 32 | 42 | 38 | 65 | 50 | 69 | 52 |
| 2 | 79 | 64 | 84 | 67 | 64 | 54 | 81 | 59 | 52 | 40 | 33 | 23 | 34 | 20 | 30 | 18 | 35 | 42 | 51 | 40 | 79 | 54 | 80 | 58 |
| 3 | 78 | 64 | 75 | 68 | 65 | 52 | 80 | 56 | 40 | 34 | 48 | 25 | 25 | 14 | 26 | 1 | 52 | 32 | 51 | 38 | 72 | 53 | 83 | 65 |
| 4 | 71 | 61 | 72 | 60 | 75 | 55 | 72 | 46 | 36.5 | 30 | 46 | 33 | 31 | 23 | 29 | 5 | 32 | 28 | 57 | 38 | 55 | 49 | 75 | 60 |
| 5 | 79.5 | 60 | 78.5 | 53 | 70 | 58 | 61 | 48 | 53 | 34 | 53 | 34 | 23 | 13 | 35 | 8 | 51 | 30 | 51 | 38 | 57 | 48 | 60 | 50 |
| 6 | 73 | 65 | 80 | 65.5 | 70 | 62 | 57 | 44 | 56 | 29 | 34 | 28 | 15 | 9 | 45 | 24 | 60 | 44 | 51 | 40 | 60 | 44 | 60 | 43 |
| 7 | 75 | 54 | 79 | 68 | 68 | 60 | 63 | 40 | 49.5 | 26 | 38 | 25 | 15 | 5 | 52 | 31 | 57 | 44 | 47 | 38 | 77 | 58 | 68 | 49 |
| 8 | 89 | 67 | 83 | 68 | 72 | 57 | 52 | 49 | 57 | 38 | 36 | 29 | 27 | 4 | 45 | 34 | 66 | 42 | 62 | 40 | 73 | 53 | 63 | 53 |
| 9 | 80 | 67 | 80.5 | 66 | 75 | 55 | 62 | 48 | 54 | 32 | 36 | 29 | 41 | 27 | 36 | 28 | 73 | 49 | 72 | 54 | 60 | 56 | 60 | 46 |
| 10 | 72 | 65 | 75.5 | 64 | 70 | 63 | 57 | 48 | 44 | 28 | 30 | 29 | 42 | 36 | 33 | 22 | 69 | 52 | 62 | 49 | 55 | 42 | 61 | 54 |
| 11 | 69 | 60 | 77 | 62 | 75 | 66 | 52 | 42 | 45 | 27 | 47 | 36 | 36 | 33 | 25 | 16 | 63 | 37 | 60 | 50 | 50 | 40 | 63 | 53 |
| 12 | 73 | 53.5 | 80 | 66 | 78 | 62 | 50 | 40 | 52 | 32 | 55 | 29 | 36 | 32 | 32 | 12 | 49 | 35 | 59 | 48 | 45 | 43 | 61 | 48 |
| 13 | 73 | 62 | 78 | 63 | 72 | 65 | 66 | 42 | 57 | 32 | 56 | 37 | 39 | 32 | 36 | 30 | 41 | 36 | 55 | 44 | 48 | 43 | 67 | 47 |
| 14 | 80 | 65 | 75 | 61 | 75 | 60 | 75 | 52 | 61 | 38 | 45 | 31 | 38 | 32 | 34 | 26 | 43 | 37 | 51 | 40 | 52 | 38 | 68 | 49 |
| 15 | 87 | 64 | 73.5 | 59 | 81 | 65 | 75.5 | 52 | 60 | 50 | 54 | 36 | 32 | 31 | 36 | 31 | 43 | 36 | 50 | 44 | 52 | 41 | 82 | 56 |
| 16 | 90 | 67 | 70 | 62 | 78 | 65 | 61.5 | 55 | 52 | 46 | 52 | 46 | 31 | 28 | 36 | 30 | 56 | 38 | 55 | 44 | 58 | 37 | 77 | 68 |
| 17 | 79 | 66 | 77 | 67 | 65 | 60 | 71 | 49 | 62 | 42.5 | 55 | 39 | 44 | 30 | 41 | 29 | 45 | 35 | 57 | 46 | 57 | 51 | 70 | 60 |
| 18 | 75 | 63 | 79 | 59 | 64 | 50 | 68 | 63 | 42.5 | 35 | 51 | 34 | 52 | 38 | 29 | 16 | 40 | 34 | 75 | 48 | 66 | 46 | 67 | 57 |
| 19 | 73 | 63 | 79 | 62 | 69.5 | 44 | 66 | 53 | 40 | 30 | 60 | 50 | 55 | 36 | 38 | 13 | 45 | 36 | 68 | 62 | 75 | 49 | 70 | 49 |
| 20 | 70 | 60 | 78 | 59 | 69 | 50 | 53 | 48 | 52 | 31 | 59 | 51 | 47 | 41 | 48 | 35 | 45 | 36 | 75 | 57 | 81 | 60 | 79 | 55 |
| 21 | 69 | 61 | 88 | 64.5 | 62 | 50 | 53 | 45 | 50 | 37 | 61 | 46 | 46 | 35 | 54 | 43 | 39 | 32 | 62 | 54 | 60 | 52 | 68 | 58 |
| 22 | 74 | 55.5 | 88 | 68 | 70.5 | 44 | 51 | 44 | 54 | 38 | 52 | 40 | 35 | 25 | 57 | 39 | 57 | 32 | 81 | 52 | 58 | 46 | 58 | 53 |
| 23 | 76 | 60 | 77 | 69 | 78 | 50 | 67 | 45 | 54 | 41 | 56 | 45 | 27 | 10 | 43 | 34 | 55 | 32 | 81 | 61 | 68 | 43 | 62 | 56 |
| 24 | 79 | 60 | 76 | 66 | 77 | 56 | 69 | 52 | 62 | 50 | 51 | 43 | 42 | 10 | 35 | 33 | 55 | 19 | 74 | 55 | 71 | 63 | 73 | 58 |
| 25 | 85 | 68 | 80 | 60 | 77 | 61 | 65 | 56 | 58 | 49 | 50 | 41 | 45 | 40 | 34 | 27 | 30 | 20 | 65 | 50 | 77 | 63 | 71 | 60 |
| 26 | 87 | 73 | 78 | 64 | 78 | 65 | 58 | 50 | 51 | 45 | 43 | 39 | 43 | 33 | 34 | 27 | 42 | 29 | 58 | 48 | 68 | 58 | 86 | 62 |
| 27 | 83.5 | 71 | 84 | 61 | 81 | 61 | 57 | 49 | 47 | 37 | 42 | 38 | 35 | 31 | 41 | 26 | 68 | 42 | 61 | 50 | 63 | 52 | 79 | 69 |
| 28 | 85 | 71 | 86 | 65 | 72.5 | 64 | 70 | 49 | 37 | 29 | 45 | 38 | 31 | 20 | 47 | 32 | 55 | 35 | 52 | 48 | 61 | 53 | 81 | 67 |
| 29 | 82 | 73 | 79 | 71 | 76 | 56.5 | 64 | 47.5 | 29 | 17.5 | 46 | 37 | 25 | 20 | ..... | ..... | 40 | 34 | 52 | 48 | 60 | 47 | 82 | 68 |
| 30 | 78 | 68 | 78 | 64 | 86 | 61 | 53 | 41 | 23.5 | 11 | 38 | 30 | 35 | 21 | ..... | ..... | 49 | 33 | 65 | 50 | 59 | 50 | 81 | 71 |
| 31 | 84 | 67 | 77 | 59 | ..... | ..... | 52 | 41 | ..... | ..... | 34 | 27 | 34 | 25 | ..... | ..... | 45 | 38 | ..... | ..... | 64 | 48 | ..... | ..... |
| Range | 36°.5 | | 35° | | 42° | | 45° | | 53° | | 38° | | 51° | | 56° | | 54° | | 43° | | 44° | | 43° | |
| Monthly means | 72°.3 | | 71°.7 | | 65°.2 | | 55°.8 | | 41°.5 | | 40°.7 | | 29°.9 | | 31°.4 | | 42°.4 | | 53°.6 | | 57°.1 | | 65°.1 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, COLEMAN CITY, TEX.

| Day of month. | 1877. July. | | August. | | September. | | October. | | November. | | December. | | 1878. January. | | February. | | March. | | April. | | May. | | June. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 98 | 83 | 94 | 80 | 94 | 84 | 90 | 77 | (†) | ..... | 49 | 31 | 47 | 39 | 51 | 35 | 70 | 55 | 68 | 40 | 84 | 59 | 73 | 63 |
| 2 | 97 | 82 | 94 | 82 | 90 | 71 | 93 | 73 | ..... | ..... | 54 | 39 | 36 | 27 | 42 | 30 | 65 | 42 | 70 | 52 | 88 | 56 | 98 | 62 |
| 3 | 98 | 82 | 96 | 82 | 79 | 73 | 83 | 58 | ..... | ..... | 63 | 50 | 40 | 30 | 51 | 36 | 68 | 39 | 61 | 40 | 70 | 53 | 85 | 70 |
| 4 | 96 | 84 | 96 | 82 | 73 | 64 | 61 | 51 | ..... | ..... | 58 | 40 | 32 | 23 | 62 | 42 | 71 | 36 | 72 | 39 | 79 | 45 | 78 | 63 |
| 5 | 95 | 80 | 95 | 83 | 71 | 64 | 78 | 62 | ..... | ..... | 45 | 35 | 43 | 27 | 64 | 47 | 76 | 40 | 85 | 46 | 90 | 47 | 71 | 63 |
| 6 | 97 | 80 | 97 | 85 | 78 | 64 | 81 | 70 | ..... | ..... | 48 | 30 | 39 | 32 | 61 | 44 | 78 | 40 | 86 | 47 | 91 | 52 | 82 | 60 |
| 7 | 100 | 82 | 94 | 81 | 83 | 69 | 75 | 60 | 60 | 52 | 60 | 35 | 36 | 34 | 64 | 44 | 81 | 49 | 70 | 52 | 92 | 66 | 74 | 60 |
| 8 | 100 | 86 | 90 | 78 | 81 | 74 | 80 | 60 | 56 | 42 | 55 | 39 | 47 | 37 | 60 | 37 | 67 | 52 | 70 | 50 | 76 | 54 | 80 | 59 |
| 9 | 100 | 85 | 95 | 75 | 85 | 75 | 85 | 71 | 48 | 36 | 56 | 42 | 39 | 44 | 47 | 33 | 63 | 38 | 68 | 53 | 75 | 52 | 83 | 60 |
| 10 | 98 | 88 | 96 | 79 | 91 | 78 | 84 | 71 | 55 | 36 | 62 | 45 | 54 | 43 | 44 | 31 | 71 | 36 | 65 | 44 | 77 | 52 | 83 | 61 |
| 11 | 94 | 84 | 98 | 81 | 92 | 72 | 85 | 68 | 60 | 40 | 65 | 45 | 57 | 42 | 61 | 35 | 73 | 35 | 82 | 41 | 64 | 50 | 85 | 62 |
| 12 | 100 | 83 | 98 | 80 | 90 | 75 | 85 | 67 | 67 | 45 | 64 | 47 | 47 | 40 | 64 | 47 | 70 | 41 | 84 | 56 | 79 | 60 | 91 | 68 |
| 13 | 98 | 81 | 95 | 80 | 90 | 78 | 82 | 72 | 74 | 61 | 62 | 55 | 48 | 36 | 66 | 43 | 82 | 43 | 81 | 60 | 80 | 59 | 97 | 71 |
| 14 | 98 | 83 | 93 | 78 | 85 | 72 | 86 | 71 | 63 | 52 | 67 | 53 | 50 | 39 | 68 | 41 | 77 | 45 | 85 | 57 | 82 | 51 | 92 | 70 |
| 15 | 97 | 79 | 80 | 73 | 90 | 75 | 85 | 62 | 68 | 53 | 65 | 58 | 55 | 39 | 62 | 40 | 80 | 48 | 86 | 53 | 83 | 63 | 96 | 68 |
| 16 | 99 | 81 | 90 | 79 | 90 | 78 | 60 | 51 | 72 | 54 | 70 | 63 | 56 | 39 | 74 | 44 | 80 | 49 | 89 | 58 | 96 | 58 | 85 | 64 |
| 17 | 96 | 87 | 86 | 73 | 77 | 67 | 63 | 53 | 71 | 54 | 69 | 62 | 63 | 46 | 73 | 48 | 81 | 47 | 80 | 64 | 91 | 64 | 95 | 67 |
| 18 | 104 | 85 | 90 | 79 | 75 | 63 | 57 | 55 | 70 | 56 | 64 | 62 | 62 | 46 | 75 | 53 | 74 | 45 | 86 | 48 | 85 | 60 | 95 | 70 |
| 19 | 92 | 78 | 90 | 78 | 77 | 65 | 55 | 50 | 59 | 54 | 61 | 60 | 59 | 43 | 76 | 55 | 67 | 52 | 86 | 65 | 94 | 57 | 95 | 68 |
| 20 | 88 | 76 | 95 | 75 | 82 | 64 | 51 | 45 | 55 | 51 | 58 | 54 | 50 | 37 | 67 | 53 | 72 | 41 | 86 | 61 | 93 | 57 | 93 | 71 |
| 21 | 82 | 71 | 89 | 72 | 85 | 70 | 57 | 46 | 55 | 41 | (†) | ..... | 54 | 47 | 64 | 48 | 77 | 41 | 88 | 69 | 90 | 72 | 82 | 72 |
| 22 | 85 | 72 | 88 | 73 | 86 | 71 | 64 | 50 | 62 | 45 | ..... | ..... | 63 | 45 | 49 | 44 | 80 | 42 | 87 | 65 | 88 | 72 | 90 | 66 |
| 23 | 89 | 74 | 95 | 68 | (†) | ..... | 73 | 52 | 68 | 45 | 56 | 53 | 65 | 40 | 57 | 42 | 79 | 44 | 73 | 53 | 92 | 73 | 95 | 64 |
| 24 | (†) | ..... | 98 | 82 | 85 | 70 | 66 | 61 | 61 | 47 | 62 | 47 | 61 | 48 | 61 | 44 | 81 | 52 | 85 | 43 | 92 | 67 | 98 | 68 |
| 25 | ..... | ..... | (†) | ..... | 85 | 70 | 72 | 58 | 59 | 45 | 63 | 50 | 67 | 53 | 57 | 58 | 81 | 47 | 87 | 51 | 85 | 67 | 93 | 64 |
| 26 | 102 | 81 | ..... | ..... | 90 | 74 | 77 | 60 | 57 | 50 | 64 | 57 | 66 | 49 | 50 | 45 | 79 | 46 | 89 | 52 | 80 | 63 | 89 | 68 |
| 27 | (†) | ..... | 94 | 82 | 92 | 76 | 83 | 60 | 42 | 25 | 52 | 50 | 59 | 43 | 60 | 48 | 78 | 49 | 86 | 53 | 86 | 56 | 89 | 69 |
| 28 | ..... | ..... | 90 | 82 | 90 | 74 | 81 | 65 | 40 | 30 | 40 | 37 | 70 | 48 | 65 | 51 | 72 | 40 | 69 | 55 | 94 | 62 | 92 | 69 |
| 29 | ..... | ..... | 94 | 84 | 89 | 73 | 77 | 48 | 35 | 20 | 38 | 33 | 55 | 47 | ..... | ..... | 75 | 44 | 79 | 51 | 93 | 65 | 95 | 72 |
| 30 | ..... | ..... | 92 | 81 | 90 | 76 | 51 | 48 | 40 | 20 | 36 | 28 | 53 | 38 | ..... | ..... | 73 | 49 | 87 | 55 | 96 | 73 | 95 | 71 |
| 31 | 94 | 81 | 97 | 81 | ..... | ..... | 55 | 50 | ..... | ..... | 39 | 27 | 70 | 38 | ..... | ..... | 64 | 41 | ..... | ..... | 89 | 72 | ..... | ..... |
| Range | | | | | | | 48° | | | | | | 47° | | 46° | | 47° | | 50° | | 51° | | 39° | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

* The temperatures from July, 1877, to February, 1878, inclusive, are the highest and lowest *observed* daily.

† No observations taken.

‡ Commenced using self-registering maximum and minimum thermometers March 1, 1878.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, CONCHO, TEX.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 99 | 76 | 96 | 72 | 96 | 71 | 92 | 67 | 67 | 48 | 52 | 11 | 47 | 23 | 56 | 26 | 66 | 42 | 63 | 40 | 86 | 63 | 95 | 83 |
| 2 | 100 | 75 | 96 | 70 | 91 | 71 | 99 | 64 | 63 | 43 | 57 | 26 | 38 | 27 | 45 | 30 | 66 | 37 | 71 | 49 | 89 | 67 | 101 | 77 |
| 3 | 98 | 69 | 92 | 71 | 82 | 67 | 86 | 59 | 66 | 40 | 69 | 45 | 43 | 26 | 56 | 18 | 66 | 33 | 73 | 39 | 72 | 54 | 101 | 77 |
| 4 | 95 | 70 | 98 | 74 | 72 | 64 | 69 | 48 | 70 | 48 | 63 | 33 | 33 | 23 | 66 | 31 | 73 | 30 | 74 | 41 | 81 | 46 | 78 | 64 |
| 5 | 91 | 70 | 99 | 70 | 79 | 62 | 81 | 45 | 52 | 38 | 46 | 24 | 44 | 17 | 66 | 35 | 79 | 48 | 85 | 54 | 88 | 58 | 79 | 61 |
| 6 | 98 | 73 | 101 | 74 | 78 | 60 | 86 | 60 | 59 | 29 | 50 | 17 | 40 | 30 | 66 | 38 | 79 | 55 | 87 | 54 | 93 | 62 | 80 | 62 |
| 7 | 100 | 72 | 96 | 76 | 79 | 61 | 80 | 60 | 72 | 28 | 65 | 25 | 40 | 30 | 69 | 33 | 85 | 43 | 77 | 61 | 94 | 64 | 76 | 67 |
| 8 | (*) | ..... | 88 | 69 | 85 | 70 | 83 | 62 | 60 | 39 | 52 | 23 | 55 | 36 | 61 | 38 | 68 | 47 | 75 | 50 | 77 | 57 | 83 | 58 |
| 9 | 100 | 70 | 93 | 67 | 89 | 66 | 89 | 44 | 64 | 27 | 53 | 37 | 65 | 35 | 51 | 26 | 66 | 38 | 67 | 50 | 79 | 55 | 94 | 68 |
| 10 | 95 | 75 | 96 | 67 | 96 | 67 | 85 | 60 | 60 | 23 | 63 | 41 | 68 | 30 | 51 | 29 | 71 | 33 | 70 | 45 | 71 | 55 | 92 | 72 |
| 11 | 92 | 70 | 96 | 67 | 95 | 70 | 87 | 59 | 62 | 30 | 65 | 35 | 58 | 37 | 61 | 17 | 76 | 36 | 84 | 45 | 69 | 59 | 90 | 66 |
| 12 | 95 | 80 | 96 | 64 | 87 | 68 | 84 | 64 | 68 | 36 | 64 | 41 | 53 | 36 | 68 | 39 | 76 | 36 | 87 | 61 | 78 | 62 | 94 | 70 |
| 13 | 97 | 70 | 96 | 64 | 87 | 68 | 88 | 65 | 73 | 52 | 62 | 52 | 51 | 29 | 71 | 41 | 83 | 38 | 87 | 64 | 84 | 66 | 100 | 77 |
| 14 | 97 | 73 | 96 | 64 | 86 | 67 | 88 | 70 | (*) | ..... | 67 | 47 | 54 | 20 | 71 | 33 | 72 | 51 | 85 | 61 | 78 | 56 | 99 | 72 |
| 15 | 95 | 73 | 82 | 63 | 88 | 70 | 87 | 54 | ..... | ..... | 68 | 55 | 62 | 24 | 66 | 22 | 81 | 48 | 86 | 56 | 86 | 67 | 93 | 72 |
| 16 | 97 | 75 | 90 | 64 | 87 | 67 | 59 | 49 | ..... | ..... | 72 | 57 | 60 | 30 | 77 | 40 | 81 | 48 | 90 | 55 | 96 | 72 | 87 | 67 |
| 17 | 93 | 73 | 88 | 64 | 77 | 64 | 61 | 50 | 60 | 49 | 71 | 59 | 64 | 25 | 76 | 42 | 82 | 48 | 81 | 64 | 90 | 75 | 97 | 75 |
| 18 | 100 | 74 | 89 | 65 | 78 | 54 | 65 | 53 | 70 | 46 | 68 | 37 | 65 | 46 | 80 | 32 | 72 | 47 | 84 | 48 | 87 | 61 | 92 | 69 |
| 19 | 92 | 72 | 93 | 69 | 80 | 57 | 57 | 43 | 67 | 49 | 69 | 61 | 61 | 33 | 78 | 51 | 64 | 52 | 80 | 61 | 95 | 64 | 98 | 71 |
| 20 | 92 | 61 | 100 | 72 | 82 | 50 | 60 | 41 | 66 | 45 | 57 | 49 | 52 | 32 | 66 | 48 | 70 | 38 | 85 | 56 | 96 | 65 | 92 | 72 |
| 21 | 84 | 63 | 91 | 73 | 89 | 49 | 60 | 36 | 66 | 41 | 65 | 50 | 57 | 26 | 67 | 38 | 78 | 37 | 91 | 67 | 91 | 73 | 81 | 71 |
| 22 | 89 | 55 | 88 | 62 | 87 | 50 | 66 | 31 | 65 | 35 | 61 | 42 | 63 | 25 | 54 | 40 | 81 | 37 | 87 | 65 | 90 | 71 | 84 | 67 |
| 23 | 82 | 60 | 97 | 64 | 87 | 51 | 76 | 37 | 70 | 37 | 61 | 45 | 67 | 21 | 58 | 36 | 77 | 42 | 76 | 52 | 92 | 75 | (*) | ..... |
| 24 | 90 | 59 | 96 | 70 | 87 | 59 | 76 | 38 | 69 | 34 | 65 | 39 | 66 | 40 | 66 | 24 | 79 | 46 | 87 | 54 | 91 | 68 | ..... | ..... |
| 25 | 92 | 70 | 99 | 73 | 86 | 69 | 73 | 50 | 65 | 33 | 65 | 38 | 71 | 28 | 54 | 42 | 82 | 43 | 83 | 56 | 86 | 69 | ..... | ..... |
| 26 | 100 | 72 | 100 | 72 | 91 | 65 | 81 | 48 | 59 | 39 | 61 | 41 | 68 | 46 | 45 | 42 | 81 | 58 | 88 | 52 | 86 | 66 | ..... | ..... |
| 27 | 100 | 67 | 94 | 71 | 95 | 67 | 85 | 50 | 43 | 29 | 52 | 46 | 61 | 32 | 56 | 38 | 81 | 48 | 91 | 61 | 88 | 61 | ..... | ..... |
| 28 | 83 | 67 | 90 | 70 | 93 | 64 | 81 | 60 | 42 | 24 | 43 | 40 | 71 | 28 | 64 | 35 | 72 | 40 | 65 | 57 | 93 | 69 | ..... | ..... |
| 29 | 82 | 69 | 92 | 66 | 91 | 58 | 73 | 47 | 42 | 17 | 40 | 29 | 57 | 46 | ..... | ..... | 73 | 45 | 78 | 53 | 99 | 71 | ..... | ..... |
| 30 | 95 | 71 | 95 | 68 | 90 | 60 | 55 | 47 | 41 | 15 | 38 | 26 | 73 | 26 | ..... | ..... | 75 | 45 | 86 | 59 | 95 | 77 | ..... | ..... |
| 31 | 100 | 72 | 92 | 70 | ..... | ..... | 58 | 48 | ..... | ..... | 41 | 23 | 58 | 36 | ..... | ..... | 70 | 45 | ..... | ..... | 90 | 78 | ..... | ..... |
| Range | ..... | ..... | 39° | | 47° | | 68° | | ..... | ..... | 61° | | 56° | | 63° | | 55° | | 52° | | 53° | | ..... | |
| Monthly means | ..... | ..... | ..... | | ..... | | ..... | | ..... | ..... | ..... | | ..... | | ..... | | ..... | | 66°.2 | | 73°.7 | | ..... | |

* No observations taken.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, CORSICANA, TEX.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 95 | 73 | 100 | 74 | 100 | 72 | 91 | 67 | 74 | 55 | 48 | 32 | 51 | 27 | 55 | 39 | 73 | 53 | 71 | 47 | 88 | 58 | 92 | 73 |
| 2 | 96 | 72 | 103 | 76 | 86 | 78 | 93 | 66 | 60 | 47 | 52 | 25 | 47 | 30 | 45 | 34 | 68 | 48 | 74 | 51 | 73 | 58 | 90 | 74 |
| 3 | 97 | 72 | 98 | 73 | 76 | 70 | 98 | 65 | 68 | 46 | 56 | 45 | 39 | 32 | 50 | 32 | 68 | 45 | 65 | 42 | 71 | 58 | 93 | 71 |
| 4 | 96 | 74 | 100 | 73 | 81 | 67 | 71 | 53 | 64 | 47 | 68 | 45 | 36 | 24 | 63 | 32 | 70 | 41 | 69 | 42 | 82 | 59 | 91 | 71 |
| 5 | 97 | 72 | 101 | 76 | 74 | 67 | 77 | 52 | 60 | 43 | 49 | 33 | 41 | 17 | 66 | 40 | 76 | 46 | 85 | 46 | 86 | 57 | 78 | 66 |
| 6 | 98 | 73 | 102 | 77 | 81 | 67 | 78 | 61 | 56 | 32 | 52 | 28 | 43 | 25 | 56 | 46 | 75 | 63 | 89 | 57 | 85 | 61 | 86 | 65 |
| 7 | 101 | 73 | 95 | 77 | 81 | 69 | 78 | 59 | 69 | 39 | 56 | 31 | 43 | 34 | 54 | 47 | 79 | 63 | 68 | 60 | 87 | 67 | 81 | 72 |
| 8 | 102 | 74 | 95 | 74 | 93 | 69 | 81 | 53 | 57 | 45 | 59 | 30 | 43 | 33 | 55 | 38 | 73 | 52 | 72 | 53 | 73 | 60 | 85 | 66 |
| 9 | 102 | 74 | 99 | 68 | 91 | 75 | 84 | 57 | 47 | 35 | 58 | 38 | 49 | 40 | 49 | 36 | 66 | 49 | 73 | 59 | 79 | 54 | 92 | 65 |
| 10 | 92 | 76 | 101 | 70 | 93 | 68 | 83 | 59 | 51 | 27 | 62 | 35 | 59 | 40 | 43 | 28 | 74 | 44 | 70 | 49 | 80 | 55 | 84 | 67 |
| 11 | 93 | 71 | 101 | 72 | 97 | 70 | 86 | 61 | 60 | 31 | 64 | 35 | 56 | 36 | 57 | 27 | 78 | 48 | 81 | 44 | 75 | 60 | 88 | 67 |
| 12 | 94 | 74 | 99 | 70 | 92 | 70 | 85 | 62 | 68 | 38 | 63 | 43 | 56 | 44 | 58 | 40 | 75 | 49 | 84 | 53 | 81 | 61 | 89 | 74 |
| 13 | 96 | 71 | 90 | 70 | 93 | 69 | 85 | 64 | 70 | 52 | 72 | 53 | 46 | 40 | 66 | 48 | 84 | 49 | 81 | 64 | 81 | 61 | 97 | 75 |
| 14 | 98 | 74 | 94 | 67 | 93 | 72 | 81 | 70 | 67 | 53 | 72 | 49 | 52 | 31 | 72 | 40 | 82 | 52 | 89 | 69 | 75 | 54 | 94 | 72 |
| 15 | 92 | 74 | 90 | 64 | 89 | 75 | 81 | 70 | 70 | 44 | 69 | 52 | 55 | 32 | 62 | 43 | 80 | 58 | 90 | 68 | 83 | 60 | 96 | 75 |
| 16 | 95 | 72 | 95 | 67 | 90 | 70 | 70 | 62 | 75 | 44 | 75 | 62 | 60 | 36 | 70 | 43 | 83 | 56 | 90 | 68 | 86 | 65 | 88 | 72 |
| 17 | 96 | 72 | 82 | 70 | 83 | 68 | 64 | 61 | 74 | 45 | 75 | 61 | 64 | 38 | 73 | 51 | 83 | 55 | 80 | 65 | 83 | 63 | 90 | 69 |
| 18 | 99 | 74 | 88 | 66 | 77 | 56 | 62 | 56 | 68 | 49 | 71 | 59 | 57 | 47 | 76 | 45 | 77 | 53 | 82 | 59 | 78 | 59 | 93 | 71 |
| 19 | 91 | 73 | 92 | 69 | 80 | 50 | 63 | 51 | 65 | 55 | 70 | 59 | 57 | 42 | 75 | 36 | 70 | 52 | 85 | 69 | 90 | 56 | 97 | 74 |
| 20 | 86 | 68 | 90 | 72 | 86 | 50 | 63 | 45 | 62 | 55 | 63 | 56 | 56 | 39 | 67 | 55 | 76 | 48 | 85 | 72 | 93 | 73 | 92 | 69 |
| 21 | 82 | 59 | 85 | 65 | 89 | 56 | 54 | 45 | 61 | 49 | 65 | 55 | 54 | 34 | 67 | 52 | 83 | 51 | 83 | 69 | 74 | 70 | 88 | 71 |
| 22 | 86 | 60 | 83 | 62 | 88 | 58 | 67 | 40 | 61 | 39 | 68 | 50 | 63 | 35 | 60 | 45 | 84 | 53 | 76 | 72 | 91 | 74 | 89 | 64 |
| 23 | 90 | 63 | 89 | 61 | 89 | 58 | 71 | 42 | 67 | 45 | 62 | 50 | 65 | 36 | 60 | 42 | 84 | 53 | 78 | 59 | 92 | 72 | 92 | 66 |
| 24 | 88 | 62 | 96 | 66 | 89 | 61 | 66 | 50 | 74 | 50 | 68 | 49 | 66 | 41 | 63 | 35 | 83 | 58 | 84 | 51 | 90 | 70 | 97 | 68 |
| 25 | 89 | 65 | 96 | 73 | 90 | 64 | 77 | 62 | 60 | 45 | 66 | 44 | 68 | 39 | 68 | 42 | 82 | 59 | 88 | 57 | 91 | 68 | 91 | 72 |
| 26 | 92 | 72 | 96 | 70 | 93 | 65 | 83 | 54 | 65 | 37 | 65 | 40 | 71 | 55 | 66 | 49 | 80 | 54 | 88 | 56 | 78 | 63 | 96 | 72 |
| 27 | 90 | 70 | 96 | 70 | 95 | 68 | 81 | 55 | 53 | 36 | 54 | 44 | 60 | 39 | 65 | 45 | 78 | 53 | 88 | 57 | 83 | 61 | 90 | 72 |
| 28 | 85 | 71 | 91 | 71 | 93 | 67 | 83 | 59 | 48 | 34 | 52 | 41 | 67 | 39 | 69 | 41 | 73 | 50 | 82 | 59 | 89 | 64 | 87 | 74 |
| 29 | 96 | 72 | 95 | 71 | 91 | 65 | 85 | 63 | 42 | 20 | 42 | 37 | 67 | 46 | ..... | ..... | 80 | 53 | 83 | 59 | 90 | 67 | 97 | 74 |
| 30 | 97 | 77 | 96 | 71 | 92 | 66 | 66 | 59 | 38 | 14 | 42 | 32 | 51 | 39 | ..... | ..... | 75 | 51 | 90 | 58 | 91 | 73 | 94 | 74 |
| 31 | 97 | 73 | 97 | 70 | ..... | ..... | 66 | 59 | ..... | ..... | 39 | 29 | 60 | 34 | ..... | ..... | 70 | 47 | ..... | ..... | 86 | 73 | ..... | ..... |
| Range | 43° | | 42° | | 50° | | 58° | | 61° | | 53° | | 54° | | 49° | | 46° | | 48° | | 43° | | 33° | |
| Monthly means | 81°.4 | | 81°.9 | | 75°.9 | | 65°.4 | | 51°.4 | | 51°.7 | | 45°.4 | | 51°.3 | | 61°.1 | | 69° | | 73°.1 | | 79°.1 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, DAVENPORT, IOWA.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 80 | 65 | 87 | 69 | 74 | 58 | 82 | 68 | 41 | 35 | 28 | 21 | 36 | 28 | 34 | 29 | 58 | 38 | 56 | 40 | 61 | 53 | 77 | 61 |
| 2 | 83 | 64 | 81 | 67 | 70 | 50 | 73 | 62 | 37 | 34 | 38 | 20 | 30 | 23 | 38 | 28 | 54 | 40 | 56 | 39 | 63 | 55 | 81 | 61 |
| 3 | 86 | 66 | 81 | 61 | 73 | 51 | 78 | 48 | 45 | 32 | 40 | 30 | 32 | 22 | 35 | 20 | 41 | 35 | 55 | 39 | 56 | 43 | 75 | 63 |
| 4 | 90 | 75 | 80 | 64 | 75 | 55 | 52 | 41 | 44 | 34 | 45 | 36 | 30 | 8 | 41 | 22 | 45 | 33 | 61 | 38 | 54 | 41 | 72 | 56 |
| 5 | 90 | 74 | 83 | 64 | 75 | 62 | 60 | 42 | 35 | 24 | 36 | 29 | 24 | 7 | 50 | 33 | 59 | 39 | 58 | 46 | 64 | 44 | 75 | 56 |
| 6 | 86 | 68 | 81 | 68 | 71 | 58 | 63 | 40 | 38 | 22 | 30 | 21 | 11 | 3 | 56 | 40 | 60 | 40 | 58 | 35 | 76 | 44 | 75 | 61 |
| 7 | 92 | 71 | 84 | 66 | 74 | 55 | 57 | 50 | 39 | 31 | 42 | 22 | 22 | 0 | 50 | 40 | 62 | 39 | 56 | 41 | 67 | 54 | 66 | 52 |
| 8 | 88 | 71 | 85 | 69 | 75 | 56 | 58 | 47 | 36 | 33 | 32 | 25 | 35 | 22 | 41 | 30 | 68 | 54 | 61 | 45 | 67 | 50 | 55 | 50 |
| 9 | 85 | 69 | 79 | 63 | 66 | 60 | 50 | 46 | 35 | 28 | 41 | 24 | 38 | 32 | 31 | 20 | 67 | 54 | 64 | 44 | 58 | 46 | 60 | 50 |
| 10 | 79 | 65 | 82 | 63 | 75 | 59 | 54 | 43 | 38 | 22 | 46 | 33 | 40 | 31 | 27 | 18 | 59 | 49 | 53 | 42 | 57 | 41 | 70 | 48 |
| 11 | 79 | 60 | 81 | 67 | 75 | 56 | 57 | 39 | 48 | 29 | 52 | 37 | 38 | 27 | 33 | 17 | 62 | 46 | 63 | 42 | 52 | 39 | 70 | 49 |
| 12 | 82 | 63 | 73 | 68 | 80 | 59 | 57 | 45 | 53 | 36 | 57 | 39 | 44 | 31 | 43 | 28 | 61 | 46 | 62 | 45 | 57 | 36 | 72 | 56 |
| 13 | 85 | 66 | 75 | 62 | 83 | 65 | 74 | 53 | 57 | 39 | 47 | 35 | 37 | 33 | 39 | 31 | 50 | 43 | 60 | 40 | 57 | 40 | 72 | 54 |
| 14 | 86 | 68 | 78 | 58 | 86 | 70 | 69 | 58 | 55 | 49 | 47 | 30 | 37 | 30 | 38 | 33 | 57 | 39 | 52 | 40 | 60 | 43 | 75 | 58 |
| 15 | 91 | 69 | 80 | 60 | 78 | 66 | 66 | 53 | 53 | 43 | 57 | 40 | 35 | 23 | 41 | 33 | 60 | 43 | 57 | 44 | 65 | 48 | 79 | 65 |
| 16 | 83 | 66 | 83 | 63 | 74 | 60 | 65 | 50 | 54 | 40 | 56 | 32 | 35 | 23 | 48 | 36 | 52 | 42 | 66 | 45 | 58 | 49 | 77 | 63 |
| 17 | 85 | 65 | 83 | 65 | 66 | 51 | 64 | 54 | 49 | 36 | 55 | 50 | 49 | 34 | 42 | 34 | 44 | 36 | 73 | 48 | 63 | 43 | 75 | 61 |
| 18 | 76 | 64 | 84 | 65 | 68 | 47 | 58 | 53 | 43 | 33 | 59 | 47 | 48 | 32 | 43 | 35 | 53 | 39 | 73 | 56 | 62 | 49 | 76 | 56 |
| 19 | 70 | 59 | 85 | 66 | 73 | 55 | 55 | 47 | 43 | 33 | 62 | 54 | 45 | 31 | 51 | 36 | 62 | 40 | 75 | 59 | 73 | 59 | 81 | 58 |
| 20 | 71 | 58 | 85 | 68 | 76 | 56 | 49 | 43 | 49 | 33 | 62 | 53 | 42 | 36 | 53 | 38 | 60 | 37 | 69 | 50 | 67 | 54 | 72 | 60 |
| 21 | 79 | 55 | 75 | 64 | 72 | 52 | 52 | 38 | 48 | 40 | 63 | 47 | 38 | 30 | 47 | 36 | 56 | 45 | 68 | 54 | 64 | 47 | 71 | 53 |
| 22 | 84 | 61 | 74 | 57 | 77 | 55 | 62 | 38 | 44 | 34 | 58 | 51 | 35 | 23 | 44 | 34 | 59 | 38 | 76 | 65 | 65 | 49 | 74 | 50 |
| 23 | 85 | 65 | 74 | 53 | 80 | 62 | 64 | 47 | 44 | 36 | 58 | 50 | 32 | 15 | 41 | 33 | 73 | 43 | 68 | 57 | 81 | 60 | 79 | 55 |
| 24 | 85 | 66 | 79 | 58 | 81 | 63 | 64 | 51 | 43 | 34 | 56 | 48 | 47 | 30 | 37 | 33 | 55 | 36 | 57 | 50 | 77 | 57 | 84 | 62 |
| 25 | 87 | 70 | 78 | 61 | 80 | 64 | 59 | 49 | 46 | 39 | 55 | 46 | 37 | 31 | 39 | 30 | 52 | 29 | 57 | 49 | 72 | 60 | 82 | 67 |
| 26 | 86 | 73 | 86 | 63 | 78 | 65 | 56 | 51 | 41 | 36 | 46 | 37 | 37 | 27 | 44 | 28 | 69 | 45 | 50 | 45 | 72 | 53 | 80 | 64 |
| 27 | 84 | 69 | 88 | 73 | 78 | 63 | 61 | 52 | 38 | 29 | 43 | 36 | 40 | 25 | 49 | 30 | 62 | 40 | 62 | 45 | 69 | 48 | 84 | 65 |
| 28 | 85 | 71 | 80 | 68 | 80 | 62 | 68 | 47 | 30 | 15 | 45 | 40 | 35 | 19 | 58 | 35 | 46 | 32 | 68 | 50 | 70 | 54 | 88 | 68 |
| 29 | 86 | 65 | 82 | 69 | 82 | 65 | 53 | 40 | 15 | 7 | 43 | 36 | 33 | 23 | ..... | ..... | 47 | 35 | 73 | 50 | 70 | 52 | 84 | 70 |
| 30 | 84 | 68 | 86 | 66 | 84 | 67 | 51 | 34 | 25 | 15 | 40 | 34 | 35 | 24 | ..... | ..... | 41 | 34 | 67 | 55 | 66 | 49 | 83 | 71 |
| 31 | 88 | 67 | 87 | 72 | ..... | ..... | 47 | 36 | ..... | ..... | 38 | 30 | 32 | 26 | ..... | ..... | 53 | 34 | ..... | ..... | 70 | 52 | ..... | ..... |
| Range | 37° | | 35° | | 39° | | 48° | | 50° | | 43° | | 49° | | 41° | | 44° | | 41° | | 45° | | 40° | |
| Monthly means | 75°.3 | | 72°.8 | | 67°.3 | | 53°.7 | | 37°.2 | | 42°.7 | | 30°.0 | | 36°.9 | | 48°.4 | | 55°.0 | | 57°.7 | | 68°.2 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, DEADWOOD,* DAK.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | | | | | | | | | | | | | 20 | 5 | 40 | 33 | 40 | 25 | 51 | (†) | 52 | 36 | (‡) | |
| 2 | | | | | | | | | | | | | 37 | 2 | 42 | 18 | 43 | 30 | 52 | | 52 | 39 | | |
| 3 | | | | | | | | | | | | | 25 | 2 | 46 | 15 | 47 | 31 | 59 | | 54 | 38 | | |
| 4 | | | | | | | | | | | | | 21 | — 8 | 53 | 26 | 57 | 40 | 55 | | 64 | 33 | | |
| 5 | | | | | | | | | | | | | 17 | — 2 | 50 | 34 | 50 | 30 | 59 | | 64 | 42 | | |
| 6 | | | | | | | | | | | | | 26 | — 3 | 39 | 23 | 52 | 29 | 58 | | 55 | 43 | | |
| 7 | | | | | | | | | | | | | 35 | 13 | 42 | 18 | 52 | 36 | 58 | | 55 | 39 | | |
| 8 | | | | | | | | | | | | | 38 | 5 | 33 | 21 | 36 | 23 | 44 | 31 | 48 | 36 | | |
| 9 | | | | | | | | | | | | | 37 | 25 | 30 | 11 | 26 | 20 | 35 | 26 | 50 | 31 | | |
| 10 | | | | | | | | | | | | | 54 | 16 | 36 | 12 | 28 | 23 | 44 | 28 | 58 | 30 | | |
| 11 | | | | | | | | | | | | | 42 | 25 | 45 | 21 | 29 | 22 | 49 | 39 | 46 | 35 | | |
| 12 | | | | | | | | | | | | | 33 | 14 | 36 | 18 | 32 | 23 | 44 | 35 | 36 | 32 | | |
| 13 | | | | | | | | | | | | | 36 | 9 | 38 | 22 | 42 | 10 | 37 | 30 | 42 | 32 | | |
| 14 | | | | | | | | | | | | | 46 | 5 | 38 | 12 | 53 | 20 | 41 | 27 | 55 | 30 | | |
| 15 | | | | | | | | | | | | | 50 | 12 | 38 | 13 | 47 | 35 | 42 | 32 | 47 | 43 | | |
| 16 | | | | | | | | | | | | | 50 | 14 | 40 | 15 | 57 | 23 | 51 | 26 | 56 | 35 | | |
| 17 | | | | | | | | | | | | | 49 | 17 | 47 | 17 | 61 | 30 | 49 | 34 | 45 | 35 | | |
| 18 | | | | | | | | | | | | | 44 | 18 | 51 | 31 | 57 | 30 | 38 | 31 | 39 | 33 | | |
| 19 | | | | | | | | | | | | | 42 | 20 | 46 | 27 | 60 | 30 | 45 | 33 | 39 | 32 | | |
| 20 | | | | | | | | | | | | | 40 | 21 | 43 | 30 | 56 | (†) | 50 | 30 | 44 | 36 | | |
| 21 | | | | | | | | | | | | | 43 | 17 | 45 | 18 | 58 | | 49 | 35 | 58 | 38 | | |
| 22 | | | | | | | | | | | | | 42 | 17 | 35 | 17 | 66 | | 42 | 33 | 62 | 44 | | |
| 23 | | | | | | | | | | | | | 49 | 29 | 37 | 15 | 56 | | 49 | 38 | 59 | 43 | | |
| 24 | | | | | | | | | | | | | 43 | 28 | 42 | 13 | 62 | | 55 | 40 | 64 | 42 | | |
| 25 | | | | | | | | | | | 46 | 16 | 48 | 19 | 55 | 18 | 66 | | 65 | 33 | 58 | 38 | | |
| 26 | | | | | | | | | | | 39 | 24 | 44 | 16 | 59 | 24 | 60 | | 65 | 36 | 63 | 45 | | |
| 27 | | | | | | | | | | | 26 | 20 | 40 | 19 | 54 | 29 | 44 | | 65 | 47 | 63 | 48 | | |
| 28 | | | | | | | | | | | 26 | 18 | 46 | 21 | 39 | 26 | 29 | | 60 | 38 | 52 | 48 | | |
| 29 | | | | | | | | | | | 19 | 15 | 42 | 16 | | | 39 | | 59 | 38 | 68 | 48 | | |
| 30 | | | | | | | | | | | 26 | 3 | 47 | 20 | | | 51 | | 53 | 34 | 59 | 47 | | |
| 31 | | | | | | | | | | | 32 | 5 | 34 | 26 | | | 47 | | | | 63 | 38 | | |
| Range | | | | | | | | | | | | | 62° | | 48° | | | | | | 38° | | | |
| Monthly means | | | | | | | | | | | | | 26°.2 | | 31°.8 | | 37°.3 | | 41°.6 | | 45°.9 | | | |

* Observations commenced December 25, 1877.

† Minimum thermometer unserviceable.

‡ Station closed June 1, 1878.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, DECATUR, TEX.*

| Day of month. | 1877. | | | | | | | | | | 1878. | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 96 | 70 | 95 | 73 | 98 | 72 | 89 | 65 | 58 | 53 | 50 | 23 | 49 | 23.5 | 51 | 34 | 71 | 47 | 68 | 43 | 91 | 60 | 92 | 72 |
| 2 | 95 | 72 | 96 | 75 | (*) | 68 | 91 | 64 | 58 | 42 | 49 | 27 | 47 | 25 | 51 | 29 | 71 | 41 | 75 | 49 | 85 | 67 | 101 | 74 |
| 3 | 94 | 69 | 94 | 72 | 72 | 64 | 88 | 67 | 64 | 42 | 52 | 38 | 35 | 25 | 46 | 25 | 66 | 40 | 73 | 40 | 85 | 54 | 92 | 72 |
| 4 | 95 | 73.5 | 94 | 73 | 69 | 62 | (*) | ..... | (*) | ..... | 60 | 41 | 34 | 20 | 65 | 32 | 63 | 38 | 68 | 36 | 80 | 48 | 81 | 62 |
| 5 | 93 | 72 | 98 | 75 | 70.5 | 63 | ..... | ..... | 63 | 36 | 55 | 28 | 40 | 17.5 | 68 | 38 | 79 | 40 | 89 | 47 | 88 | 58 | (*) | ..... |
| 6 | 97 | 72 | 98 | 76 | 76 | 60 | ..... | ..... | 52 | 29 | 55 | 25 | 40 | 24 | 67 | 45 | 78 | 58 | 91 | 61 | 87 | 56 | ..... | ..... |
| 7 | 98.5 | 73 | 85 | 70 | 81 | 61 | ..... | ..... | 69 | 38 | 57 | 30 | 40 | 30 | 49 | 44 | 79 | 60 | 89 | 59 | 93 | 65 | ..... | ..... |
| 8 | 98 | 75 | 88 | 69 | (*) | ..... | ..... | ..... | 68 | 41 | 57 | 28.5 | 38 | 31 | 50 | 37 | 79 | 52 | 67 | 51 | 92 | 54 | 88 | 61 |
| 9 | 97 | 76 | 98.5 | 69 | 84 | 65 | ..... | ..... | 50 | 29.5 | 61 | 37 | 51 | 36 | 45 | 32 | 65 | 47 | 68 | 54 | 76 | 57 | 84 | 67 |
| 10 | 89 | 73.5 | 101 | 72 | 90.5 | 64 | ..... | ..... | 50.5 | 26 | 63 | 40 | 55 | 31 | 39 | 26 | 73 | 41 | 66 | 45 | 76 | 53 | 83 | 60 |
| 11 | 90.5 | 68 | 101 | 73 | 94 | 66 | 85 | 61 | 58 | 29 | 69 | 41 | 51 | 35 | 56 | 21 | 77 | 41 | 78 | 39 | 79 | 59 | 87 | 62 |
| 12 | 91 | 66 | 100 | 72 | 84 | 71 | (*) | ..... | 63 | 37 | 68 | 42 | 53 | 37 | 56 | 37 | 77 | 40 | 83 | 56 | 83 | 58 | 93 | 66 |
| 13 | 93 | 66 | 86 | 73 | 90 | 66 | ..... | ..... | 67 | 36 | 69 | 53 | 42 | 31 | 60 | 44 | 84 | 45 | 83 | 63 | 81 | 57 | 98 | 71 |
| 14 | 97 | 73 | 89 | 64 | 90 | 73 | 81 | 59 | 64 | 36 | 69 | 48 | 47 | 27 | 69 | 35 | 84 | 44 | 89 | 65 | 71 | 49 | 97 | 66 |
| 15 | 96 | 76 | 80 | 63 | 91 | 71 | 79 | 64 | 72 | 47 | 69 | 50 | 53 | 32 | 69 | 37 | 84 | 50 | 91 | 62 | 83 | 50 | 97 | 73 |
| 16 | 97 | 72 | 92 | 63 | 91 | 68 | 77 | 56 | 75 | 49 | 68 | 52 | 59 | 33 | 73 | 40 | 83 | 56 | 90 | 66 | 83 | 61 | 96 | 68 |
| 17 | 98 | 72 | 89 | 70 | 77 | 60 | 59 | 54 | 75 | 52 | 70 | 59.5 | 62 | 38 | 76 | 35 | 83 | 52 | 88 | 60 | 93 | 70 | (*) | ..... |
| 18 | 73 | 56 | 90 | 61 | 74 | 54 | 59 | 52 | 73 | 46 | 70 | 59 | 63 | 46 | 75 | 46 | 80 | 53 | 86 | 49 | 93 | 61 | ..... | ..... |
| 19 | 88.5 | 68 | 91 | 60 | 76 | 52 | 59 | 44 | 67 | 49 | 69 | 57 | 60 | 37 | 75 | 53 | 77 | 51 | 89 | 60 | 91 | 56 | 98 | 64 |
| 20 | 82 | 64 | 90 | 66 | 83 | 53 | 55 | 41 | 55 | 49 | 65 | 55.5 | 52 | 37 | (*) | ..... | 76 | 50 | 90 | 70 | 95 | 68 | 92 | 66 |
| 21 | 80 | 59 | (*) | ..... | 87 | 62 | 57 | 42 | 55 | 43 | 58 | 52 | (*) | ..... | ..... | ..... | 82 | 50 | 89 | 69 | 81 | 68 | 84 | 69 |
| 22 | 83 | 61 | 75 | 65 | 89 | 62 | 64 | 38 | 55 | 37 | 65 | 49 | ..... | ..... | 74 | 44 | 83 | 58 | 85 | 70 | 87 | 71 | 84 | 66 |
| 23 | 86 | 63 | 89 | 56 | 87 | 60 | 68 | 42 | 63 | 41 | 65 | 46 | ..... | ..... | 74 | 35 | 85 | 52 | 80 | 60 | 91 | 71 | 92 | 66 |
| 24 | 89 | 65 | 95 | 67 | 85 | 60 | 67 | 48 | (*) | ..... | 67 | 47 | 62 | 29 | 61 | 35 | 86 | 50 | 78 | 48 | 93 | 70 | 96 | 67 |
| 25 | (*) | ..... | 96 | 67 | 84 | 61 | 74 | 57 | ..... | ..... | 65 | 43.5 | 66 | 39 | 65 | 41 | 81 | 50 | 84 | 58 | 93 | 67 | 93 | 65 |
| 26 | ..... | ..... | 92 | 70 | 82 | 63 | (*) | ..... | ..... | 34 | 63 | 40 | 68 | 41 | 63 | 45 | 81 | 49 | 89 | 59 | 89 | 62 | 92 | 69 |
| 27 | ..... | ..... | 95 | 72 | 93.5 | 63 | 81 | 53 | 56 | 33 | 63 | 42.5 | 67 | 39 | 66 | 42 | 80 | 28 | 89 | 59 | 85 | 57 | 91 | 71 |
| 28 | 86 | 65 | 93 | 70 | 90 | 65 | 81.5 | 58 | 42 | 26 | 50 | 39 | 69 | 40 | 66 | 40 | 77 | 44 | 83 | 62 | 84 | 62 | 85 | 67 |
| 29 | 90 | 73 | (*) | ..... | 87 | 64 | 81 | 54 | 37 | 20 | 40 | 30.5 | 62 | 41 | ..... | ..... | 75 | 47 | 84 | 59 | 91 | 66 | 91 | 70 |
| 30 | 91 | 72 | 97 | 69 | 91 | 65 | 58 | 51 | 36 | 13.5 | 36 | 27 | 44 | 33 | ..... | ..... | 74 | 49 | 92 | 57 | 91 | 72 | 96 | 72 |
| 31 | 93.5 | 73 | 97 | 68 | ..... | ..... | 57 | 49 | ..... | ..... | (*) | ..... | 54 | 27 | ..... | ..... | 69 | 41 | ..... | ..... | 91 | 71 | ..... | ..... |
| Range | | | | | | | | | | | | | | | | | 58° | | 56° | | 47° | | | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

* No observations taken.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, DENISON TEX.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 94 | 73 | 101 | 75 | 99 | 75 | 86 | 69 | 64 | 50 | 44 | 33 | 46 | 25 | 49 | 37 | 68 | 48 | 67 | 48 | 82 | 64 | 86 | 75 |
| 2 | 92 | 73 | 102 | 76 | 89 | 70 | 90 | 65 | 58 | 42 | 49 | 29 | 38 | 28 | 47 | 31 | 62 | 46 | 73 | 49 | 87 | 63 | 92 | 74 |
| 3 | 94 | 73 | 96 | 75 | 73 | 64 | 95 | 60 | 64 | 43 | 52 | 39 | 37 | 26 | 50 | 31 | 62 | 43 | 67 | 42 | 87 | 65 | 98 | 67 |
| 4 | 95 | 75 | 97 | 72 | 67 | 64 | 65 | 43 | 64 | 49 | 56 | 40 | 43 | 23 | 58 | 31 | 64 | 39 | 66 | 42 | 87 | 72 | 98 | 65 |
| 5 | 95 | 74 | 98 | 76 | 71 | 64 | 69 | 47 | 61 | 37 | 49 | 31 | 39 | 17 | 62 | 39 | 74 | 49 | 85 | 49 | 82 | 72 | 98 | 65 |
| 6 | 97 | 76 | 100 | 79 | 77 | 65 | 73 | 51 | 52 | 29 | 46 | 29 | 40 | 22 | 56 | 48 | 74 | 60 | 85 | 60 | 78 | 68 | 98 | 67 |
| 7 | 99 | 74 | 93 | 69 | 79 | 62 | 71 | 57 | 59 | 39 | 54 | 32 | 40 | 30 | 54 | 43 | 77 | 62 | 71 | 60 | 82 | 66 | 98 | 64 |
| 8 | 99 | 76 | 89 | 69 | 81 | 67 | 80 | 53 | 56 | 39 | 55 | 30 | 39 | 33 | 51 | 35 | 67 | 54 | 67 | 53 | 84 | 68 | 98 | 64 |
| 9 | 100 | 77 | 94 | 68 | 84 | 72 | 78 | 57 | 49 | 32 | 57 | 38 | 47 | 37 | 48 | 31 | 64 | 46 | 67 | 53 | 84 | 74 | 98 | 68 |
| 10 | 89 | 73 | 100 | 70 | 87 | 65 | 75 | 55 | 48 | 27 | 59 | 38 | 56 | 34 | 43 | 27 | 63 | 42 | 65 | 48 | 77 | 72 | 98 | 68 |
| 11 | 90 | 68 | 100 | 74 | 92 | 66 | 82 | 63 | 55 | 30 | 63 | 43 | 55 | 37 | 53 | 27 | 63 | 50 | 73 | 47 | 77 | 70 | 98 | 62 |
| 12 | 90 | 68 | 98 | 77 | 89 | 71 | 84 | 62 | 63 | 39 | 62 | 40 | 56 | 36 | 58 | 40 | 68 | 47 | 81 | 58 | 78 | 68 | 98 | 71 |
| 13 | 94 | 68 | 87 | 69 | 86 | 69 | 81 | 65 | 64 | 53 | 68 | 53 | 46 | 37 | 61 | 46 | 77 | 49 | 75 | 65 | 82 | 68 | 98 | 74 |
| 14 | 97 | 73 | 88 | 65 | 86 | 72 | 76 | 60 | 64 | 49 | 68 | 54 | 50 | 31 | 60 | 40 | 73 | 50 | 87 | 65 | 84 | 72 | 98 | 67 |
| 15 | 97 | 75 | 84 | 66 | 89 | 70 | 76 | 63 | 68 | 44 | 67 | 52 | 52 | 31 | 52 | 40 | 70 | 51 | 87 | 67 | 81 | 68 | 98 | 70 |
| 16 | 98 | 74 | 87 | 64 | 92 | 70 | 66 | 61 | 70 | 48 | 67 | 58 | 57 | 35 | 56 | 42 | 73 | 53 | 87 | 73 | 90 | 68 | 98 | 68 |
| 17 | 96 | 72 | 92 | 70 | 84 | 62 | 62 | 56 | 72 | 47 | 66 | 62 | 59 | 38 | 69 | 43 | 77 | 51 | 75 | 73 | 93 | 68 | 98 | 71 |
| 18 | 96 | 77 | 90 | 66 | 74 | 54 | 59 | 52 | 69 | 48 | 68 | 60 | 52 | 47 | 70 | 45 | 73 | 52 | 86 | 74 | 93 | 68 | 98 | 72 |
| 19 | 94 | 70 | 89 | 66 | 77 | 50 | 56 | 48 | 56 | 49 | 66 | 58 | 50 | 44 | 71 | 52 | 70 | 51 | 86 | 76 | 93 | 68 | 98 | 68 |
| 20 | 82 | 64 | 95 | 69 | 84 | 54 | 56 | 45 | 56 | 50 | 62 | 57 | 53 | 38 | 66 | 54 | 73 | 51 | 76 | 66 | 84 | 68 | 98 | 64 |
| 21 | 80 | 59 | 87 | 65 | 86 | 58 | 56 | 43 | 57 | 43 | 60 | 55 | 54 | 34 | 61 | 46 | 79 | 54 | 82 | 70 | 85 | 69 | 98 | 66 |
| 22 | 83 | 62 | 82 | 61 | 84 | 62 | 60 | 39 | 56 | 39 | 63 | 51 | 60 | 36 | 56 | 43 | 85 | 60 | 82 | 74 | 85 | 69 | 98 | 66 |
| 23 | 87 | 64 | 85 | 60 | 84 | 60 | 66 | 44 | 60 | 40 | 62 | 47 | 62 | 36 | 55 | 41 | 81 | 58 | 77 | 77 | 85 | 72 | 98 | 69 |
| 24 | 91 | 64 | 93 | 63 | 86 | 63 | 69 | 49 | 66 | 47 | 65 | 50 | 60 | 45 | 55 | 35 | 79 | 56 | 76 | 77 | 85 | 74 | 98 | 66 |
| 25 | 89 | 67 | 98 | 73 | 85 | 63 | 70 | 58 | 56 | 43 | 62 | 44 | 67 | 44 | 62 | 45 | 76 | 56 | 82 | 77 | 83 | 74 | 98 | 72 |
| 26 | 81 | 71 | 97 | 72 | 87 | 64 | 75 | 54 | 59 | 42 | 56 | 37 | 67 | 49 | 61 | 45 | 80 | 55 | 82 | 78 | 83 | 79 | 98 | 73 |
| 27 | 89 | 72 | 96 | 73 | 95 | 66 | 76 | 58 | 51 | 35 | 50 | 46 | 57 | 42 | 60 | 44 | 79 | 62 | 80 | 78 | 85 | 79 | 98 | 73 |
| 28 | 93 | 73 | 94 | 72 | 90 | 66 | 72 | 61 | 39 | 26 | 49 | 36 | 64 | 42 | 64 | 43 | 65 | 50 | 80 | 76 | 89 | 79 | 98 | 73 |
| 29 | 91 | 70 | 95 | 72 | 88 | 66 | 73 | 53 | 34 | 17 | 40 | 33 | 59 | 37 | ..... | ..... | 73 | 48 | 82 | 72 | 87 | 82 | 93 | 75 |
| 30 | 94 | 73 | 97 | 73 | 91 | 68 | 62 | 52 | 34 | 14 | 40 | 31 | 47 | 36 | ..... | ..... | 66 | 51 | 83 | 57 | 88 | 73 | ..... | ..... |
| 31 | 97 | 75 | 98 | 73 | ..... | ..... | 61 | 51 | ..... | ..... | 43 | 31 | 50 | 34 | ..... | ..... | 65 | 43 | ..... | ..... | ..... | ..... | ..... | ..... |
| Range | 41° | | 42° | | 49° | | 56° | | 58° | | 45° | | 50° | | 44° | | 46° | | 46° | | 38° | | 33° | |
| Monthly means | 81°.6 | | 81°.8 | | 74°.0 | | 62°.6 | | 47°.7 | | 49°.2 | | 42°.9 | | 48°.5 | | 61°.8 | | 66°.4 | | 70°.8 | | 76°.9 | |

*Maximum, minimum, and mean temperatures—Continued.*

STATION, DENVER, COLO.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 89 | 57 | 92 | 55 | 78 | 54 | 81 | 40 | 44 | 30 | 48 | 7 | 28 | 0 | 45 | 28 | 48 | 33 | 57 | 33 | 58 | 42 | 85 | 46 |
| 2 | 92 | 48 | 85 | 61 | 64 | 54 | 85 | 45 | 50 | 24 | 43 | 19 | 20 | — 5 | 44 | 30 | 44 | 28 | 53 | 41 | 49 | 39 | 70 | 43 |
| 3 | 99 | 57 | 94 | 57 | 68 | 50 | 60 | 40 | 47 | 27 | 43 | 25 | 28 | 0 | 50 | 23 | 50 | 35 | 59 | 37 | 59 | 32 | 70 | 44 |
| 4 | 92 | 70 | 90 | 60 | 63 | 48 | 64 | 28 | 45 | 25 | 32 | 19 | 18 | —10 | 60 | 30 | 65 | 30 | 72 | 35 | 70 | 44 | 70 | 48 |
| 5 | 98 | 61 | 99 | 63 | 79 | 49 | 60 | 35 | 50 | 28 | 37 | 12 | 20 | —12 | 48 | 34 | 63 | 36 | 74 | 38 | 80 | 46 | 65 | 49 |
| 6 | 98 | 65 | 90 | 59 | 84 | 48 | 63 | 36 | 46 | 29 | 54 | 18 | 25 | —10 | 43 | 30 | 64 | 36 | 76 | 41 | 76 | 44 | 58 | 48 |
| 7 | 92 | 63 | 83 | 53 | 80 | 50 | 68 | 37 | 46 | 33 | 48 | 26 | 40 | — 5 | 44 | 30 | 60 | 31 | 66 | 43 | 47 | 33 | 67 | 43 |
| 8 | 77 | 68 | 82 | 56 | 68 | 48 | 74 | 39 | 44 | 29 | 56 | 24 | 50 | 0 | 37 | 27 | 37 | 25 | 65 | 30 | 66 | 39 | 76 | 45 |
| 9 | 85 | 60 | 95 | 57 | 82 | 42 | 72 | 34 | 55 | 20 | 57 | 30 | 50 | 26 | 35 | 20 | 38 | 29 | 39 | 25 | 50 | 42 | 85 | 54 |
| 10 | 89 | 57 | 92 | 62 | 92 | 50 | 80 | 36 | 56 | 30 | 64 | 34 | 41 | 17 | 39 | 17 | 44 | 24 | 54 | 25 | 70 | 36 | 78 | 52 |
| 11 | 92 | 60 | 88 | 63 | 90 | 55 | 77 | 46 | 67 | 29 | 60 | 35 | 40 | 27 | 55 | 25 | 42 | 31 | 72 | 41 | 74 | 45 | 83 | 53 |
| 12 | 92 | 69 | 76 | 60 | 80 | 55 | 74 | 45 | 57 | 33 | 56 | 29 | 30 | 19 | 50 | 27 | 49 | 21 | 75 | 39 | 53 | 37 | 70 | 55 |
| 13 | 96 | 62 | 80 | 55 | 78 | 54 | 49 | 40 | 47 | 30 | 50 | 27 | 32 | 2 | 45 | 30 | 49 | 27 | 62 | 35 | 62 | 44 | 84 | 54 |
| 14 | 99 | 64 | 79 | 59 | 70 | 52 | 42 | 34 | 58 | 28 | 60 | 30 | 30 | 3 | 45 | 26 | 63 | 28 | 55 | 35 | 62 | 45 | 86 | 56 |
| 15 | 85 | 55 | 85 | 53 | 83 | 43 | 42 | 34 | 63 | 33 | 55 | 32 | 37 | 0 | 50 | 24 | 66 | 37 | 55 | 36 | 66 | 45 | 70 | 52 |
| 16 | 87 | 55 | 89 | 52 | 66 | 42 | 52 | 31 | 64 | 37 | 54 | 32 | 45 | 13 | 50 | 25 | 69 | 33 | 67 | 32 | 66 | 40 | 80 | 54 |
| 17 | 90 | 63 | 90 | 55 | 72 | 37 | 58 | 28 | 60 | 34 | 56 | 34 | 46 | 18 | 60 | 33 | 70 | 36 | 53 | 35 | 55 | 40 | 76 | 47 |
| 18 | 85 | 58 | 85 | 51 | 81 | 39 | 49 | 31 | 49 | 33 | 50 | 28 | 45 | 20 | 61 | 34 | 72 | 36 | 54 | 37 | 59 | 36 | 78 | 54 |
| 19 | 82 | 57 | 86 | 59 | 85 | 45 | 37 | 32 | 57 | 25 | 46 | 29 | 47 | 17 | 60 | 33 | 65 | 37 | 70 | 33 | 67 | 37 | 75 | 53 |
| 20 | 80 | 55 | 80 | 57 | 90 | 45 | 50 | 24 | 57 | 27 | 43 | 28 | 38 | 23 | 45 | 31 | 70 | 36 | 70 | 34 | 66 | 40 | 78 | 52 |
| 21 | 90 | 54 | 83 | 47 | 82 | 52 | 60 | 26 | 41 | 21 | 46 | 32 | 44 | 13 | 45 | 28 | 72 | 34 | 64 | 42 | 68 | 46 | 86 | 54 |
| 22 | 94 | 58 | 84 | 51 | 80 | 51 | 66 | 30 | 57 | 23 | 45 | 25 | 40 | 17 | 37 | 27 | 76 | 36 | 57 | 35 | 70 | 48 | 90 | 58 |
| 23 | 93 | 57 | 94 | 49 | 85 | 44 | 62 | 38 | 64 | 31 | 60 | 21 | 55 | 21 | 40 | 17 | 72 | 36 | 61 | 34 | 75 | 45 | 84 | 59 |
| 24 | 80 | 58 | 90 | 58 | 72 | 50 | 63 | 38 | 42 | 29 | 48 | 24 | 48 | 29 | 46 | 19 | 74 | 38 | 67 | 37 | 73 | 43 | 80 | 54 |
| 25 | 85 | 62 | 94 | 54 | 73 | 50 | 65 | 36 | 54 | 27 | 33 | 20 | 38 | 23 | 40 | 18 | 74 | 42 | 72 | 33 | 70 | 42 | 78 | 52 |
| 26 | 91 | 56 | 92 | 54 | 85 | 42 | 66 | 40 | 35 | 25 | 32 | 22 | 47 | 25 | 57 | 15 | 57 | 48 | 70 | 39 | 79 | 42 | 73 | 50 |
| 27 | 80 | 55 | 90 | 58 | 76 | 44 | 50 | 32 | 25 | 5 | 27 | 21 | 47 | 25 | 61 | 30 | 48 | 35 | 70 | 41 | 78 | 51 | 87 | 51 |
| 28 | 93 | 55 | 92 | 59 | 87 | 42 | 39 | 31 | 22 | —10 | 26 | 12 | 50 | 32 | 50 | 33 | 37 | 31 | 71 | 45 | 81 | 46 | 93 | 60 |
| 29 | 99 | 62 | 95 | 57 | 85 | 50 | 33 | 26 | 16 | —18 | 22 | 3 | 42 | 32 | ..... | ..... | 39 | 29 | 80 | 40 | 87 | 45 | 86 | 56 |
| 30 | 95 | 60 | 92 | 61 | 68 | 46 | 37 | 23 | 27 | —10 | 25 | — 5 | 49 | 25 | ..... | ..... | 57 | 27 | 65 | 36 | 80 | 47 | 67 | 53 |
| 31 | 86 | 52 | 90 | 57 | ..... | ..... | 37 | 22 | ..... | ..... | 22 | — 5 | 47 | 30 | ..... | ..... | 46 | 34 | ..... | ..... | 81 | 47 | ..... | ..... |
| Range | 51° | | 52° | | 55° | | 63° | | 85° | | 69° | | 67° | | 46° | | 55° | | 55° | | 55° | | 50° | |
| Monthly means | 73°.8 | | 70°.9 | | 61°.9 | | 44°.7 | | 34°.8 | | 30°.0 | | 26°.1 | | 36°.2 | | 44°.3 | | 49°.9 | | 54°.9 | | 64°.3 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, DETROIT, MICH.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 78 | 63 | 88 | 63 | 67 | 51 | 84 | 64 | 46 | 31 | 30 | 24 | 34 | 22 | 29 | 20 | 40 | 31 | 46 | 39 | 70 | 53 | 76 | 51 |
| 2 | 72 | 57 | 86 | 70 | 63 | 51 | 75 | 62 | 44 | 39 | 32 | 18 | 33 | 14 | 28 | 18 | 54 | 33 | 59 | 36 | 78 | 51 | 76 | 59 |
| 3 | 81 | 64 | 78 | 60 | 69 | 45 | 79 | 60 | 39 | 34 | 40 | 26 | 27 | 9 | 30 | 7 | 47 | 33 | 57 | 38 | 63 | 52 | 82 | 66 |
| 4 | 73 | 57 | 78 | 56 | 75 | 52 | 72 | 44 | 46 | 32 | 46 | 35 | 29 | 17 | 30 | 9 | 36 | 27 | 60 | 38 | 56 | 44 | 71 | 51 |
| 5 | 84 | 64 | 84 | 57 | 75 | 58 | 56 | 36 | 45 | 25 | 46 | 34 | 17 | 6 | 35 | 13 | 50 | 29 | 56 | 34 | 60 | 46 | 65 | 47 |
| 6 | 76 | 60 | 85 | 63 | 67 | 56 | 60 | 36 | 37 | 18 | 34 | 26 | 15 | 4 | 42 | 26 | 59 | 42 | 50 | 38 | 64 | 39 | 63 | 44 |
| 7 | 78 | 54 | 81 | 66 | 69 | 49 | 58 | 41 | 45 | 27 | 35 | 21 | 15 | 0 | 44 | 29 | 59 | 44 | 55 | 31 | 75 | 55 | 70 | 51 |
| 8 | 86 | 67 | 85 | 62 | 70 | 55 | 56 | 50 | 48 | 40 | 34 | 29 | 27 | 10 | 40 | 30 | 62 | 40 | 58 | 44 | 65 | 50 | 57 | 48 |
| 9 | 89 | 71 | 81 | 63 | 72 | 54 | 61 | 47 | 44 | 30 | 32 | 25 | 40 | 25 | 33 | 21 | 68 | 42 | 64 | 49 | 60 | 45 | 65 | 42 |
| 10 | 76 | 62 | 80 | 57 | 68 | 63 | 57 | 41 | 38 | 28 | 30 | 30 | 40 | 35 | 25 | 15 | 65 | 44 | 64 | 53 | 51 | 42 | 66 | 50 |
| 11 | 74 | 55 | 80 | 57 | 73 | 65 | 48 | 40 | 48 | 26 | 50 | 36 | 40 | 32 | 25 | 8 | 57 | 44 | 60 | 45 | 52 | 33 | 65 | 48 |
| 12 | 82 | 58 | 85 | 66 | 75 | 64 | 50 | 40 | 48 | 30 | 52 | 30 | 33 | 30 | 31 | 15 | 45 | 38 | 64 | 45 | 50 | 33 | 70 | 45 |
| 13 | 85 | 64 | 75 | 63 | 80 | 60 | 65 | 45 | 53 | 33 | 49 | 33 | 33 | 28 | 33 | 25 | 44 | 38 | 60 | 39 | 54 | 35 | 75 | 48 |
| 14 | 83 | 63 | 72 | 61 | 79 | 59 | 72 | 53 | 54 | 40 | 40 | 25 | 35 | 30 | 34 | 19 | 47 | 37 | 56 | 41 | 54 | 37 | 73 | 50 |
| 15 | 86 | 69 | 67 | 56 | 81 | 66 | 75 | 55 | 57 | 50 | 53 | 32 | 34 | 28 | 33 | 20 | 51 | 35 | 53 | 41 | 57 | 34 | 80 | 54 |
| 16 | 86 | 65 | 72 | 60 | 80 | 62 | 65 | 52 | 52 | 41 | 48 | 35 | 31 | 20 | 34 | 21 | 50 | 40 | 62 | 40 | 60 | 44 | 80 | 64 |
| 17 | 83 | 61 | 81 | 58 | 68 | 52 | 67 | 50 | 57 | 40 | 52 | 33 | 40 | 28 | 35 | 27 | 44 | 36 | 63 | 42 | 65 | 46 | 66 | 53 |
| 18 | 76 | 67 | 85 | 61 | 65 | 43 | 65 | 56 | 40 | 32 | 48 | 33 | 40 | 32 | 27 | 20 | 47 | 31 | 67 | 48 | 66 | 45 | 72 | 48 |
| 19 | 71 | 60 | 86 | 61 | 69 | 47 | 57 | 50 | 36 | 26 | 58 | 48 | 50 | 33 | 35 | 13 | 52 | 35 | 74 | 54 | 75 | 54 | 76 | 52 |
| 20 | 69 | 55 | 85 | 63 | 64 | 50 | 50 | 44 | 50 | 30 | 53 | 45 | 42 | 37 | 50 | 32 | 50 | 33 | 74 | 58 | 77 | 59 | 73 | 59 |
| 21 | 75 | 57 | 86 | 69 | 65 | 47 | 46 | 39 | 51 | 39 | 49 | 42 | 38 | 35 | 44 | 38 | 40 | 34 | 70 | 48 | 59 | 49 | 64 | 51 |
| 22 | 82 | 63 | 86 | 67 | 70 | 47 | 54 | 34 | 46 | 40 | 44 | 40 | 35 | 14 | 47 | 36 | 44 | 33 | 65 | 52 | 65 | 43 | 56 | 48 |
| 23 | 83 | 59 | 72 | 65 | 76 | 50 | 67 | 45 | 48 | 40 | 50 | 42 | 19 | 7 | 36 | 32 | 60 | 30 | 77 | 50 | 70 | 47 | 66 | 54 |
| 24 | 85 | 61 | 71 | 65 | 80 | 59 | 65 | 49 | 50 | 46 | 42 | 40 | 40 | 18 | 36 | 29 | 41 | 20 | 70 | 52 | 77 | 58 | 80 | 55 |
| 25 | 84 | 61 | 78 | 58 | 79 | 62 | 63 | 51 | 52 | 46 | 42 | 39 | 45 | 37 | 34 | 24 | 32 | 16 | 62 | 50 | 76 | 60 | 81 | 56 |
| 26 | 90 | 70 | 80 | 61 | 79 | 61 | 51 | 43 | 52 | 42 | 43 | 39 | 39 | 32 | 44 | 21 | 39 | 28 | 60 | 49 | 70 | 54 | 85 | 66 |
| 27 | 81 | 72 | 82 | 65 | 76 | 64 | 55 | 42 | 42 | 38 | 42 | 35 | 32 | 31 | 47 | 27 | 55 | 37 | 57 | 48 | 67 | 49 | 85 | 63 |
| 28 | 87 | 72 | 83 | 69 | 73 | 60 | 69 | 45 | 38 | 26 | 43 | 33 | 31 | 15 | 52 | 28 | 38 | 31 | 57 | 50 | 65 | 46 | 87 | 65 |
| 29 | 88 | 72 | 84 | 67 | 80 | 54 | 60 | 44 | 26 | 14 | 41 | 33 | 25 | 9 | ..... | ..... | 45 | 27 | 59 | 50 | 57 | 46 | 89 | 66 |
| 30 | 83 | 67 | 75 | 61 | 83 | 62 | 50 | 35 | 26 | 11 | 37 | 29 | 30 | 18 | ..... | ..... | 40 | 32 | 70 | 51 | 65 | 45 | 92 | 69 |
| 31 | 84 | 64 | 76 | 64 | ..... | ..... | 50 | 40 | ..... | ..... | 30 | 25 | 27 | 20 | ..... | ..... | 43 | 39 | ..... | ..... | 70 | 47 | ..... | ..... |
| Range | 36° | | 32° | | 40° | | 50° | | 46° | | 40° | | 50° | | 45° | | 52° | | 46° | | 45° | | 50° | |
| Monthly means | 72°.5 | | 71°.6 | | 64°.6 | | 53°.8 | | 39°.2 | | 38°.3 | | 28°.0 | | 29°.9 | | 40°.9 | | 53°.3 | | 56°.0 | | 64°.9 | |

*Maximum, minimum, and mean temperatures—Continued.*

STATION, DODGE CITY, KANS.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 97 | 65 | 91 | 72 | 81 | 64 | 83 | 52 | 52 | 36 | 51 | 10 | 37 | 18 | 31 | 28 | 53 | 38 | 64 | 43 | 67 | 51 | 95 | 68 |
| 2 | 87 | 68 | 84 | 67 | 67 | 59 | 82 | 62 | 55 | 28 | 62 | 28 | 30 | 13 | 37 | 27 | 54 | 37 | 54 | 37 | 65 | 44 | 83 | 55 |
| 3 | 98 | 69 | 76 | 67 | 59 | 49 | 68 | 38 | 60 | 30 | 50 | 32 | 38 | 16 | 53 | 22 | 53 | 32 | 52 | 34 | 65 | 38 | 77 | 58 |
| 4 | 98 | 72 | 91 | 68 | 66 | 54 | 58 | 26 | 50 | 31 | 36 | 29 | 25 | 9 | 58 | 26 | 67 | 31 | 70 | 30 | 72 | 37 | 76 | 52 |
| 5 | 99 | 72 | 95 | 69 | 75 | 52 | 65 | 35 | 37 | 21 | 33 | 23 | 30 | 12 | 60 | 28 | 66 | 44 | 77 | 40 | 84 | 40 | 71 | 56 |
| 6 | 98 | 71 | 96 | 65 | 84 | 53 | 64 | 46 | 48 | 22 | 53 | 13 | 36 | 10 | 49 | 36 | 68 | 37 | 77 | 40 | 92 | 54 | 78 | 56 |
| 7 | 99 | 72 | 81 | 64 | 83 | 60 | 71 | 42 | 44 | 35 | 49 | 21 | 39 | 20 | 45 | 36 | 75 | 41 | 63 | 50 | 66 | 50 | 73 | 50 |
| 8 | 101 | 68 | 89 | 63 | 79 | 58 | 84 | 44 | 45 | 26 | 52 | 24 | 43 | 29 | 36 | 26 | 59 | 39 | 64 | 48 | 73 | 39 | 81 | 48 |
| 9 | 79 | 66 | 90 | 63 | 82 | 56 | 67 | 42 | 40 | 20 | 63 | 32 | 52 | 23 | 26 | 19 | 48 | 34 | 52 | 36 | 62 | 45 | 76 | 51 |
| 10 | 91 | 63 | 97 | 68 | 92 | 48 | 71 | 37 | 63 | 23 | 64 | 32 | 54 | 23 | 30 | 18 | 54 | 26 | 57 | 36 | 71 | 38 | 76 | 52 |
| 11 | 88 | 66 | 89 | 73 | 95 | 62 | 84 | 47 | 66 | 33 | 68 | 33 | 45 | 27 | 53 | 21 | 57 | 34 | 75 | 40 | 79 | 50 | 93 | 56 |
| 12 | 89 | 62 | 85 | 65 | 93 | 68 | 87 | 58 | 71 | 35 | 61 | 35 | 39 | 31 | 52 | 28 | 57 | 27 | 79 | 42 | 51 | 36 | 93 | 61 |
| 13 | 94 | 65 | 78 | 65 | 88 | 70 | 73 | 55 | 58 | 42 | 58 | 29 | 40 | 25 | 38 | 32 | 57 | 28 | 74 | 41 | 46 | 39 | 80 | 59 |
| 14 | 99 | 69 | 84 | 56 | 79 | 59 | 58 | 48 | 58 | 39 | 65 | 28 | 46 | 16 | 37 | 30 | 62 | 35 | 59 | 38 | 58 | 43 | 84 | 63 |
| 15 | 101 | 71 | 83 | 65 | 85 | 49 | 49 | 38 | 62 | 31 | 60 | 30 | 48 | 21 | 51 | 24 | 75 | 40 | 77 | 43 | 77 | 47 | 83 | 59 |
| 16 | 88 | 65 | 88 | 63 | 72 | 54 | 47 | 39 | 66 | 32 | 67 | 34 | 51 | 24 | 46 | 32 | 65 | 39 | 81 | 40 | 71 | 44 | 69 | 56 |
| 17 | 98 | 72 | 90 | 57 | 71 | 42 | 56 | 43 | 71 | 36 | 63 | 40 | 56 | 26 | 59 | 27 | 65 | 39 | 67 | 47 | 88 | 52 | 70 | 55 |
| 18 | 89 | 65 | 87 | 59 | 76 | 45 | 52 | 39 | 53 | 40 | 62 | 31 | 42 | 36 | 70 | 33 | 77 | 43 | 70 | 43 | 73 | 48 | 84 | 59 |
| 19 | 78 | 61 | 89 | 64 | 87 | 53 | 45 | 34 | 43 | 38 | 57 | 52 | 50 | 35 | 70 | 36 | 69 | 46 | 72 | 36 | 75 | 41 | 91 | 65 |
| 20 | 78 | 55 | 91 | 66 | 92 | 47 | 47 | 33 | 52 | 41 | 54 | 44 | 44 | 30 | 52 | 41 | 74 | 44 | 84 | 45 | 74 | 46 | 78 | 61 |
| 21 | 84 | 50 | 82 | 58 | 91 | 58 | 57 | 31 | 48 | 28 | 53 | 45 | 50 | 29 | 52 | 34 | 64 | 44 | 80 | 55 | 64 | 54 | 83 | 57 |
| 22 | 86 | 57 | 79 | 57 | 92 | 62 | 67 | 35 | 48 | 31 | 48 | 34 | 50 | 26 | 52 | 31 | 69 | 39 | 71 | 40 | 85 | 62 | 88 | 60 |
| 23 | 85 | 56 | 87 | 54 | 88 | 58 | 71 | 43 | 57 | 30 | 55 | 29 | 50 | 26 | 47 | 31 | 80 | 39 | 66 | 45 | 80 | 55 | 89 | 65 |
| 24 | 84 | 58 | 93 | 63 | 89 | 62 | 69 | 50 | 48 | 36 | 54 | 36 | 57 | 30 | 53 | 29 | 69 | 40 | 69 | 40 | 82 | 60 | 86 | 65 |
| 25 | 88 | 65 | 101 | 71 | 73 | 58 | 71 | 44 | 53 | 26 | 48 | 32 | 53 | 26 | 45 | 32 | 79 | 41 | 74 | 57 | 69 | 57 | 79 | 61 |
| 26 | 81 | 65 | 92 | 66 | 84 | 53 | 77 | 38 | 47 | 31 | 41 | 33 | 41 | 31 | 56 | 32 | 70 | 52 | 76 | 51 | 78 | 51 | 83 | 65 |
| 27 | 92 | 67 | 95 | 67 | 87 | 53 | 66 | 41 | 36 | 24 | 38 | 30 | 53 | 24 | 64 | 36 | 62 | 34 | 76 | 48 | 80 | 50 | 85 | 65 |
| 28 | 91 | 64 | 98 | 72 | 91 | 62 | 54 | 41 | 31 | 14 | 30 | 27 | 40 | 27 | 67 | 38 | 51 | 33 | 58 | 47 | 88 | 58 | 87 | 63 |
| 29 | 91 | 66 | 94 | 67 | 91 | 63 | 52 | 38 | 26 | 0 | 28 | 18 | 33 | 29 | ..... | ..... | 51 | 35 | 73 | 46 | 86 | 59 | 93 | 72 |
| 30 | 92 | 65 | 94 | 68 | 81 | 63 | 50 | 41 | 37 | 5 | 27 | 15 | 32 | 28 | ..... | ..... | 50 | 32 | 64 | 53 | 93 | 64 | 79 | 60 |
| 31 | 94 | 73 | 99 | 72 | ..... | ..... | 56 | 43 | ..... | ..... | 37 | 15 | 31 | 24 | ..... | ..... | 58 | 33 | ..... | ..... | 87 | 67 | ..... | ..... |
| Range | 51° | | 47° | | 53° | | 61° | | 71° | | 58° | | 48° | | 52° | | 54° | | 54° | | 57° | | 47° | |
| Monthly means | 77°.5 | | 76°.2 | | 68°.4 | | 51°.7 | | 38°.6 | | 39°.0 | | 32°.0 | | 38°.2 | | 49°.3 | | 55°.9 | | 61°.9 | | 70°.5 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, DUBUQUE, IOWA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 84 | 63 | 91 | 68 | 73 | 57 | 78 | 64 | 42 | 33 | 30 | 23 | 34 | 26 | 35.5 | 28 | 55 | 37 | 58 | 38 | 58 | 49 | 78.5 | 63 |
| 2 | 82 | 63 | 80 | 64 | 72 | 50 | 72 | 59 | 38 | 33 | 38 | 19 | 31 | 19 | 37 | 26 | 47 | 39 | 58 | 40 | 61 | 48 | 84 | 63 |
| 3 | 89 | 62 | 84 | 58 | 75 | 48 | 71 | 48 | 42 | 30 | 41 | 29 | 30 | 20 | 36 | 17 | 39.5 | 34 | 55 | 38 | 57 | 41 | 72.5 | 61 |
| 4 | 93 | 70 | 86 | 58 | 79 | 53 | 52 | 38 | 36 | 30 | 44 | 35 | 30 | 5 | 42 | 20 | 45 | 29 | 62.5 | 39.5 | 55 | 36.5 | 75 | 57 |
| 5 | 87 | 76 | 88 | 61 | 77 | 56 | 56 | 38 | 32 | 23 | 36 | 30 | 21 | 2 | 48.5 | 30 | 59.5 | 38 | 58 | 43 | 66 | 39.5 | 78 | 53 |
| 6 | 89 | 65 | 88 | 68 | 75 | 57 | 60 | 33 | 41 | 11 | 30 | 20 | 9 | — 1 | 37 | 37 | 57 | 34.5 | 59 | 35 | 75.5 | 47.5 | 75 | 59 |
| 7 | 95 | 69 | 88 | 63 | 76 | 50 | 54 | 50 | 38 | 28 | 38 | 22 | 24 | — 5 | 49 | 39 | 61.5 | 36 | 54 | 36 | 69.5 | 56 | 62.5 | 53 |
| 8 | 84 | 67 | 84 | 64 | 76 | 54 | 55 | 45 | 38 | 34 | 30 | 21 | 36 | 22 | 39.5 | 32 | 66 | 50 | 59.5 | 45 | 67.5 | 51.5 | 54 | 49 |
| 9 | 86 | 69 | 79 | 60 | 68 | 60 | 50 | 38 | 36 | 24 | 48.5 | 21 | 39 | 33 | 32 | 23 | 65 | 55 | 62 | 43 | 59 | 43.5 | 66 | 51 |
| 10 | 78 | 63 | 87 | 58 | 78 | 58 | 55 | 45 | 35 | 16 | 46.5 | 33 | 38 | 33 | 30.5 | 18 | 59 | 49 | 46.5 | 39 | 58 | 39 | 75 | 45 |
| 11 | 82 | 56 | 87 | 66 | 80 | 51 | 57 | 37 | 45 | 24 | 50 | 34 | 34.5 | 26 | 34 | 13 | 60.5 | 43 | 62 | 40 | 53 | 37.5 | 69.5 | 50 |
| 12 | 86 | 57 | 83 | 66 | 82 | 54 | 54 | 42 | 50 | 33 | 54 | 36 | 40 | 30.5 | 39.5 | 29 | 62 | 45 | 62 | 46 | 60 | 35 | 73.5 | 50 |
| 13 | 88 | 63 | 73 | 61 | 88 | 63 | 70 | 50 | 55 | 37 | 45 | 32 | 37 | 30 | 38 | 29 | 49 | 43 | 58.5 | 37 | 61 | 36.5 | 74 | 54 |
| 14 | 90 | 67 | 81 | 59 | 87 | 69 | 71 | 57 | 52 | 46 | 46.5 | 28 | 36.5 | 23 | 37 | 31 | 61.5 | 36 | 51 | 41.5 | 61 | 41 | 80 | 60 |
| 15 | 95 | 68 | 84 | 55 | 77 | 62 | 65 | 50 | 53 | 44 | 52 | 36 | 29.5 | 20 | 39 | 33 | 61 | 37 | 52 | 43 | 65 | 47 | 82 | 66 |
| 16 | 84 | 66 | 85 | 60 | 69 | 58 | 60 | 47 | 55 | 37 | 53 | 29 | 32.5 | 25 | 43.5 | 35.5 | 50 | 42 | 62 | 43 | 60 | 49 | 77 | 58 |
| 17 | 87 | 62 | 86 | 60 | 63 | 47 | 60 | 53 | 45 | 34 | 48 | 43 | 43.5 | 29 | 39.5 | 34 | 45.5 | 36 | 72 | 49 | 65 | 39 | 78 | 58 |
| 18 | 76 | 64 | 87 | 61 | 71 | 42 | 58 | 52 | 39 | 31 | 60 | 43 | 37 | 30.5 | 43 | 32 | 53 | 31 | 76 | 56 | 60 | 46.5 | 80.5 | 54 |
| 19 | 68 | 58 | 89 | 61 | 73 | 54 | 55 | 45 | 43 | 35 | 57 | 48 | 42 | 29 | 51 | 36 | 65 | 41.5 | 78 | 56 | 77 | 57 | 82 | 58 |
| 20 | 77 | 57 | 89 | 64 | 75 | 52 | 49 | 41 | 48 | 33 | 64 | 51 | 40 | 32 | 50.5 | 30 | 60 | 36 | 70 | 48 | 67.5 | 53 | 75 | 61 |
| 21 | 84 | 54 | 73 | 63 | 73 | 48 | 53 | 36 | 47 | 40 | 61 | 43 | 37 | 30.5 | 42 | 35 | 52.5 | 41.5 | 61.5 | 51 | 63 | 48 | 73 | 52 |
| 22 | 86 | 59 | 78 | 55 | 79 | 54 | 64 | 36 | 41 | 31 | 56 | 50 | 34 | 21 | 43 | 34 | 50 | 36.5 | 79.5 | 55 | 69 | 47 | 74 | 49 |
| 23 | 90 | 60 | 78 | 53 | 80 | 62 | 64 | 46 | 43 | 34 | 58.5 | 49 | 29 | 10 | 39.5 | 32 | 71 | 41 | 68.5 | 55 | 83 | 61 | 83.5 | 53 |
| 24 | 91 | 61 | 83 | 53 | 82 | 59 | 67 | 51 | 43 | 33 | 52.5 | 43.5 | 45 | 27 | 37 | 32 | 54 | 34 | 60 | 49 | 81 | 55 | 91 | 58.5 |
| 25 | 90 | 65 | 82 | 59 | 82 | 65 | 56 | 45 | 42 | 39 | 50.5 | 43 | 39 | 33 | 40 | 30 | 50 | 29 | 59 | 49 | 74 | 56 | 85 | 67 |
| 26 | 87 | 72 | 89 | 62 | 80 | 61 | 56 | 47 | 41 | 35 | 43 | 37 | 36 | 25 | 45.5 | 24 | 70 | 45 | 51 | 42.5 | 68 | 50 | 77 | 63.5 |
| 27 | 87 | 70 | 85 | 73 | 79 | 62 | 60 | 48 | 36 | 28 | 41 | 36 | 37 | 18 | 49.5 | 27 | 54 | 41 | 64 | 47 | 70 | 51 | 85 | 58 |
| 28 | 86 | 69 | 76 | 66 | 80 | 59 | 52 | 43 | 28 | 15 | 44 | 38 | 30 | 14.5 | 57.5 | 34 | 47.5 | 32 | 71 | 47.5 | 68 | 50 | 91.5 | 63 |
| 29 | 87 | 63 | 82 | 64 | 84 | 63 | 52 | 37 | 18 | 7 | 41 | 36 | 30 | 19 | ..... | ..... | 49 | 33.5 | 77 | 47 | 61 | 51 | 85 | 70 |
| 30 | 90 | 64 | 82 | 58 | 85 | 66 | 49 | 31 | 28 | 17 | 43 | 33 | 35.5 | 24 | ..... | ..... | 40 | 36 | 70 | 53 | 70 | 45.5 | 86.5 | 72 |
| 31 | 88 | 64 | 85 | 68 | ..... | ..... | 48 | 34 | ..... | ..... | 38 | 28 | 34 | 25 | ..... | ..... | 55 | 34 | ..... | ..... | 74 | 52 | ..... | ..... |
| Range | 41° | | 38° | | 46° | | 47° | | 48° | | 45° | | 50° | | 44°.5 | | 42° | | 44°.5 | | 48° | | 46°.5 | |
| Monthly means | 74°.7 | | 71°.9 | | 66°.3 | | 51°.7 | | 35°.2 | | 41°.6 | | 30° | | 35° | | 43°.8 | | 53°.8 | | 56°.3 | | 67°.2 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, DULUTH, MINN.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 81 | 57 | 82 | 63 | 72 | 48 | 53 | 44 | 47 | 37 | 23 | 14 | 28 | 8 | 38 | 33 | 40 | 27 | 55 | 40 | 70 | 46 | 55 | 45 |
| 2 | 68 | 55 | 77 | 58 | 71 | 49 | 52 | 46 | 42 | 30 | 30 | 13 | 18 | −4 | 41 | 24 | 42 | 35 | 49 | 39 | 58 | 45 | 52 | 45 |
| 3 | 67 | 53 | 77 | 55 | 81 | 53 | 53 | 42 | 33 | 26 | 36 | 16 | 26 | 7 | 41 | 16 | 37 | 27 | 49 | 36 | 46 | 33 | 58 | 44 |
| 4 | 64 | 52 | 74 | 60 | 69 | 55 | 43 | 36 | 33 | 22 | 30 | 29 | 13 | −12 | 41 | 22 | 50 | 18 | 54 | 27 | 48 | 34 | 62 | 53 |
| 5 | 62 | 50 | 81 | 62 | 65 | 53 | 51 | 33 | 34 | 15 | 36 | 20 | 10 | −4 | 40 | 25 | 57 | 33 | 54 | 34 | 68 | 37 | 55 | 41 |
| 6 | 62 | 50 | 85 | 67 | 64 | 49 | 58 | 36 | 37 | 16 | 20 | 1 | 2 | −11 | 43 | 32 | 50 | 35 | 56 | 33 | 56 | 45 | 50 | 43 |
| 7 | 94 | 54 | 83 | 64 | 67 | 53 | 50 | 43 | 39 | 26 | 33 | 8 | 12 | −13 | 43 | 28 | 54 | 33 | 45 | 35 | 58 | 41 | 62 | 44 |
| 8 | 88 | 69 | 75 | 60 | 73 | 60 | 53 | 47 | 35 | 22 | 25 | 14 | 29 | 9 | 31 | 21 | 46 | 39 | 45 | 37 | 60 | 44 | 60 | 43 |
| 9 | 83 | 65 | 77 | 59 | 68 | 60 | 50 | 43 | 34 | 18 | 29 | 9 | 38 | 22 | 23 | 14 | 47 | 41 | 46 | 41 | 50 | 36 | 71 | 46 |
| 10 | 79 | 56 | 77 | 59 | 77 | 60 | 51 | 43 | 40 | 21 | 42 | 25 | 37 | 27 | 26 | 11 | 43 | 37 | 47 | 39 | 50 | 34 | 65 | 49 |
| 11 | 85 | 58 | 76 | 61 | 74 | 56 | 48 | 37 | 45 | 26 | 43 | 30 | 37 | 25 | 36 | 16 | 42 | 36 | 48 | 36 | 48 | 33 | 71 | 48 |
| 12 | 82 | 62 | 72 | 61 | 71 | 58 | 50 | 41 | 45 | 29 | 43 | 33 | 37 | 30 | 35 | 23 | 43 | 35 | 54 | 36 | 54 | 32 | 66 | 47 |
| 13 | 73 | 60 | 72 | 58 | 73 | 63 | 52 | 45 | 49 | 36 | 42 | 28 | 33 | 22 | 35 | 18 | 41 | 33 | 56 | 33 | 54 | 35 | 64 | 51 |
| 14 | 83 | 59 | 80 | 61 | 76 | 69 | 51 | 47 | 52 | 35 | 47 | 26 | 34 | 15 | 36 | 29 | 43 | 30 | 46 | 36 | 55 | 36 | 62 | 50 |
| 15 | 80 | 64 | 83 | 62 | 67 | 59 | 47 | 41 | 45 | 29 | 48 | 30 | 32 | 17 | 37 | 28 | 45 | 26 | 42 | 35 | 65 | 40 | 65 | 51 |
| 16 | 82 | 61 | 83 | 62 | 63 | 49 | 48 | 36 | 45 | 33 | 43 | 27 | 31 | 23 | 36 | 23 | 46 | 33 | 42 | 37 | 56 | 36 | 68 | 54 |
| 17 | 81 | 58 | 89 | 61 | 51 | 42 | 51 | 42 | 38 | 22 | 41 | 30 | 32 | 24 | 33 | 26 | 39 | 23 | 48 | 37 | 52 | 40 | 66 | 52 |
| 18 | 64 | 54 | 86 | 67 | 68 | 43 | 54 | 46 | 35 | 21 | 43 | 37 | 33 | 26 | 35 | 11 | 61 | 28 | 46 | 42 | 49 | 41 | 65 | 49 |
| 19 | 61 | 52 | 82 | 63 | 60 | 45 | 49 | 37 | 37 | 28 | 43 | 36 | 34 | 27 | 37 | 30 | 52 | 38 | 46 | 41 | 48 | 42 | 77 | 56 |
| 20 | 78 | 51 | 86 | 65 | 61 | 46 | 49 | 34 | 44 | 33 | 41 | 36 | 33 | 24 | 40 | 33 | 46 | 32 | 66 | 40 | 56 | 42 | 67 | 56 |
| 21 | 84 | 60 | 76 | 61 | 62 | 47 | 54 | 35 | 43 | 37 | 43 | 37 | 36 | 22 | 39 | 33 | 44 | 32 | 52 | 42 | 56 | 42 | 67 | 48 |
| 22 | 72 | 57 | 75 | 53 | 68 | 55 | 69 | 37 | 42 | 30 | 45 | 39 | 30 | 8 | 41 | 28 | 62 | 33 | 44 | 38 | 52 | 40 | 68 | 47 |
| 23 | 75 | 54 | 72 | 55 | 62 | 55 | 54 | 44 | 38 | 28 | 48 | 42 | 20 | −5 | 38 | 33 | 56 | 31 | 48 | 39 | 57 | 43 | 80 | 52 |
| 24 | 86 | 59 | 72 | 59 | 57 | 52 | 49 | 43 | 41 | 33 | 44 | 36 | 32 | 14 | 35 | 27 | 37 | 17 | 58 | 38 | 67 | 50 | 71 | 61 |
| 25 | 77 | 64 | 73 | 62 | 67 | 52 | 48 | 41 | 38 | 35 | 43 | 34 | 33 | 23 | 40 | 19 | 44 | 25 | 49 | 40 | 63 | 50 | 67 | 57 |
| 26 | 80 | 64 | 76 | 61 | 56 | 51 | 50 | 41 | 40 | 31 | 42 | 37 | 33 | 17 | 48 | 22 | 46 | 35 | 50 | 39 | 57 | 48 | 81 | 60 |
| 27 | 74 | 65 | 79 | 60 | 63 | 50 | 56 | 46 | 31 | 23 | 39 | 34 | 27 | 6 | 47 | 28 | 42 | 31 | 59 | 36 | 57 | 42 | 88 | 60 |
| 28 | 82 | 62 | 76 | 61 | 61 | 44 | 48 | 38 | 23 | 10 | 40 | 33 | 19 | −5 | 39 | 28 | 48 | 21 | 51 | 38 | 58 | 41 | 80 | 65 |
| 29 | 83 | 63 | 81 | 55 | 62 | 51 | 44 | 34 | 27 | 6 | 39 | 31 | 27 | 3 | ..... | ..... | 48 | 28 | 50 | 38 | 54 | 41 | 73 | 63 |
| 30 | 75 | 66 | 75 | 63 | 69 | 52 | 43 | 31 | 24 | 17 | 35 | 25 | 32 | 24 | ..... | ..... | 43 | 34 | 63 | 41 | 55 | 39 | 77 | 63 |
| 31 | 74 | 65 | 72 | 60 | ..... | ..... | 41 | 34 | ..... | ..... | 30 | 24 | 36 | 27 | ..... | ..... | 52 | 35 | ..... | ..... | 52 | 43 | ..... | ..... |
| Range | 44° | | 36° | | 39° | | 38° | | 46° | | 47° | | 51° | | 37° | | 45° | | 39° | | 38° | | 47° | |
| Monthly means | 68°.1 | | 69°.2 | | 59°.1 | | 45°.5 | | 32°.8 | | 34°.1 | | 22°.2 | | 31°.8 | | 39°.4 | | 44°.3 | | 49°.5 | | 60°.2 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, EAGLE PASS, TEX.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 99 | 79 | 95 | 81 | 100 | 75 | 94 | 68 | 72 | 62 | 53 | 22 | 51 | 32 | 65 | 43 | 78 | (*) | 80 | (*) | 90 | 50 | 93 | 71 |
| 2 | 98 | 77 | 96 | 81 | 102 | 78 | 98 | 70 | 65 | 55 | 52 | 42 | 55 | 36 | 56 | 40 | 65 | ..... | 75 | ..... | 89 | 65 | 98 | 71 |
| 3 | 95 | 76 | 99 | 82 | 101 | 76 | 101 | 77 | 68 | 51 | 62 | 47 | 57 | 37 | 57 | 32 | 72 | ..... | 78 | ..... | 81 | 60 | 100 | 69 |
| 4 | 94 | 83 | 99 | 84 | 99 | 77 | 86 | 62 | 65 | 55 | 75 | 43 | 51 | 32 | 68 | 35 | 74 | ..... | 75 | ..... | 82 | 45 | 88 | 70 |
| 5 | 93 | 80 | 98 | 82 | 92 | 79 | 81 | 61 | 69 | 56 | 55 | 38 | 49 | 30 | 71 | 38 | 72 | ..... | 83 | ..... | 87 | 49 | 89 | 69 |
| 6 | 94 | 79 | 100 | 82 | 91 | 74 | 89 | 68 | 61 | 45 | 57 | 25 | 45 | 39 | 73 | 53 | 75 | ..... | 83 | ..... | 89 | 49 | 90 | 68 |
| 7 | 97 | 78 | 101 | 82 | 87 | 75 | 93 | 71 | 72 | 42 | 60 | 26 | 42 | 36 | 75 | 44 | 80 | ..... | 82 | 60 | 86 | 62 | 94 | 68 |
| 8 | 99 | 80 | 96 | 82 | 92 | 73 | 87 | 63 | 68 | 45 | 60 | 33 | 53 | 40 | 72 | 43 | 73 | ..... | 86 | 53 | 83 | 59 | 87 | 63 |
| 9 | 99 | 80 | 95 | 82 | 96 | 74 | 90 | 69 | 64 | 37 | 58 | 48 | 55 | 39 | 68 | 39 | (†) | ..... | 86 | 52 | 76 | 59 | 92 | 67 |
| 10 | 99 | 82 | 94 | 81 | 97 | 74 | 91 | 72 | 60 | 34 | 60 | 48 | 54 | 42 | 58 | 32 | 77 | ..... | 86 | 52 | 72 | 60 | 95 | 63 |
| 11 | 90 | 75 | 94 | 79 | 87 | 74 | 91 | 66 | 64 | 33 | 64 | 53 | 58 | 46 | 62 | 36 | 84 | ..... | 76 | 53 | 76 | 54 | 95 | 62 |
| 12 | 92 | 80 | 95 | 78 | 95 | 73 | 89 | 65 | 72 | 36 | 59 | 53 | 61 | 44 | 66 | 49 | 77 | ..... | 85 | 62 | 82 | 54 | 91 | 66 |
| 13 | 93 | 80 | 98 | 72 | 96 | 77 | 91 | 68 | 75 | 53 | 66 | 58 | 55 | 40 | 77 | 48 | 82 | ..... | 80 | 64 | 84 | 62 | 97 | 71 |
| 14 | 94 | 81 | 99 | 74 | 96 | 76 | 91 | 75 | 73 | 54 | 66 | 58 | 58 | 34 | 78 | 41 | 76 | ..... | 82 | 62 | 85 | 60 | 93 | 71 |
| 15 | 96 | 82 | 101 | 76 | 97 | 75 | 92 | 75 | 73 | 44 | 70 | 62 | 60 | 35 | 70 | 39 | 76 | ..... | 86 | 57 | 78 | 57 | 96 | 72 |
| 16 | 90 | 78 | 98 | 72 | 94 | 73 | 83 | 62 | 77 | 53 | 74 | 64 | 63 | 42 | 70 | 35 | 82 | ..... | 89 | 59 | 88 | 63 | 98 | 71 |
| 17 | 93 | 78 | 101 | 76 | 93 | 73 | 76 | 61 | 78 | 54 | 74 | 65 | 64 | 47 | 80 | 38 | 81 | ..... | 91 | 59 | 88 | 63 | 101 | 75 |
| 18 | 96 | 81 | 98 | 76 | 86 | 68 | 72 | 61 | 78 | 58 | 73 | 65 | 69 | 55 | 82 | 42 | 75 | ..... | 85 | 61 | 87 | 63 | 100 | 72 |
| 19 | 94 | 81 | 100 | 75 | 87 | 59 | 66 | 53 | 73 | 53 | 75 | 57 | 68 | 43 | 80 | 57 | 67 | ..... | 84 | 69 | 92 | 62 | 100 | 74 |
| 20 | 93 | 79 | 100 | 74 | 87 | 62 | 68 | 45 | 73 | 46 | 62 | 54 | 70 | 40 | 80 | 53 | 70 | ..... | 93 | 69 | 89 | 67 | 100 | 73 |
| 21 | 88 | 74 | 100 | 78 | 90 | 54 | 69 | 43 | 69 | 42 | 68 | 54 | 61 | 38 | 79 | 38 | 74 | ..... | 92 | 67 | 90 | 73 | 99 | 73 |
| 22 | 86 | 68 | 98 | 77 | 91 | 60 | 73 | 41 | 70 | 46 | 69 | 47 | 64 | 36 | 72 | 44 | 76 | ..... | 93 | 71 | 91 | 73 | 96 | 70 |
| 23 | 87 | 70 | 101 | 78 | 89 | 62 | 78 | 46 | 75 | 42 | 68 | 56 | 66 | 33 | 71 | 45 | 77 | ..... | 85 | 61 | 94 | 71 | 96 | 70 |
| 24 | 90 | 74 | 101 | 76 | 90 | 63 | 77 | 64 | 81 | 51 | 69 | 48 | 66 | 34 | 71 | (*) | 76 | ..... | 86 | 43 | 91 | 67 | 98 | 71 |
| 25 | 96 | 78 | 100 | 83 | 92 | 70 | 81 | 61 | 66 | 46 | 70 | 48 | 70 | 41 | 71 | ..... | 78 | ..... | 87 | 51 | 91 | 67 | 98 | 71 |
| 26 | 102 | 82 | 99 | 76 | 91 | 75 | 83 | 49 | 75 | 36 | 69 | 52 | 76 | 54 | 60 | ..... | 80 | ..... | 87 | 62 | 90 | 64 | 98 | 72 |
| 27 | 101 | 86 | 97 | 76 | 95 | 73 | 89 | 50 | 63 | 37 | 62 | 54 | 71 | 43 | 62 | ..... | 83 | ..... | 88 | 57 | 87 | 58 | 92 | 73 |
| 28 | 97 | 84 | 95 | 74 | 94 | 69 | 87 | 66 | 54 | 42 | 54 | 47 | 72 | 40 | 67 | ..... | 88 | ..... | 78 | 50 | 90 | 58 | 89 | 66 |
| 29 | 94 | 82 | 96 | 72 | 93 | 68 | 87 | 70 | 48 | 30 | 48 | 40 | 71 | 44 | ..... | ..... | 88 | ..... | 81 | 50 | 89 | 67 | 91 | 70 |
| 30 | 95 | 78 | 93 | 72 | 92 | 68 | 77 | 58 | 47 | 26 | 46 | 33 | 65 | 48 | ..... | ..... | 78 | ..... | 88 | 50 | 88 | 67 | 95 | 69 |
| 31 | 95 | 73 | 98 | 76 | ..... | ..... | 64 | 55 | ..... | ..... | 48 | 29 | 70 | 37 | ..... | ..... | 80 | ..... | ..... | ..... | 93 | 67 | ..... | ..... |
| Range | 34° | | 29° | | 48° | | 60° | | 55° | | 53° | | 41° | | ..... | | ..... | | ..... | | 49° | | 39° | |
| Monthly means | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | |

* Minimum thermometer broken.

† Missing.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, EASTPORT, ME.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 57 | 50 | 69 | 53 | 63 | 55 | 64 | 50 | 46 | 37 | 30 | 13 | 23 | 11 | 23 | 9.5 | 30 | 9 | 36 | 29 | 44 | 39 | 69 | 47 |
| 2 | 65 | 50 | 69 | 51 | 64 | 55 | 60 | 52 | 54 | 36 | 21 | 10 | 26 | 17 | 17 | 6 | 35 | 15 | 38 | 29 | 60 | 41 | 62 | 46 |
| 3 | 78 | 55 | 66 | 51 | 69 | 53 | 57 | 47 | 53 | 38 | 36 | 14 | 21 | 5 | 30 | 10 | 44 | 34 | 43 | 34 | 51 | 41 | 63 | 46 |
| 4 | 74 | 51 | 81 | 55 | 66 | 51 | 58 | 52 | 42 | 31 | 40 | 25 | 28 | 3 | 32 | 21 | 41 | 29 | 38 | 33 | 55 | 41 | 61 | 47 |
| 5 | 75 | 52 | 73 | 54 | 68 | 51 | 60 | 45 | 48 | 29 | 52 | 36 | 40 | 17 | 31 | 24 | 40 | 18 | 37 | 33 | 58 | 43 | 53 | 45 |
| 6 | 71 | 52 | 67 | 55 | 61 | 52 | 54 | 37 | 50 | 24 | 54 | 38 | 17 | 0 | 37 | 24 | 37 | 23 | 41 | 34 | 53 | 42 | 58 | 46 |
| 7 | 68 | 51 | 68 | 55 | 63 | 48 | 52 | 38 | 43 | 23 | 38 | 20 | 4 | — 6 | 38 | 28 | 42 | 36 | 37 | 32 | 63 | 40 | 64 | 42 |
| 8 | 68 | 51 | 66 | 52 | 59 | 50 | 52 | 39 | 49 | 34 | 38 | 20 | 5 | —15 | 43 | 32 | 47 | 34 | 42 | 34 | 56 | 47 | 60 | 44 |
| 9 | 63 | 50 | 65 | 55 | 65 | 52 | 51 | 43 | 59 | 40 | 35 | 26 | 29.5 | 4 | 37 | 29 | 46 | 33 | 51 | 31 | 59 | 45 | 55 | 44 |
| 10 | 69 | 50 | 59 | 53 | 68 | 52 | 52 | 47 | 40 | 28 | 26 | 13 | 37 | 17 | 29 | 14 | 53 | 33 | 44 | 31 | 53 | 44 | 56 | 45 |
| 11 | 65 | 47 | 66 | 54 | 71 | 52 | 52 | 49 | 34 | 27 | 33 | 21 | 42 | 36.5 | 21 | 12 | 34 | 21 | 46 | 37 | 58 | 40 | 50 | 45 |
| 12 | 67 | 50 | 65 | 52 | 72 | 52 | 53 | 45 | 35 | 23 | 35 | 25 | 38 | 30 | 24 | 5 | 35 | 23 | 44 | 36 | 55 | 40 | 60 | 45 |
| 13 | 69 | 46 | 66 | 52 | 81 | 54 | 50 | 43 | 36 | 26 | 38 | 23 | 36 | 30 | 33 | 8 | 33 | 30 | 44 | 36 | 52 | 41 | 61 | 41 |
| 14 | 71 | 57 | 59 | 53 | 71 | 53 | 50 | 38 | 45 | 22 | 35 | 9 | 43 | 32 | 21 | 3 | 33 | 28 | 46 | 35 | 52 | 39 | 58 | 41 |
| 15 | 82 | 53 | 65 | 53 | 64 | 52 | 55 | 43 | 52 | 41 | 38 | 6 | 40 | 24 | 26 | 10 | 38 | 27 | 47 | 39 | 48 | 38 | 58 | 42 |
| 16 | 83 | 56 | 67 | 53 | 68 | 53 | 46 | 38 | 54 | 48 | 43 | 26 | 24 | — 4 | 29 | 17 | 38 | 22 | 54 | 36 | 49 | 40 | 55 | 44 |
| 17 | 66 | 52 | 69 | 55 | 66 | 54 | 49 | 34 | 50 | 41 | 42 | 22 | 9 | — 6 | 32 | 16 | 46 | 30 | 49 | 39 | 60 | 42 | 58 | 46 |
| 18 | 70 | 54 | 70 | 52 | 64 | 50 | 54 | 56 | 46 | 36 | 27 | 13 | 23 | 5 | 28 | 10 | 35 | 27 | 47 | 33 | 61 | 41 | 62 | 46 |
| 19 | 63 | 53 | 70 | 53 | 64 | 47 | 59 | 40 | 40 | 31 | 40 | 19 | 38 | 20 | 19 | 4 | 36 | 25 | 51 | 32 | 57 | 43 | 61 | 45 |
| 20 | 64 | 54 | 78 | 52 | 70 | 47 | 48 | 37 | 32 | 28 | 40 | 20 | 46 | 30 | 31 | 13 | 38 | 25 | 55 | 36 | 58 | 41 | 71 | 47 |
| 21 | 75 | 56 | 75 | 55 | 59 | 49 | 44 | 34 | 31 | 23.5 | 23 | 14 | 40.5 | 37 | 33 | 20 | 27 | 14 | 57 | 39 | 48 | 43 | 70 | 50 |
| 22 | 72 | 54 | 72 | 53 | 58 | 47 | 44 | 34 | 35 | 23 | 29 | 19 | 40 | 34 | 31 | 15 | 28 | 11 | 56 | 42 | 49 | 42 | 67 | 48 |
| 23 | 77 | 52 | 77 | 55 | 68 | 44 | 51 | 34 | 43 | 30 | 29 | 21 | 46 | 7 | 37 | 28 | 42 | 21 | 49 | 37 | 51 | 43 | 60 | 51 |
| 24 | 76 | 56 | 82 | 59 | 68 | 53 | 48 | 37 | 43 | 36 | 33 | 24 | 8.5 | — 6 | 40 | 34 | 42 | 35 | 49 | 36 | 58 | 43 | 60 | 48 |
| 25 | 71 | 52 | 65 | 56 | 59 | 49 | 39 | 31 | 41 | 37 | 35 | 25 | 30 | 8.5 | 37 | 29 | 39 | 21 | 50 | 39 | 59 | 46 | 58 | 48 |
| 26 | 65 | 50 | 59 | 54 | 64 | 51 | 39 | 26 | 46 | 39 | 35 | 22 | 39 | 30 | 35 | 28 | 40 | 21 | 52 | 42 | 54 | 42 | 66 | 50 |
| 27 | 66 | 50 | 62 | 53 | 61 | 49 | 40 | 29 | 55 | 45 | 40 | 24 | 34 | 26 | 44 | 27 | 40 | 31 | 54 | 47 | 65 | 44 | 67 | 52 |
| 28 | 69 | 53 | 67 | 54 | 58 | 46 | 46 | 27 | 51 | 42 | 37 | 26 | 37 | 9 | 47 | 29 | 36 | 33 | 49 | 42 | 68 | 50 | 67 | 49 |
| 29 | 71 | 57 | 62 | 53 | 64 | 50 | 53 | 34 | 45 | 35 | 37 | 23 | 12 | 1 | ..... | ..... | 37 | 32 | 48 | 42 | 63 | 51 | 76 | 54 |
| 30 | 64 | 55 | 74 | 54 | 64 | 47 | 53 | 35 | 36 | 30 | 33 | 22 | 12 | — 6 | ..... | ..... | 34 | 30 | 44 | 41 | 62 | 45 | 81 | 58 |
| 31 | 72 | 53 | 69 | 53 | ..... | ..... | 46 | 34 | ..... | ..... | 28 | 22 | 20 | 1 | ..... | ..... | 37 | 31 | ..... | ..... | 67 | 45 | ..... | ..... |
| Range | 37° | | 31° | | 37° | | 38° | | 37° | | 48° | | 61° | | 44° | | 44° | | 28° | | 30° | | 40° | |
| Monthly means | 60°.6 | | 61°.1 | | 57°.5 | | 45°.5 | | 39°.3 | | 29°.2 | | 22°.0 | | 26°.0 | | 32°.5 | | 41°.7 | | 49°.5 | | 54°.6 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, EL PASO, TEX.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | | | | | | | | | | | | | | | | | | | | | 82 | 66 | 87 | 73 |
| 2 | | | | | | | | | | | | | | | | | | | | | 79 | 70 | 87 | 72 |
| 3 | | | | | | | | | | | | | | | | | | | | | 79 | 67 | 87 | 74 |
| 4 | | | | | | | | | | | | | | | | | | | | | 76 | 63 | 87 | 72 |
| 5 | | | | | | | | | | | | | | | | | | | | | 77 | 64 | 89 | 74 |
| 6 | | | | | | | | | | | | | | | | | | | | | 80 | 62 | 89 | 74 |
| 7 | | | | | | | | | | | | | | | | | | | | | 83 | 70 | 83 | 75 |
| 8 | | | | | | | | | | | | | | | | | | | | | 82 | 64 | 84 | 74 |
| 9 | | | | | | | | | | | | | | | | | | | | | 81 | 68 | 89 | 72 |
| 10 | | | | | | | | | | | | | | | | | | | | | 73 | 69 | 90 | 71 |
| 11 | | | | | | | | | | | | | | | | | | | | | 73 | 63 | 93 | 75 |
| 12 | | | | | | | | | | | | | | | | | | | | | 79 | 61 | 90 | 75 |
| 13 | | | | | | | | | | | | | | | | | | | 79 | 60 | 80 | 63 | 90 | 74 |
| 14 | | | | | | | | | | | | | | | | | | | 77 | 64 | 82 | 61 | 94 | 73 |
| 15 | | | | | | | | | | | | | | | | | | | 72 | 64 | 81 | 67 | 88 | 78 |
| 16 | | | | | | | | | | | | | | | | | | | 74 | 63 | 83 | 67 | 85 | 74 |
| 17 | | | | | | | | | | | | | | | | | | | 70 | 59 | 82 | 71 | 90 | 74 |
| 18 | | | | | | | | | | | | | | | | | | | 69 | 56 | 77 | 68 | 94 | 73 |
| 19 | | | | | | | | | | | | | | | | | | | 76 | 54 | 80 | 67 | 92 | 78 |
| 20 | | | | | | | | | | | | | | | | | | | 79 | 62 | 83 | 67 | 92 | 79 |
| 21 | | | | | | | | | | | | | | | | | | | 72 | 60 | 80 | 68 | 91 | 80 |
| 22 | | | | | | | | | | | | | | | | | | | 70 | 59 | 83 | 66 | 94 | 77 |
| 23 | | | | | | | | | | | | | | | | | | | 70 | 57 | 77 | 66 | 88 | 77 |
| 24 | | | | | | | | | | | | | | | | | | | 72 | 59 | 84 | 66 | 92 | 72 |
| 25 | | | | | | | | | | | | | | | | | | | 76 | 60 | 82 | 68 | 95 | 78 |
| 26 | | | | | | | | | | | | | | | | | | | 75 | 62 | 77 | 67 | 93 | 79 |
| 27 | | | | | | | | | | | | | | | | | | | 77 | 61 | 85 | 67 | 84 | 70 |
| 28 | | | | | | | | | | | | | | | | | | | 74 | 63 | 85 | 68 | 92 | 75 |
| 29 | | | | | | | | | | | | | | | | | | | 81 | 64 | 86 | 67 | 95 | 77 |
| 30 | | | | | | | | | | | | | | | | | | | 86 | 65 | 86 | 72 | 95 | 80 |
| 31 | | | | | | | | | | | | | | | | | | | | | 87 | 73 | | |
| Range | | | | | | | | | | | | | | | | | | | | | 26° | | 24° | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

* Observations commenced April 13, 1878.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, ERIE, PA.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 79 | 67 | 86 | 69 | 69 | 61 | 80 | 63 | 52 | 42 | 35 | 23 | 36 | 25 | 34 | 23 | 43 | 31 | 49 | 36 | 65 | 51 | 72 | 52 |
| 2 | 69 | 63 | 87 | 69 | 63 | 54 | 73 | 61 | 58 | 39 | 35 | 26 | 36 | 14 | 29 | 17 | 53 | 34 | 55 | 41 | 82 | 55 | 77 | 60 |
| 3 | 79 | 65 | 77 | 67 | 63 | 54 | 75 | 58 | 41 | 34 | 40 | 23 | 27 | 9 | 30 | 10 | 52 | 35 | 55 | 38 | 74 | 54 | 83 | 63 |
| 4 | 79 | 62 | 76 | 63 | 74 | 54 | 69 | 52 | 50 | 36 | 50 | 34 | 34 | 21 | 32 | 10 | 35 | 28 | 54 | 38 | 56 | 48 | 72 | 56 |
| 5 | 79 | 64 | 79 | 55 | 76 | 58 | 55 | 47 | 56 | 32 | 57 | 38 | 35 | 14 | 34 | 16 | 52 | 30 | 54 | 36 | 59 | 47 | 59 | 49 |
| 6 | 79 | 62 | 83 | 63 | 65 | 58 | 58 | 48 | 39 | 27 | 40 | 32 | 21 | 13 | 49 | 27 | 61 | 46 | 48 | 40 | 62 | 45 | 65 | 43 |
| 7 | 77 | 55 | 80 | 67 | 65 | 57 | 63 | 42 | 52 | 29 | 37 | 26 | 18 | 12 | 55 | 34 | 58 | 46 | 48 | 37 | 73 | 53 | 68 | 48 |
| 8 | 87 | 68 | 81 | 67 | 65 | 57 | 60 | 49 | 59 | 40 | 42 | 27 | 28 | 10 | 44 | 35 | 58 | 42 | 54 | 39 | 72 | 53 | 55 | 49 |
| 9 | 79 | 67 | 81 | 66 | 70 | 57 | 63 | 51 | 56 | 33 | 35 | 28 | 45 | 26 | 40 | 28 | 68 | 51 | 67 | 50 | 61 | 48 | 63 | 46 |
| 10 | 76 | 63 | 77 | 63 | 73 | 61 | 62 | 51 | 39 | 31 | 45 | 28 | 45 | 34 | 37 | 20 | 71 | 51 | 68 | 50 | 54 | 44 | 60 | 50 |
| 11 | 73 | 61 | 77 | 61 | 76 | 64 | 57 | 44 | 44 | 30 | 45 | 40 | 37 | 32 | 25 | 18 | 62 | 39 | 60 | 49 | 48 | 41 | 64 | 49 |
| 12 | 79 | 58 | 80 | 67 | 78 | 65 | 52 | 44 | 48 | 34 | 54 | 32 | 40 | 34 | 34 | 16 | 44 | 36 | 60 | 48 | 49 | 39 | 65 | 50 |
| 13 | 78 | 64 | 75 | 67 | 77 | 64 | 60 | 44 | 54 | 38 | 54 | 36 | 42 | 35 | 38 | 20 | 45 | 36 | 56 | 40 | 53 | 36 | 70 | 51 |
| 14 | 80 | 61 | 78 | 62 | 76 | 61 | 71 | 56 | 62 | 37 | 40 | 33 | 41 | 32 | 36 | 23 | 44 | 34 | 55 | 40 | 54 | 37 | 74 | 51 |
| 15 | 86 | 67 | 75 | 61 | 84 | 66 | 71 | 56 | 59 | 50 | 52 | 37 | 36 | 29 | 39 | 33 | 46 | 37 | 50 | 43 | 57 | 40 | 82 | 58 |
| 16 | 91 | 71 | 75 | 61 | 78 | 65 | 65 | 54 | 59 | 48 | 54 | 44 | 28 | 20 | 40 | 30 | 51 | 39 | 59 | 42 | 58 | 39 | 80 | 64 |
| 17 | 81 | 66 | 76 | 62 | 72 | 56 | 60 | 48 | 59 | 44 | 54 | 37 | 40 | 26 | 41 | 33 | 45 | 39 | 60 | 44 | 65 | 48 | 68 | 59 |
| 18 | 81 | 65 | 81 | 63 | 64 | 53 | 65 | 59 | 50 | 35 | 48 | 34 | 46 | 35 | 33 | 18 | 48 | 38 | 74 | 50 | 60 | 45 | 74 | 56 |
| 19 | 75 | 64 | 81 | 64 | 69 | 46 | 58 | 49 | 39 | 32 | 59 | 47 | 54 | 43 | 40 | 11 | 46 | 37 | 70 | 56 | 74 | 57 | 74 | 50 |
| 20 | 74 | 61 | 81 | 63 | 68 | 51 | 54 | 43 | 44 | 29 | 59 | 44 | 48 | 40 | 48 | 35 | 43 | 34 | 71 | 56 | 81 | 58 | 81 | 54 |
| 21 | 75 | 60 | 82 | 65 | 64 | 50 | 48 | 42 | 48 | 38 | 54 | 42 | 46 | 36 | 52 | 44 | 45 | 33 | 62 | 52 | 59 | 50 | 77 | 60 |
| 22 | 78 | 56 | 89 | 67 | 66 | 46 | 51 | 41 | 51 | 38 | 50 | 41 | 38 | 23 | 57 | 40 | 45 | 33 | 66 | 47 | 65 | 46 | 63 | 57 |
| 23 | 84 | 63 | 80 | 67 | 76 | 51 | 62 | 45 | 56 | 46 | 48 | 39 | 19 | 9 | 45 | 35 | 55 | 33 | 83 | 47 | 65 | 42 | 60 | 56 |
| 24 | 85 | 62 | 79 | 67 | 78 | 59 | 66 | 52 | 60 | 49 | 45 | 38 | 42 | 14 | 37 | 33 | 52 | 12 | 78 | 61 | 71 | 57 | 71 | 59 |
| 25 | 85 | 62 | 79 | 63 | 76 | 63 | 61 | 49 | 60 | 53 | 46 | 39 | 47 | 40 | 36 | 25 | 33 | 13 | 65 | 51 | 74 | 62 | 76 | 56 |
| 26 | 90 | 72 | 80 | 64 | 76 | 64 | 51 | 45 | 60 | 49 | 44 | 39 | 43 | 35 | 37 | 26 | 44 | 31 | 58 | 50 | 70 | 56 | 88 | 61 |
| 27 | 84 | 74 | 85 | 63 | 73 | 62 | 54 | 45 | 49 | 42 | 45 | 39 | 42 | 32 | 42 | 32 | 65 | 40 | 63 | 51 | 68 | 51 | 86 | 67 |
| 28 | 86 | 71 | 89 | 69 | 75 | 64 | 69 | 45 | 43 | 36 | 44 | 40 | 35 | 19 | 47 | 34 | 50 | 36 | 58 | 50 | 62 | 50 | 85 | 63 |
| 29 | 84 | 73 | 81 | 72 | 75 | 59 | 64 | 48 | 36 | 21 | 43 | 34 | 28 | 16 | ..... | ..... | 47 | 34 | 64 | 52 | 61 | 46 | 89 | 69 |
| 30 | 85 | 67 | 74 | 63 | 79 | 62 | 50 | 42 | 26 | 15 | 36 | 31 | 32 | 19 | ..... | ..... | 56 | 33 | 62 | 52 | 62 | 50 | 90 | 71 |
| 31 | 83 | 66 | 67 | 60 | ..... | ..... | 52 | 44 | ..... | ..... | 34 | 25 | 29 | 20 | ..... | ..... | 47 | 38 | ..... | ..... | 69 | 48 | ..... | ..... |
| Range | 36° | | 34° | | 38° | | 39° | | 47° | | 36° | | 45° | | 47° | | 59° | | 47° | | 46° | | 47° | |
| Monthly means | 71°.4 | | 71°.6 | | 64°.8 | | 55°.5 | | 43°.2 | | 40°.7 | | 30°.6 | | 33°.2 | | 42°.3 | | 53°.7 | | 56°.3 | | 65°.0 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, ESCANABA, MICH.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 76 | 61 | 82 | 69 | 66 | 48 | (*) | 46 | 45 | 29 | 31 | 20 | 32 | 16 | 35 | 21 | 37 | 23 | 50 | 34 | 59 | 45 | 62 | 52 |
| 2 | 69 | 52 | 79 | 57 | 57 | 45 | 50 | 45 | 41 | 33 | 31 | 18 | 21 | 10 | 34 | 17 | 34 | 29 | 50 | 27 | 50 | 45 | 61 | 54 |
| 3 | 65 | 57 | 70 | 52 | 74 | 43 | 61 | 48 | 37 | 28 | 35 | 25 | 25 | 13 | 34 | 13 | 33 | 24 | 51 | 34 | 51 | 40 | 69 | 54 |
| 4 | 69 | 50 | 75 | 47 | 67 | 53 | 50 | 35 | 32 | 25 | 42 | 32 | 25 | — 1 | 33 | 19 | 35 | 22 | 50 | 33 | 47 | 35 | 59 | 46 |
| 5 | 76 | 58 | 78 | 58 | 65 | 48 | 47 | 30 | 29 | 21 | 42 | 25 | 12 | — 2 | 36 | 19 | 38 | 31 | 43 | 34 | 49 | 32 | 62 | 49 |
| 6 | 73 | 51 | 83 | 62 | 65 | 42 | 55 | 34 | 39 | 18 | 25 | 10 | 10 | — 1 | 40 | 31 | 40 | 33 | 48 | 28 | 55 | 35 | 54 | 48 |
| 7 | 69 | 61 | 83 | 62 | 65 | 42 | 53 | 41 | 38 | 22 | 29 | 18 | 12 | — 5 | 47 | 33 | 46 | 32 | 44 | 25 | 59 | 44 | 60 | 46 |
| 8 | 85 | 63 | 79 | 58 | 68 | 41 | 52 | 46 | 39 | 31 | 27 | 22 | 32 | 12 | 33 | 23 | 48 | 30 | 50 | 32 | 57 | 44 | 64 | 45 |
| 9 | 83 | 61 | 72 | 57 | 70 | 57 | 53 | 43 | 31 | 22 | 34 | 18 | 35 | 27 | 24 | 14 | 55 | 44 | 49 | 42 | 56 | 37 | 70 | 44 |
| 10 | 72 | 56 | 73 | 54 | 71 | 51 | 49 | 42 | 38 | 18 | 40 | 26 | 35 | 31 | 23 | 12 | 47 | 36 | 49 | 39 | 45 | 33 | 59 | 47 |
| 11 | 76 | 51 | 75 | 53 | 72 | 51 | 46 | 39 | 40 | 24 | 44 | 35 | 32 | 27 | 26 | 12 | 43 | 34 | 50 | 38 | 45 | 33 | 64 | 44 |
| 12 | 82 | 56 | 74 | 57 | 72 | 53 | 51 | 31 | 43 | 27 | 40 | 30 | 30 | 23 | 32 | 16 | 44 | 32 | 54 | 38 | 49 | 28 | 69 | 44 |
| 13 | 78 | 56 | 67 | 59 | 71 | 54 | 52 | 47 | 46 | 31 | 40 | 26 | 32 | 25 | 35 | 15 | 42 | 30 | 53 | 34 | 52 | 30 | 69 | 46 |
| 14 | 78 | 65 | 73 | 57 | 74 | 63 | 55 | 47 | 48 | 41 | 38 | 25 | 35 | 28 | 33 | 18 | 42 | 34 | 54 | 32 | 53 | 28 | 70 | 45 |
| 15 | 80 | 66 | 74 | 58 | 75 | 61 | 65 | 45 | 47 | 35 | 44 | 34 | 30 | 20 | 38 | 22 | 45 | 28 | 52 | 36 | 56 | 31 | 63 | 57 |
| 16 | 83 | 64 | 77 | 52 | 70 | 47 | 52 | 38 | 45 | 34 | 42 | 29 | 30 | 18 | 38 | 27 | 44 | 35 | 56 | 34 | 58 | 45 | 64 | 52 |
| 17 | 85 | 62 | 77 | 58 | 60 | 43 | 55 | 48 | 40 | 29 | 39 | 28 | 33 | 27 | 29 | 17 | 35 | 28 | 62 | 41 | 58 | 36 | 69 | 44 |
| 18 | 72 | 56 | 77 | 60 | 64 | 40 | 54 | 49 | 31 | 28 | 39 | 30 | 35 | 21 | 29 | 9 | 43 | 25 | 55 | 47 | 52 | 40 | 69 | 46 |
| 19 | 60 | 51 | 76 | 55 | 65 | 47 | 49 | 39 | 36 | 28 | 42 | 37 | 39 | 28 | 36 | 24 | 53 | 33 | 52 | 45 | 51 | 46 | 74 | 57 |
| 20 | 70 | 49 | 80 | 59 | 59 | 45 | 45 | 34 | 43 | 36 | 41 | 35 | 35 | 30 | 41 | 32 | 41 | 29 | 55 | 43 | 54 | 44 | 65 | 48 |
| 21 | 77 | 56 | 78 | 65 | 62 | 37 | 48 | 28 | 45 | 38 | 43 | 37 | 36 | 30 | 35 | 32 | 45 | 34 | 52 | 37 | 56 | 40 | 54 | 45 |
| 22 | 74 | 56 | 72 | 55 | 67 | 55 | 56 | 34 | 41 | 35 | 44 | 36 | 30 | 4 | 34 | 31 | 47 | 28 | 47 | 42 | 57 | 37 | 63 | 46 |
| 23 | 75 | 53 | 74 | 49 | 67 | 58 | 51 | 36 | 41 | 37 | 45 | 41 | 20 | 1 | 34 | 29 | 49 | 22 | 50 | 42 | 54 | 48 | 73 | 50 |
| 24 | 81 | 58 | 72 | 59 | (*) | 54 | 53 | 39 | 42 | 33 | 44 | 40 | 29 | 18 | 29 | 24 | 22 | 10 | 53 | 43 | 76 | 52 | 78 | 57 |
| 25 | 81 | 61 | 77 | 49 | ..... | 58 | 48 | 36 | 43 | 39 | 41 | 36 | 28 | 21 | 33 | 23 | 39 | 20 | 49 | 37 | 68 | 53 | 75 | 60 |
| 26 | 79 | 64 | 75 | 54 | ..... | 51 | 47 | 37 | 44 | 38 | 38 | 33 | 31 | 21 | 38 | 15 | 38 | 32 | 52 | 35 | 60 | 48 | 70 | 60 |
| 27 | 78 | 68 | 77 | 65 | ..... | 56 | 52 | 44 | 44 | 33 | 37 | 31 | 26 | 14 | 38 | 23 | 37 | 27 | 53 | 40 | 55 | 43 | 74 | 57 |
| 28 | 81 | 65 | 76 | 62 | ..... | 46 | 46 | 38 | 34 | 22 | 39 | 33 | 18 | 10 | 35 | 23 | 38 | 25 | 62 | 41 | 59 | 35 | 76 | 65 |
| 29 | 81 | 62 | 75 | 57 | ..... | 55 | 43 | 35 | 30 | 17 | 37 | 31 | 26 | 4 | ..... | ..... | 41 | 20 | 63 | 43 | 57 | 37 | 79 | 62 |
| 30 | 82 | 56 | 72 | 51 | ..... | 55 | 48 | 29 | 31 | 22 | 39 | 27 | 31 | 14 | ..... | ..... | 42 | 30 | 63 | 43 | 63 | 38 | 77 | 60 |
| 31 | 81 | 66 | 67 | 52 | ..... | ..... | 42 | 32 | ..... | ..... | 31 | 24 | 28 | 17 | ..... | ..... | 50 | 35 | ..... | ..... | 62 | 47 | ..... | ..... |
| Range | 36° | | 36° | | ..... | | ..... | | 31° | | 35° | | 44° | | 38° | | 45° | | 38° | | 48° | | 39° | |
| Monthly means | 68°.0 | | 66°.7 | | 58°.7 | | 45°.5 | | 34°.5 | | 33°.8 | | 22°.5 | | 27°.5 | | 35°.3 | | 44°.1 | | 48°.1 | | 59°.4 | |

* Maximum thermometer broken.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, FATHER POINT, CANADA.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 70.9 | 52.4 | 65.5 | 48.2 | 64.9 | 53.0 | 66.4 | 44.9 | 38.1 | 32.8 | 23.6 | 5.4 | 20.6 | 5.6 | 8.3 | —13.1 | 14.6 | — 2.0 | 32.0 | 28.2 | 41.3 | 34.7 | 68.0 | 52.4 |
| 2 | 66.9 | 47.9 | 75.9 | 49.0 | 67.2 | 46.1 | 47.5 | 40.5 | 40.9 | 32.2 | 19.6 | 13.3 | 18.6 | — 1.4 | 12.3 | —11.1 | 17.3 | — 1.6 | 33.4 | 29.3 | 48.3 | 34.9 | 68.2 | 54.2 |
| 3 | 65.7 | 45.1 | 76.7 | 52.2 | 57.3 | 42.5 | 48.5 | 39.8 | 40.5 | 33.8 | 31.3 | 13.3 | 0.4 | — 9.1 | 22.9 | 11.0 | 26.3 | 16.0 | 36.2 | 28.7 | 50.8 | 37.8 | 68.1 | 48.8 |
| 4 | 80.7 | 44.7 | 64.0 | 51.0 | 59.6 | 46.1 | 63.8 | 46.1 | 35.6 | 30.4 | 32.3 | 22.9 | 11.7 | —10.4 | 26.4 | 18.1 | 27.5 | 19.1 | 32.8 | 27.4 | 51.8 | 35.5 | 61.7 | 47.0 |
| 5 | 64.8 | 51.3 | 59.7 | 49.9 | 55.0 | 45.1 | 51.0 | 39.5 | 32.6 | 27.2 | 40.1 | 24.7 | 26.2 | 1.8 | 27.5 | 16.8 | 20.7 | 9.7 | 33.8 | 30.5 | 57.8 | 34.7 | 59.2 | 43.8 |
| 6 | 92.9 | 49.0 | 56.1 | 49.0 | 56.6 | 38.0 | 44.8 | 36.1 | 32.0 | 21.7 | 39.1 | 13.3 | 4.4 | —13.4 | 29.2 | 12.8 | 37.9 | 5.7 | 34.3 | 31.5 | 60.5 | 39.5 | 50.0 | 42.8 |
| 7 | 65.7 | 43.8 | 55.6 | 48.2 | 62.5 | 36.7 | 43.5 | 30.0 | 34.6 | 23.4 | 22.3 | 12.3 | — 8.5 | —14.7 | 34.0 | 26.1 | 36.8 | 28.5 | 35.7 | 30.8 | 50.8 | 38.4 | 53.5 | 42.1 |
| 8 | 70.0 | 50.8 | 56.1 | 48.0 | 58.0 | 37.3 | 45.0 | 29.8 | 42.9 | 28.9 | 28.2 | 13.7 | — 5.5 | —23.3 | 34.7 | 25.3 | 37.3 | 28.0 | 36.7 | 26.6 | 51.3 | 38.5 | 61.0 | 37.0 |
| 9 | 74.3 | 47.3 | 61.3 | 46.1 | 58.0 | 40.3 | 53.0 | 39.4 | 35.7 | 20.4 | 27.1 | 12.9 | 14.3 | —11.9 | 31.5 | 7.9 | 37.4 | 27.2 | 44.9 | 25.1 | 55.5 | 37.9 | 49.1 | 40.9 |
| 10 | 65.7 | 50.0 | 61.5 | 45.4 | 59.6 | 42.3 | 46.1 | 38.8 | 21.1 | 11.9 | 17.7 | 12.2 | 25.6 | 12.8 | 12.0 | 1.8 | 37.1 | 15.0 | 38.6 | 31.0 | 53.0 | 36.3 | 52.7 | 41.4 |
| 11 | 67.5 | 49.5 | 54.8 | 43.9 | 62.3 | 45.8 | 41.7 | 37.7 | 30.0 | 10.4 | 21.9 | 13.8 | 28.0 | 18.2 | 13.3 | 3.4 | 25.3 | 6.7 | 41.3 | 32.5 | 46.6 | 37.0 | 51.3 | 42.8 |
| 12 | 65.9 | 50.1 | 63.2 | 42.3 | 64.5 | 50.0 | 40.8 | 34.9 | 33.1 | 24.9 | 28.7 | 16.4 | 30.2 | 26.0 | 19.9 | — 4.2 | 23.1 | 4.6 | 39.9 | 31.0 | 45.4 | 37.4 | 56.4 | 42.5 |
| 13 | 62.7 | 47.2 | 66.9 | 42.4 | 64.1 | 46.9 | 38.6 | 33.2 | 31.2 | 13.4 | 24.7 | 11.9 | 31.5 | 24.1 | 20.9 | 4.9 | 36.3 | 19.1 | 34.5 | 31.0 | 45.3 | 36.0 | 61.1 | 47.0 |
| 14 | 65.9 | 46.5 | 60.7 | 45.4 | 59.9 | 39.6 | 42.3 | 34.0 | 38.5 | 13.0 | 24.8 | — 2.5 | 30.3 | 21.2 | 12.4 | — 0.8 | 28.2 | 23.5 | 42.4 | 32.0 | 47.0 | 37.5 | 67.1 | 44.5 |
| 15 | 66.3 | 48.8 | 62.5 | 44.9 | 55.0 | 41.8 | 42.6 | 36.2 | 42.1 | 33.4 | 30.5 | — 4.0 | 25.9 | 13.0 | 15.3 | — 0.4 | 30.3 | 13.5 | 43.6 | 32.2 | 48.2 | 36.8 | 71.5 | 51.4 |
| 16 | 78.9 | 49.2 | 51.8 | 43.9 | 54.3 | 41.3 | 40.6 | 29.0 | 42.1 | 33.0 | 34.1 | 12.1 | (†) | — 8.4 | 21.0 | 1.8 | 33.4 | 10.6 | 44.1 | 32.0 | 50.0 | 41.1 | 63.9 | 50.0 |
| 17 | 85.0 | 54.4 | 52.4 | 44.3 | 69.6 | 40.6 | 44.5 | 35.0 | 39.2 | 29.2 | 18.6 | 9.7 | 0.1 | —11.4 | 21.4 | 7.5 | 37.2 | 24.1 | 41.5 | 29.3 | 57.5 | 37.2 | 62.7 | 44.8 |
| 18 | 72.9 | 52.8 | 69.7 | 44.3 | 73.2 | 44.5 | 47.3 | 36.8 | 34.1 | 27.4 | 16.1 | 9.5 | 17.9 | — 8.4 | 17.9 | — 1.2 | 27.8 | 18.1 | 43.1 | 27.2 | 50.1 | 38.8 | 59.3 | 45.8 |
| 19 | 79.6 | 53.0 | 68.5 | 51.6 | 53.0 | 44.2 | 42.5 | 32.7 | 34.1 | 28.0 | 29.8 | 13.8 | 28.0 | 16.0 | 17.1 | — 0.2 | 28.3 | 22.6 | 45.4 | 33.5 | 56.8 | 35.4 | 56.7 | 50.7 |
| 20 | 80.7 | 51.2 | 73.1 | 50.3 | 54.8 | 40.2 | 38.4 | 31.8 | 30.4 | 24.9 | 29.9 | 10.1 | 33.3 | 25.1 | 27.6 | 7.4 | 30.4 | 14.0 | 52.5 | 32.8 | 57.1 | 41.1 | 64.7 | 48.3 |
| 21 | 69.4 | 52.3 | 74.9 | 48.2 | 50.2 | 43.4 | 38.2 | 29.9 | 25.9 | 16.5 | 15.8 | 0.4 | 28.0 | 20.1 | 24.7 | 4.9 | 21.7 | 5.6 | 48.3 | 35.7 | 52.6 | 43.3 | 63.5 | 51.7 |
| 22 | 68.5 | 48.7 | 77.5 | 51.3 | 51.8 | 41.9 | 36.1 | 23.2 | 30.0 | 15.0 | 27.6 | 7.7 | 28.5 | 24.1 | 26.4 | 2.2 | 22.7 | 4.9 | 42.3 | 32.9 | 48.6 | 39.6 | 56.7 | 44.9 |
| 23 | 64.3 | 48.9 | 70.4 | 54.2 | 54.8 | 41.3 | 37.9 | 28.5 | 34.8 | 25.3 | 25.8 | 15.3 | 29.0 | 1.9 | 31.1 | 18.1 | 30.4 | 13.2 | 39.9 | 29.8 | 49.3 | 38.4 | 47.6 | 42.4 |
| 24 | 67.7 | 47.8 | 63.8 | 51.8 | 57.5 | 44.3 | 35.5 | 29.7 | 36.0 | 25.7 | 28.2 | 14.8 | 4.9 | — 9.4 | 32.3 | 28.7 | 23.9 | 17.8 | 49.3 | 34.6 | 56.9 | 38.6 | 61.2 | 41.7 |
| 25 | 61.5 | 45.1 | 62.5 | 50.7 | 49.9 | 41.4 | 33.3 | 20.6 | 34.0 | 25.1 | 24.7 | 10.0 | 14.3 | — 4.2 | 32.6 | 26.2 | 25.3 | 21.1 | 48.1 | 35.5 | 53.9 | 41.9 | 56.3 | 43.5 |
| 26 | 58.5 | 45.1 | 62.1 | 50.3 | 49.1 | 40.8 | 38.1 | 25.4 | 38.0 | 28.0 | 27.3 | 17.1 | 15.5 | — 9.4 | 32.9 | 25.8 | 29.7 | 21.5 | 41.3 | 34.9 | 48.7 | 41.4 | 63.1 | 46.8 |
| 27 | 72.4 | 45.5 | 63.7 | 50.3 | 55.8 | 38.3 | 36.3 | 31.8 | 49.2 | 32.9 | 29.5 | 19.1 | 22.1 | 13.0 | 36.8 | 20.7 | 37.3 | 21.9 | 41.8 | 34.7 | 57.3 | 41.2 | 64.2 | 47.8 |
| 28 | 68.5 | 50.1 | 67.4 | 45.8 | 55.4 | 36.0 | 35.2 | 27.0 | 43.4 | 35.0 | 28.2 | 14.0 | 23.9 | — 3.2 | 34.8 | 3.9 | 33.4 | 27.8 | 43.9 | 37.4 | 55.2 | 46.4 | 73.0 | 49.4 |
| 29 | 70.3 | 52.0 | 65.3 | 47.3 | 52.8 | 39.2 | 48.2 | 27.0 | 37.8 | 31.9 | 25.6 | 12.7 | — 0.1 | — 9.4 | ..... | ..... | 40.0 | 26.9 | 46.3 | 36.0 | 53.6 | 45.3 | 74.3 | 60.2 |
| 30 | 73.2 | 49.3 | 61.7 | 46.1 | 64.2 | 34.0 | 40.2 | 32.0 | 33.8 | 22.5 | 20.9 | 6.1 | 5.9 | — 7.2 | ..... | ..... | 36.4 | 20.5 | 43.7 | 35.2 | 60.2 | 44.4 | 81.4 | 58.2 |
| 31 | 69.5 | 50.4 | 66.5 | 49.1 | ..... | ..... | 39.0 | 29.4 | ..... | ..... | 17.9 | 5.4 | 8.4 | — 8.4 | ..... | ..... | 34.5 | 25.5 | ..... | ..... | 68.9 | 45.3 | ..... | ..... |
| Range | 41°.2 | | 35°.2 | | 39°.2 | | 45°.8 | | 32°.5 | | 44°.1 | | 56°.6 | | 49°.9 | | 42°.0 | | 27°.4 | | 34°.2 | | 44°.4 | |
| Monthly means | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, FLORENCE, ARIZ.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | *97 | 74 | 99 | 84 | 101 | 82 | 94 | 77 | 65 | 35 | 73 | 45 | 54 | 29 | 65 | 35 | 60 | 43 | 74 | 46 | 82 | 55 | 85 | 56 |
| 2 | 101 | 74 | 101 | 85 | 99 | 85 | 91 | 74 | 75 | 32 | 60 | 39 | 45 | 28 | 65 | 30 | 65 | 40 | 77 | 48 | 86 | 53 | 90 | 55 |
| 3 | 102 | 75 | 99 | 84 | 99 | 85 | 90 | 70 | 79 | 43 | 60 | 32 | 49 | 25 | 66 | 43 | 76 | 44 | 81 | 49 | 89 | 52 | 92 | 62 |
| 4 | 101 | 79 | 103 | 88 | 94 | 77 | 90 | 70 | 70 | 38 | 61 | 30 | 52 | 25 | 71 | 43 | 75 | 44 | 85 | 50 | 95 | 47 | 94 | 56 |
| 5 | 107 | 82 | 104 | 89 | 99 | 82 | 90 | 70 | 79 | 34 | 60 | 29 | 55 | 28 | 65 | 40 | 75 | 45 | 90 | 50 | 94 | 47 | 93 | 62 |
| 6 | 105 | 88 | 102 | 84 | 103 | 85 | 91 | 70 | 75 | 39 | 66 | 36 | 61 | 35 | 65 | 30 | 73 | 45 | 80 | 55 | 90 | 57 | 94 | 60 |
| 7 | 100 | 91 | 104 | 88 | 101 | 88 | 87 | 71 | 72 | 37 | 74 | 49 | 61 | 34 | 65 | 47 | 70 | 50 | 81 | 54 | 88 | 56 | 91 | 59 |
| 8 | 103 | 90 | 103 | 77 | 104 | 84 | 90 | 70 | 76 | 34 | 75 | 54 | 62 | 32 | 61 | 30 | 60 | 39 | 80 | 52 | 91 | 55 | 95 | 61 |
| 9 | 105 | 88 | 107 | 82 | 100 | 90 | 92 | 68 | 77 | 41 | 66 | 42 | 63 | 32 | 60 | 34 | 60 | 32 | 75 | 52 | 95 | 57 | 97 | 63 |
| 10 | 104 | 87 | 102 | 86 | 95 | 89 | 92 | 68 | 81 | 60 | 69 | 42 | 63 | 31 | 61 | 30 | 65 | 32 | 80 | 52 | 95 | 68 | 98 | 67 |
| 11 | 103 | 87 | 103 | 82 | 85 | 75 | 90 | 75 | 81 | 57 | 70 | 52 | 60 | 35 | 65 | 29 | 70 | 37 | 86 | 48 | 94 | 73 | 95 | 52 |
| 12 | 97 | 87 | 107 | 84 | 90 | 81 | 82 | 70 | 70 | 50 | 72 | 52 | 60 | 32 | 65 | 35 | 75 | 40 | 85 | 52 | 94 | 61 | 95 | 59 |
| 13 | 104 | 82 | 107 | 86 | 85 | 74 | 79 | 65 | 67 | 41 | 76 | 54 | 61 | 33 | 60 | 35 | 76 | 45 | 79 | 51 | 93 | 61 | 98 | 61 |
| 14 | 105 | 89 | 106 | 85 | 85 | 70 | 67 | 62 | 76 | 37 | 76 | 64 | 65 | 45 | 65 | 42 | 80 | 45 | 70 | 50 | 93 | 60 | 95 | 62 |
| 15 | 104 | 90 | 100 | 88 | 95 | 75 | 73 | 57 | 79 | 41 | 70 | 55 | 63 | 32 | 70 | 44 | 84 | 45 | 70 | 49 | 90 | 60 | 91 | 61 |
| 16 | 100 | 89 | 100 | 87 | 87 | 75 | 74 | 59 | 81 | 39 | 65 | 45 | 66 | 36 | 70 | 45 | 87 | 48 | 60 | 43 | 92 | 60 | 95 | 61 |
| 17 | 103 | 88 | 102 | 87 | 95 | 79 | 71 | 60 | 75 | 41 | 71 | 49 | 61 | 43 | 76 | 40 | 85 | 53 | 62 | 39 | 80 | 58 | 99 | 61 |
| 18 | 108 | 86 | 102 | 87 | 99 | 82 | 75 | 58 | 67 | 39 | 56 | 49 | 62 | 32 | 72 | 40 | 60 | 49 | 69 | 39 | 82 | 46 | 94 | 65 |
| 19 | 108 | 94 | 102 | 83 | 98 | 83 | 75 | 60 | 70 | 32 | 59 | 46 | 65 | 32 | 70 | 50 | 72 | 49 | 79 | 45 | 84 | 53 | 96 | 68 |
| 20 | 101 | 92 | 102 | 83 | 99 | 84 | 75 | 64 | 70 | 35 | 59 | 44 | 67 | 35 | 70 | 40 | 80 | 55 | 70 | 50 | 82 | 58 | 104 | 68 |
| 21 | 104 | 91 | 103 | 80 | 100 | 83 | 79 | 60 | 72 | 36 | 60 | 39 | 65 | 34 | 60 | 40 | 80 | 60 | 62 | 48 | 77 | 55 | 105 | 67 |
| 22 | 99 | 88 | 103 | 80 | 95 | 80 | 80 | 49 | 73 | 32 | 61 | 39 | 66 | 52 | 61 | 39 | 77 | 59 | 65 | 49 | 79 | 46 | 103 | 72 |
| 23 | 103 | 90 | 103 | 80 | 92 | 79 | 80 | 55 | 75 | 39 | 65 | 36 | 72 | 45 | 65 | 30 | 79 | 51 | 74 | 44 | 81 | 47 | 102 | 72 |
| 24 | 96 | 88 | 103 | 85 | 89 | 76 | 75 | 52 | 75 | 36 | 65 | 34 | 70 | 37 | 70 | 40 | 82 | 50 | 80 | 50 | 82 | 47 | 102 | 63 |
| 25 | 96 | 94 | 102 | 80 | (†) | ..... | 77 | 46 | 73 | 34 | 66 | 36 | 65 | 44 | 70 | 45 | 80 | 52 | 82 | 48 | 89 | 57 | 105 | 67 |
| 26 | 99 | 92 | 99 | 82 | 91 | 74 | 80 | 45 | 72 | 34 | 59 | 32 | 63 | 32 | 72 | 40 | 69 | 57 | 83 | 50 | 93 | 62 | 105 | 68 |
| 27 | 100 | 84 | 101 | 76 | 93 | 67 | 85 | 49 | 72 | 36 | 54 | 30 | 65 | 32 | 71 | 45 | 75 | 42 | 80 | 51 | 95 | 61 | 105 | 71 |
| 28 | 101 | 79 | 106 | 78 | 93 | 75 | 82 | 48 | 61 | 34 | 56 | 33 | 70 | 35 | 50 | 49 | 66 | 39 | 86 | 51 | 93 | 67 | 105 | 71 |
| 29 | 97 | 77 | 104 | 80 | 83 | 78 | 79 | 50 | 65 | 34 | 56 | 30 | 68 | 33 | ..... | ..... | 70 | 46 | 91 | 55 | 90 | 57 | 105 | 65 |
| 30 | 100 | 83 | 102 | 80 | 89 | 74 | 67 | 55 | 66 | 42 | 59 | 40 | 71 | 32 | ..... | ..... | 68 | 48 | 91 | 56 | 89 | 54 | 104 | 66 |
| 31 | 100 | 85 | 102 | 82 | ..... | ..... | 65 | 35 | ..... | ..... | 55 | 37 | 65 | 35 | ..... | ..... | 70 | 51 | ..... | ..... | 90 | 55 | ..... | ..... |
| Range | 34° | | 31° | | ..... | | ..... | | 49° | | 47° | | 47° | | 47° | | 55° | | 52° | | 49° | | 53° | |
| Monthly means | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | |

* The highest and lowest observed readings are recorded from July 1 to October 21, 1877.

† Observations of maximum and minimum thermometer began October 22, 1877.

; No observations taken

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, FORT BAYARD, N. MEX.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | ..... | ..... | ..... | ..... | 86 | 61 | 84 | 53 | 53 | 26 | 51 | 20 | 38 | 17 | 47 | 23 | 43 | 29 | 45 | 33 | (†) | ..... | ..... | ..... |
| 2 | ..... | ..... | ..... | ..... | 90 | 58 | 77 | 52 | 57 | 26 | 54 | 27 | 31 | 18 | 45 | 26 | 54 | 23 | 57 | 30 | ..... | ..... | ..... | ..... |
| 3 | ..... | ..... | ..... | ..... | 77 | 58 | 77 | 55 | 61 | 30 | 42 | 27 | 37 | 4 | 48 | 12 | 58 | 23 | 65 | 33 | ..... | ..... | ..... | ..... |
| 4 | ..... | ..... | ..... | ..... | 74 | 56 | 73 | 47 | 56 | 35 | 40 | 25 | 39 | 10 | 51 | 20 | 65 | 35 | 71 | 39 | ..... | ..... | ..... | ..... |
| 5 | ..... | ..... | ..... | ..... | 80 | 50 | 76 | 48 | 60 | 30 | 42 | 16 | 39 | 15 | 49 | 26 | 58 | 35 | 75 | 40 | ..... | ..... | ..... | ..... |
| 6 | ..... | ..... | ..... | ..... | 79 | 54 | 76 | 50 | 61 | 31 | 44 | 15 | 40 | 26 | 46 | 27 | 62 | 40 | 65 | 45 | ..... | ..... | ..... | ..... |
| 7 | ..... | ..... | (*) | ..... | 82 | 58 | 77 | 48 | 56 | 36 | 56 | 21 | 47 | 26 | 48 | 30 | 61 | 43 | 66 | 45 | ..... | ..... | ..... | ..... |
| 8 | ..... | ..... | 92 | 62 | 82 | 58 | 76 | 49 | 57 | 26 | 46 | 34 | 50 | 25 | 40 | 23 | 41 | 25 | 65 | 42 | ..... | ..... | ..... | ..... |
| 9 | ..... | ..... | 90 | 66 | 87 | 58 | 78 | 54 | 55 | 23 | 46 | 28 | 56 | 27 | 35 | 16 | 45 | 29 | 61 | 43 | ..... | ..... | ..... | ..... |
| 10 | ..... | ..... | 90 | 58 | 89 | 54 | 79 | 46 | 59 | 34 | 46 | 28 | 53 | 28 | 44 | 17 | 50 | 18 | 66 | 36 | ..... | ..... | ..... | ..... |
| 11 | ..... | ..... | 92 | 58 | 80 | 62 | 79 | 52 | 65 | 34 | 45 | 30 | 43 | 28 | 47 | 17 | 56 | 25 | 73 | 40 | ..... | ..... | ..... | ..... |
| 12 | ..... | ..... | 95 | 61 | 79 | 54 | 74 | 51 | 64 | 38 | 52 | 40 | 42 | 26 | 46 | 25 | 59 | 30 | 70 | 46 | ..... | ..... | ..... | ..... |
| 13 | ..... | ..... | 93 | 63 | 74 | 50 | 61 | 45 | 51 | 33 | 52 | 42 | 42 | 17 | 50 | 26 | 60 | 30 | 63 | 39 | ..... | ..... | ..... | ..... |
| 14 | ..... | ..... | 94 | 62 | 73 | 39 | 61 | 41 | 57 | 30 | 52 | 42 | 46 | 21 | 50 | 28 | 67 | 34 | 57 | 40 | ..... | ..... | ..... | ..... |
| 15 | ..... | ..... | 90 | 63 | 80 | 49 | 67 | 31 | 61 | 27 | 56 | 43 | 45 | 27 | 54 | 28 | 73 | 42 | 57 | 37 | ..... | ..... | ..... | ..... |
| 16 | ..... | ..... | 83 | 61 | 84 | 53 | 50 | 36 | 65 | 31 | 53 | 39 | 52 | 27 | 57 | 37 | 72 | 43 | 64 | 31 | ..... | ..... | ..... | ..... |
| 17 | ..... | ..... | 83 | 60 | 81 | 53 | 51 | 39 | 65 | 35 | 54 | 39 | 47 | 30 | 63 | 28 | 68 | 45 | 47 | 26 | ..... | ..... | ..... | ..... |
| 18 | ..... | ..... | 70 | 60 | 79 | 54 | 58 | 30 | 51 | 31 | 53 | 35 | 50 | 30 | 61 | 26 | 57 | 41 | 60 | 28 | ..... | ..... | ..... | ..... |
| 19 | ..... | ..... | 84 | 53 | 86 | 56 | 56 | 36 | 54 | 35 | 42 | 30 | 55 | 31 | 49 | 40 | 58 | 41 | 70 | 33 | ..... | ..... | ..... | ..... |
| 20 | ..... | ..... | 86 | 57 | 84 | 55 | 51 | 30 | 57 | 30 | 51 | 29 | 49 | 29 | 47 | 28 | 60 | 33 | 67 | 36 | ..... | ..... | ..... | ..... |
| 21 | ..... | ..... | 89 | 59 | 85 | 54 | 57 | 35 | 54 | 32 | 44 | 29 | 44 | 20 | 45 | 26 | 63 | 33 | 57 | 40 | ..... | ..... | ..... | ..... |
| 22 | ..... | ..... | 87 | 60 | 82 | 58 | 66 | 45 | 60 | 34 | 48 | 25 | 49 | 24 | 45 | 28 | 60 | 44 | 53 | 32 | ..... | ..... | ..... | ..... |
| 23 | * | ..... | 90 | 61 | 78 | 53 | 63 | 41 | 60 | 33 | 45 | 23 | 54 | 26 | 47 | 22 | 55 | 42 | 62 | 31 | ..... | ..... | ..... | ..... |
| 24 | ..... | ..... | 90 | 60 | 79 | 55 | 51 | 42 | 61 | 35 | 49 | 23 | 58 | 30 | 51 | 25 | 62 | 35 | 71 | 38 | ..... | ..... | ..... | ..... |
| 25 | ..... | ..... | 90 | 61 | 76 | 47 | 61 | 36 | 60 | 30 | 42 | 24 | 56 | 30 | 53 | 37 | 68 | 41 | 78 | 37 | ..... | ..... | ..... | ..... |
| 26 | ..... | ..... | 90 | 59 | 80 | 49 | 66 | 38 | 61 | 31 | 39 | 21 | 50 | 25 | 53 | 30 | 50 | 35 | 72 | 37 | ..... | ..... | ..... | ..... |
| 27 | ..... | ..... | 95 | 62 | 83 | 51 | 67 | 41 | 55 | 33 | 42 | 18 | 54 | 25 | 52 | 30 | 56 | 35 | 69 | 41 | ..... | ..... | ..... | ..... |
| 28 | ..... | ..... | 91 | 64 | 83 | 53 | 62 | 46 | 36 | 13 | 33 | 18 | 54 | 27 | 38 | 30 | 51 | 31 | 77 | 43 | ..... | ..... | ..... | ..... |
| 29 | ..... | ..... | 92 | 58 | 78 | 57 | 65 | 43 | 42 | 12 | 29 | 20 | 51 | 33 | ..... | ..... | 40 | 26 | 80 | 47 | ..... | ..... | ..... | ..... |
| 30 | ..... | ..... | 88 | 58 | 78 | 49 | 62 | 43 | 43 | 14 | 32 | 20 | 54 | 25 | ..... | ..... | 54 | 24 | 78 | 51 | ..... | ..... | ..... | ..... |
| 31 | ..... | ..... | 90 | 57 | ..... | ..... | 60 | 41 | ..... | ..... | 36 | 21 | 53 | 33 | ..... | ..... | 53 | 30 | ..... | ..... | ..... | ..... | ..... | ..... |
| Range | ..... | ..... | ..... | ..... | 43° | | 54° | | 53° | | 41° | | 54° | | 49° | | 55° | | 54° | | ..... | ..... | ..... | ..... |
| Monthly means | ..... | ..... | ..... | ..... | 64°.5 | | 53°.9 | | 41°.8 | | 35°.8 | | 34°.6 | | 37°.0 | | 45°.6 | | ..... | | ..... | ..... | ..... | ..... |

* Observations commenced August 8, 1877.

† Station closed May 15, 1878; no record kept during May, 1878.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, FORT CRAIG, N. MEX.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 101 | 64 | 78 | 65 | 96 | 63 | 85 | 45 | 55 | 35 | 47 | 10 | 36 | 12 | 50 | 22 | 59 | 38 | 52 | 38 | 80 | 51 | (*) | ..... |
| 2 | 98 | 63 | 82 | 64 | 97 | 60 | 85 | 45 | 58 | 23 | 57 | 17 | 30 | 18 | 46 | 30 | 63 | 31 | 65 | 29 | 85 | 50 | ..... | ..... |
| 3 | 99 | 66 | 85 | 62 | 79 | 63 | 80 | 61 | 65 | 22 | 53 | 29 | 26 | 0 | 49 | 19 | 61 | 26 | 74 | 37 | 70 | 41 | ..... | ..... |
| 4 | 100 | 76 | 92 | 60 | 75 | 58 | 78 | 48 | 68 | 35 | 43 | 29 | 29 | — 5 | 53 | 15 | 74 | 27 | 78 | 39 | 81 | 36 | ..... | ..... |
| 5 | 98 | 69 | 91 | 60 | 84 | 56 | 83 | 46 | 59 | 25 | 39 | 11 | 28 | 0 | 50 | 32 | 74 | 36 | 82 | 40 | 89 | 43 | 88 | 54 |
| 6 | 93 | 74 | 96 | 63 | 87 | 56 | 86 | 44 | 63 | 27 | 42 | 8 | 34 | 17 | 54 | 36 | 73 | 34 | 82 | 44 | 88 | 47 | 88 | 55 |
| 7 | 92 | 72 | 93 | 59 | 87 | 53 | 77 | 40 | 59 | 32 | 49 | 12 | 35 | 9 | 56 | 21 | 73 | 48 | 69 | 50 | 85 | 52 | 80 | 54 |
| 8 | 97 | 73 | 95 | 59 | 82 | 57 | 80 | 39 | 51 | 30 | 44 | 24 | 40 | 10 | 46 | 25 | 48 | 29 | 80 | 41 | 80 | 48 | 86 | 53 |
| 9 | 98 | 70 | 92 | 60 | 89 | 52 | 80 | 39 | 54 | 17 | 48 | 33 | 45 | 15 | 49 | 15 | 55 | 32 | 72 | 50 | 83 | 46 | 92 | 55 |
| 10 | 98 | 72 | 97 | 60 | 89 | 53 | 82 | 37 | 59 | 20 | 47 | 26 | 45 | 17 | 45 | 16 | 64 | 28 | 66 | 39 | 69 | 55 | 95 | 54 |
| 11 | 96 | 72 | 98 | 60 | 86 | 54 | 86 | 46 | 62 | 25 | 48 | 33 | 50 | 18 | 49 | 10 | 66 | 29 | 78 | 35 | 81 | 42 | 88 | 55 |
| 12 | 94 | 71 | 100 | 60 | 87 | 60 | 80 | 57 | 68 | 30 | 53 | 40 | 42 | 26 | 54 | 15 | 68 | 29 | 83 | 39 | 83 | 55 | 89 | 54 |
| 13 | 96 | 70 | 90 | 70 | 86 | 58 | 73 | 53 | 60 | 38 | 53 | 38 | 38 | 12 | 52 | 35 | 71 | 31 | 79 | 47.5 | 87 | 49 | 91 | 50 |
| 14 | 98 | 72 | 90 | 65 | 80 | 51 | 70 | 45 | 60 | 28 | 54 | 40 | 37 | 15 | 50 | 34 | 75 | 38 | 76 | 44 | 87 | 49 | 96 | 55 |
| 15 | 102 | 70 | 93 | 57 | 80 | 44 | 67 | 44 | 59 | 26 | (*) | ..... | 47 | 16 | 59 | 30 | 75 | 37 | 73 | 45 | 88 | 59 | 83 | 58 |
| 16 | 101 | 66 | 89 | 65 | 87 | 45 | 56 | 43 | 62 | 24 | 58 | 35 | 46 | 17 | 63 | 37 | 79 | 36 | 74 | 43 | 89 | 53 | 82 | 54 |
| 17 | 102 | 69 | 94 | 63 | 86 | 55 | 45 | 42 | 68 | 24 | 56 | 28 | 49 | 28 | 62 | 30 | 79 | 38 | 60 | 36 | 82 | 53 | 93 | 54 |
| 18 | 92 | 69 | 76 | 62 | 88 | 50 | (*) | ..... | 53 | 34 | 57 | 30 | 51 | 33 | 67 | 25 | 62 | 42 | 69 | 26 | 80 | 38 | 97 | 59 |
| 19 | 87 | 62 | 90 | 60 | 90 | 59 | ..... | ..... | 59 | 39 | 50 | 35 | 47 | 22 | 59 | 43 | 65 | 45 | 78 | 33 | 83 | 40 | 93 | 60 |
| 20 | 91 | 65 | 95 | 59 | 91 | 45 | ..... | ..... | 60 | 23 | 54 | 31 | 46 | 26 | (*) | ..... | 67 | 43 | 76 | 40 | 83 | 45 | 89 | 60 |
| 21 | 96 | 60 | 95 | 55 | 91 | 50 | ..... | ..... | 58 | 24 | 51 | 23 | 44 | 19 | 50 | 43 | 72 | 37 | 72 | 40 | 83 | 52 | 90 | 60 |
| 22 | 94 | 60 | 96 | 52 | 90 | 55 | ..... | ..... | 59 | 25 | 48 | 22 | 45 | 15 | 52 | 32 | 74 | 40 | 54 | 36 | 84 | 45 | 95 | 60 |
| 23 | 85 | 60 | 98 | 52 | 89 | 50 | 61 | 40 | 57 | 24 | 48 | 20 | 46 | 18 | 54 | 23 | 62 | 50 | 76 | 41 | 84 | 49 | 97 | 61 |
| 24 | 85 | 60 | 97 | 54 | 89 | 56 | 61 | 47 | 60 | 35 | 52 | 19 | 55 | 22 | 57 | 25 | 73 | 38 | 77 | 38 | 88 | 63 | 99 | 62 |
| 25 | 89 | 61 | 98 | 55 | 85 | 52 | 64 | 34 | 54 | 23 | 53 | 30 | 64 | 32 | 59.5 | 39 | 78 | 40 | 80 | 40 | 72 | 44 | 97 | 58 |
| 26 | 92 | 68 | 96 | 57 | 85 | 41 | 70 | 34 | 60 | 25 | 42 | 18 | 52 | 36 | 59 | 39 | 64 | 46 | 83 | 42 | 79 | 45 | 88 | 65 |
| 27 | 90 | 60 | 90 | 53 | 87 | 39 | 75 | 35 | 46 | 23 | 41 | 8 | 51 | 22 | 63 | 41 | 70 | 42 | 79 | 43 | 92 | 48 | 93 | 58 |
| 28 | 90 | 57 | 100 | 52 | 90 | 40 | 74 | 47 | 37 | 16 | 32 | 22 | 57 | 22 | 53 | 31 | 70 | 37 | 78 | 42 | 89 | 54 | 101 | 66 |
| 29 | 90 | 59 | 100 | 60 | 84 | 55 | 72 | 40 | 38 | 12 | (*) | ..... | 51 | 39 | ..... | ..... | 65 | 40 | 85 | 40 | (*) | ..... | 97 | 66 |
| 30 | 96 | 63 | 93 | 58 | 82 | 53 | 65 | 38 | 41 | 8 | 34 | 15 | 51 | 20 | ..... | ..... | 69 | 30 | 89 | 45 | ..... | ..... | 98 | 56 |
| 31 | 96 | 60 | 95 | 58 | ..... | ..... | 69 | 37 | ..... | ..... | 37 | 19 | 55 | 24 | ..... | ..... | 45.5 | 40 | ..... | ..... | ..... | ..... | ..... | ..... |
| Range | 45° | | 48° | | 58° | | ..... | | 60° | | ..... | | 69° | | ..... | | 53° | | 63° | | ..... | | ..... | |
| Monthly means | †79°.9 | | †77°.4 | | 69°.2 | | §59°.0 | | 41°.8 | | 36°.5 | | 31°.9 | | §40°.9 | | 51°.0 | | ..... | | ..... | | ..... | |

* No observations taken. † Twenty-three days only. ‡ Thirty days only. § Twenty-six days only.

*Maximum, minimum, and mean temperatures—Continued.*

*FORT DAVIS, TEX.**

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 64 | (†) | 84 | 68 | 89 | 74 |
| 2 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 54 | ..... | 80 | 70 | 90 | 71 |
| 3 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 62 | ..... | 66 | 57 | 90 | 70 |
| 4 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 67 | ..... | 75 | 52 | 75 | 70 |
| 5 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 74 | ..... | 82 | 60 | 78 | 66 |
| 6 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 75 | ..... | 84 | 70 | 77 | 67 |
| 7 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 65 | ..... | 81 | 69 | 77 | 67 |
| 8 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 69 | ..... | 70 | 62 | 78 | 67 |
| 9 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 71 | ..... | 70 | 59 | 86 | 66 |
| 10 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 68 | ..... | 63 | 57 | 85 | 69 |
| 11 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 74 | ..... | 65 | 56 | 80 | 70 |
| 12 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 78 | ..... | 75 | 58 | 83 | 66 |
| 13 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 74 | ..... | 69 | 63 | 86 | 70 |
| 14 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 73 | ..... | 71 | 61 | 83 | 69 |
| 15 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 75 | ..... | 81 | 66 | 90 | 72 |
| 16 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 76 | ..... | 84 | 64 | 84 | 70 |
| 17 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 68 | 62 | 80 | 70 | 89 | 69 |
| 18 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 75 | 66 | 77 | 67 | 86 | 72 |
| 19 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 77 | 69 | 80 | 59 | 87 | 70 |
| 20 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 80 | 70 | 86 | 65 | 80 | 75 |
| 21 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 80 | 72 | 83 | 68 | 78 | 73 |
| 22 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 74 | 60 | 86 | 67 | 76 | 66 |
| 23 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 67 | 63 | 75 | 69 | 84 | 72 |
| 24 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 75 | 68 | 80 | 67 | 81 | 72 |
| 25 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 76 | 70 | 80 | 66 | 89 | 71 |
| 26 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 78 | 70 | 78 | 66 | 75 | 68 |
| 27 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 81 | 74 | 82 | 63 | 76 | 65 |
| 28 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 71 | 67 | 85 | 67 | 82 | 68 |
| 29 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 78 | 72 | 84 | 63 | 88 | 71 |
| 30 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 84 | 75 | 88 | 71 | 85 | 73 |
| 31 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 91 | 72 | ..... | ..... |
| Range | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | 39° | | 25° | |
| Monthly means | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | |

* Observations commenced April 1, 1878.

† Minimum thermometer unserviceable.

*Maximum, minimum, and mean temperature*—Continued.

STATION, FORT GARRY, MANITOBA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 87.0 | 54.0 | 78.4 | 54.0 | 68.0 | 36.5 | 51.5 | 28.3 | 35.0 | 26.0 | 16.6 | 1.2 | 27.3 | − 3.4 | 34. | 7.4 | 27.5 | 17.0 | 56.0 | 25.4 | 60.5 | 36.0 | 70.0 | 41.0 |
| 2 | 82.6 | 58.4 | 74.0 | 52.5 | 77.0 | 35.5 | 50.0 | 27.6 | 29.6 | 20.2 | 32.5 | 15.0 | 11.5 | − 9.3 | 38.3 | 8.5 | 33.5 | 21.4 | 58.4 | 23.7 | 43.0 | 28.0 | 70.3 | 45.0 |
| 3 | 80.0 | 55.5 | 83.0 | 48.0 | 83.0 | 48.0 | 47.0 | 35.0 | 22.5 | 9.8 | 33.7 | 12.4 | 10.5 | −14.3 | 42.4 | 16.0 | 32.5 | 14.3 | 61.3 | 26.0 | 36.5 | 26.0 | 74.0 | 46.6 |
| 4 | 95.0 | 60.0 | 82.5 | 60.0 | 71.4 | 40.0 | 44.0 | 26.4 | 25.5 | 5.2 | 25.5 | 10.3 | −1.2 | −23.3 | 41.5 | 13.4 | 47.5 | 19.0 | 54.4 | 34.0 | 57.5 | 25.0 | 65.6 | 37.3 |
| 5 | 91.5 | 62.4 | 81.0 | 63.5 | 74.0 | 33.5 | 54.4 | 29.0 | 25.5 | 9.4 | 21.0 | 4.3 | −2.0 | −18.3 | 41.5 | 18.0 | 50.5 | 30.4 | 50.5 | 22.5 | 66.5 | 33.0 | 68.0 | 38.4 |
| 6 | 78.5 | 60.4 | 81.4 | 56.0 | 77.5 | 46.0 | 72.5 | 24.2 | 38.0 | 10.4 | 17.5 | −3.2 | −6.4 | −25.3 | 36.5 | 24.0 | 55.0 | 28.4 | 50.0 | 30.0 | 60.0 | 41.0 | 78.7 | 39.4 |
| 7 | 86.0 | 61.5 | 76.0 | 55.3 | 74.0 | 57.4 | 48.0 | 40.0 | 41.5 | 25.0 | 26.3 | 12.3 | 8.5 | −14.4 | 25.0 | 12.5 | 55.0 | 27.5 | 58.5 | 28.0 | 65.0 | 53.5 | 71.0 | 51.5 |
| 8 | 82.0 | 58.0 | 74.0 | 56.0 | 74.0 | 42.4 | 70.5 | 31.3 | 28.0 | 6.5 | 21.5 | 3.2 | 21.0 | −11.5 | 20.0 | 8.5 | 40.0 | 26.5 | 50.0 | 40.5 | 54.5 | 34.2 | 75.3 | 50.0 |
| 9 | 76.5 | 59.0 | 77.5 | 50.0 | 78.5 | 42.0 | 52.0 | 29.7 | 30.5 | 2.0 | 35.5 | 12.0 | 25.3 | − 2.2 | 20.0 | −5.4 | 35.0 | 24.5 | 46.4 | 36.0 | 50.0 | 31.5 | 77. | 52.4 |
| 10 | 84.0 | 50.5 | 80.0 | 54.4 | 87.5 | 52.0 | 57.0 | 25.2 | 50.0 | 25.0 | 34.0 | 18.4 | 10.5 | − 5.3 | 23.0 | 10.4 | 37.0 | 31.5 | 41.5 | 32.0 | 54.5 | 28.4 | 78. | 49. |
| 11 | 83.0 | 55.5 | 72.4 | 52.0 | 86.0 | 55.5 | 50.0 | 25.0 | 50.5 | 24.0 | 37.0 | 22.5 | 33.5 | 10.5 | 23.5 | 4.2 | 38.5 | 32.0 | 57.0 | 31.0 | 54.5 | 26.0 | 78.5 | 50. |
| 12 | 80.0 | 58.0 | 75.0 | 53.4 | 77.0 | 47.5 | 52.2 | 36.0 | 46.5 | 24.0 | 41.3 | 20.0 | 23.5 | 7.2 | 21.0 | 3.4 | 47.4 | 33.0 | 50.3 | 29.0 | 54.0 | 24.5 | 80.5 | 62.4 |
| 13 | 80.0 | 62.0 | 82.3 | 55.0 | 84.0 | 54.4 | 59.0 | 29.5 | 44.2 | 26.4 | 33.0 | 13.5 | 21.5 | − 2.3 | 29.0 | 9.3 | 44.3 | 31.5 | 50.0 | 27.3 | 56.5 | 25.0 | 80.4 | 50. |
| 14 | 79.0 | 58.4 | 84.0 | 52.5 | 71.3 | 52.0 | 42.5 | 30.0 | 43.0 | 17.5 | 42.7 | 25.4 | 30.6 | 4.4 | 30.5 | 14.5 | 48.5 | 28. | 45.3 | 23.4 | 63.4 | 30.0 | 75. | 49.5 |
| 15 | 69.5 | 54.0 | 85.5 | 55.0 | 66.5 | 46.0 | 47.0 | 30.3 | 47.5 | 26.0 | 42.5 | 23.3 | 25.5 | 18.0 | 28.0 | 4.2 | 46.0 | 35.0 | 53.0 | 30.5 | 58.0 | 31.5 | 75. | 54.4 |
| 16 | 75.5 | 57.4 | 82.0 | 60.0 | 56.0 | 34.3 | 45.5 | 23.4 | 30.0 | 16.3 | 42.0 | 23.4 | 24.5 | 8.3 | 32.5 | 17.4 | 44.4 | 24.3 | 48.3 | 31.5 | 60.5 | 28.5 | 74.0 | 44.4 |
| 17 | 57.4 | 52.0 | 85.0 | 56.0 | 54.5 | 33.0 | 58.0 | 28.5 | 25.5 | 4.3 | 31.5 | 8.3 | 27.4 | 16.4 | 30.0 | 6.3 | 44.6 | 22.0 | 62.3 | 31.0 | 65.3 | 35.0 | 81.5 | 60.3 |
| 18 | 57.4 | 48.0 | 82.0 | 48.4 | 61.0 | 36.5 | 50.7 | 27.5 | 28.0 | 5.3 | 36.3 | 23.5 | 28.7 | 12.3 | 32.5 | 9.5 | 56.7 | 29.4 | 51.0 | 44.0 | 66.5 | 41.0 | 86.5 | 64.2 |
| 19 | 70.0 | 44.0 | 88.5 | 58.0 | 57.0 | 31.5 | 45.0 | 22.3 | 35.5 | 25.4 | 34.0 | 22.4 | 29.0 | 6.2 | 36.0 | 26.0 | 45.5 | 25.0 | 64.5 | 42.0 | 56.5 | 48.0 | 78.4 | 59.1 |
| 20 | 79.0 | 46.5 | 81.0 | 54.5 | 68.4 | 32.0 | 63.0 | 30.5 | 44.0 | 33.0 | 30.4 | 22.0 | 32.5 | 8.6 | 37.5 | 30.3 | 56.3 | 29.4 | 62.5 | 40.0 | 59.5 | 35.0 | 81.3 | 48.7 |
| 21 | 84.5 | 52.0 | 65.0 | 42.0 | 77.4 | 46.0 | 57.0 | 31.0 | 42.2 | 18.5 | 36.0 | 25.5 | 33.0 | 7.3 | 37.0 | 28.5 | 49.3 | 30.0 | 64.5 | 34.0 | 67.5 | 31.5 | 84.0 | 52.5 |
| 22 | 85.5 | 57.4 | 77.3 | 40.0 | 67.3 | 40.5 | 55.5 | 28.3 | 33.5 | 10.4 | 42.5 | 34.4 | 8.0 | −14.3 | 33.4 | 26.0 | 64.0 | 31.4 | 51.5 | 40.0 | 59.5 | 50.0 | 85.4 | 60.2 |
| 23 | 87.0 | 60.0 | 83.5 | 55.0 | 81.0 | 30.5 | 52.3 | 25.0 | 41.6 | 30.0 | 47.4 | 36.0 | 16.0 | −12.5 | 29.5 | 22.5 | 47.3 | 22.5 | 50.3 | 40.0 | 64.5 | 52.0 | 81.4 | 50.5 |
| 24 | 90.0 | 63.5 | 72.0 | 55.0 | 61.4 | 45.0 | 46.0 | 28.0 | 39.5 | 24.3 | 37.5 | 30.3 | 13.5 | − 0.5 | 34.3 | 17.5 | 34.0 | 12.5 | 59.5 | 41.3 | 57.3 | 48.0 | 88.5 | 54.4 |
| 25 | 83.5 | 62.0 | 80.0 | 54.3 | 67.0 | 38.0 | 45.0 | 40.0 | 28.7 | 18.4 | 38.3 | 33.0 | 17.3 | − 9.0 | 40.0 | 14.5 | 43.0 | 18.5 | 59.5 | 30.5 | 52.3 | 42.5 | 76.5 | 58.2 |
| 26 | 86.0 | 53.5 | 78.5 | 58.0 | 70.5 | 46.0 | 54.6 | 35.0 | 28.3 | 20.5 | 35.4 | 27.3 | 21.5 | 6.2 | 44.5 | 24.0 | 43.5 | 26.0 | 68.0 | 32.0 | 63.6 | 41.4 | 82.0 | 49.4 |
| 27 | 82.0 | 62.5 | 72.4 | 45.0 | 63.5 | 38.0 | 50.7 | 29.0 | 22.5 | 6.2 | 28.3 | 21.5 | 9.5 | −12.3 | 37.5 | 22.0 | 33.5 | 14.5 | 67.5 | 42.3 | 63.5 | 38.0 | 90.5 | 61.6 |
| 28 | 80.0 | 58.6 | 70.0 | 52.5 | 65.3 | 30.0 | 40.0 | 20.5 | 7.3 | −5.5 | 28.3 | 20.5 | 10.5 | −16.3 | 23.5 | 4.2 | 43.5 | 13.5 | 67.5 | 44.0 | 64.5 | 37.0 | 91.4 | 62.2 |
| 29 | 85.5 | 57.0 | 82.5 | 43.0 | 69.0 | 46.0 | 36.5 | 25.0 | 13.0 | 1.4 | 24.3 | 15.4 | 22.5 | 0.2 | ..... | ..... | 48.3 | 16.4 | 70.5 | 43.5 | 65.6 | 36.5 | 81.0 | 65.5 |
| 30 | 90.0 | 62.0 | 82.6 | 48.3 | 56.0 | 36.5 | 40.2 | 25.0 | 10.0 | 2.2 | 26.0 | 9.5 | 26.5 | 16.5 | ..... | ..... | 54.0 | 27.4 | 60.4 | 40.0 | 66.3 | 50.5 | 72.5 | 51.4 |
| 31 | 78.0 | 64.0 | 73.0 | 41.0 | ..... | ..... | 38.4 | 25.0 | ..... | ..... | 26.0 | 8.5 | 31.5 | 8.5 | ..... | ..... | 60.0 | 34.0 | ..... | ..... | 74.6 | 52.4 | ..... | ..... |
| Range | 51°.0 | | 48°.5 | | 57°.5 | | 52°.0 | | 56°.0 | | 50°.6 | | 58°.3 | | 49°.9 | | 51°.5 | | 48°.0 | | 50°.1 | | 54°.1 | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

*Maximum, minimum, and mean temperatures—Continued.*

STATION, FORT GIBSON, IND. TER.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 91 | 75 | 95 | 72 | 90 | 68 | 87 | 70 | 58 | 46 | 42 | 14 | 44 | 26 | 39 | 32 | 64 | 49 | 67 | 44 | 83 | 64 | 91 | 76 |
| 2 | 91 | 76 | 90 | 71 | 76 | 65 | 83 | 63 | 54 | 38 | 49 | 27 | 33 | 28 | 39 | 35 | 61 | 46 | 68 | 40 | 73 | 60 | 93 | 72 |
| 3 | 92 | 74 | 89 | 65 | 67 | 63 | 84 | 52 | 64 | 33 | 46 | 37 | 35 | 25 | 40 | 28 | 57 | 41 | 57 | 41 | 68 | 50 | 84 | 65 |
| 4 | 95 | 72 | 89 | 70 | 68 | 63 | 65 | 39 | 63 | 48 | 48 | 36 | 32 | 15 | 53 | 23 | 59 | 29 | 62 | 38 | 73 | 44 | 80 | 64 |
| 5 | 95 | 73 | 95 | 72 | 69 | 63 | 68 | 38 | 58 | 35 | 41 | 33 | 38 | 13 | 63 | 41 | 72 | 48 | 76 | 40 | 81 | 49 | 75 | 63 |
| 6 | 95 | 70 | 98 | 76 | 78 | 65 | 73 | 46 | 52 | 27 | 45 | 28 | 32 | 18 | 61 | 49 | 74 | 62 | 84 | 48 | 82 | 58 | 80 | 65 |
| 7 | 96 | 73 | 78 | 68 | 81 | 61 | 62 | 47 | 48 | 38 | 56 | 34 | 35 | 20 | 52 | 43 | 72 | 60 | 75 | 60 | 84 | 66 | 79 | 64 |
| 8 | 97 | 73 | 85 | 67 | 75 | 65 | 75 | 42 | 47 | 36 | 56 | 26 | 38 | 30 | 47 | 41 | 69 | 50 | 71 | 59 | 71 | 54 | 77 | 59 |
| 9 | 97 | 75 | 88 | 62 | 79 | 62 | 76 | 57 | 36 | 33 | 57 | 30 | 45 | 35 | 41 | 33 | 60 | 47 | 63 | 50 | 76 | 45 | 71 | 61 |
| 10 | 87 | 71 | 95 | 63 | 78 | 60 | 71 | 45 | 45 | 22 | 62 | 36 | 46 | 27 | 33 | 26 | 62 | 36 | 63 | 36 | 73 | 47 | 74 | 58 |
| 11 | 87 | 65 | 96 | 67 | 85 | 58 | 77 | 57 | 56 | 29 | 67 | 41 | 56 | 29 | 43 | 19 | 72 | 45 | 75 | 37 | 74 | 48 | 81 | 54 |
| 12 | 88 | 62 | 89 | 72 | 89 | 69 | 82 | 60 | 62 | 38 | 67 | 42 | 50 | 44 | 58 | 36 | 64 | 45 | 85 | 57 | 77 | 55 | 89 | 67 |
| 13 | 89 | 66 | 88 | 68 | 89 | 66 | 80 | 66 | 64 | 50 | 65 | 46 | 44 | 34 | 50 | 45 | 68 | 38 | 74 | 63 | 59 | 49 | 80 | 63 |
| 14 | 92 | 65 | 79 | 64 | 89 | 72 | 70 | 63 | 59 | 45 | 63 | 48 | 42 | 30 | 55 | 44 | 67 | 47 | 84 | 61 | 56 | 48 | 89 | 68 |
| 15 | 94 | 74 | 82 | 58 | 86 | 70 | 76 | 64 | 65 | 36 | 67 | 59 | 48 | 33 | 47 | 40 | 73 | 41 | 86 | 57 | 65 | 50 | 88 | 67 |
| 16 | 94 | 72 | 85 | 55 | 90 | 68 | 66 | 57 | 71 | 38 | 63 | 57 | 54 | 25 | 60 | 37 | 75 | 45 | 84 | 64 | 76 | 58 | 87 | 70 |
| 17 | 90 | 74 | 86 | 64 | 77 | 59 | 60 | 54 | 71 | 34 | 63 | 61 | 60 | 36 | 63 | 38 | 67 | 41 | 80 | 67 | 84 | 61 | 86 | 67 |
| 18 | 86 | 75 | 82 | 62 | 73 | 46 | 57 | 53 | 69 | 49 | 68 | 58 | 50 | 45 | 67 | 33 | 70 | 49 | 81 | 49 | 80 | 62 | 83 | 68 |
| 19 | 80 | 62 | 84 | 63 | 77 | 41 | 56 | 50 | 60 | 49 | 69 | 53 | 48 | 48 | 69 | 53 | 74 | 48 | 87 | 61 | 81 | 57 | 88 | 68 |
| 20 | 74 | 60 | 88 | 67 | 82 | 44 | 55 | 47 | 59 | 50 | 66 | 57 | 49 | 42 | 62 | 55 | 79 | 44 | 82 | 61 | 78 | 56 | 84 | 67 |
| 21 | 79 | 59 | 78 | 65 | 85 | 49 | 57 | 42 | 55 | 40 | 62 | 55 | 43 | 32 | 53 | 46 | 81 | 51 | 85 | 68 | 82 | 64 | 80 | 62 |
| 22 | 84 | 55 | 76 | 56 | 85 | 58 | 62 | 34 | 56 | 34 | 63 | 54 | 50 | 29 | 50 | 39 | 77 | 52 | 77 | 63 | 79 | 65 | 83 | 58 |
| 23 | 84 | 59 | 79 | 53 | 84 | 58 | 66 | 40 | 58 | 32 | 61 | 42 | 54 | 28 | 45 | 34 | 80 | 49 | 68 | 53 | 83 | 71 | 85 | 59 |
| 24 | 89 | 62 | 85 | 59 | 84 | 62 | 69 | 50 | 58 | 45 | 56 | 48 | 57 | 44 | 52 | 28 | 69 | 55 | 72 | 48 | 78 | 65 | 87 | 63 |
| 25 | 90 | 64 | 94 | 69 | 83 | 62 | 69 | 56 | 48 | 35 | 48 | 40 | 60 | 32 | 59 | 42 | 72 | 42 | 72 | 46 | 75 | 64 | 90 | 69 |
| 26 | 86 | 70 | 93 | 73 | 78 | 62 | 72 | 52 | 51 | 31 | 49 | 38 | 66 | 49 | 69 | 44 | 79 | 56 | 76 | 47 | 79 | 69 | 90 | 69 |
| 27 | 84 | 65 | 93 | 70 | 85 | 55 | 78 | 57 | 42 | 32 | 54 | 45 | 53 | 40 | 61 | 42 | 75 | 54 | 79 | 50 | 82 | 57 | 92 | 71 |
| 28 | 79 | 67 | 93 | 73 | 82 | 60 | 76 | 60 | 32 | 24 | 50 | 37 | 61 | 33 | 64 | 41 | 55 | 49 | 75 | 49 | 84 | 58 | 81 | 71 |
| 29 | 85 | 69 | 91 | 71 | 86 | 63 | 66 | 54 | 24 | 14 | 37 | 33 | 54 | 46 | ..... | ..... | 69 | 48 | 66 | 56 | 89 | 65 | 89 | 71 |
| 30 | 82 | 69 | 94 | 73 | 87 | 67 | 60 | 53 | 29 | 11 | 34 | 31 | 40 | 38 | ..... | ..... | 52 | 45 | 79 | 51 | 86 | 73 | 91 | 74 |
| 31 | 94 | 71 | 96 | 74 | ..... | ..... | 61 | 49 | ..... | ..... | 35 | 32 | 45 | 34 | ..... | ..... | 60 | 35 | ..... | ..... | 90 | 73 | ..... | ..... |
| Range | 42° | | 45° | | 49° | | 53° | | 60° | | 55° | | 53° | | 50° | | 52° | | 51° | | 46° | | 39° | |
| Monthly means | 78°.2 | | 77°.1 | | 70°.5 | | 60°.5 | | 44°.3 | | 48°.0 | | 39°.2 | | 45°.4 | | 57°.3 | | 64°.4 | | 68°.5 | | 74°.9 | |

* *Maximum, minimum, and mean temperatures*—Continued.

STATION, FORT GRIFFIN, TEX.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 100 | 75 | 98 | 73 | 99 | 73 | 93 | 65 | 56 | 51 | 54 | 22 | 52 | 26 | 55 | 34 | 72 | 38 | 70 | 41 | 88 | 62 | 97 | 74 |
| 2 | 100 | 74 | 100 | 72 | 83 | 74 | 98 | 65 | 51 | 43 | 55 | 25 | 38 | 26 | 45 | 30 | 67 | 44 | 74 | 42 | 88 | 60 | 99 | 75 |
| 3 | 100 | 72 | 72 | 53 | 74 | 67 | 81 | 61 | 67 | 39 | 66 | 44 | 38 | 28 | 51 | 25 | 70 | 39 | 65 | 40 | 88 | 53 | 94 | 68 |
| 4 | 99 | 72 | 96 | 73 | 66 | 63 | 66 | 44 | 72 | 53 | 57 | 37 | 33 | 23 | 66 | 26 | 70 | 29 | 70 | 37 | 83 | 44 | 83 | 62 |
| 5 | 95 | 71 | 100 | 71 | 75 | 63 | 79 | 43 | 62 | 39 | 48 | 30 | 41 | 16 | 72 | 26 | 83 | 52 | 89 | 43 | 93 | 49 | 70 | 61 |
| 6 | 99 | 73 | 101 | 75 | 80 | 58 | 82 | 53 | 56 | 30 | 55 | 24 | 39 | 24 | 61 | 35 | 82 | 56 | 92 | 61 | 95 | 65 | 82 | 60 |
| 7 | 102 | 73 | 89 | 78 | 85 | 58 | 77 | 58 | 69 | 44 | 63 | 28 | 37 | 31 | 67 | 36 | 79 | 50 | 73 | 56 | 95 | 67 | 75 | 63 |
| 8 | 103 | 73 | 92 | 69 | 88 | 59 | 84 | 50 | 58 | 43 | 53 | 27 | 52 | 34 | 51 | 41 | 70 | 55 | 71 | 49 | 81 | 55 | 83 | 60 |
| 9 | 102 | 73 | 98 | 67 | 89 | 67 | 83 | 56 | 47 | 31 | 61 | 32 | 64 | 40 | 46 | 31 | 66 | 37 | 66 | 49 | 80 | 48 | 89 | 68 |
| 10 | 92 | 73 | 100 | 68 | 95 | 61 | 83 | 58 | 60 | 24 | 64 | 35 | 60 | 32 | 46 | 26 | 77 | 32 | 67 | 46 | 79 | 52 | 81 | 66 |
| 11 | 95 | 65 | 100 | 73 | 96 | 67 | 83 | 58 | 61 | 32 | 71 | 35 | 58 | 35 | 63 | 19 | 76 | 42 | 84 | 43 | 78 | 62 | 87 | 65 |
| 12 | 96 | 65 | 96 | 70 | 94 | 69 | 85 | 64 | 69 | 33 | 68 | 37 | 55 | 41 | 69 | 40 | 70 | 35 | 90 | 62 | 80 | 60 | 91 | 66 |
| 13 | 99 | 70 | 100 | 76 | 94 | 73 | 84 | 66 | 76 | 51 | 63 | 48 | 50 | 35 | 65 | 44 | (*) | (*) | 85 | 65 | 72 | 57 | 95 | 66 |
| 14 | 100 | 75 | 92 | 68 | 84 | 75 | 70 | 65 | 65 | 44 | 68 | 43 | 53 | 26 | 70 | 30 | 69 | 41 | 86 | 62 | 75 | 51 | 96 | 72 |
| 15 | 100 | 75 | 85 | 67 | 96 | 67 | 70 | 52 | 74 | 38 | 68 | 48 | 58 | 32 | 65 | 30 | 81 | 47 | 88 | 56 | 89 | 61 | 96 | 69 |
| 16 | 100 | 75 | 93 | 64 | 95 | 70 | (*) | 49 | 76 | 41 | 72 | 56 | 58 | 30 | 74 | 37 | 83 | 47 | 92 | 54 | 92 | 66 | 83 | 66 |
| 17 | 100 | 75 | 89 | 65 | 79 | 65 | (*) | (*) | 76 | 41 | 73 | 61 | 65 | 29 | 68 | 34 | 83 | 45 | 82 | 57 | 95 | 68 | 86 | 65 |
| 18 | 95 | 77 | 95 | 68 | 79 | 54 | 65 | 52 | 69 | 42 | 71 | 59 | 60 | 46 | 80 | 33 | 80 | 44 | 82 | 43 | 86 | 54 | 90 | 68 |
| 19 | 96 | 69 | 90 | 69 | 81 | 51 | 58 | 46 | 61 | 54 | 66 | 59 | 60 | 41 | 77 | 53 | 60 | 52 | 82 | 50 | 95 | 56 | 94 | 67 |
| 20 | 86 | 70 | 97 | 72 | 86 | 49 | 49 | 45 | 58 | 50 | 62 | 55 | 52 | 30 | 70 | 52 | 77 | 39 | 89 | 59 | 95 | 64 | 90 | 73 |
| 21 | 84 | 60 | 89 | 68 | 92 | 48 | 59 | 42 | 55 | 42 | 60 | 54 | 56 | 34 | 70 | 45 | 60 | 43 | 90 | 70 | 84 | 74 | 90 | 71 |
| 22 | 88 | 56 | 90 | 65 | 90 | 55 | 66 | 38 | 61 | 34 | 62 | 48 | 66 | 30 | 55 | 38 | 82 | 43 | 88 | 64 | 89 | 74 | 89 | 68 |
| 23 | 91 | 58 | 92 | 66 | 90 | 55 | 74 | 41 | 70 | 38 | 63 | 48 | 68 | 28 | 62 | 37 | 82 | 43 | 75 | 53 | 91 | 74 | 90 | 67 |
| 24 | 92 | 63 | 100 | 71 | 89 | 57 | 78 | 56 | 86 | 47 | 66 | 43 | 64 | 41 | 67 | 30 | 82 | 52 | 82 | 44 | 91 | 69 | 94 | 68 |
| 25 | 91 | 73 | 102 | 75 | 87 | 56 | 75 | 53 | 58 | 38 | 67 | 43 | 65 | 33 | 67 | 40 | 83 | 45 | 87 | 47 | 84 | 61 | 94 | 64 |
| 26 | 100 | 74 | 100 | 75 | 89 | 69 | 83 | 50 | 58 | 37 | 65 | 41 | 67 | 45 | 60 | 49 | 82 | 50 | 89 | 53 | 80 | 61 | 90 | 69 |
| 27 | 98 | 71 | 99 | 73 | 98 | 63 | 85 | 61 | 45 | 37 | 57 | 47 | 67 | 37 | 67 | 39 | 80 | 50 | 90 | 56 | 83 | 58 | 86 | 66 |
| 28 | 87 | 68 | 98 | 66 | 97 | 61 | 84 | 59 | 51 | 27 | 48 | 38 | 74 | 30 | 70 | 35 | 66 | 41 | 82 | 63 | 91 | 64 | 88 | 66 |
| 29 | 92 | 71 | 95 | 69 | 94 | 66 | 67 | 50 | 40 | 20 | 41 | 33 | 58 | 43 | ..... | ..... | 75 | 48 | 85 | 56 | 94 | 69 | 90 | 73 |
| 30 | 93 | 70 | 98 | 72 | 95 | 68 | 52 | 47 | 43 | 15 | 38 | 28 | 54 | 35 | ..... | ..... | 71 | 45 | 93 | 55 | 95 | 73 | 90 | 73 |
| 31 | 97 | 75 | 98 | 73 | ..... | ..... | 54 | 50 | ..... | ..... | 42 | 26 | 71 | 27 | ..... | ..... | 62 | 42 | ..... | ..... | 95 | 72 | ..... | ..... |
| Range | 47° | | 49° | | 51° | | ..... | | 71° | | 51° | | 58° | | 61° | | ..... | | 56° | | 51° | | 39° | |
| Monthly means | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | |

* No observation taken.

*Maximum, minimum, and mean temperatures—Continued.*

STATION, FORT McKAVETT, TEX.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 86 | 46 | 93 | 71 |
| 2 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 86 | 48 | 99 | 71 |
| 3 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 76 | 42 | 101 | 64 |
| 4 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 79 | 37 | 75 | 69 |
| 5 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 85 | 50 | 84 | 64 |
| 6 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 89 | 64 | 91 | 64 |
| 7 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 94 | 65 | (†) | ..... |
| 8 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 79 | 52 | ..... | ..... |
| 9 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 81 | 58 | 97 | 65 |
| 10 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 74 | 57 | 97 | 62 |
| 11 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 66 | 59 | 91 | 68 |
| 12 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 81 | 60 | 91 | 72 |
| 13 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 83 | 58 | 97 | 67 |
| 14 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 82 | 61 | 96 | 68 |
| 15 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 91 | 61 | 98 | 79 |
| 16 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 92 | 70 | 91 | 64 |
| 17 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 88 | 61 | 100 | 66 |
| 18 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 85 | 68 | 95 | 68 |
| 19 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 92 | 57 | 99 | 67 |
| 20 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 94 | 70 | 94 | 71 |
| 21 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 88 | 72 | 82 | 63 |
| 22 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | (*) | ..... | 87 | 72 | 89 | 70 |
| 23 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 79 | 50 | 91 | 65 | 90 | 69 |
| 24 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 83 | 41 | 89 | 66 | 96 | 70 |
| 25 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 85 | 41 | 81 | 70 | 97 | 70 |
| 26 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 87 | 52 | 85 | 57 | 85 | 69 |
| 27 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 87 | 55 | 91 | 64 | 94 | 67 |
| 28 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 72 | 54 | 89 | 68 | 90 | 70 |
| 29 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 81 | 49 | 90 | 71 | 91 | 70 |
| 30 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 85 | 47 | 90 | 73 | 91 | 64 |
| 31 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 90 | 75 | ..... | ..... |
| Range | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 57° | | ..... | ..... |
| Monthly means | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | | ..... | ..... |

*Station supplied with maximum and minimum thermometers April 23, 1878.

†No observations taken.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, FORT SILL, IND. TER.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 94 | 67 | 95 | 69 | 98 | 70 | 88 | 67 | 51 | 45 | 50 | 20 | 51 | 21 | 48 | 30 | 64 | 52 | 67 | 47 | 83 | 63 | 74 | 67 |
| 2 | 93 | 72 | 95 | 69 | 79 | 65 | 88 | 66 | 59 | 40 | 51 | 24 | 38 | 23 | 41 | 28 | 63 | 42 | 68 | 44 | 74 | 62 | 89 | 74 |
| 3 | 92 | 70 | 92 | 72 | 67 | 58 | 79 | 54 | 65 | 35 | 56 | 38 | 40 | 26 | 48 | 22 | 68 | 41 | 62 | 42 | 70 | 50 | 79 | 68 |
| 4 | 94 | 69 | 94 | 71 | 66 | 55 | 67 | 40 | 65 | 45 | 49 | 30 | 31 | 15 | 62 | 24 | 68 | 30 | 68 | 40 | 82 | 53 | 82 | 62 |
| 5 | 94 | 70 | 95 | 70 | 74 | 55 | 72 | 42 | 47 | 32 | 46 | 30 | 38 | 13 | 67 | 27 | 78 | 47 | 88 | 47 | 91 | 61 | 80 | 62 |
| 6 | 95 | 69 | 98 | 72 | 80 | 55 | 76 | 47 | 53 | 25 | 49 | 22 | 38 | 19 | 53 | 45 | 77 | 52 | 88 | 55 | 92 | 62 | 87 | 70 |
| 7 | 98 | 71 | 86 | 66 | 80 | 57 | 75 | 58 | 61 | 39 | 53 | 23 | 36 | 26 | 53 | 43 | 79 | 55 | 68 | 62 | 86 | 66 | 78 | 63 |
| 8 | 99 | 72 | 88 | 68 | 84 | 65 | 80 | 50 | 51 | 34 | 53 | 29 | 38 | 32 | 43 | 36 | 70 | 52 | 68 | 54 | 72 | 53 | 81 | 59 |
| 9 | 95 | 71 | 92 | 63 | 85 | 63 | 74 | 23 | 43 | 27 | 59 | 30 | 48 | 36 | 38 | 29 | 65 | 43 | 64 | 49 | 77 | 48 | 78 | 67 |
| 10 | 88 | 69 | 95 | 66 | 88 | 55 | 75 | 49 | 51 | 20 | 62 | 33 | 56 | 34 | 30 | 25 | 67 | 35 | 59 | 47 | 76 | 52 | 77 | 59 |
| 11 | 89 | 61 | 95 | 64 | 92 | 62 | 85 | 56 | 61 | 28 | 67 | 36 | 51 | 33 | 58 | 24 | 75 | 40 | 78 | 46 | 75 | 53 | 83 | 58 |
| 12 | 90 | 62 | 93 | 67 | 91 | 69 | 82 | 64 | 64 | 35 | 66 | 36 | 51 | 34 | 64 | 35 | 67 | 42 | 90 | 56 | 77 | 60 | 88 | 49 |
| 13 | 95 | 70 | 85 | 71 | 88 | 68 | 76 | 65 | 74 | 50 | 59 | 44 | 43 | 34 | 52 | 41 | 73 | 45 | 71 | 61 | 61 | 48 | 90 | 69 |
| 14 | 98 | 71 | 85 | 63 | 84 | 68 | 71 | 60 | 65 | 48 | 61 | 34 | 51 | 30 | 53 | 32 | 72 | 42 | 78 | 59 | 63 | 47 | 87 | 65 |
| 15 | 97 | 73 | 83 | 65 | 88 | 63 | 62 | 50 | 72 | 37 | 66 | 46 | 53 | 27 | 56 | 37 | 79 | 45 | 85 | 62 | 83 | 53 | 92 | 71 |
| 16 | 98 | 69 | 87 | 58 | 91 | 68 | 60 | 48 | 72 | 39 | 68 | 55 | 58 | 32 | 54 | 37 | 82 | 46 | 86 | 58 | (*) | ..... | 83 | 67 |
| 17 | 97 | 71 | 90 | 62 | 75 | 54 | 55 | 49 | 73 | 39 | 72 | 60 | 59 | 30 | 67 | 31 | 79 | 47 | 74 | 60 | 90 | 65 | 87 | 65 |
| 18 | 88 | 67 | 89 | 64 | 73 | 49 | 59 | 49 | 68 | 45 | 65 | 58 | 55 | 47 | 71 | 36 | 78 | 47 | 77 | 48 | 82 | 67 | 85 | 66 |
| 19 | 89 | 67 | 84 | 67 | 78 | 49 | 51 | 42 | 59 | 46 | 64 | 57 | 50 | 43 | 77 | 49 | 72 | 54 | 84 | 58 | 87 | 59 | 92 | 67 |
| 20 | 76 | 62 | 90 | 68 | 83 | 51 | 48 | 41 | 54 | 46 | 62 | 55 | 52 | 31 | 68 | 48 | 78 | 44 | 85 | 55 | 81 | 69 | 85 | 66 |
| 21 | 79 | 56 | 81 | 62 | 85 | 55 | 58 | 32 | 54 | 41 | 62 | 53 | 52 | 32 | 67 | 44 | 80 | 48 | 87 | 70 | 72 | 70 | 84 | 65 |
| 22 | 85 | 57 | 80 | 58 | 86 | 56 | 66 | 33 | 54 | 32 | 60 | 47 | 60 | 28 | 56 | 37 | 76 | 49 | 82 | 62 | 87 | 72 | 86 | 63 |
| 23 | 86 | 65 | 85 | 55 | 87 | 57 | 71 | 38 | 62 | 32 | 63 | 39 | 64 | 31 | 55 | 36 | 82 | 46 | 70 | 62 | 90 | 68 | 88 | 63 |
| 24 | 88 | 59 | 93 | 63 | 85 | 60 | 69 | 51 | 58 | 45 | 65 | 42 | 63 | 36 | 60 | 38 | 77 | 53 | 76 | 59 | 85 | 67 | 91 | 68 |
| 25 | 89 | 60 | 97 | 69 | 85 | 60 | 75 | 52 | 57 | 38 | 60 | 38 | 62 | 32 | 62 | 38 | 80 | 49 | 80 | 52 | 70 | 64 | 87 | 68 |
| 26 | 79 | 64 | 95 | 70 | 84 | 61 | 80 | 45 | 56 | 38 | 58 | 34 | 58 | 43 | 65 | 38 | 78 | 52 | 83 | 54 | 73 | 63 | 89 | 67 |
| 27 | 88 | 68 | 95 | 72 | 91 | 57 | 75 | 49 | 46 | 33 | 49 | 40 | 59 | 37 | 69 | 36 | 67 | 54 | 80 | 58 | 80 | 68 | 87 | 68 |
| 28 | 86 | 67 | 94 | 66 | 90 | 57 | 78 | 53 | 35 | 23 | 45 | 34 | 67 | 34 | 70 | 39 | 62 | 43 | 74 | 59 | 84 | 64 | 87 | 68 |
| 29 | 90 | 66 | 94 | 71 | 87 | 64 | 62 | 43 | 26 | 16 | 36 | 29 | 55 | 35 | ..... | ..... | 68 | 48 | 77 | 56 | 88 | 68 | 88 | 72 |
| 30 | 89 | 69 | 95 | 66 | 82 | 65 | 50 | 45 | 39 | 12 | 38 | 24 | 42 | 31 | ..... | ..... | 62 | 44 | 85 | 61 | 88 | 71 | 85 | 71 |
| 31 | 94 | 72 | 97 | 69 | ..... | ..... | 52 | 45 | ..... | ..... | 40 | 23 | 52 | 27 | ..... | ..... | 58 | 43 | ..... | ..... | 88 | 70 | ..... | ..... |
| Range | 43° | | 43° | | 49° | | 65° | | 62° | | 52° | | 54° | | 57° | | 52° | | 50° | | ..... | | 34° | |
| Monthly means | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | |

* No observation taken.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, FORT SULLY, DAK.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 73 | 48 | 78 | 59 | 79 | 47 | 62 | 44 | | | | | | | | | | | | | | | | |
| 2 | 77 | 52 | 95 | 59 | 82 | 45 | 51 | 42 | | | | | | | | | | | | | | | | |
| 3 | 91 | 58 | 94 | 66 | 84 | 47 | 52 | 38 | | | | | | | | | | | | | | | | |
| 4 | 101 | 71 | 93 | 67 | 74 | 60 | 45 | 27 | | | | | | | | | | | | | | | | |
| 5 | 109 | 73 | 93 | 69 | 80 | 47 | 55 | 21 | | | | | | | | | | | | | | | | |
| 6 | 104 | 74 | 88 | 58 | 92 | 59 | 65 | 44 | | | | | | | | | | | | | | | | |
| 7 | 91 | 67 | 91 | 59 | 82 | 67 | 67 | 37 | | | | | | | | | | | | | | | | |
| 8 | 88 | 67 | 86 | 59 | 80 | 58 | 65 | 42 | | | | | | | | | | | | | | | | |
| 9 | 89 | 64 | 90 | 56 | 80 | 47 | 57 | 43 | | | | | | | | | | | | | | | | |
| 10 | 91 | 61 | 94 | 58 | 95 | 55 | 63 | 38 | | | | | | | | | | | | | | | | |
| 11 | 93 | 64 | 89 | 59 | 93 | 63 | 67 | 44 | | | | | | | | | | | | | | | | |
| 12 | 100 | 68 | 77 | 59 | 87 | 61 | 62 | 47 | | | | | | | | | | | | | | | | |
| 13 | 88 | 60 | 83 | 55 | 92 | 68 | 49 | 43 | | | | | | | | | | | | | | | | |
| 14 | 93 | 65 | 87 | 52 | 74 | 54 | 40 | 36 | | | | | | | | | | | | | | | | |
| 15 | 82 | 60 | 91 | 59 | 72 | 48 | 51 | 30 | | | | | | | | | | | | | | | | |
| 16 | 92 | 55 | 87 | 57 | 62 | 44 | 58 | 43 | | | | | | | | | | | | | | | | |
| 17 | 87 | 57 | 84 | 61 | 70 | 37 | 44 | 33 | | | | | | | | | | | | | | | | |
| 18 | 74 | 57 | 88 | 58 | 79 | 37 | 51 | 32 | | | | | | | | | | | | | | | | |
| 19 | 76 | 52 | 99 | 66 | 83 | 50 | 48 | 32 | | | | | | | | | | | | | | | | |
| 20 | 75 | 48 | 83 | 59 | 90 | 43 | 53 | 25 | | | | | | | | | | | | | | | | |
| 21 | 95 | 58 | 81 | 48 | 95 | 59 | 67 | 31 | | | | | | | | | | | | | | | | |
| 22 | 96 | 61 | 83 | 50 | 82 | 58 | 71 | 31 | | | | | | | | | | | | | | | | |
| 23 | 96 | 65 | 100 | 62 | 76 | 49 | 70 | 33 | | | | | | | | | | | | | | | | |
| 24 | 94 | 67 | 98 | 66 | 76 | 53 | 70 | 20 | | | | | | | | | | | | | | | | |
| 25 | 89 | 67 | 98 | 66 | 80 | 40 | 67 | 38 | | | | | | | | | | | | | | | | |
| 26 | 97 | 57 | 80 | 65 | 84 | 53 | 54 | 42 | | | | | | | | | | | | | | | | |
| 27 | 81 | 62 | 77 | 53 | 71 | 46 | 55 | 35 | | | | | | | | | | | | | | | | |
| 28 | 92 | 56 | 87 | 54 | 87 | 52 | 48 | 33 | | | | | | | | | | | | | | | | |
| 29 | 102 | 68 | 94 | 59 | 91 | 64 | 50 | 23 | | | | | | | | | | | | | | | | |
| 30 | 99 | 66 | 98 | 64 | 61 | 45 | 52 | 37 | | | | | | | | | | | | | | | | |
| 31 | 86 | 60 | 79 | 57 | | | 60 | 25 | | | | | | | | | | | | | | | | |
| Range | 61° | | 52° | | 58° | | 51° | | | | | | | | | | | | | | | | | |
| Monthly means | 74°.9 | | 72°.7 | | 64°.7 | | 45°.0 | | | | | | | | | | | | | | | | | |

Station discontinued October 31, 1877.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, FREDERICKSBURG, TEX.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | | | | | | | | | | | *51 | (†) | 59 | 24 | 68 | 31 | 72 | 39 | 72 | 47 | 79 | 55 | 88 | 60 |
| 2 | | | | | | | | | | | 52 | | 54 | 28 | 55 | 31 | 71 | 40 | 73 | 48 | 79 | 59 | 92 | 68 |
| 3 | | | | | | | | | | | 70 | | 51 | 29 | 64 | 24 | 71 | 38 | 74 | 42 | 76 | 55 | 91 | 61 |
| 4 | | | | | | | | | | | 74 | | 51 | 31 | 69 | 23 | 71 | 32 | 75 | 36 | 80 | 41 | 98 | 62 |
| 5 | | | | | | | | | | | 53 | | 52 | 14 | 68 | 31 | 71 | 42 | 80 | 42 | 80 | 47 | 85 | 64 |
| 6 | | | | | | | | | | | 58 | | 48 | 17 | 68 | 39 | 71 | 51 | 82 | 45 | 80 | 52 | 86 | 65 |
| 7 | | | | | | | | | | | 58 | 22 | 42 | 20 | 71 | 35 | 75 | 42 | 68 | 56 | 83 | 60 | 86 | 63 |
| 8 | | | | | | | | | | | 61 | 21 | 47 | 28 | 68 | 41 | 69 | 53 | 79 | 46 | 79 | 57 | 78 | 56 |
| 9 | | | | | | | | | | | 62 | 38 | 69 | 30 | 59 | 32 | 69 | 42 | (‡) | 49 | 80 | 51 | 90 | 57 |
| 10 | | | | | | | | | | | 70 | 41 | 65 | 31 | 57 | 25 | 72 | 33 | 76 | (‡) | 80 | 51 | 92 | 64 |
| 11 | | | | | | | | | | | 70 | 30 | 65 | 31 | 62 | 22 | 78 | 36 | 79 | 42 | 80 | 55 | 85 | 65 |
| 12 | | | | | | | | | | | 59 | 31 | 60 | 36 | 62 | 33 | 85 | 41 | 76 | 53 | 80 | 57 | 88 | 64 |
| 13 | | | | | | | | | | | 68 | 41 | 68 | 32 | 72 | 40 | 78 | 47 | 75 | 56 | 85 | 57 | 90 | 64 |
| 14 | | | | | | | | | | | 68 | 44 | 69 | 34 | 77 | 33 | 73 | 50 | 83 | 57 | 81 | 58 | 93 | 67 |
| 15 | | | | | | | | | | | 67 | 44 | 68 | 32 | 69 | 32 | 83 | 53 | 85 | 53 | 82 | 53 | 94 | 69 |
| 16 | | | | | | | | | | | 68 | 43 | 63 | 29 | 72 | 31 | 82 | 48 | 84 | 59 | 84 | 55 | 86 | 67 |
| 17 | | | | | | | | | | | 67 | 45 | 63 | 39 | 82 | 40 | (‡) | 47 | 85 | 54 | 85 | 64 | 93 | 70 |
| 18 | | | | | | | | | | | 66 | 50 | 69 | 43 | 79 | 39 | 75 | (‡) | 83 | 47 | 86 | 55 | 94 | 65 |
| 19 | | | | | | | | | | | 68 | 54 | 67 | 40 | 75 | 41 | 68 | 49 | 80 | 55 | 88 | 54 | 95 | 69 |
| 20 | | | | | | | | | | | 62 | 45 | 68 | 29 | 73 | 52 | 79 | 41 | 81 | 62 | 90 | 53 | 93 | 67 |
| 21 | | | | | | | | | | | 69 | 46 | 60 | 32 | 72 | 42 | 80 | 48 | 75 | 60 | 85 | 65 | 90 | 67 |
| 22 | | | | | | | | | | | 70 | 45 | 68 | 25 | 64 | 40 | 73 | 45 | 81 | 65 | 85 | 66 | 84 | 60 |
| 23 | | | | | | | | | | | 67 | 43 | 65 | 27 | 66 | 39 | 83 | 54 | 77 | 52 | 87 | 65 | 87 | 62 |
| 24 | | | | | | | | | | | 70 | 43 | 68 | 32 | 65 | 31 | 81 | 47 | 76 | 40 | 84 | 60 | 88 | 62 |
| 25 | | | | | | | | | | | 70 | 38 | 70 | 35 | 58 | 31 | 72 | 51 | 81 | 47 | 82 | 59 | 90 | 66 |
| 26 | | | | | | | | | | | 70 | 41 | 74 | 31 | 55 | 25 | 80 | 50 | 82 | 49 | 78 | 65 | 90 | 67 |
| 27 | | | | | | | | | | | 67 | 46 | 71 | 40 | 65 | 39 | 83 | 44 | 82 | 49 | 85 | 55 | 86 | 66 |
| 28 | | | | | | | | | | | 57 | 39 | 69 | 33 | (‡) | (‡) | 79 | 50 | 72 | 54 | 85 | 56 | 86 | 64 |
| 29 | | | | | | | | | | | 57 | 28 | 64 | 44 | | | 80 | 40 | 80 | 50 | 83 | 64 | 87 | 65 |
| 30 | | | | | | | | | | | 55 | 31 | 65 | 36 | | | 74 | 41 | 80 | 53 | 81 | 66 | 90 | 66 |
| 31 | | | | | | | | | | | 55 | 23 | 69 | 27 | | | | | | | 87 | 66 | | |
| Range | | | | | | | | | | | | | 60° | | | | | | | | 49° | | 42° | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

*Observations of maximum thermometer commenced December 1, 1877. †Minimum thermometer broken. ‡No observations taken.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, GALVESTON, TEX.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 92 | 80 | 97 | 81 | 93 | 82 | 84 | 74 | 79 | 61 | 47 | 35 | 50 | 37 | 59 | 50 | 69 | 59 | 71 | 60 | 82 | 70 | 88 | 77 |
| 2 | 92 | 80 | 97 | 80 | 93 | 81 | 85 | 74 | 69 | 58 | 56 | 45 | 56 | 44 | 54 | 46 | 72 | 61 | 71 | 61 | 81 | 72 | 89 | 78 |
| 3 | 92 | 81 | 95 | 81 | 89 | 81 | 87 | 75 | 63 | 56 | 67 | 55 | 64 | 42 | 53 | 41 | 66 | 52 | 70 | 57 | 83 | 72 | 89 | 78 |
| 4 | 88 | 81 | 94 | 82 | 91 | 82 | 80 | 69 | 70 | 61 | 64 | 57 | 49 | 39 | 57 | 42 | 67 | 52 | 68 | 53 | 80 | 65 | 89 | 78 |
| 5 | 92 | 81 | 95 | 83 | 93 | 83 | 72 | 64 | 70 | 54 | 61 | 44 | 46 | 34 | 64 | 53 | 70 | 58 | 73 | 54 | 80 | 67 | 89 | 78 |
| 6 | 93 | 81 | 94 | 83 | 85 | 73 | 81 | 68 | 58 | 46 | 51 | 38 | 47 | 41 | 61 | 52 | 68 | 62 | 76 | 63 | 81 | 71 | 90 | 79 |
| 7 | 95 | 78 | 92 | 83 | 89 | 77 | 82 | 64 | 72 | 55 | 54 | 42 | 43 | 38 | 61 | 50 | 71 | 63 | 70 | 66 | 82 | 72 | 89 | 80 |
| 8 | 96 | 79 | 93 | 70 | 90 | 79 | 78 | 68 | 64 | 52 | 55 | 49 | 48 | 40 | 67 | 54 | 71 | 64 | 75 | 63 | 82 | 73 | 85 | 72 |
| 9 | 94 | 82 | 91 | 77 | 91 | 81 | 77 | 69 | 56 | 42 | 58 | 48 | 52 | 42 | 60 | 46 | 67 | 52 | 77 | 68 | 73 | 68 | 89 | 74 |
| 10 | 93 | 82 | 93 | 79 | 88 | 82 | 79 | 69 | 52 | 41 | 57 | 49 | 56 | 48 | 49 | 38 | 69 | 57 | 78 | 67 | 78 | 68 | 90 | 79 |
| 11 | 90 | 79 | 90 | 79 | 91 | 81 | 78 | 70 | 55 | 48 | 59 | 48 | 57 | 44 | 53 | 39 | 69 | 57 | 75 | 63 | 76 | 69 | 89 | 76 |
| 12 | 94 | 80 | 93 | 80 | 89 | 79 | 83 | 73 | 65 | 52 | 60 | 55 | 64 | 52 | 58 | 50 | 74 | 61 | 76 | 65 | 79 | 69 | 87 | 78 |
| 13 | 93 | 78 | 92 | 79 | 90 | 81 | 83 | 75 | 72 | 60 | 63 | 56 | 53 | 44 | 66 | 55 | 71 | 61 | 76 | 69 | 82 | 71 | 87 | 80 |
| 14 | 93 | 81 | 90 | 79 | 91 | 82 | 84 | 75 | 72 | 66 | 63 | 56 | 51 | 41 | 66 | 50 | 72 | 61 | 78 | 70 | 80 | 68 | 88 | 75 |
| 15 | 91 | 82 | 92 | 80 | 90 | 81 | 79 | 71 | 68 | 61 | 66 | 56 | 56 | 43 | 60 | 47 | 70 | 66 | 85 | 71 | 75 | 68 | 87 | 79 |
| 16 | 93 | 81 | 88 | 76 | 83 | 75 | 83 | 66 | 67 | 59 | 68 | 61 | 55 | 49 | 63 | 52 | 76 | 66 | 80 | 71 | 83 | 71 | 91 | 80 |
| 17 | 93 | 81 | 91 | 79 | 78 | 71 | 81 | 69 | 68 | 60 | 66 | 59 | 58 | 49 | 71 | 58 | 80 | 63 | 78 | 71 | 84 | 75 | 91 | 79 |
| 18 | 92 | 83 | 83 | 75 | 77 | 65 | 77 | 67 | 71 | 65 | 63 | 60 | 63 | 54 | 64 | 59 | 71 | 64 | 78 | 71 | 84 | 76 | 91 | 80 |
| 19 | 88 | 75 | 90 | 76 | 75 | 60 | 69 | 58 | 71 | 65 | 64 | 60 | 63 | 56 | 69 | 59 | 68 | 62 | 81 | 73 | 85 | 76 | 93 | 74 |
| 20 | 88 | 78 | 90 | 80 | 78 | 65 | 64 | 53 | 66 | 58 | 64 | 56 | 65 | 52 | 70 | 62 | 68 | 61 | 78 | 72 | 83 | 73 | 90 | 79 |
| 21 | 85 | 73 | 88 | 80 | 81 | 67 | 61 | 49 | 65 | 55 | 64 | 57 | 57 | 47 | 69 | 55 | 73 | 62 | 81 | 73 | 82 | 75 | 91 | 79 |
| 22 | 86 | 72 | 89 | 76 | 80 | 70 | 60 | 52 | 64 | 53 | 65 | 58 | 59 | 47 | 63 | 57 | 77 | 60 | 77 | 73 | 85 | 75 | 87 | 76 |
| 23 | 88 | 73 | 89 | 76 | 84 | 70 | 67 | 56 | 66 | 57 | 63 | 59 | 63 | 48 | 64 | 53 | 77 | 62 | 80 | 69 | 86 | 76 | 91 | 80 |
| 24 | 82 | 78 | 92 | 81 | 82 | 72 | 74 | 64 | 73 | 59 | 65 | 55 | 67 | 53 | 64 | 51 | 77 | 62 | 81 | 64 | 86 | 75 | 91 | 79 |
| 25 | 89 | 73 | 91 | 80 | 82 | 74 | 73 | 65 | 64 | 51 | 67 | 56 | 69 | 59 | 63 | 55 | 76 | 62 | 82 | 65 | 87 | 76 | 92 | 79 |
| 26 | 91 | 78 | 93 | 81 | 82 | 74 | 73 | 67 | 71 | 52 | 65 | 54 | 68 | 59 | 60 | 50 | 76 | 65 | 82 | 67 | 86 | 68 | 91 | 81 |
| 27 | 92 | 78 | 89 | 80 | 84 | 73 | 76 | 65 | 61 | 51 | 62 | 57 | 64 | 55 | 60 | 48 | 77 | 69 | 81 | 70 | 85 | 67 | 92 | 82 |
| 28 | 93 | 82 | 89 | 75 | 87 | 73 | 80 | 69 | 56 | 45 | 58 | 52 | 61 | 51 | 63 | 50 | 78 | 65 | 79 | 70 | 87 | 73 | 90 | 81 |
| 29 | 93 | 81 | 88 | 80 | 83 | 75 | 81 | 74 | 48 | 34 | 54 | 43 | 67 | 55 | ..... | ..... | 75 | 67 | 82 | 69 | 88 | 76 | 92 | 82 |
| 30 | 93 | 81 | 90 | 81 | 84 | 76 | 77 | 67 | 45 | 30 | 47 | 37 | 56 | 47 | ..... | ..... | 80 | 62 | 81 | 68 | 88 | 77 | 93 | 82 |
| 31 | 94 | 81 | 92 | 81 | ..... | ..... | 71 | 67 | ..... | ..... | 44 | 36 | 60 | 42 | ..... | ..... | 70 | 63 | ..... | ..... | 89 | 78 | ..... | ..... |
| Range | 24° | | 27° | | 33° | | 38° | | 49° | | 33° | | 35° | | 33° | | 28° | | 32° | | 24° | | 21° | |
| Monthly means | 84°.4 | | 84°.6 | | 80°.1 | | 71°.5 | | 59°.2 | | 55°.9 | | 52°.2 | | 56°.3 | | 66°.2 | | 71°.7 | | 76°.7 | | 83°.5 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, GRAHAM, TEX.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 98 | 74 | 96 | 75 | 100 | 74 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 70 | 35 | 73 | 41 | 69 | 43 | 90 | 60 | 93 | 77 |
| 2 | 98 | 75 | 96 | 82 | 97 | 69 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 52 | 29 | 73 | 45 | 74 | 43 | 86 | 71 | (‡) | ..... |
| 3 | 96 | 74 | 95 | 77 | 79 | 63 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 50 | 34 | 68 | 41 | 74 | 41 | 87 | 49 | ..... | ..... |
| 4 | 97 | 76 | 95 | 72 | 73 | 65 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 65 | 22 | 74 | 29 | 69 | 32 | 82 | 41 | 82 | 65 |
| 5 | 96 | 75 | 99 | 73 | 72 | 65 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 71 | 34 | 81 | 51 | 85 | 40 | 89 | 53 | 88 | 63 |
| 6 | 97 | 78 | 101 | 77 | 80 | 60 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 69 | 50 | 81 | 50 | 90 | 51 | 90 | 60 | 83 | 62 |
| 7 | 99 | 72 | 100 | 70 | 84 | 60 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 57 | 47 | 84 | 51 | 90 | 61 | 94 | 69 | 82 | 60 |
| 8 | 100 | 76 | 90 | 68 | 85 | 71 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 57 | 33 | 84 | 55 | 70 | 54 | 92 | 55 | 82 | 61 |
| 9 | 100 | 71 | 96 | 63 | 85 | 68 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 45 | 30 | 67 | 44 | 69 | 32 | 78 | 50 | 85 | 68 |
| 10 | 100 | 74 | 100 | 66 | (*) | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 43 | 26 | 72 | 32 | 66 | 47 | 80 | 52 | 85 | 65 |
| 11 | 92 | 65 | 100 | 65 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 61 | 19 | 75 | 32 | 80 | 41 | 89 | 66 | 86 | 66 |
| 12 | 94 | 68 | 100 | 69 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 62 | 41 | 75 | 37 | 87 | 58 | 80 | 65 | 89 | 66 |
| 13 | 96 | 75 | 99 | 71 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 63 | 44 | 83 | 40 | 87 | 58 | 80 | 56 | 94 | 75 |
| 14 | 98 | 76 | 90 | 65 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 70 | 29 | 82 | 40 | 85 | 59 | 72 | 51 | 95 | 70 |
| 15 | 98 | 76 | 90 | 69 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 70 | 32 | 81 | 46 | 87 | 52 | 86 | 60 | 93 | 72 |
| 16 | 98 | 75 | 90 | 63 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 73 | 43 | 83 | 46 | 89 | 53 | 89 | 62 | 86 | 67 |
| 17 | 98 | 75 | 90 | 71 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 73 | 34 | 84 | 46 | 89 | 69 | 93 | 75 | 85 | 66 |
| 18 | 97 | 75 | 92 | 66 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 76 | 31 | 83 | 46 | 81 | 39 | 93 | 61 | (‡) | ..... |
| 19 | 94 | 68 | 93 | 68 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 78 | 56 | 79 | 60 | 83 | 61 | 89 | 60 | 91 | 68 |
| 20 | 93 | 69 | 90 | 72 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 76 | 54 | 78 | 35 | 90 | 60 | 93 | 71 | 92 | 69 |
| 21 | 85 | 56 | 91 | 66 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 70 | 46 | 79 | 39 | 90 | 73 | 82 | 72 | 86 | 70 |
| 22 | 86 | 58 | 86 | 61 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | (†) | ..... | 70 | 39 | 81 | 41 | (‡) | ..... | 84 | 77 | 86 | 67 |
| 23 | 89 | 65 | 86 | 62 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 72 | ..... | 58 | 35 | 84 | 46 | 64 | 58 | 90 | 76 | 89 | 66 |
| 24 | 91 | 66 | 97 | 72 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 72 | 43 | 65 | 31 | 84 | 46 | 81 | 43 | 90 | 73 | 94 | 74 |
| 25 | 90 | 73 | 99 | 78 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 65 | 28 | 67 | 31 | 82 | 44 | 85 | 48 | 90 | 73 | 92 | 66 |
| 26 | 90 | 70 | 99 | 76 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 67 | 49 | 64 | 50 | 82 | 51 | 86 | 51 | 84 | 64 | 88 | 69 |
| 27 | 92 | 73 | 96 | 75 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 68 | 37 | 70 | 37 | 80 | 55 | 90 | 51 | 81 | 56 | 86 | 72 |
| 28 | 94 | 70 | 96 | 65 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 70 | 31 | 72 | 41 | 77 | 45 | (‡) | ..... | 87 | 67 | 88 | 66 |
| 29 | 91 | 76 | 96 | 71 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 70 | 41 | ..... | ..... | 73 | 47 | 80 | 52 | 89 | 71 | 90 | 76 |
| 30 | 93 | 70 | 95 | 72 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 51 | 35 | ..... | ..... | 74 | 47 | 90 | 60 | 93 | 77 | 89 | 76 |
| 31 | 96 | 76 | 97 | 75 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 70 | 26 | ..... | ..... | 69 | 44 | ..... | ..... | (‡) | ..... | ..... | ..... |
| Range | 44° | | 39° | | ..... | | ..... | | ..... | | ..... | | ..... | | 59° | | 55° | | ..... | | ..... | | ..... | |
| Monthly means | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | |

* Station closed September 10, 1877.

† Station reopened January 23, 1878.

‡ No observation taken.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, GRAND HAVEN, MICH.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 69 | 59 | 81 | 71 | 67 | 53 | 71 | 64 | 50 | 34 | 40 | 25 | 39 | 31 | 36 | 25 | 52 | 32 | 46 | 38 | 59 | 50 | 75 | 60 |
| 2 | 75 | 59 | 75 | 65 | 63 | 54 | 68 | 59 | 45 | 36 | 37 | 27 | 31 | 18 | 34 | 20 | 53 | 38 | 50 | 35 | 59 | 48 | 75 | 64 |
| 3 | 70 | 60 | 71 | 59 | 67 | 47 | 76 | 59 | 43 | 35 | 42 | 35 | 39 | 27 | 33 | 10 | 45 | 52 | 60 | 38 | 53 | 44 | 70 | 60 |
| 4 | 77 | 58 | 68 | 52 | 70 | 55 | 59 | 49 | 42 | 33 | 50 | 38 | 36 | 15 | 37 | 15 | 38 | 28 | 51 | 38 | 50 | 44 | 60 | 53 |
| 5 | 85 | 62 | 75 | 51 | 71 | 58 | 52 | 47 | 33 | 25 | 48 | 35 | 20 | 10 | 44 | 35 | 51 | 38 | 51 | 40 | 50 | 46 | 59 | 47 |
| 6 | 77 | 61 | 75 | 66 | 70 | 52 | 55 | 37 | 40 | 26 | 35 | 29 | 16 | 10 | 47 | 38 | 56 | 42 | 45 | 36 | 62 | 46 | 68 | 48 |
| 7 | 79 | 58 | 75 | 67 | 66 | 47 | 57 | 39 | 42 | 27 | 41 | 30 | 22 | 14 | 47 | 37 | 47 | 40 | 49 | 33 | 57 | 50 | 60 | 52 |
| 8 | 76 | 66 | 76 | 66 | 66 | 47 | 57 | 49 | 37 | 33 | 36 | 29 | 35 | 15 | 41 | 34 | 68 | 42 | 65 | 40 | 58 | 50 | 59 | 48 |
| 9 | 74 | 64 | 72 | 63 | 71 | 53 | 63 | 47 | 33 | 26 | 40 | 30 | 41 | 33 | 34 | 19 | 71 | 52 | 65 | 43 | 54 | 46 | 65 | 40 |
| 10 | 72 | 60 | 71 | 61 | 69 | 61 | 53 | 44 | 40 | 21 | 45 | 34 | 42 | 37 | 28 | 18 | 65 | 54 | 65 | 44 | 48 | 40 | 60 | 50 |
| 11 | 70 | 54 | 79 | 55 | 72 | 62 | 48 | 42 | 44 | 36.5 | 47 | 35 | 42 | 36 | 34 | 17 | 58 | 44 | 54 | 43 | 50 | 34 | 59 | 50 |
| 12 | 71 | 57 | 78 | 64 | 71 | 62 | 54 | 33 | 51 | 36 | 50 | 35 | 39 | 33 | 40 | 30 | 50 | 42 | 55 | 47 | 49 | 40 | 61 | 45 |
| 13 | 75 | 56 | 74 | 65 | 72 | 55 | 65 | 46 | 52 | 33 | 47 | 36 | 36 | 30 | 37 | 23 | 48 | 39 | 52 | 46 | 50 | 41 | 72 | 51 |
| 14 | 79 | 65 | 70 | 60 | 78 | 58 | 70 | 59 | 56 | 49 | 43 | 33 | 38 | 32 | 35 | 24 | 43 | 36 | 54 | 43 | 53 | 37 | 75 | 56 |
| 15 | 82 | 69 | 73 | 61 | 72 | 68 | 66 | 59 | 55 | 49 | 48 | 43 | 38 | 28 | 39 | 25 | 55 | 33 | 57 | 42 | 56 | 44 | 71 | 59 |
| 16 | 79 | 66 | 70 | 60 | 75 | 54 | 62 | 51 | 53 | 47 | 45 | 33 | 38 | 25 | 40 | 35 | 47 | 42 | 60 | 44 | 60 | 43 | 70 | 60 |
| 17 | 78 | 66 | 73 | 53 | 66 | 57 | 61 | 53 | 52 | 38 | 51 | 39 | 41 | 33 | 37 | 30 | 44 | 37 | 67 | 49 | 60 | 47 | 66 | 52 |
| 18 | 75 | 66 | 75 | 60 | 63 | 51 | 61 | 53 | 39 | 30 | 54 | 35 | 41 | 35 | 36 | 26 | 43 | 38 | 69 | 49 | 62 | 50 | 69 | 53 |
| 19 | 67 | 58 | 76 | 58 | 67 | 53 | 56 | 47 | 33 | 29 | 56 | 48 | 46 | 32 | 43 | 31 | 48 | 40 | 69 | 59 | 62 | 50 | 71 | 48 |
| 20 | 64 | 57 | 76 | 57 | 65 | 50 | 40 | 40 | 47 | 30 | 58 | 48 | 45 | 38 | 49 | 42 | 45 | 36 | 64 | 50 | 62 | 54 | 70 | 56 |
| 21 | 69 | 47 | 85 | 63 | 62 | 46 | 50 | 33 | 52 | 39 | 51 | 45 | 42 | 35 | 45 | 39 | 50 | 36 | 65 | 49 | 54 | 46 | 56 | 52 |
| 22 | 74 | 54 | 70 | 61 | 67 | 45 | 56 | 35 | 47 | 39 | 54 | 47 | 35 | 14 | 42 | 34 | 45 | 37 | 60 | 55 | 62 | 42 | 59 | 49 |
| 23 | 76 | 58 | 65 | 60 | 71 | 48 | 59 | 54 | 50 | 39 | 61 | 52 | 28 | 12 | 37 | 33 | 52 | 35 | 63 | 55 | 70 | 52 | 62 | 52 |
| 24 | 80 | 63 | 68 | 63 | 73 | 64 | 58 | 54 | 53 | 45 | 54 | 48 | 44 | 27 | 38 | 31 | 35 | 20 | 60 | 47 | 66 | 57 | 67 | 54 |
| 25 | 82 | 64 | 72 | 57 | 72 | 65 | 59 | 48 | 51 | 45.5 | 50 | 45 | 44 | 35 | 35 | 29 | 37 | 22 | 55 | 45 | 65 | 56 | 80 | 52 |
| 26 | 86 | 69 | 76 | 57 | 75 | 64 | 50 | 46 | 50 | 43 | 47 | 42 | 40 | 35 | 40 | 28 | 47 | 34 | 51 | 43 | 62 | 52 | 75 | 62 |
| 27 | 80 | 72 | 77 | 67 | 73 | 61 | 60 | 45 | 43 | 37 | 43 | 40 | 40 | 27 | 45 | 29 | 53 | 37 | 54 | 46 | 60 | 51 | 73 | 58 |
| 28 | 79 | 68 | 76 | 68 | 70 | 60 | 67 | 43 | 37 | 28 | 45 | 38 | 27 | 17 | 48 | 32 | 42 | 33 | 47 | 48 | 58 | 45 | 82 | 61 |
| 29 | 78 | 70 | 75 | 68 | 76 | 59 | 57 | 46 | 30 | 25 | 40 | 35 | 27 | 14 | ..... | ..... | 41 | 30 | 57 | 50 | 54 | 49 | 83 | 61 |
| 30 | 80 | 64 | 71 | 55 | 77 | 68 | 53 | 43 | 40 | 27 | 40 | 32 | 32 | 20 | ..... | ..... | 40 | 35 | 64 | 48 | 64 | 43 | 87 | 71 |
| 31 | 87 | 67 | 77 | 61 | ..... | ..... | 50 | 43 | ..... | ..... | 36 | 30 | 32 | 25 | ..... | ..... | 45 | 37 | ..... | ..... | 69 | 47 | ..... | ..... |
| Range | 40° | | 34° | | 33° | | 43° | | 35° | | 36° | | 36° | | 39° | | 51° | | 36° | | 36° | | 47° | |
| Monthly means | 70°.1 | | 68°.7 | | 63°.8 | | 52°.9 | | 39°.4 | | 42°.0 | | 31°.9 | | 34° | | 42°.9 | | 52°.0 | | 53°.1 | | 62°.7 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, HALIFAX, N. S.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 70.1 | 45.6 | 74.0 | 52.1 | 69.9 | 54.3 | 64.5 | 46.1 | 44.2 | 33.9 | 36.7 | 14.8 | 26.8 | 20.8 | 20.3 | 11.0 | 37.4 | 15.0 | 44.2 | 32.3 | 42.4 | 38.1 | 76.9 | 45.8 |
| 2 | 67.8 | 51.4 | 73.8 | 51.5 | 70.0 | 63.1 | 66.9 | 52.1 | 50.5 | 32.8 | 24.0 | 12.9 | 24.6 | 15.0 | 18.8 | 9.8 | 36.4 | 13.6 | 39.0 | 32.8 | 58.7 | 40.3 | 72.7 | 45.6 |
| 3 | 78.8 | 50.1 | 71.9 | 51.7 | 73.8 | 56.5 | 55.0 | 50.2 | 58.4 | 40.5 | 34.2 | 14.5 | 20.5 | 6.8 | 31.0 | 7.3 | 50.0 | 29.5 | 40.0 | 32.6 | 62.2 | 41.9 | 75.3 | 50.4 |
| 4 | 74.6 | 50.0 | 77.6 | 62.9 | 72.7 | 50.5 | 59.6 | 52.0 | 43.7 | 31.3 | 38.9 | 27.0 | 26.3 | 5.0 | 38.2 | 20.3 | 46.4 | 33.8 | 46.4 | 33.9 | 66.9 | 41.5 | 76.6 | 51.0 |
| 5 | 78.1 | 48.5 | 73.1 | 57.1 | 72.2 | 49.9 | 61.6 | 50.2 | 46.9 | 26.7 | 50.5 | 26.7 | 40.8 | 25.2 | 28.6 | 21.6 | 34.9 | 23.0 | 42.5 | 32.1 | 64.9 | 47.1 | 71.4 | 53.0 |
| 6 | 76.4 | 49.0 | 74.7 | 54.5 | 66.4 | 50.1 | 55.1 | 38.7 | 54.8 | 29.1 | 54.8 | 37.3 | 27.3 | 9.1 | 31.8 | 21.1 | 39.1 | 19.6 | 42.7 | 34.8 | 56.3 | 45.9 | 63.5 | 48.9 |
| 7 | 78.4 | 53.3 | 75.0 | 51.4 | 67.8 | 42.4 | 55.6 | 34.8 | 39.9 | 25.0 | 37.5 | 18.9 | 11.2 | 0.0 | 40.2 | 23.0 | 39.3 | 27.8 | 41.8 | 34.2 | 60.2 | 45.6 | 66.9 | 44.0 |
| 8 | 74.0 | 49.0 | 75.2 | 61.0 | 69.9 | 48.1 | 54.8 | 31.0 | 51.2 | 31.0 | 36.9 | 18.6 | 6.3 | − 4.0 | 47.1 | 21.0 | 44.3 | 33.8 | 44.9 | 34.0 | 61.2 | 48.0 | 65.1 | 43.3 |
| 9 | 72.8 | 52.8 | 79.6 | 62.0 | 71.5 | 54.0 | 52.0 | 35.0 | 58.8 | 45.0 | 37.2 | 23.6 | 32.2 | − 1.2 | 47.1 | 25.0 | 43.9 | 30.3 | 57.5 | 31.4 | 64.9 | 48.2 | 59.2 | 48.6 |
| 10 | 63.4 | 59.5 | 65.6 | 59.9 | 74.4 | 51.1 | 55.0 | 47.1 | 54.3 | 28.6 | 29.8 | 22.0 | 35.3 | 31.2 | 31.1 | 19.4 | 51.3 | 27.3 | 64.9 | 30.3 | 53.2 | 43.1 | 63.1 | 47.1 |
| 11 | 69.5 | 57.9 | 77.0 | 59.1 | 76.9 | 47.5 | 53.5 | 49.8 | 34.2 | 28.4 | 35.8 | 20.0 | 41.0 | 35.0 | 33.5 | 17.6 | 31.0 | 19.1 | 54.8 | 32.0 | 61.1 | 40.4 | 51.9 | 46.0 |
| 12 | 67.4 | 55.9 | 74.3 | 55.8 | 80.6 | 53.0 | 59.0 | 48.0 | 37.8 | 29.1 | 37.5 | 29.0 | 37.2 | 29.0 | 21.4 | 12.9 | 39.8 | 17.0 | 46.3 | 33.8 | 57.3 | 38.7 | 60.4 | 45.3 |
| 13 | 67.0 | 56.1 | 76.1 | 55.5 | 78.2 | 57.4 | 60.6 | 44.6 | 34.9 | 26.0 | 37.8 | 26.0 | 38.5 | 29.0 | 34.8 | 11.7 | 33.2 | 21.1 | 42.1 | 34.1 | 55.4 | 38.0 | 66.1 | 43.8 |
| 14 | 71.0 | 60.8 | 70.2 | 60.6 | 72.5 | 52.0 | 52.7 | 40.5 | 44.3 | 19.0 | 39.8 | 11.8 | 40.2 | 30.4 | 17.4 | 2.0 | 39.8 | 30.0 | 45.3 | 34.9 | 54.4 | 38.5 | 60.1 | 41.8 |
| 15 | 79.0 | 56.6 | 73.1 | 64.0 | 70.1 | 48.6 | 55.8 | 36.4 | 54.7 | 42.8 | 33.3 | 7.4 | 43.2 | 32.5 | 31.4 | 1.4 | 33.8 | 23.0 | 44.2 | 36.2 | 49.2 | 38.0 | 62.9 | 43.0 |
| 16 | 82.6 | 58.2 | 70.3 | 63.3 | 77.9 | 52.8 | 47.8 | 34.6 | 58.5 | 47.5 | 43.0 | 27.5 | 33.5 | 4.4 | 33.4 | 7.2 | 38.0 | 21.0 | 50.1 | 31.6 | 49.8 | 38.8 | 76.1 | 42.4 |
| 17 | 78.9 | 55.0 | 77.4 | 62.2 | 78.5 | 61.7 | 46.8 | 34.6 | 54.8 | 46.1 | 40.4 | 20.0 | 12.2 | 2.2 | 34.6 | 14.6 | 42.8 | 24.0 | 54.3 | 29.6 | 54.3 | 41.5 | 66.2 | 46.8 |
| 18 | 72.7 | 58.8 | 78.9 | 61.9 | 73.0 | 56.0 | 52.9 | 34.0 | 49.2 | 44.7 | 32.5 | 18.0 | 23.7 | 4.5 | 33.2 | 8.6 | 46.7 | 29.6 | 46.0 | 29.9 | 55.8 | 39.0 | 61.0 | 50.4 |
| 19 | 73.9 | 57.1 | 78.3 | 61.1 | 70.1 | 47.5 | 61.7 | 35.5 | 45.1 | 33.0 | 38.7 | 14.9 | 37.4 | 14.9 | 17.2 | 3.0 | 45.7 | 31.1 | 41.3 | 27.4 | 62.0 | 37.1 | 67.0 | 51.5 |
| 20 | 72.0 | 60.9 | 80.4 | 59.1 | 67.3 | 45.6 | 49.8 | 35.8 | 38.1 | 31.4 | 41.0 | 21.8 | 43.1 | 31.6 | 32.4 | 1.5 | 42.0 | 30.6 | 57.2 | 34.0 | 55.9 | 36.2 | 72.6 | 50.4 |
| 21 | 72.2 | 61.3 | 80.0 | 57.4 | 61.5 | 49.0 | 48.2 | 31.0 | 34.0 | 29.1 | 23.5 | 17.6 | 39.8 | 33.7 | 35.0 | 15.4 | 35.0 | 19.0 | 45.9 | 34.0 | 52.0 | 38.2 | 81.3 | 50.1 |
| 22 | 69.5 | 60.0 | 75.5 | 55.0 | 60.0 | 45.7 | 44.9 | 40.5 | 38.6 | 25.1 | 25.0 | 17.4 | 43.7 | 36.3 | 31.2 | 7.5 | 29.1 | 13.2 | 59.5 | 38.8 | 46.3 | 41.8 | 76.1 | 53.7 |
| 23 | 78.4 | 60.0 | 82.6 | 58.3 | 66.4 | 42.0 | 51.0 | 35.6 | 44.8 | 24.4 | 28.9 | 17.0 | 38.4 | 33.1 | 34.2 | 26.8 | 47.2 | 18.0 | 54.3 | 29.0 | 50.9 | 43.1 | 69.1 | 51.0 |
| 24 | 71.9 | 57.5 | 88.2 | 55.5 | 71.9 | 47.6 | 48.4 | 40.7 | 45.0 | 31.1 | 32.8 | 21.1 | 33.5 | 10.9 | 39.0 | 33.0 | 45.8 | 33.3 | 44.3 | 30.1 | 56.7 | 46.0 | 58.9 | 52.0 |
| 25 | 72.4 | 52.4 | 76.6 | 59.2 | 69.4 | 51.2 | 42.0 | 33.3 | 40.2 | 30.8 | 34.0 | 29.0 | 36.8 | 11.0 | 45.1 | 30.7 | 45.2 | 24.0 | 70.1 | 37.8 | 67.7 | 47.3 | 69.6 | 51.1 |
| 26 | 70.1 | 46.2 | 63.9 | 58.0 | 70.2 | 54.6 | 40.6 | 29.3 | 43.9 | 35.6 | 34.9 | 28.8 | 41.2 | 26.0 | 37.1 | 29.9 | 37.9 | 24.0 | 55.0 | 38.3 | 66.6 | 46.5 | 66.0 | 50.8 |
| 27 | 67.7 | 48.5 | 73.2 | 59.1 | 64.3 | 48.9 | 43.3 | 26.0 | 50.0 | 41.0 | 41.2 | 28.0 | 41.4 | 26.0 | 42.4 | 26.4 | 44.1 | 26.4 | 50.4 | 40.7 | 66.9 | 45.4 | 78.9 | 54.6 |
| 28 | 75.0 | 50.9 | 74.1 | 63.5 | 60.6 | 39.9 | 45.3 | 29.6 | 56.4 | 43.3 | 38.5 | 24.0 | 41.0 | 25.8 | 48.3 | 27.4 | 43.0 | 34.5 | 48.8 | 41.0 | 73.3 | 49.1 | 70.9 | 54.8 |
| 29 | 73.8 | 58.0 | 69.9 | 63.7 | 66.3 | 48.4 | 53.0 | 27.2 | 52.2 | 36.1 | 40.9 | 19.2 | 31.4 | 11.4 | ..... | ..... | 48.2 | 34.1 | 50.9 | 42.0 | 63.5 | 51.2 | 82.8 | 51.3 |
| 30 | 76.8 | 60.4 | 76.1 | 57.9 | 64.9 | 41.6 | 54.1 | 37.0 | 51.1 | 32.6 | 31.7 | 22.0 | 11.6 | 0.3 | ..... | ..... | 41.2 | 34.1 | 47.8 | 38.7 | 67.8 | 42.6 | 92.8 | 61.0 |
| 31 | 77.1 | 58.2 | 78.8 | 54.2 | ..... | ..... | 48.9 | 30.0 | ..... | ..... | 32.0 | 26.2 | 19.0 | 4.1 | ..... | ..... | 41.7 | 33.4 | ..... | ..... | 71.6 | 44.1 | ..... | ..... |
| Range | 37°.0 | | 36°.8 | | 39°.0 | | 40°.9 | | 39°.8 | | 47°.4 | | 47°.7 | | 46°.9 | | 38°.1 | | 42°.7 | | 37°.1 | | 50°.4 | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, HAVANA, CUBA.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 68 | 63 | 69 | 64 | 77 | 66 | 79 | 69 | 90 | 77 | 81 | 73 | 85 | 78 |
| 2 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 72 | 63 | 70 | 64 | 81 | 65 | 85 | 67 | 88 | 79 | 83 | 73 | 86 | 79 |
| 3 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 79 | 67 | 79 | 62 | 79 | 67 | 81 | 70 | 86 | 78 | 86 | 72 | 89 | 79 |
| 4 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 81 | 65 | 79 | 65 | 70 | 65 | 72 | 66 | 79 | 75 | 89 | 75 | 86 | 80 |
| 5 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 85 | 69 | 70 | 64 | 68 | 63 | 75 | 63 | 76 | 72 | 82 | 76 | 87 | 81 |
| 6 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 76 | 65 | 70 | 66 | 68 | 61 | 78 | 64 | 76 | 70 | 83 | 73 | 86 | 80 |
| 7 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 72 | 65 | 72 | 67 | 81 | 62 | 78 | 65 | 80 | 66 | 83 | 75 | 89 | 81 |
| 8 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 77 | 68 | 77 | 67 | 84 | 67 | 80 | 66 | 86 | 68 | 81 | 71 | 89 | 82 |
| 9 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 73 | 68 | 77 | 68 | 84 | 74 | 83 | 68 | 88 | 79 | 84 | 72 | 93 | 81 |
| 10 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 76 | 68 | 73 | 67 | 84 | 69 | 85 | 70 | 93 | 80 | 83 | 74 | 93 | 83 |
| 11 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 78 | 69 | 71 | 67 | 72 | 65 | 90 | 71 | 87 | 82 | 82 | 75 | 91 | 81 |
| 12 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 77 | 70 | 80 | 67 | 71 | 65 | 90 | 74 | 86 | 79 | 85 | 77 | 90 | 83 |
| 13 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 77 | 68 | 79 | 70 | 80 | 65 | 91 | 74 | 88 | 77 | 88 | 77 | 92 | 82 |
| 14 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 76 | 68 | 73 | 69 | 80 | 68 | 87 | 72 | 89 | 79 | 91 | 78 | 88 | 83 |
| 15 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 78 | 67 | 73 | 67 | 81 | 71 | 84 | 74 | 90 | 77 | 85 | 81 | 87 | 81 |
| 16 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 78 | 68 | 68 | 63 | 79 | 69 | (*) | ..... | 92 | 81 | 89 | 81 | 88 | 81 |
| 17 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 78 | 69 | 74 | 63 | 81 | 65 | 79 | 72 | 86 | 81 | 90 | 80 | 88 | 82 |
| 18 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 79 | 69 | 74 | 61 | 78 | 67 | 74 | 72 | 85 | 77 | 89 | 82 | 90 | 80 |
| 19 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 79 | 70 | 76 | 61 | 79 | 69 | 78 | 70 | 83 | 75 | 90 | 81 | 89 | 82 |
| 20 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 80 | 69 | 79 | 65 | 81 | 68 | 79 | 70 | 84 | 72 | 88 | 79 | 90 | 80 |
| 21 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 81 | 69 | 80 | 66 | 84 | 68 | 84 | 73 | 83 | 73 | 86 | 79 | 89 | 79 |
| 22 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 82 | 71 | 74 | 66 | 88 | 75 | 78 | 71 | 86 | 73 | 84 | 77 | 93 | 78 |
| 23 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 85 | 71 | 72 | 64 | 87 | 74 | 76 | 73 | 89 | 75 | 85 | 76 | 90 | 81 |
| 24 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 84 | 71 | 73 | 66 | 78 | 72 | 76 | 73 | 90 | 74 | 84 | 77 | 89 | 81 |
| 25 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 80 | 71 | 80 | 63 | 78 | 72 | 78 | 73 | 90 | 79 | 85 | 77 | 88 | 79 |
| 26 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 76 | 71 | 78 | 65 | 83 | 71 | 79 | 68 | 81 | 73 | 84 | 76 | 90 | 79 |
| 27 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 78 | 71 | 77 | 67 | 79 | 63 | 81 | 70 | 85 | 72 | 80 | 75 | 86 | 78 | 89 | 78 |
| 28 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 85 | 74 | 79 | 67 | 77 | 68 | 73 | 68 | 88 | 77 | 82 | 74 | 89 | 79 | 88 | 77 |
| 29 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 79 | 74 | 78 | 69 | 81 | 69 | ..... | ..... | 90 | 79 | 78 | 75 | 91 | 79 | 89 | 79 |
| 30 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 67 | 61 | 75 | 71 | 81 | 67 | ..... | ..... | 87 | 78 | 79 | 74 | 86 | 78 | 90 | 81 |
| 31 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 73 | 67 | 80 | 66 | ..... | ..... | 90 | 77 | ..... | ..... | 88 | 78 | ..... | ..... |
| Range | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 22° | | 20° | | 27° | | 28° | | 27° | | 20° | | 10° | |
| Monthly means | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | |

* No observations.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, HENRIETTA, TEX.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | | | | | | | | | | | | | | | | | 71 | 54 | 72 | 47 | 92 | 57 | | |
| 2 | | | | | | | | | | | | | | | | | (†) | | 75 | 43 | 86 | 68 | | |
| 3 | | | | | | | | | | | | | | | | | 72 | 36 | 60 | 39 | 79 | 53 | | |
| 4 | | | | | | | | | | | | | | | | | 73 | 31 | 73 | 33 | 85 | 43 | | |
| 5 | | | | | | | | | | | | | | | | | 84 | 43 | 91 | 33 | 94 | 56 | | |
| 6 | | | | | | | | | | | | | | | | | 81 | 58 | 94 | 55 | 93 | 57 | | |
| 7 | | | | | | | | | | | | | | | | | 83 | 52 | 68 | 58 | 95 | 67 | | |
| 8 | | | | | | | | | | | | | | | | | 72 | 53 | 75 | 43 | 90 | 49 | | |
| 9 | | | | | | | | | | | | | | | | | 72 | 41 | 70 | 52 | 86 | 52 | | |
| 10 | | | | | | | | | | | | | | | | | 74 | 32 | 68 | 46 | 89 | 47 | | |
| 11 | | | | | | | | | | | | | | | | | 78 | 32 | 84 | 41 | 82 | 59 | | |
| 12 | | | | | | | | | | | | | | | (*) | | 72 | 36 | 91 | 54 | 82 | 56 | | |
| 13 | | | | | | | | | | | | | | | 54 | 46 | 80 | 32 | 93 | 56 | 76 | 53 | | |
| 14 | | | | | | | | | | | | | | | 66 | 28 | 71 | 48 | 85 | 61 | 72 | 49 | | |
| 15 | | | | | | | | | | | | | | | 58 | 31 | 81 | 44 | 93 | 56 | 89 | 51 | | |
| 16 | | | | | | | | | | | | | | | 65 | 42 | 84 | 44 | 93 | 61 | 81 | 52 | | |
| 17 | | | | | | | | | | | | | | | 68 | 33 | 85 | 47 | 84 | 60 | 97 | 68 | | |
| 18 | | | | | | | | | | | | | | | 74 | 31 | 82 | 46 | 84 | 44 | 87 | 59 | | |
| 19 | | | | | | | | | | | | | | | 78 | 54 | 76 | 42 | 86 | 61 | 93 | 54 | | |
| 20 | | | | | | | | | | | | | | | 70 | 54 | 78 | 42 | 95 | 63 | 94 | 59 | | |
| 21 | | | | | | | | | | | | | | | 65 | 44 | 81 | 41 | 94 | 63 | 94 | 58 | | |
| 22 | | | | | | | | | | | | | | | 55 | 39 | 82 | 53 | 89 | 70 | 91 | 60 | | |
| 23 | | | | | | | | | | | | | | | 57 | 30 | 87 | 50 | 65 | 49 | 94 | 67 | | |
| 24 | | | | | | | | | | | | | | | 63 | 33 | 79 | 49 | 83 | 44 | 95 | 66 | | |
| 25 | | | | | | | | | | | | | | | 64 | 42 | 85 | 57 | 89 | 45 | 91 | 69 | | |
| 26 | | | | | | | | | | | | | | | 62 | 45 | 79 | 55 | 87 | 43 | 81 | 60 | | |
| 27 | | | | | | | | | | | | | | | 66 | 35 | 76 | 54 | 89 | 41 | 82 | 58 | | |
| 28 | | | | | | | | | | | | | | | 71 | 38 | 67 | 46 | 89 | 64 | 88 | 59 | | |
| 29 | | | | | | | | | | | | | | | | | 74 | 45 | 83 | 56 | 92 | 63 | | |
| 30 | | | | | | | | | | | | | | | | | 72 | 45 | 96 | 58 | 93 | 58 | | |
| 31 | | | | | | | | | | | | | | | | | 69 | 40 | | | 95 | 72 | | |
| Range | | | | | | | | | | | | | | | | | | | 63°. | | 54°. | | | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

* Observations commenced February 13, 1878.

† No observation taken.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, INDIANAPOLIS, IND.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 95 | 70 | 88 | 67 | 71 | 60 | 82 | 59 | 48 | 31 | 31 | 20 | 44 | 32 | 34 | 25 | 61 | 29 | 58 | 36 | 78 | 57 | 80 | 55 |
| 2 | 85 | 65 | 88 | 69 | 69 | 53 | 83 | 59 | 48 | 37 | 37 | 25 | 37 | 26 | 35 | 27 | 60 | 47 | 63 | 45 | 79 | 63 | 83 | 62 |
| 3 | 86 | 73 | 81 | 61 | 72 | 51 | 82 | 60 | 50 | 33 | 46 | 25 | 35 | 20 | 32 | 26 | 49 | 38 | 64 | 41 | 65 | 54 | 84 | 69 |
| 4 | 90 | 72 | 81 | 58 | 75 | 51 | 72 | 47 | 59 | 36 | 54 | 37 | 33 | 12 | 33 | 19 | 41 | 33 | 63 | 45 | 63 | 46 | 77 | 60 |
| 5 | 89 | 68 | 84 | 60 | 75 | 61 | 61 | 39 | 53 | 31 | 53 | 34 | 27 | 4 | 42 | 18 | 59 | 32 | 63 | 39 | 65 | 45 | 72 | 50 |
| 6 | 82 | 66 | 82 | 62 | 70 | 61 | 66 | 39 | 41 | 22 | 36 | 28 | 20 | 4 | 52 | 31 | 61 | 51 | 55 | 40 | 72 | 45 | 73 | 54 |
| 7 | 85 | 63 | 85 | 66 | 71 | 55 | 67 | 47 | 48 | 27 | 46 | 24 | 17 | — 2 | 55 | 38 | 66 | 51 | 61 | 35 | 76 | 60 | 75 | 55 |
| 8 | 90 | 66 | 86 | 67 | 71 | 50 | 56 | 47 | 58 | 43 | 38 | 29 | 34 | 6 | 45 | 38 | 67 | 54 | 62 | 47 | 74 | 59 | 65 | 56 |
| 9 | 83 | 75 | 81 | 66 | 72 | 57 | 67 | 46 | 46 | 35 | 39 | 21 | 45 | 31 | 39 | 33 | 72 | 57 | 75 | 58 | 62 | 50 | 59 | 53 |
| 10 | 86 | 64 | 81 | 61 | 74 | 63 | 57 | 47 | 40 | 22 | 50 | 33 | 42 | 37 | 33 | 24 | 64 | 56 | 65 | 46 | 59 | 45 | 69 | 51 |
| 11 | 76 | 60 | 76 | 63 | 73 | 60 | 57 | 41 | 46 | 25 | 58 | 40 | 39 | 33 | 33 | 19 | 64 | 44 | 65 | 47 | 56 | 42 | 71 | 52 |
| 12 | 79 | 57 | 86 | 68 | 76 | 64 | 60 | 35 | 54 | 31 | 63 | 37 | 45 | 30 | 46 | 28 | 56 | 47 | 70 | 51 | 55 | 43 | 71 | 54 |
| 13 | 83 | 60 | 76 | 62 | 79 | 59 | 74 | 53 | 58 | 34 | 55 | 39 | 39 | 35 | 50 | 38 | 58 | 47 | 65 | 50 | 57 | 35 | 75 | 55 |
| 14 | 85 | 62 | 73 | 60 | 82 | 61 | 75 | 53 | 61 | 42 | 48 | 27 | 39 | 32 | 49 | 35 | 51 | 40 | 57 | 49 | 59 | 43 | 80 | 61 |
| 15 | 89 | 63 | 71 | 59 | 75 | 64 | 74 | 53 | 58 | 51 | 57 | 36 | 38 | 31 | 49 | 31 | 57 | 34 | 64 | 47 | 63 | 40 | 79 | 68 |
| 16 | 82 | 71 | 77 | 58 | 80 | 62 | 75 | 52 | 58 | 42 | 61 | 50 | 39 | 31 | 54 | 35 | 54 | 44 | 70 | 45 | 55 | 50 | 84 | 69 |
| 17 | 83 | 63 | 82 | 58 | 66 | 56 | 74 | 55 | 58 | 41 | 62 | 55 | 51 | 32 | 48 | 39 | 46 | 40 | 71 | 50 | 61 | 46 | 72 | 64 |
| 18 | 80 | 67 | 83 | 61 | 65 | 43 | 75 | 64 | 45 | 32 | 65 | 57 | 54 | 36 | 44 | 32 | 48 | 37 | 67 | 58 | 74 | 50 | 77 | 60 |
| 19 | 71 | 60 | 85 | 62 | 69 | 42 | 69 | 64 | 47 | 32 | 67 | 56 | 52 | 34 | 50 | 29 | 61 | 34 | 75 | 58 | 76 | 64 | 80 | 56 |
| 20 | 71 | 61 | 85 | 63 | 75 | 48 | 66 | 52 | 57 | 35 | 66 | 48 | 53 | 45 | 60 | 48 | 60 | 42 | 73 | 63 | 79 | 64 | 78 | 64 |
| 21 | 74 | 54 | 87 | 66 | 69 | 51 | 52 | 41 | 54 | 48 | 66 | 44 | 49 | 39 | 61 | 49 | 62 | 43 | 80 | 53 | 69 | 56 | 64 | 55 |
| 22 | 82 | 58 | 80 | 66 | 73 | 51 | 59 | 36 | 51 | 41 | 58 | 53 | 39 | 32 | 55 | 41 | 61 | 38 | 70 | 66 | 71 | 47 | 67 | 51 |
| 23 | 84 | 62 | 71 | 64 | 79 | 52 | 66 | 46 | 50 | 42 | 59 | 53 | 32 | 19 | 44 | 36 | 69 | 44 | 75 | 63 | 76 | 58 | 77 | 57 |
| 24 | 81 | 69 | 75 | 64 | 79 | 59 | 65 | 49 | 53 | 46 | 60 | 56 | 51 | 25 | 43 | 34 | 62 | 28 | 67 | 54 | 78 | 68 | 82 | 53 |
| 25 | 87 | 73 | 78 | 57 | 80 | 61 | 64 | 54 | 52 | 47 | 59 | 55 | 52 | 39 | 40 | 30 | 43 | 23 | 62 | 51 | 74 | 63 | 84 | 62 |
| 26 | 89 | 72 | 82 | 60 | 82 | 61 | 60 | 53 | 49 | 42 | 55 | 46 | 43 | 32 | 42 | 25 | 65 | 33 | 59 | 49 | 73 | 59 | 86 | 68 |
| 27 | 84 | 70 | 85 | 60 | 80 | 65 | 68 | 55 | 44 | 38 | 47 | 44 | 43 | 37 | 50 | 27 | 69 | 55 | 55 | 44 | 70 | 56 | 87 | 68 |
| 28 | 89 | 71 | 86 | 64 | 82 | 62 | 71 | 52 | 39 | 25 | 46 | 42 | 37 | 27 | 54 | 29 | 62 | 41 | 60 | 47 | 72 | 51 | 91 | 70 |
| 29 | 85 | 72 | 85 | 70 | 84 | 60 | 64 | 49 | 25 | 12 | 45 | 40 | 34 | 23 | ..... | ..... | 51 | 31 | 70 | 50 | 81 | 59 | 90 | 73 |
| 30 | 86 | 65 | 83 | 65 | 85 | 60 | 59 | 40 | 27 | 9 | 40 | 35 | 38 | 26 | ..... | ..... | 57 | 40 | 75 | 49 | 66 | 56 | 89 | 73 |
| 31 | 88 | 72 | 89 | 69 | ..... | ..... | 55 | 44 | ..... | ..... | 39 | 33 | 36 | 32 | ..... | ..... | 48 | 38 | ..... | ..... | 74 | 47 | ..... | ..... |
| Range | 36° | | 32° | | 43° | | 48° | | 52° | | 47° | | 56° | | 43° | | 49° | | 45° | | 46° | | 41° | |
| Monthly means | 76°.1 | | 73°.5 | | 66°.5 | | 58°.6 | | 43°.1 | | 46°.8 | | 34°.7 | | 39°.5 | | 50°.3 | | 58°.8 | | 61°.9 | | 69°.8 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, INDIANOLA, TEX.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 92 | 79 | 94 | 79 | 93 | 79 | 87 | 71 | 82 | 70 | 46 | 39 | 49 | 35 | 62 | 52 | 77 | 60 | 73 | 62 | 82 | 69 | 89 | 78 |
| 2 | 93 | 78 | 100 | 77 | 95 | 80 | 93 | 73 | 72 | 58 | 54 | 45 | 54 | 43 | 59 | 47 | 76 | 58 | 73 | 63 | 81 | 72 | 88 | 77 |
| 3 | 92 | 78 | 99 | 80 | 96 | 80 | 91 | 76 | 63 | 55 | 77 | 52 | 51 | 44 | 53 | 41 | 69 | 54 | 73 | 61 | 85 | 71 | 90 | 78 |
| 4 | 89 | 79 | 92 | 81 | 93 | 82 | 82 | 66 | 73 | 60 | 65 | 55 | 50 | 36 | 63 | 42 | 69 | 53 | 72 | 51 | 84 | 62 | 85 | 76 |
| 5 | 88 | 77 | 93 | 81 | 91 | 80 | 76 | 65 | 72 | 55 | 59 | 38 | 49 | 33 | 66 | 47 | 74 | 57 | 77 | 60 | 82 | 64 | 86 | 76 |
| 6 | 89 | 78 | 96 | 81 | 82 | 73 | 83 | 71 | 58 | 44 | 53 | 33 | 48 | 40 | 66 | 57 | 70 | 63 | 79 | 58 | 80 | 69 | 92 | 76 |
| 7 | 93 | 78 | 96 | 82 | 86 | 76 | 86 | 65 | 66 | 57 | 54 | 43 | 43 | 38 | 69 | 50 | 77 | 65 | 72 | 67 | 81 | 73 | 90 | 77 |
| 8 | 94 | 76 | 98 | 79 | 91 | 78 | 78 | 72 | 66 | 55 | 58 | 49 | 48 | 39 | 71 | 54 | 74 | 65 | 83 | 66 | 83 | 68 | 87 | 63 |
| 9 | 95 | 79 | 90 | 78 | 94 | 78 | 79 | 69 | 58 | 43 | 58 | 50 | 53 | 43 | 61 | 49 | 69 | 55 | 90 | 67 | 78 | 68 | 90 | 71 |
| 10 | 93 | 78 | 91 | 79 | 95 | 81 | 80 | 69 | 54 | 40 | 58 | 51 | 52 | 47 | 54 | 42 | 75 | 52 | 79 | 64 | 78 | 70 | 93 | 78 |
| 11 | 93 | 79 | 95 | 76 | 90 | 77 | 79 | 68 | 59 | 48 | 62 | 50 | 62 | 45 | 55 | 45 | 76 | 59 | 73 | 65 | 75 | 69 | 86 | 73 |
| 12 | 91 | 80 | 90 | 74 | 91 | 78 | 85 | 70 | 68 | 56 | 62 | 54 | 65 | 55 | 61 | 52 | 80 | 60 | 79 | 64 | 80 | 69 | 88 | 78 |
| 13 | 92 | 79 | 90 | 77 | 91 | 79 | 85 | 74 | 77 | 65 | 61 | 57 | 56 | 43 | 72 | 49 | 73 | 61 | 80 | 69 | 87 | 71 | 89 | 80 |
| 14 | 92 | 78 | 97 | 78 | 91 | 80 | 87 | 75 | 82 | 66 | 64 | 57 | 54 | 43 | 73 | 51 | 73 | 63 | 83 | 70 | 80 | 66 | 90 | 79 |
| 15 | 94 | 79 | 95 | 78 | 90 | 80 | 86 | 76 | 71 | 61 | 64 | 55 | 54 | 43 | 64 | 47 | 72 | 64 | 84 | 70 | 80 | 69 | 95 | 80 |
| 16 | 91 | 79 | 90 | 78 | 85 | 78 | 86 | 66 | 71 | 59 | 66 | 59 | 55 | 48 | 69 | 53 | 72 | 65 | 79 | 70 | 86 | 70 | 92 | 80 |
| 17 | 97 | 78 | 95 | 78 | 82 | 75 | 83 | 65 | 69 | 57 | 73 | 59 | 59 | 50 | 72 | 60 | 78 | 59 | 84 | 71 | 83 | 75 | 94 | 80 |
| 18 | 97 | 81 | 88 | 73 | 83 | 68 | 75 | 63 | 74 | 64 | 65 | 58 | 70 | 58 | 72 | 60 | 75 | 61 | 78 | 70 | 84 | 76 | 95 | 79 |
| 19 | 89 | 80 | 91 | 76 | 80 | 62 | 70 | 57 | 79 | 65 | 67 | 60 | 65 | 53 | 73 | 60 | 68 | 60 | 81 | 73 | 86 | 75 | 98 | 80 |
| 20 | 89 | 79 | 90 | 77 | 83 | 61 | 69 | 50 | 70 | 54 | 66 | 55 | 69 | 52 | 79 | 65 | 69 | 62 | 82 | 73 | 85 | 74 | 94 | 79 |
| 21 | 85 | 71 | 90 | 79 | 81 | 67 | 66 | 49 | 68 | 54 | 66 | 55 | 59 | 45 | 73 | 52 | 79 | 60 | 81 | 73 | 82 | 75 | 96 | 78 |
| 22 | 85 | 68 | 93 | 78 | 83 | 68 | 68 | 50 | 70 | 54 | 68 | 58 | 64 | 50 | 65 | 54 | 79 | 58 | 83 | 74 | 84 | 76 | 92 | 79 |
| 23 | 86 | 72 | 95 | 80 | 82 | 71 | 69 | 59 | 68 | 56 | 69 | 60 | 63 | 45 | 65 | 53 | 73 | 60 | 82 | 66 | 86 | 74 | 91 | 80 |
| 24 | 82 | 77 | 96 | 79 | 84 | 71 | 77 | 66 | 78 | 61 | 68 | 58 | 70 | 41 | 65 | 51 | 82 | 59 | 81 | 61 | 88 | 74 | 92 | 78 |
| 25 | 86 | 73 | 95 | 80 | 85 | 74 | 83 | 65 | 67 | 50 | 70 | 56 | 73 | 57 | 62 | 58 | 80 | 61 | 83 | 63 | 88 | 76 | 90 | 79 |
| 26 | 93 | 78 | 94 | 79 | 85 | 74 | 80 | 61 | 75 | 52 | 67 | 57 | 72 | 60 | 61 | 52 | 78 | 65 | 84 | 65 | 89 | 66 | 91 | 79 |
| 27 | 91 | 76 | 90 | 79 | 85 | 74 | 81 | 66 | 62 | 50 | 65 | 59 | 66 | 58 | 61 | 50 | 87 | 68 | 83 | 67 | 90 | 68 | 90 | 80 |
| 28 | 94 | 81 | 88 | 75 | 88 | 71 | 84 | 69 | 53 | 43 | 61 | 51 | 66 | 56 | 67 | 51 | 81 | 60 | 83 | 67 | 89 | 76 | 93 | 80 |
| 29 | 91 | 79 | 85 | 78 | 85 | 73 | 83 | 75 | 48 | 33 | 52 | 43 | 72 | 53 | ..... | ..... | 80 | 66 | 78 | 63 | 89 | 76 | 92 | 80 |
| 30 | 94 | 79 | 88 | 79 | 84 | 74 | 78 | 67 | 43 | 28 | 51 | 35 | 58 | 49 | ..... | ..... | 80 | 66 | 84 | 65 | 89 | 77 | 92 | 79 |
| 31 | 96 | 80 | 88 | 80 | ..... | ..... | 74 | 69 | ..... | ..... | 46 | 36 | 67 | 48 | ..... | ..... | 72 | 67 | ..... | ..... | 90 | 77 | ..... | ..... |
| Range | 29° | | 27° | | 35° | | 44° | | 54° | | 44° | | 40° | | 38° | | 35° | | 39° | | 28° | | 35° | |
| Monthly means | 84°.9 | | 85°.6 | | 81°.2 | | 70°.2 | | 60°.3 | | 58°.5 | | 52°.9 | | 58°.7 | | 68°.0 | | 73°.0 | | 77°.7 | | 83°.6 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, JACKSBORO', TEX.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 97 | 73 | 95 | 76 | 98 | 72 | (*) | ..... | (*) | ..... | (*) | ..... | 49 | 24 | 52 | 35 | 72 | 52 | 69 | 43 | 87 | 61 | 94 | 73 |
| 2 | 98 | 70 | 96 | 77 | 83 | 69 | ..... | ..... | ..... | ..... | ..... | ..... | 36 | 25 | 45 | 31 | 68 | 43 | 75 | 45 | 89 | 59 | 100 | 76 |
| 3 | 99 | 74 | 94 | 72 | 74 | 63 | ..... | ..... | ..... | ..... | ..... | ..... | 37 | 25 | 49 | 24 | 68 | 42 | 62 | 40 | 73 | 54 | 90 | 67 |
| 4 | 96 | 72 | 95 | 72 | 70 | 64 | ..... | ..... | ..... | ..... | ..... | ..... | 29 | 17 | 64 | 23 | 69 | 33 | 68 | 36 | 82 | 46 | 83 | 64 |
| 5 | 95 | 75 | 98 | 73 | 72 | 63 | ..... | ..... | ..... | ..... | ..... | ..... | 41 | 11 | 69 | 37 | 89 | 49 | 89 | 47 | 90 | 56 | 73 | 61 |
| 6 | 100 | 69 | 99 | 75 | 79 | 60 | ..... | ..... | ..... | ..... | ..... | ..... | 42 | 22 | 53 | 49 | 80 | 53 | 88 | 60 | 88 | 60 | 86 | 62 |
| 7 | 101 | 74 | 87 | 69 | 81 | 61 | ..... | ..... | ..... | ..... | 59 | 29 | 38 | 30 | 53 | 45 | 81 | 57 | 72 | 57 | 92 | 66 | 70 | 60 |
| 8 | 99 | 76 | 89 | 67 | 85 | 63 | ..... | ..... | ..... | ..... | 63 | 25 | 46 | 30 | 48 | 35 | 70 | 62 | 70 | 52 | 74 | 54 | 85 | 61 |
| 9 | 101 | 74 | 96 | 66 | 85 | 68 | ..... | ..... | ..... | ..... | 60 | 36 | 60 | 39 | 42 | 31 | 66 | 46 | 67 | 54 | 77 | 52 | 84 | 68 |
| 10 | 93 | 73 | 100 | 67 | 90 | 60 | ..... | ..... | ..... | ..... | 63 | 33 | 58 | 30 | 43 | 23 | 73 | 35 | 66 | 47 | 78 | 54 | 76 | 62 |
| 11 | 91 | 65 | 100 | 69 | 94 | 70 | ..... | ..... | ..... | ..... | 70 | 34 | 58 | 37 | 60 | 21 | 77 | 45 | 81 | 43 | 77 | 62 | 86 | 63 |
| 12 | 92 | 64 | 97 | 69 | 91 | 70 | ..... | ..... | ..... | ..... | 65 | 40 | 52 | 37 | 62 | 38 | 71 | 42 | 86 | 60 | 82 | 60 | 91 | 69 |
| 13 | 94 | 64 | 87 | 71 | 90 | 70 | ..... | ..... | ..... | ..... | 65 | 54 | 49 | 37 | 64 | 42 | 83 | 46 | 84 | 63 | 71 | 55 | 94 | 73 |
| 14 | 99 | 75 | 92 | 64 | 87 | 70 | ..... | ..... | ..... | ..... | 69 | 46 | 60 | 26 | 69 | 32 | 75 | 49 | 60 | 46 | 71 | 50 | 90 | 64 |
| 15 | 99 | 75 | 83 | 64 | 92 | 70 | ..... | ..... | ..... | ..... | 69 | 50 | 58 | 30 | 61 | 32 | 82 | 47 | 88 | 60 | 86 | 56 | 93 | 68 |
| 16 | 99 | 73 | 91 | 63 | 93 | 71 | ..... | ..... | ..... | ..... | 70 | 55 | 62 | 34 | 74 | 42 | 83 | 52 | 90 | 60 | 71 | 61 | 83 | 67 |
| 17 | 100 | 74 | 90 | 64 | 79 | 62 | ..... | ..... | ..... | ..... | 73 | 50 | 63 | 39 | 67 | 33 | 82 | 53 | 81 | 60 | 93 | 71 | 87 | 74 |
| 18 | 94 | 74 | 92 | 64 | 73 | 52 | ..... | ..... | ..... | ..... | 73 | 59 | 65 | 48 | 75 | 37 | 80 | 54 | 82 | 46 | 80 | 58 | 83 | 68 |
| 19 | 91 | 67 | 84 | 64 | 75 | 50 | ..... | ..... | ..... | ..... | 73 | 61 | 54 | 44 | 78 | 54 | 69 | 54 | 85 | 60 | 90 | 60 | 92 | 72 |
| 20 | 84 | 67 | 90 | 70 | (*) | ..... | ..... | ..... | ..... | ..... | 66 | 54 | 52 | 33 | 60 | 49 | 74 | 40 | 89 | 65 | 92 | 60 | (*) | ..... |
| 21 | 80 | 57 | 84 | 63 | ..... | ..... | ..... | ..... | ..... | ..... | 62 | 53 | 54 | 30 | 65 | 45 | 80 | 48 | 87 | 72 | 78 | 71 | 85 | 66 |
| 22 | 83 | 60 | 78 | 62 | ..... | ..... | ..... | ..... | ..... | ..... | 63 | 50 | 63 | 30 | 55 | 41 | 81 | 55 | 86 | 71 | 89 | 58 | 85 | 65 |
| 23 | 86 | 60 | 88 | 62 | ..... | ..... | ..... | ..... | ..... | ..... | 65 | 46 | 66 | 33 | 59 | 35 | 82 | 53 | 72 | 61 | 90 | 73 | 87 | 65 |
| 24 | 90 | 61 | 95 | 70 | ..... | ..... | ..... | ..... | ..... | ..... | 62 | 44 | 63 | 36 | 62 | 33 | 81 | 53 | 79 | 52 | 90 | 71 | 93 | 69 |
| 25 | 90 | 61 | 98 | 72 | ..... | ..... | ..... | ..... | ..... | ..... | 67 | 40 | 65 | 32 | 66 | 43 | 87 | 47 | 84 | 56 | 83 | 62 | 87 | 63 |
| 26 | 88 | 68 | 96 | 70 | ..... | ..... | ..... | ..... | ..... | ..... | 67 | 37 | 67 | 48 | 62 | 47 | 72 | 54 | 87 | 56 | 86 | 60 | 87 | 69 |
| 27 | 88 | 72 | 95 | 70 | ..... | ..... | ..... | ..... | ..... | ..... | 53 | 36 | 59 | 37 | 66 | 41 | 79 | 54 | 87 | 60 | 82 | 57 | 87 | 66 |
| 28 | 87 | 72 | 94 | 62 | ..... | ..... | ..... | ..... | ..... | ..... | 40 | 38 | 69 | 38 | 68 | 39 | 65 | 45 | 82 | 62 | 86 | 64 | 87 | 68 |
| 29 | 91 | 75 | 95 | 69 | ..... | ..... | ..... | ..... | ..... | ..... | 43 | 31 | 63 | 40 | ..... | ..... | 72 | 46 | 82 | 56 | 90 | 68 | 90 | 63 |
| 30 | 92 | 61 | 96 | 71 | ..... | ..... | ..... | ..... | ..... | ..... | 44 | 27 | 47 | 32 | ..... | ..... | 70 | 46 | 91 | 58 | 91 | 73 | 93 | 75 |
| 31 | 95 | 75 | 96 | 72 | ..... | ..... | ..... | ..... | ..... | ..... | 40 | 24 | 65 | 26 | ..... | ..... | 66 | 42 | ..... | ..... | 92 | 72 | ..... | ..... |
| Range | 44° | | 38° | | ..... | | ..... | | ..... | | ..... | | 58° | | 57° | | 52° | | 55° | | 47° | | ..... | |
| Monthly means | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | |

* No observations taken.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, JACKSONVILLE, FLA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 92 | 72 | 88 | 74 | 96 | 69 | 77 | 68 | 80 | 62 | 52 | 29 | 56 | 37 | 63 | 43 | 69 | 45 | 75 | 64 | 85 | 57 | 86 | 73 |
| 2 | 95 | 75 | 87 | ..... | 91 | 71 | 81 | 73 | 84 | 68 | 52 | 30 | 58 | 36 | 74 | 51 | 73 | 54 | 70 | 63 | 87 | 61 | 93 | 66 |
| 3 | 95 | 77 | 90 | 72 | 84 | 71 | 80 | 75 | 68 | 53 | 67 | 39 | 63 | 36 | 58 | 50 | 73 | 57 | 70 | 63 | 86 | 68 | 95 | 74 |
| 4 | 96 | 76 | 90 | 74 | 85 | 68 | 81 | 72 | 75 | 55 | 67 | 55 | 65 | 49 | 52 | 46 | 60 | 49 | 67 | 54 | 85 | 69 | 96 | 73 |
| 5 | 100.5 | 70 | 92 | 74 | 90 | 71 | 75 | 62 | 80 | 64 | 67 | 61 | 51 | 38 | 53 | 39 | 62 | 39 | 70 | 50 | 79 | 59 | 93 | 71 |
| 6 | 96 | 70 | 95 | 77 | 90 | 72 | 73 | 59 | 70 | 64 | 66 | 45 | 48 | 33 | 59 | 40 | 71 | 43 | 80 | 55 | 85 | 55 | 91 | 66 |
| 7 | 86 | 70 | 95 | 78 | 94 | 74 | 75 | 59 | 73 | 58 | 55 | 36 | 49 | 33 | 71 | 58 | 75 | 54 | 80 | 60 | 87 | 65 | 89 | 72 |
| 8 | 87 | 75 | 94 | 79 | 89 | 77 | 84 | 65 | 79 | 71 | 62 | 43 | 53 | 42 | 71 | 55 | 74 | 52 | 83 | 61 | 88 | 66 | 92 | 76 |
| 9 | 91 | 75 | 92 | 78 | 87 | 75 | 76 | 65 | 74 | 54 | 60 | 39 | 63 | 51 | 68 | 50 | 74 | 58 | 76 | 64 | 90 | 67 | 92 | 76 |
| 10 | 95 | 78 | 95 | 76 | 90 | 75 | 78 | 64 | 58 | 44 | 66 | 48 | 56 | 46 | 65 | 52 | 75 | 62 | 83 | 63 | 88 | 66 | 82 | 72 |
| 11 | 89 | 76 | 93 | 75 | 93 | 75 | 81 | 56 | 60 | 41 | 68 | 44 | 61 | 43 | 58 | 40 | 82 | 64 | 85 | 64 | 76 | 62 | 87 | 70 |
| 12 | 87 | 75 | 90 | 72 | 92 | 72 | 78 | 56 | 64 | 41 | 69 | 42 | 61 | 38 | 52 | 32 | 76 | 64 | 75 | 62 | 81 | 56 | 92 | 70 |
| 13 | 87 | 74 | 92 | 73 | 87 | 76 | 77 | 59 | 69 | 46 | 71 | 41 | 72 | 52 | 62 | 42 | 75 | 63 | 82 | 53 | 82 | 64 | 80 | 72 |
| 14 | 90 | 75 | 93 | 73 | 88 | 72 | 80 | 65 | 75 | 54 | 64 | 46 | 60 | 48 | 70 | 53 | 81 | 57 | 87 | 64 | 85 | 68 | 77 | 71 |
| 15 | 90 | 70 | 88 | 72 | 91 | 71 | 81 | 70 | 77 | 58 | 71 | 50 | 52 | 37 | 69 | 50 | 81 | 60 | 87 | 68 | 83 | 66 | 81 | 72 |
| 16 | 89 | 70 | 92 | 74 | 91 | 73 | 80 | 67 | 76 | 62 | 72 | 50 | 56 | 34 | 64 | 49 | 71 | 55 | 79 | 66 | 79 | 64 | 83 | 70 |
| 17 | 93 | 68 | 90 | 74 | 89 | 73 | 80 | 65 | 77 | 56 | 71 | 50 | 60 | 34 | 70 | 44 | 79 | 55 | 71 | 64 | 91 | 69 | 86 | 71 |
| 18 | 93 | 76 | 79 | 73 | 88 | 71 | 82 | 66 | 74 | 55 | 71 | 54 | 63 | 40 | 70 | 52 | 65 | 51 | 72 | 63 | 90 | 68 | 91 | 74 |
| 19 | 93 | 76 | 82 | 70 | 93 | 75 | 85 | 66 | 75 | 53 | 61 | 56 | 70 | 46 | 62 | 45 | 68 | 45 | 78 | 63 | 89 | 69 | 90 | 73 |
| 20 | 90 | 77 | 84 | 70 | 89 | 75 | 83 | 69 | 74 | 65 | 67 | 58 | 74 | 54 | 69 | 49 | 72 | 49 | 83 | 63 | 84 | 68 | 84 | 73 |
| 21 | 88 | 75 | 86 | 72 | 84 | 73 | 77 | 68 | 72 | 66 | 72 | 59 | 67 | 53 | 69 | 62 | 72 | 58 | 86 | 67 | 88 | 70 | 92 | 70 |
| 22 | 87 | 73 | 90 | 72 | 86 | 69 | 71 | 56 | 68 | 60 | 74 | 66 | 63 | 44 | 74 | 58 | 67 | 61 | 85 | 67 | 94 | 70 | 93 | 76 |
| 23 | 89 | 73 | 87 | 72 | 85 | 69 | 72 | 50 | 64 | 59 | 72 | 64 | 64 | 42 | 66 | 55 | 73 | 60 | 87 | 67 | 93 | 74 | 89 | 70 |
| 24 | 91 | 77 | 89 | 75 | 84 | 70 | 76 | 56 | 64 | 51 | 73 | 63 | 65 | 40 | 72 | 52 | 82 | 58 | 81 | 71 | 97 | 73 | 91 | 70 |
| 25 | 90 | 75 | 84 | 73 | 82 | 71 | 85 | 68 | 68 | 44 | 74 | 62 | 67 | 50 | 63 | 46 | 76 | 55 | 82 | 63 | 98.5 | 77 | 91 | 74 |
| 26 | 94 | 76 | 85 | 71 | 84 | 72 | 84 | 72 | 67 | 52 | 65 | 54 | 68 | 46 | 58 | 42 | 77 | 47 | 85 | 63 | 95 | 77 | 90 | 75 |
| 27 | 95 | 75 | 88 | 73 | 80 | 74 | 79 | 66 | 74 | 51 | 64 | 51 | 71 | 50 | 58 | 50 | 82 | 56 | 84 | 64 | 92 | 76 | 87 | 73 |
| 28 | 95 | 77 | 87 | 73 | 82 | 70 | 80 | 59 | 66 | 56 | 64 | 48 | 65 | 52 | 67 | 47 | 76 | 62 | 84 | 61 | 87 | 73 | 89 | 73 |
| 29 | 99 | 80 | 87 | 74 | 81 | 69 | 82 | 64 | 58 | 42 | 68 | 58 | 63 | 41 | ..... | ..... | 83 | 61 | 83 | 59 | 87 | 69 | 90 | 73 |
| 30 | 98 | 76 | 90 | 71 | 79 | 67 | 83 | 67 | 46 | 31 | 59 | 49 | 66 | 57 | ..... | ..... | 86 | 60 | 81 | 59 | 89 | 68 | 89 | 71 |
| 31 | 97 | 76 | 92 | 73 | ..... | ..... | 84 | 70 | ..... | ..... | 53 | 44 | 62 | 51 | ..... | ..... | 81 | 69 | ..... | ..... | 94 | 72 | ..... | ..... |
| Range | 32°.5 | | 25° | | 28° | | 35° | | 53° | | 45° | | 41° | | 42° | | 47° | | 37° | | 43°.5 | | 30° | |
| Monthly means | 82°.4 | | 81°.0 | | 79°.4 | | 72°.0 | | 62°.7 | | *57°.3 | | 53°.3 | | 56°.7 | | 65°.4 | | 71°.3 | | 78°.2 | | 80°.4 | |

* Thirty days only.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, KEOKUK, IOWA.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 80 | 68 | 86 | 68 | 76 | 61 | 85 | 67 | 45 | 37 | 31 | 22 | 47 | 30 | 36 | 31 | 58 | 38 | 61 | 42 | 71 | 58 | 79 | 63 |
| 2 | 88 | 67 | 84 | 70 | 73 | 53 | 79 | 63 | 43 | 37 | 44 | 21 | 33 | 26 | 38 | 29 | 51 | 43 | 58 | 41 | 70 | 58 | 84 | 62 |
| 3 | 92 | 70 | 82 | 68 | 75 | 56 | 81 | 49 | 53 | 33 | 46 | 33 | 39 | 28 | 38 | 25 | 43 | 34 | 56 | 42 | 70 | 49 | 78 | 64 |
| 4 | 93 | 77 | 82 | 64 | 77 | 58 | 55 | 41 | 51 | 39 | 49 | 35 | 32 | 11 | 45 | 28 | 50 | 32 | 61 | 41 | 60 | 40 | 73 | 59 |
| 5 | 96 | 80 | 84 | 68 | 73 | 64 | 64 | 45 | 46 | 28 | 37 | 28 | 28 | 14 | 54 | 33 | 64 | 40 | 62 | 48 | 68 | 44 | 78 | 58 |
| 6 | 90 | 74 | 79 | 70 | 74 | 61 | 65 | 42 | 40 | 23 | 35 | 23 | 15 | 8 | 60 | 39 | 66 | 46 | 60 | 41 | 78 | 44 | 77 | 62 |
| 7 | 96 | 76 | 85 | 68 | 77 | 55 | 57 | 47 | 37 | 31 | 45 | 35 | 29 | 5 | 54 | 36 | 65 | 43 | 52 | 42 | 72 | 60 | 72 | 59 |
| 8 | 96 | 79 | 87 | 70 | 77 | 57 | 64 | 48 | 37 | 34 | 38 | 28 | 41 | 24 | 42 | 29 | 70 | 56 | 59 | 46 | 68 | 54 | 61 | 53 |
| 9 | 87 | 70 | 80 | 66 | 68 | 61 | 63 | 46 | 36 | 32 | 51 | 26 | 44 | 36 | 29 | 23 | 59 | 50 | 65 | 44 | 61 | 51 | 58 | 53 |
| 10 | 83 | 70 | 84 | 68 | 73 | 59 | 63 | 42 | 43 | 30 | 50 | 40 | 39 | 32 | 29 | 19 | 61 | 48 | 57 | 43 | 61 | 41 | 72 | 50 |
| 11 | 80 | 63 | 80 | 68 | 77 | 59 | 60 | 40 | 52 | 29 | 58 | 44 | 41 | 32 | 39 | 16 | 64 | 47 | 66 | 42 | 51 | 36 | 76 | 59 |
| 12 | 82 | 65 | 75 | 68 | 83 | 58 | 62 | 48 | 55 | 39 | 64 | 47 | 44 | 32 | 46 | 33 | 66 | 46 | 71 | 53 | 56 | 38 | 75 | 59 |
| 13 | 86 | 67 | 79 | 65 | 85 | 68 | 78 | 59 | 62 | 40 | 51 | 36 | 38 | 34 | 42 | 32 | 53 | 40 | 60 | 43 | 56 | 44 | 69 | 59 |
| 14 | 88 | 70 | 73 | 59 | 88 | 70 | 71 | 54 | 58 | 48 | 51 | 33 | 37 | 32 | 42 | 33 | 60 | 40 | 57 | 41 | 62 | 42 | 72 | 60 |
| 15 | 95 | 70 | 82 | 66 | 81 | 68 | 70 | 51 | 58 | 48 | 63 | 48 | 33 | 22 | 43 | 34 | 64 | 43 | 60 | 46 | 65 | 48 | 84 | 65 |
| 16 | 82 | 68 | 87 | 67 | 83 | 62 | 71 | 50 | 55 | 40 | 61 | 42 | 47 | 22 | 52 | 39 | 56 | 42 | 74 | 50 | 58 | 48 | 79 | 62 |
| 17 | 86 | 70 | 86 | 68 | 68 | 54 | 66 | 53 | 53 | 39 | 61 | 53 | 55 | 36 | 44 | 32 | 47 | 35 | 74 | 57 | 59 | 47 | 76 | 66 |
| 18 | 80 | 65 | 84 | 65 | 71 | 52 | 57 | 52 | 46 | 32 | 64 | 58 | 55 | 40 | 46 | 33 | 53 | 34 | 75 | 58 | 68 | 47 | 77 | 59 |
| 19 | 70 | 60 | 85 | 68 | 74 | 56 | 56 | 52 | 47 | 35 | 62 | 56 | 45 | 36 | 59 | 35 | 60 | 40 | 73 | 58 | 75 | 60 | 84 | 62 |
| 20 | 69 | 58 | 86 | 67 | 79 | 58 | 52 | 44 | 48 | 37 | 65 | 53 | 45 | 36 | 54 | 47 | 62 | 42 | 74 | 52 | 69 | 54 | 79 | 66 |
| 21 | 80 | 61 | 75 | 66 | 75 | 53 | 53 | 40 | 52 | 43 | 64 | 46 | 38 | 32 | 51 | 38 | 68 | 50 | 80 | 61 | 68 | 50 | 73 | 62 |
| 22 | 82 | 65 | 75 | 54 | 80 | 53 | 63 | 41 | 50 | 35 | 61 | 54 | 32 | 25 | 42 | 37 | 63 | 44 | 78 | 63 | 62 | 51 | 74 | 57 |
| 23 | 85 | 68 | 75 | 55 | 84 | 64 | 66 | 47 | 44 | 34 | 60 | 51 | 38 | 17 | 40 | 33 | 76 | 47 | 70 | 58 | 80 | 61 | 81 | 59 |
| 24 | 86 | 68 | 80 | 62 | 83 | 66 | 63 | 54 | 48 | 40 | 55 | 51 | 54 | 34 | 39 | 32 | 58 | 40 | 61 | 51 | 78 | 58 | 87 | 66 |
| 25 | 88 | 70 | 75 | 62 | 81 | 65 | 58 | 53 | 45 | 39 | 52 | 46 | 41 | 32 | 44 | 28 | 54 | 35 | 58 | 47 | 75 | 61 | 85 | 70 |
| 26 | 80 | 71 | 88 | 62 | 82 | 65 | 59 | 54 | 42 | 37 | 47 | 41 | 37 | 29 | 45 | 28 | 73 | 43 | 54 | 44 | 75 | 55 | 84 | 68 |
| 27 | 85 | 70 | 91 | 74 | 79 | 61 | 62 | 50 | 40 | 30 | 45 | 38 | 44 | 31 | 49 | 35 | 66 | 42 | 63 | 44 | 72 | 52 | 87 | 68 |
| 28 | 85 | 74 | 90 | 74 | 82 | 63 | 75 | 50 | 30 | 18 | 45 | 40 | 38 | 27 | 60 | 34 | 47 | 35 | 68 | 47 | 78 | 55 | 87 | 72 |
| 29 | 84 | 70 | 84 | 67 | 84 | 67 | 53 | 41 | 18 | 8 | 40 | 38 | 34 | 25 | ..... | ..... | 47 | 34 | 76 | 52 | 80 | 58 | 86 | 75 |
| 30 | 85 | 70 | 92 | 68 | 85 | 66 | 53 | 39 | 27 | 13 | 42 | 36 | 35 | 28 | ..... | ..... | 44 | 37 | 75 | 57 | 66 | 52 | 89 | 71 |
| 31 | 90 | 68 | 94 | 75 | ..... | ..... | 51 | 37 | ..... | ..... | 42 | 30 | 33 | 28 | ..... | ..... | 55 | 35 | ..... | ..... | 73 | 57 | ..... | ..... |
| Range | 38° | | 40° | | 36° | | 48° | | 54° | | 44° | | 50° | | 44° | | 44° | | 39° | | 44° | | 39° | |
| Monthly means | 76°.7 | | 74°.4 | | 70°.1 | | 55°.3 | | 39°.6 | | 44°.8 | | 33°.3 | | 37°.8 | | 50°.3 | | 57°.5 | | 60°.3 | | 70°.7 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, KEY WEST, FLA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 88.5 | 79 | 92 | 80 | 90 | 80 | 87 | 80.5 | 86 | 78 | 60 | 54 | 64.5 | 59.5 | 78.5 | 65.5 | 75 | 66 | 86 | 76 | 84 | 72 | 92 | 79 |
| 2 | 85 | 74.5 | 89.5 | 81.5 | 94 | 81 | 87.5 | 78.5 | 89.5 | 77 | 62.5 | 54.5 | 66.5 | 57 | 76 | 65.5 | 79 | 70 | 88 | 77 | 83 | 73 | 91 | 78 |
| 3 | 87 | 77 | 89 | 81.5 | 92 | 82 | 86 | 79 | 84.5 | 77 | 69.5 | 61 | 71 | 58 | 76 | 67 | 75 | 68 | 83 | 74 | 83 | 74 | 88 | 79 |
| 4 | 88 | 80 | 91 | 82.5 | 94 | 81 | 86.5 | 80 | 85.5 | 77 | 76.5 | 69 | 76 | 66.5 | 68 | 60 | 68 | 62 | 76 | 69 | 83 | 76 | 88 | 80 |
| 5 | 89 | 79.5 | 88 | 78 | 93 | 81.5 | 89 | 79.5 | 85 | 77 | 81 | 72 | 66.5 | 60 | 62 | 56 | 69 | 59 | 70 | 65 | 81 | 73 | 88 | 79 |
| 6 | 92 | 80.5 | 91 | 81 | 89 | 82 | 85 | 75 | 84.5 | 78.5 | 76 | 61 | 61 | 54 | 68 | 55 | 74 | 65 | 78 | 67 | 81 | 72 | 90 | 80 |
| 7 | 94 | 81 | 91 | 80.5 | 89 | 81 | 80 | 72 | 84 | 76.5 | 63.5 | 56.5 | 63 | 56.5 | 74 | 65 | 75 | 67 | 80 | 68 | 81 | 72 | 92 | 79 |
| 8 | 90 | 80.5 | 92 | 81.5 | 92 | 80.5 | 82 | 74 | 81.5 | 75.5 | 66.5 | 63 | 72.5 | 62 | 81 | 68 | 75 | 67 | 81 | 70 | 82 | 73 | 93 | 79 |
| 9 | 88.5 | 78.5 | 92 | 81 | 92 | 81.5 | 86.5 | 75 | 79.5 | 72 | 69 | 63.5 | 75.5 | 69 | 82 | 71 | 77 | 69 | 83 | 75 | 83 | 73 | 93 | 82 |
| 10 | 88.5 | 80.5 | 92.5 | 83 | 93.5 | 81.5 | 87 | 77 | 73 | 64.5 | 71 | 64 | 70 | 62.5 | 75 | 65 | 76 | 71 | 86 | 76 | 83 | 74 | 94 | 82 |
| 11 | 88 | 78.5 | 93 | 77 | 92 | 82 | 82 | 77.5 | 66.5 | 62 | 71 | 65 | 62.5 | 59.5 | 68 | 61 | 80 | 72 | 88 | 74 | 84 | 75 | 92 | 82 |
| 12 | 89.5 | 80 | 88.5 | 78 | 90 | 80 | 84 | 76 | 72 | 65 | 73 | 65.5 | 69 | 60.5 | 62 | 57 | 81 | 73 | 83 | 76 | 85 | 75 | 94 | 82 |
| 13 | 87 | 80.5 | 91 | 80 | 90.5 | 80 | 79 | 74 | 75 | 68 | 73 | 65.5 | 82 | 66 | 77 | 60 | 79 | 71 | 85 | 74 | 89 | 76 | 94 | 82 |
| 14 | 90.5 | 77 | 92.5 | 81 | 91 | 81 | 83.5 | 73.5 | 75.5 | 69.5 | 70 | 65.5 | 73.5 | 60 | 81 | 68 | 82 | 72 | 84 | 77 | 90 | 77 | 92 | 83 |
| 15 | 90 | 78 | 92.5 | 83 | 91.5 | 81 | 83 | 77 | 78 | 71 | 72 | 66.5 | 64 | 60 | 79 | 65 | 79 | 73 | 84 | 77 | 87 | 78 | 90 | 82 |
| 16 | 91 | 80 | 94 | 82 | 91.5 | 81.5 | 83 | 77 | 77 | 71.5 | 73.5 | 65 | 60.5 | 55.5 | 79 | 64 | 76 | 67 | 88 | 78 | 89 | 70 | 85 | 78 |
| 17 | 88 | 79 | 89 | 79 | 90.5 | 81 | 83.5 | 77 | 77.5 | 72 | 73 | 67 | 66.5 | 59.5 | 77 | 66 | 73 | 63 | 86 | 78 | 92 | 70 | 92 | 78 |
| 18 | 90 | 80.5 | 91 | 81 | 91 | 78 | 82 | 76.5 | 77 | 72 | 70 | 66 | 69 | 60.5 | 77 | 65 | 74 | 67 | 83 | 75 | 87 | 80 | 90 | 80 |
| 19 | 91 | 81 | 90.5 | 79 | 91 | 82 | 85 | 76.5 | 79 | 71.5 | 71 | 67.5 | 72 | 63 | 75 | 65 | 75 | 66 | 81 | 73 | 87 | 80 | 90 | 82 |
| 20 | 92.5 | 81 | 92 | 83 | 89 | 80 | 85 | 77 | 81 | 71 | 75.5 | 68 | 78.5 | 69 | 75 | 69 | 76 | 67 | 83 | 72 | 88 | 78 | 90 | 79 |
| 21 | 93.5 | 81 | 92.5 | 82 | 90 | 79 | 89 | 77 | 83 | 73 | 76.5 | 70.5 | 73 | 63 | 82 | 72 | 80 | 70 | 83 | 72 | 83 | 76 | 87 | 80 |
| 22 | 87.5 | 79 | 93.5 | 79 | 91 | 81 | 83 | 77 | 77 | 72 | 77.5 | 73 | 69 | 60.5 | 85 | 75 | 78 | 71 | 83 | 75 | 83 | 75 | 90 | 81 |
| 23 | 88.5 | 79 | 94 | 82.5 | 86 | 73.5 | 79 | 74 | 77 | 70 | 77 | 73 | 63.5 | 62 | 84 | 73 | 76 | 68 | 84 | 76 | 84 | 75 | 92 | 78 |
| 24 | 89.5 | 78.5 | 92.5 | 83 | 87.5 | 75 | 84.5 | 76 | 78 | 70 | 77 | 71.5 | 65 | 59.5 | 75 | 67 | 79 | 69 | 84 | 76 | 85 | 76 | 92 | 80 |
| 25 | 89.5 | 79 | 90 | 80 | 87 | 80 | 86 | 78.5 | 77 | 67 | 79 | 70 | 69 | 63.5 | 71 | 66 | 79 | 69 | 86 | 77 | 86 | 76 | 90 | 81 |
| 26 | 87 | 80 | 90 | 79.5 | 91 | 79 | 88.5 | 79 | 77 | 72.5 | 73 | 67.5 | 74 | 65 | 69 | 62 | 79 | 69 | 79 | 73 | 85 | 76 | 83 | 74 |
| 27 | 89 | 81 | 90 | 79 | 90 | 80 | 87 | 78.5 | 76.5 | 71.5 | 74 | 65.5 | 77 | 66 | 76 | 66 | 81 | 71 | 82 | 72 | 86 | 79 | 87 | 77 |
| 28 | 91 | 81 | 87 | 78 | 84 | 72.5 | 85 | 78.5 | 81 | 70 | 76 | 66 | 76 | 69 | 70 | 64 | 82 | 74 | 87 | 73 | 90 | 80 | 85 | 76 |
| 29 | 92 | 81 | 89 | 80.5 | 84 | 72 | 84 | 77 | 75 | 66 | 76 | 71.5 | 72 | 63.5 | ..... | ..... | 87 | 76 | 77 | 71 | 91 | 79 | 83 | 77 |
| 30 | 94.5 | 81 | 88.5 | 81 | 84 | 75 | 84.5 | 76.5 | 66 | 54.5 | 71.5 | 67.5 | 77 | 67.5 | ..... | ..... | 85 | 76 | 81 | 73 | 88 | 80 | 90 | 79 |
| 31 | 93 | 83 | 89 | 79 | ..... | ..... | 85 | 78.5 | ..... | ..... | 69 | 64.5 | 74 | 67.5 | ..... | ..... | 84 | 75 | ..... | ..... | 89 | 78 | ..... | ..... |
| Range | 20° | | 17° | | 22° | | 17° | | 35° | | 27° | | 28° | | 30° | | 28° | | 23° | | 22° | | 20° | |
| Monthly means | 84°.5 | | 85°.2 | | 84°.5 | | 80°.4 | | 74°.6 | | 68°.9 | | 66°.1 | | 69°.6 | | 73°.0 | | 77°.6 | | 80°.5 | | 84°.4 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, KITTYHAWK, N. C.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 90 | 72 | 81 | 72 | 93 | 68 | 76 | 68 | 66 | 57 | 39 | 26 | 41 | 29 | 50 | 42 | 48 | 37 | 55 | 46 | 69 | 58 | 61 | 56 |
| 2 | 95 | 76 | 80 | 75 | 76 | 68 | 74 | 69 | 77 | 61 | 41 | 31 | 51 | 31 | 42 | 36 | 63 | 43 | 62 | 45 | 84 | 60 | 63 | 56 |
| 3 | 94 | 73 | 77 | 73 | 73 | 63 | 76 | 70 | 65 | 48 | 47 | 32 | 41 | 33 | 41 | 36 | 71 | 56 | 57 | 48 | 84 | 66 | 62 | 56 |
| 4 | 87 | 74 | 86 | 71 | 83 | 62 | 77 | 66 | 59 | 43 | 55 | 32 | 60 | 40 | 41 | 34 | 57 | 42 | 51 | 43 | 82 | 69 | 75 | 59 |
| 5 | 83 | 68 | 81 | 72 | 84 | 65 | 66 | 57 | 71 | 47 | 61 | 55 | 42 | 30 | 42 | 29 | 50 | 35 | 64 | 42 | 71 | 58 | 75 | 64 |
| 6 | 82 | 71 | 90 | 69 | 85 | 72 | 64 | 57 | 65 | 47 | 63 | 40 | 41 | 24 | 49 | 31 | 67 | 41 | 60 | 50 | 70 | 55 | 68 | 56 |
| 7 | 74 | 69 | 86 | 74 | 80 | 68 | 64 | 59 | 62 | 47 | 44 | 35 | 32 | 22 | 55 | 33 | 68 | 53 | 63 | 46 | 84 | 59 | 72 | 57 |
| 8 | 81 | 68 | 92 | 73 | 71 | 64 | 75 | 63 | 71 | 62 | 52 | 37 | 43 | 26 | 65 | 46 | 62 | 48 | 62 | 46 | 85 | 67 | 77 | 63 |
| 9 | 92 | 69 | 80 | 71 | 70 | 63 | 69 | 63 | 71 | 60 | 46 | 35 | 50 | 35 | 58 | 46 | 57 | 47 | 57 | 51 | 73 | 63 | 80 | 66 |
| 10 | 95 | 74 | 88 | 72 | 81 | 63 | 76 | 61 | 62 | 48 | 54 | 32 | 52 | 42 | 62 | 48 | 70 | 48 | 56 | 54 | 73 | 56 | 80 | 67 |
| 11 | 82 | 72 | 80 | 73 | 78 | 72 | 70 | 56 | 49 | 43 | 63 | 40 | 49 | 41 | 50 | 39 | 69 | 51 | 76 | 54 | 67 | 55 | 77 | 59 |
| 12 | 75 | 68 | 87 | 71 | 83 | 71 | 65 | 51 | 54 | 38 | 54 | 44 | 46 | 35 | 45 | 31 | 71 | 51 | 72 | 51 | 74 | 51 | 74 | 58 |
| 13 | 79 | 70 | 91 | 75 | 77 | 72 | 62 | 51 | 57 | 42 | 66 | 44 | 57 | 35 | 52 | 38 | 80 | 51 | 75 | 56 | 57 | 54 | 74 | 62 |
| 14 | 77 | 69 | 86 | 73 | 75 | 72 | 73 | 52 | 68 | 46 | 57 | 37 | 61 | 44 | 46 | 41 | 64 | 50 | 60 | 53 | 61 | 52 | 70 | 55 |
| 15 | 84 | 68 | 84 | 73 | 84 | 73 | 75 | 56 | 69 | 52 | 60 | 37 | 51 | 38 | 45 | 41 | 52 | 46 | 62 | 54 | 60 | 51 | 67 | 61 |
| 16 | 90 | 75 | 87 | 72 | 84 | 71 | 79 | 60 | 69 | 55 | 65 | 49 | 45 | 39 | 44 | 38 | 57 | 40 | 57 | 50 | 66 | 45 | 77 | 59 |
| 17 | 91 | 71 | 89 | 64 | 82 | 70 | 68 | 63 | 64 | 52 | 70 | 47 | 44 | 37 | 55 | 38 | 61 | 48 | 51 | 44 | 61 | 56 | 85 | 66 |
| 18 | 89 | 74 | 86 | 70 | 76 | 67 | 74 | 62 | 60 | 51 | 57 | 52 | 45 | 35 | 50 | 38 | 51 | 43 | 50 | 44 | 59 | 55 | 75 | 66 |
| 19 | 90 | 75 | 81 | 71 | 71 | 65 | 79 | 59 | 52 | 46 | 54 | 52 | 49 | 38 | 41 | 32 | 64 | 43 | 61 | 47 | 67 | 57 | 67 | 63 |
| 20 | 79 | 66 | 80 | 75 | 69 | 65 | 79 | 67 | 53 | 49 | 55 | 51 | 59 | 41 | 60 | 32 | 65 | 47 | 76 | 54 | 71 | 62 | 74 | 61 |
| 21 | 81 | 66 | 86 | 69 | 69 | 66 | 80 | 69 | 61 | 53 | 54 | 49 | 55 | 46 | 64 | 45 | 57 | 44 | 80 | 61 | 83 | 65 | 77 | 62 |
| 22 | 78 | 69 | 85 | 73 | 69 | 62 | 72 | 55 | 61 | 57 | 53 | 50 | 56 | 44 | 69 | 49 | 51 | 45 | 80 | 55 | 68 | 57 | 83 | 69 |
| 23 | 89 | 68 | 83 | 74 | 73 | 63 | 69 | 49 | 62 | 58 | 53 | 50 | 50 | 32 | 57 | 49 | 67 | 44 | 84 | 66 | 70 | 52 | 81 | 60 |
| 24 | 87 | 75 | 86 | 74 | 78 | 67 | 72 | 53 | 63 | 55 | 51 | 48 | 46 | 31 | 52 | 43 | 77 | 44 | 76 | 66 | 72 | 61 | 82 | 65 |
| 25 | 91 | 70 | 87 | 73 | 77 | 70 | 72 | 56 | 67 | 51 | 50 | 47 | 61 | 35 | 49 | 39 | 45 | 34 | 80 | 66 | 74 | 64 | 87 | 67 |
| 26 | 90 | 74 | 86 | 72 | 78 | 71 | 66 | 60 | 67 | 54 | 54 | 50 | 59 | 43 | 44 | 33 | 50 | 35 | 79 | 61 | 90 | 65 | 96 | 72 |
| 27 | 90 | 75 | 87 | 73 | 80 | 71 | 63 | 59 | 64 | 48 | 57 | 50 | 57 | 43 | 45 | 34 | 76 | 46 | 72 | 60 | 73 | 68 | 94 | 73 |
| 28 | 93 | 69 | 91 | 71 | 74 | 67 | 68 | 54 | 58 | 48 | 51 | 49 | 57 | 41 | 56 | 37 | 68 | 60 | 81 | 58 | 78 | 66 | 94 | 70 |
| 29 | 89 | 75 | 93 | 71 | 71 | 66 | 74 | 56 | 53 | 43 | 54 | 50 | 42 | 30 | ..... | ..... | 62 | 49 | 71 | 57 | 78 | 63 | 82 | 68 |
| 30 | 87 | 74 | 88 | 76 | 72 | 69 | 71 | 62 | 44 | 29 | 56 | 41 | 49 | 33 | ..... | ..... | 52 | 47 | 72 | 60 | 85 | 68 | 78 | 68 |
| 31 | 81 | 73 | 89 | 75 | ..... | ..... | 69 | 60 | ..... | ..... | 43 | 36 | 60 | 46 | ..... | ..... | 63 | 48 | ..... | ..... | 65 | 57 | ..... | ..... |
| Range | 29° | | 29° | | 31° | | 31° | | 48° | | 44° | | 39° | | 40° | | 46° | | 42° | | 45° | | 41° | |
| Monthly means | 78°.0 | | 78°.0 | | 72°.1 | | 64°.9 | | 55°.4 | | 47°.9 | | 42°.5 | | 43°.7 | | 52°.8 | | 59°.0 | | 65°.2 | | 69°.5 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, KINGSTON, CANADA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 73.2 | 63.1 | 85.3 | 63.1 | 71.7 | 57.6 | 75.4 | 59.5 | 47.6 | 33.1 | 29.2 | 15.7 | 37.7 | 7.6 | 28.8 | 13.7 | 27.4 | 7.8 | 55.5 | 34.6 | 63.5 | 49.5 | 72.3 | 53.6 |
| 2 | 78.2 | 60.8 | 82.6 | 71.2 | 66.2 | 49.8 | 63.6 | 52.6 | 51.7 | 40.9 | 33.8 | 11.3 | 29.5 | − 8.6 | 20.0 | 5.0 | 42.3 | 12.4 | 52.3 | 37.9 | 65.4 | 49.9 | 75.0 | 55.5 |
| 3 | 76.0 | 58.9 | 81.0 | 67.1 | 60.9 | 44.4 | 60.0 | 46.3 | 51.3 | 34.8 | 39.2 | 31.7 | 18.1 | − 5.8 | 30.2 | 5.9 | 43.8 | 34.2 | 57.2 | 33.9 | 67.8 | 51.4 | 75.2 | 62.0 |
| 4 | 78.9 | 59.7 | 77.6 | 56.0 | 73.4 | 54.1 | 73.1 | 48.6 | 45.7 | 30.8 | 40.3 | 30.3 | 24.3 | 14.2 | 39.0 | 20.7 | 37.3 | 19.1 | 54.9 | 37.5 | 66.8 | 46.5 | 70.5 | 59.6 |
| 5 | 69.9 | 61.4 | 81.1 | 64.0 | 68.9 | 52.9 | 52.2 | 37.6 | 42.6 | 24.6 | 49.3 | 39.4 | 20.3 | − 5.0 | 36.0 | 20.3 | 39.0 | 20.0 | 47.0 | 35.4 | 65.9 | 45.7 | 69.8 | 46.9 |
| 6 | 77.5 | 57.9 | 76.6 | 56.0 | 65.4 | 48.8 | 52.6 | 36.7 | 35.3 | 18.1 | 43.2 | 25.3 | 4.2 | −15.0 | 39.3 | 25.6 | 42.8 | 33.3 | 47.2 | 38.7 | 65.2 | 43.8 | 69.8 | 38.1 |
| 7 | 75.4 | 58.2 | 79.3 | 64.3 | 65.8 | 53.3 | 56.9 | 41.0 | 45.3 | 31.1 | 36.3 | 15.3 | 0.2 | −16.6 | 41.9 | 30.7 | 53.9 | 39.7 | 48.4 | 38.7 | 64.9 | 45.9 | 56.1 | 44.8 |
| 8 | 74.6 | 62.1 | 80.3 | 62.9 | 68.2 | 51.9 | 56.9 | 51.5 | 52.1 | 41.1 | 37.6 | 22.6 | 25.7 | −19.0 | 44.6 | 31.1 | 41.9 | 33.0 | 47.9 | 38.3 | 66.8 | 50.3 | 59.9 | 45.8 |
| 9 | 74.8 | 60.3 | 78.5 | 64.3 | 74.0 | 50.7 | 58.2 | 49.8 | 44.1 | 24.9 | 26.7 | 15.6 | 44.8 | 23.9 | 33.8 | 18.3 | 60.2 | 31.2 | 58.9 | 37.9 | 64.2 | 49.8 | 68.0 | 46.0 |
| 10 | 74.7 | 61.2 | 78.0 | 57.9 | 76.3 | 52.3 | 62.7 | 48.5 | 29.1 | 19.3 | 38.8 | 25.9 | 41.8 | 31.7 | 32.0 | 13.6 | 53.1 | 39.7 | 54.0 | 45.9 | 63.9 | 42.7 | 62.9 | 49.7 |
| 11 | 69.9 | 58.2 | 76.5 | 61.3 | 76.0 | 64.4 | 58.0 | 47.1 | 38.0 | 22.7 | 40.3 | 34.1 | 46.7 | 34.1 | 21.0 | 3.1 | 42.3 | 32.0 | 49.4 | 41.7 | 63.5 | 38.7 | 62.0 | 51.3 |
| 12 | 72.8 | 55.9 | 73.8 | 61.0 | 73.6 | 60.6 | 57.0 | 42.5 | 46.1 | 30.8 | 41.0 | 29.6 | 39.0 | 33.0 | 32.8 | 8.9 | 39.0 | 29.6 | 55.1 | 39.7 | 44.9 | 34.7 | 62.9 | 48.4 |
| 13 | 70.0 | 54.1 | 76.6 | 62.1 | 77.0 | 66.3 | 52.6 | 41.8 | 39.0 | 23.5 | 44.3 | 25.7 | 42.1 | 30.5 | 37.6 | 18.2 | 41.5 | 31.7 | 55.7 | 38.7 | 45.4 | 32.0 | 71.9 | 51.3 |
| 14 | 72.0 | 54.9 | 80.5 | 62.5 | 78.2 | 61.4 | 59.1 | 48.8 | 48.9 | 34.1 | 38.1 | 18.7 | 33.5 | 29.7 | 28.6 | 9.4 | 41.5 | 31.7 | 50.3 | 37.6 | 50.3 | 36.7 | 73.0 | 52.9 |
| 15 | 77.6 | 58.6 | 78.8 | 62.3 | 82.0 | 61.9 | 57.7 | 51.9 | 50.9 | 34.7 | 44.1 | 37.7 | 37.6 | 10.7 | 33.3 | 5.7 | 43.9 | 29.7 | 52.1 | 35.1 | 57.0 | 39.8 | 75.0 | 57.1 |
| 16 | 82.7 | 61.1 | 77.8 | 64.0 | 78.6 | 68.0 | 62.1 | 44.8 | 53.0 | 40.5 | 45.9 | 35.5 | 13.2 | − 0.3 | 34.0 | 8.7 | 50.0 | 33.7 | 58.7 | 39.8 | 57.5 | 39.3 | 66.0 | 60.4 |
| 17 | 74.0 | 67.0 | 75.2 | 63.0 | 74.8 | 51.9 | 51.6 | 39.7 | 53.7 | 41.8 | 40.4 | 22.6 | 21.2 | 7.9 | 39.8 | 18.7 | 47.9 | 34.7 | 60.3 | 45.8 | 62.4 | 39.7 | 64.9 | 54.9 |
| 18 | 77.7 | 60.1 | 77.0 | 61.8 | 64.2 | 45.2 | 52.1 | 46.0 | 41.7 | 29.0 | 33.8 | 15.6 | 22.2 | 7.6 | 20.9 | 5.2 | 51.6 | 34.8 | 61.7 | 42.8 | 62.4 | 45.7 | 68.9 | 54.1 |
| 19 | 73.6 | 63.7 | 81.6 | 62.0 | 67.1 | 45.3 | 51.6 | 43.3 | 33.6 | 21.7 | 43.9 | 32.5 | 40.0 | 13.5 | 28.3 | 7.0 | 47.0 | 34.8 | 62.8 | 46.8 | 66.9 | 48.6 | 68.9 | 50.2 |
| 20 | 72.2 | 62.7 | 83.0 | 63.5 | 68.9 | 52.7 | 51.7 | 33.5 | 32.6 | 18.9 | 43.0 | 31.6 | 41.7 | 33.1 | 32.9 | 19.7 | 42.2 | 24.6 | 61.0 | 47.3 | 62.7 | 51.1 | 71.9 | 56.9 |
| 21 | 68.9 | 56.2 | 84.3 | 60.7 | 68.8 | 46.4 | 51.3 | 32.5 | 40.3 | 20.9 | 34.0 | 22.0 | 40.1 | 33.1 | 33.5 | 25.0 | 33.6 | 20.2 | 61.9 | 45.5 | 61.3 | 44.7 | 74.9 | 60.3 |
| 22 | 75.6 | 61.3 | 85.1 | 64.3 | 68.9 | 41.9 | 51.3 | 33.7 | 47.4 | 33.1 | 37.6 | 31.0 | 38.3 | 31.7 | 42.7 | 32.8 | 40.3 | 23.2 | 60.9 | 37.0 | 64.0 | 37.2 | 67.0 | 62.0 |
| 23 | 77.9 | 62.5 | 84.3 | 62.1 | 68.9 | 57.7 | 54.7 | 41.8 | 46.5 | 39.1 | 33.2 | 27.6 | 32.2 | − 5.3 | 39.0 | 31.7 | 43.7 | 27.0 | 61.3 | 46.4 | 66.3 | 47.7 | 64.7 | 58.2 |
| 24 | 77.0 | 59.3 | 84.0 | 70.1 | 71.0 | 55.0 | 62.1 | 38.5 | 47.4 | 41.1 | 36.5 | 24.2 | 34.0 | 1.6 | 40.9 | 26.5 | 41.0 | 4.8 | 67.3 | 44.7 | 61.5 | 49.6 | 67.7 | 57.9 |
| 25 | 90.2 | 63.5 | 82.6 | 69.9 | 76.0 | 64.8 | 41.3 | 33.7 | 45.9 | 39.6 | 30.3 | 23.6 | 33.0 | 20.7 | 30.0 | 20.6 | 30.4 | 4.8 | 63.9 | 50.0 | 64.0 | 50.8 | 73.9 | 52.8 |
| 26 | 85.1 | 65.6 | 79.2 | 67.1 | 77.0 | 57.0 | 40.4 | 27.9 | 53.4 | 39.9 | 33.6 | 25.6 | 33.1 | 19.7 | 42.9 | 20.6 | 41.3 | 19.9 | 65.1 | 49.7 | 66.7 | 51.0 | 72.0 | 50.3 |
| 27 | 76.8 | 69.4 | 82.7 | 65.0 | 68.0 | 46.5 | 44.8 | 26.0 | 47.4 | 39.5 | 41.6 | 31.0 | 38.8 | 29.7 | 41.5 | 19.7 | 51.4 | 31.7 | 68.1 | 47.1 | 65.4 | 49.8 | 74.8 | 64.1 |
| 28 | 79.0 | 69.7 | 83.8 | 67.0 | 72.5 | 43.5 | 52.1 | 31.2 | 48.3 | 33.7 | 40.0 | 30.7 | 31.9 | 2.7 | 42.1 | 20.6 | 41.5 | 33.0 | 65.9 | 52.8 | 60.3 | 47.7 | 75.4 | 62.5 |
| 29 | 82.1 | 69.1 | 80.9 | 65.9 | 67.1 | 48.4 | 61.3 | 46.0 | 37.9 | 26.6 | 32.7 | 24.9 | 22.6 | − 1.2 | ..... | ..... | 46.7 | 29.7 | 64.6 | 55.7 | 60.8 | 44.7 | 82.9 | 63.2 |
| 30 | 87.4 | 70.0 | 76.7 | 57.0 | 73.8 | 56.9 | 50.6 | 37.7 | 39.7 | 22.6 | 41.8 | 20.2 | 11.2 | − 3.0 | ..... | ..... | 49.9 | 30.4 | 68.8 | 50.6 | 59.7 | 49.6 | 87.5 | 73.0 |
| 31 | 82.2 | 67.1 | 72.0 | 61.2 | ..... | ..... | 46.5 | 37.4 | ..... | ..... | 36.2 | 11.7 | 16.2 | 2.1 | ..... | ..... | 51.6 | 35.7 | ..... | ..... | 75.1 | 51.7 | ..... | ..... |
| Range | 36°.1 | | 29°.3 | | 40°.1 | | 49°.4 | | 35°.6 | | 38°.0 | | 65°.7 | | 41°.5 | | 55°.4 | | 34°.9 | | 43°.1 | | 49°.4 | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, KNOXVILLE, TENN.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 92 | 74 | 93 | 69 | 85 | 70 | 85 | 56 | 60 | 43 | 37 | 15 | 45 | 33 | 38 | 34 | 65 | 32 | 58 | 40 | 80 | 48 | 84 | 57 |
| 2 | 94 | 73 | 92 | 68 | 76 | 60 | 82 | 58 | 60 | 43 | 38 | 17 | 46 | 28 | 40 | 33 | 67 | 55 | 65 | 37 | 82 | 52 | 87 | 55 |
| 3 | 92 | 74 | 93 | 67 | 76 | 65 | 70 | 65 | 57 | 35 | 48 | 20 | 42 | 24 | 42 | 34 | 55 | 40 | 58 | 47 | 78 | 62 | 89 | 62 |
| 4 | 95 | 70 | 92 | 68 | 81 | 55 | 70 | 51 | 64 | 32 | 48 | 29 | 36 | 22 | 37 | 32 | 43 | 35 | 50 | 44 | 63 | 53 | 80 | 64 |
| 5 | 92 | 68 | 91 | 65 | 68 | 60 | 61 | 41 | 54 | 45 | 59 | 38 | 28 | 14 | 45 | 31 | 61 | 26 | 62 | 40 | 67 | 48 | 77 | 63 |
| 6 | 86 | 68 | 92 | 63 | 77 | 65 | 65 | 40 | 49 | 34 | 36 | 32 | 28 | 11 | 52 | 27 | 66 | 36 | 65 | 50 | 75 | 41 | 75 | 58 |
| 7 | 90 | 66 | 91 | 67 | 74 | 64 | 71 | 41 | 58 | 29 | 46 | 24 | 25 | 7 | 56 | 31 | 65 | 53 | 68 | 42 | 79 | 58 | 77 | 58 |
| 8 | 91 | 65 | 86 | 71 | 78 | 57 | 65 | 51 | 63 | 48 | 52 | 31 | 33 | 11 | 51 | 45 | 73 | 49 | 71 | 48 | 72 | 62 | 75 | 65 |
| 9 | 90 | 65 | 88 | 70 | 80 | 58 | 67 | 41 | 56 | 42 | 46 | 27 | 39 | 28 | 49 | 42 | 75 | 45 | 76 | 57 | 75 | 58 | 78 | 63 |
| 10 | 92 | 70 | 87 | 63 | 76 | 65 | 71 | 43 | 45 | 34 | 54 | 24 | 44 | 35 | 45 | 32 | 72 | 55 | 73 | 55 | 70 | 51 | 67 | 54 |
| 11 | 90 | 67 | 89 | 61 | 77 | 65 | 64 | 44 | 49 | 31 | 62 | 32 | 39 | 29 | 33 | 28 | 74 | 56 | (†) | 51 | 70 | 42 | 73 | 48 |
| 12 | 90 | 65 | 91 | 69 | 83 | 65 | 66 | 37 | 60 | 27 | 67 | 36 | 47 | 24 | 47 | 25 | 70 | 53 | ..... | 46 | 76 | 47 | 75 | 47 |
| 13 | 91 | 67 | 79 | 68 | 80 | 63 | 74 | 39 | 65 | 26 | 59 | 39 | 58 | 35 | 44 | 27 | 68 | 50 | ..... | 58 | 59 | 49 | 75 | 60 |
| 14 | 93 | 65 | 78 | 63 | 82 | 60 | 75 | 45 | 65 | 32 | 55 | 34 | 45 | 39 | 44 | 37 | 67 | 44 | ..... | 56 | 55 | 48 | 80 | 63 |
| 15 | 90 | 70 | 76 | 59 | 83 | 61 | 79 | 46 | 60 | 44 | 57 | 26 | 45 | 33 | 46 | 41 | 65 | 40 | ..... | 50 | 61 | 42 | 79 | 60 |
| 16 | 84 | 67 | 81 | 59 | 83 | 65 | 77 | 48 | 65 | 47 | 65 | 35 | 44 | 32 | 52 | 35 | 70 | 37 | 81 | 60 | 64 | 44 | 80 | 68 |
| 17 | 88 | 68 | 83 | 58 | 77 | 69 | 78 | 49 | 67 | 37 | 67 | 45 | 53 | 24 | 55 | 37 | 61 | 44 | 82 | 58 | 80 | 52 | 76 | 65 |
| 18 | 80 | 66 | 85 | 57 | 69 | 59 | 80 | 52 | 61 | 40 | 64 | 43 | 56 | 26 | 48 | 37 | 55 | 43 | 72 | 57 | 87 | 54 | 79 | 66 |
| 19 | 85 | 66 | 87 | 59 | 63 | 56 | 74 | 60 | 58 | 35 | 67 | 47 | 55 | 29 | 54 | 25 | 65 | 33 | 68 | 55 | 77 | 61 | 80 | 64 |
| 20 | 79 | 65 | 88 | 60 | 73 | 54 | 69 | 54 | 65 | 42 | 68 | 39 | 60 | 44 | 62 | 33 | 70 | 38 | 67 | 58 | 83 | 61 | 83 | 65 |
| 21 | 83 | 63 | 87 | 60 | 76 | 57 | 62 | 51 | 55 | 44 | 68 | 43 | 52 | 42 | 70 | 51 | 73 | 39 | 81 | 53 | 86 | 63 | 80 | 65 |
| 22 | 87 | 66 | 84 | 63 | 77 | 54 | 56 | 43 | 58 | 48 | 60 | 52 | 57 | 39 | 56 | 47 | 76 | 43 | 82 | 61 | 89 | 58 | 75 | 58 |
| 23 | 75 | 70 | 82 | 64 | 78 | 54 | 63 | (*) | 57 | 51 | 60 | 48 | 45 | 31 | 48 | 38 | 75 | 46 | 81 | 63 | 83 | 64 | 78 | 53 |
| 24 | 87 | 69 | 82 | 65 | 81 | 58 | 65 | ..... | 54 | 48 | 64 | 53 | 51 | 25 | 47 | 33 | 69 | 45 | 76 | 57 | 88 | 70 | 82 | 59 |
| 25 | 91 | 70 | 86 | 63 | 80 | 57 | 65 | ..... | 58 | 46 | 60 | 51 | 49 | 29 | 45 | 31 | 55 | 32 | 69 | 50 | 87 | 69 | 87 | 58 |
| 26 | 93 | 70 | 87 | 61 | 81 | 57 | 62 | ..... | 49 | 39 | 59 | 49 | 59 | 39 | 46 | 29 | 69 | 30 | 67 | 49 | 78 | 67 | 89 | 62 |
| 27 | 93 | 72 | 89 | 62 | 69 | 63 | 71 | ..... | 52 | 38 | 60 | 48 | 61 | 42 | 56 | 31 | 77 | 40 | 62 | 49 | 82 | 61 | 93 | 65 |
| 28 | 94 | 72 | 89 | 61 | 82 | 63 | 74 | ..... | 52 | 32 | 65 | 51 | 51 | 41 | 62 | 31 | 63 | 55 | 61 | 48 | 78 | 55 | 88 | 69 |
| 29 | 95 | 74 | 91 | 67 | 83 | 59 | 76 | ..... | 38 | 21 | 56 | 43 | 53 | 34 | ..... | ..... | 56 | 44 | 66 | 44 | 86 | 52 | 88 | 68 |
| 30 | 95 | 72 | 91 | 67 | 84 | 59 | 63 | 58 | 31 | 16 | 44 | 35 | 44 | 34 | ..... | ..... | 72 | 41 | 76 | 52 | 86 | 59 | 86 | 67 |
| 31 | 91 | 71 | 92 | 67 | ..... | ..... | 68 | 54 | ..... | ..... | 40 | 34 | 40 | 35 | ..... | ..... | 62 | 45 | ..... | ..... | 80 | 62 | ..... | ..... |
| Range | 32° | | 36° | | 31° | | ..... | | 51° | | 53° | | 54° | | 45° | | 51° | | ..... | | 48° | | 46° | |
| Monthly means | 78°.7 | | 74°.7 | | 67°.7 | | 58°.3 | | 46°.2 | | 45°.6 | | 37°.2 | | 40°.6 | | 54°.4 | | 60°.4 | | 65°.7 | | 70°.1 | |

* Minimum thermometer broken.

† Maximum thermometer broken.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, LA CROSSE, WIS.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 80 | 63 | 89 | 71 | 66 | 53 | 69 | 53 | 45 | 38 | 30 | 21 | 31 | 25 | 41 | 29 | 59 | 40 | 57 | 40 | 62 | 50 | 77 | 64 |
| 2 | 80 | 63 | 79 | 63 | 67 | 53 | 60 | 51 | 42 | 34 | 38 | 21 | 26 | 19 | 41 | 27 | 50 | 37 | 55 | 37 | 66 | 48 | 82 | 64 |
| 3 | 81 | 64 | 79 | 58 | 73 | 46 | 61 | 47 | 38 | 32 | 40 | 27 | 34 | 22 | 41 | 19 | 41 | 33 | 56 | 36 | 59 | 40 | 72 | 61 |
| 4 | 91 | 67 | 84 | 58 | 82 | 53 | 49 | 39 | 33 | 28 | 43 | 38 | 32 | — 2 | 45 | 21 | 48 | 27 | 60 | 35 | 58 | 39 | 70 | 53 |
| 5 | 84 | 75 | 83 | 61 | 67 | 58 | 50 | 39 | 31 | 18 | 38 | 25 | 13 | 4 | 54 | 35 | 55 | 39 | 55 | 44 | 68 | 41 | 76 | 53 |
| 6 | 90 | 65 | 86 | 70 | 72 | 53 | 58 | 35 | 31 | 7 | 25 | 19 | 12 | — 3 | 59 | 41 | 52 | 36 | 55 | 36 | 67 | 50 | 70 | 58 |
| 7 | 96 | 73 | 85 | 66 | 74 | 54 | 53 | 48 | 41 | 24 | 33 | 21 | 25 | — 7 | 54 | 33 | 57 | 42 | 55 | 39 | 66 | 49 | 64 | 51 |
| 8 | 87 | 69 | 79 | 63 | 77 | 54 | 52 | 46 | 35 | 30 | 31 | 21 | 41 | 24 | 36 | 30 | 64 | 52 | 62 | 46 | 63 | 51 | 66 | 45 |
| 9 | 83 | 69 | 77 | 61 | 67 | 61 | 49 | 39 | 34 | 23 | 41 | 22 | 41 | 37 | 31 | 20 | 67 | 56 | 60 | 48 | 54 | 44 | 69 | 45 |
| 10 | 76 | 63 | 84 | 58 | 74 | 58 | 54 | 46 | 39 | 18 | 47 | 34 | 38 | 33 | 33 | 13 | 63 | 52 | 48 | 41 | 53 | 42 | 71 | 51 |
| 11 | 78 | 57 | 84 | 61 | 78 | 54 | 54 | 37 | 46 | 28 | 49 | 39 | 38 | 32 | 42 | 19 | 61 | 44 | 58 | 41 | 51 | 40 | 72 | 50 |
| 12 | 81 | 62 | 84 | 62 | 82 | 57 | 52 | 43 | 51 | 32 | 45 | 37 | 36 | 28 | 40 | 27 | 63 | 46 | 58 | 41 | 56 | 41 | 71 | 49 |
| 13 | 80 | 66 | 70 | 59 | 87 | 64 | 56 | 51 | 53 | 39 | 44 | 36 | 34 | 31 | 42 | 17 | 58 | 42 | 53 | 39 | 61 | 37 | 77 | 50 |
| 14 | 87 | 71 | 79 | 56 | 90 | 71 | 66 | 53 | 50 | 45 | 49 | 31 | 33 | 23 | 46 | 30 | 60 | 34 | 49 | 41 | 62 | 40 | 78 | 62 |
| 15 | 81 | 71 | 82 | 55 | 74 | 63 | 63 | 44 | 53 | 34 | 50 | 42 | 28 | 18 | 41 | 34 | 61 | 41 | 58 | 42 | 68 | 44 | 79 | 67 |
| 16 | 78 | 66 | 84 | 60 | 69 | 58 | 47 | 42 | 55 | 38 | 50 | 31 | 34 | 26 | 43 | 37 | 52 | 41 | 69 | 48 | 66 | 52 | 74 | 62 |
| 17 | 85 | 65 | 85 | 63 | 62 | 48 | 53 | 47 | 46 | 31 | 49 | 40 | 35 | 31 | 43 | 32 | 41 | 33 | 73 | 52 | 67 | 47 | 76 | 60 |
| 18 | 75 | 62 | 87 | 62 | 72 | 42 | 56 | 50 | 37 | 27 | 51 | 44 | 38 | 31 | 41 | 31 | 55 | 29 | 75 | 56 | 61 | 50 | 79 | 65 |
| 19 | 63 | 59 | 87 | 63 | 71 | 51 | 54 | 43 | 41 | 32 | 46 | 43 | 46 | 35 | 53 | 31 | 61 | 43 | 77 | 50 | 67 | 54 | 82 | 64 |
| 20 | 73 | 56 | 87 | 65 | 71 | 49 | 51 | 35 | 44 | 32 | 50 | 43 | 40 | 34 | 50 | 34 | 59 | 36 | 68 | 47 | 62 | 54 | 72 | 59 |
| 21 | 81 | 57 | 75 | 61 | 72 | 52 | 52 | 36 | 49 | 38 | 60 | 37 | 35 | 30 | 44 | 35 | 55 | 36 | 62 | 50 | 60 | 46 | 70 | 50 |
| 22 | 83 | 60 | 74 | 53 | 77 | 57 | 67 | 38 | 44 | 37 | 59 | 50 | 35 | 13 | 44 | 34 | 57 | 38 | 75 | 51 | 71 | 47 | 74 | 47 |
| 23 | 87 | 61 | 77 | 50 | 78 | 64 | 68 | 52 | 43 | 34 | 59 | 49 | 32 | 7 | 38 | 35 | 66 | 43 | 67 | 56 | 78 | 56 | 81 | 54 |
| 24 | 88 | 65 | 84 | 59 | 80 | 60 | 68 | 51 | 48 | 36 | 52 | 40 | 44 | 28 | 40 | 31 | 45 | 27 | 60 | 48 | 76 | 56 | 87 | 61 |
| 25 | 89 | 65 | 81 | 63 | 72 | 66 | 58 | 43 | 40 | 38 | 44 | 39 | 37 | 30 | 38 | 26 | 54 | 28 | 56 | 48 | 69 | 57 | 82 | 69 |
| 26 | 79 | 72 | 89 | 63 | 77 | 64 | 57 | 46 | 38 | 35 | 41 | 35 | 35 | 26 | 49 | 23 | 66 | 45 | 51 | 41 | 61 | 51 | 75 | 66 |
| 27 | 86 | 69 | 83 | 67 | 76 | 61 | 59 | 50 | 36 | 27 | 41 | 35 | 31 | 19 | 51 | 31 | 56 | 40 | 65 | 40 | 62 | 52 | 84 | 61 |
| 28 | 82 | 72 | 79 | 68 | 75 | 53 | 51 | 40 | 27 | 15 | 41 | 37 | 25 | 7 | 61 | 40 | 47 | 28 | 71 | 46 | 63 | 46 | 90 | 66 |
| 29 | 83 | 64 | 76 | 64 | 83 | 65 | 45 | 37 | 23 | 7 | 41 | 36 | 32 | 14 | ..... | ..... | 53 | 34 | 73 | 49 | 57 | 50 | 88 | 72 |
| 30 | 87 | 66 | 74 | 58 | 84 | 68 | 55 | 34 | 28 | 21 | 40 | 30 | 38 | 17 | ..... | ..... | 52 | 33 | 68 | 57 | 70 | 40 | 82 | 70 |
| 31 | 87 | 68 | 76 | 63 | ..... | ..... | 49 | 37 | ..... | ..... | 36 | 27 | 38 | 20 | ..... | ..... | 54 | 33 | ..... | ..... | 77 | 54 | ..... | ..... |
| Range | 40° | | 39° | | 48° | | 35° | | 48° | | 41° | | 53° | | 48° | | 40° | | 42° | | 41° | | 45° | |
| Monthly means | 74°.6 | | 71°.8 | | 65°.7 | | 49°.9 | | 35°.0 | | 39°.5 | | 27°.7 | | 37°.5 | | 47°.6 | | 54°.4 | | 56°.1 | | 68°.0 | |

*Maximum, minimum, and mean temperatures—Continued.*

STATION, LA MESILLA, N. MEX.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | ..... | ..... | ..... | ..... | 94 | 71 | 89 | 60 | 69 | 38 | 61 | 14 | 55 | 22 | 68 | 21 | 58 | 35 | 61 | 40 | 87 | 48 | 94 | 57 |
| 2 | ..... | ..... | ..... | ..... | 94 | 70 | 89 | 55 | 70 | 28 | 68 | 19 | 49 | 22 | 55 | 27 | 66 | 32 | 69 | 38 | 84 | 50 | 93 | 56 |
| 3 | ..... | ..... | (*) | ..... | 84 | 69 | 89 | 54 | 73 | 30 | 57 | 29 | 43 | 13.5 | 64 | 23 | 66 | 32 | 79 | 38 | 82 | 45 | 96 | 50 |
| 4 | ..... | ..... | 89 | 69 | 82 | 65 | 82 | 56 | 75 | 33 | 54 | 37 | 50 | 13 | 67 | 25 | 77 | 31 | 83 | 43 | 86 | 41 | 95 | 60 |
| 5 | ..... | ..... | 89 | 72 | 85 | 62 | 82 | 50 | 75 | 33 | 53 | 25 | 40 | 15.5 | 66 | 25 | 76 | 35 | 86 | 43 | 94 | 44 | 95 | 62 |
| 6 | ..... | ..... | 93 | 70 | 87 | 63 | 76 | 49 | 73 | 32 | 63 | 14 | 47 | 28 | 68 | 28.5 | 76 | 31 | 83 | 43 | 87 | 57 | 93 | 56 |
| 7 | ..... | ..... | 94 | 70 | 89 | 66 | 88 | 50 | 71 | 35.5 | 72 | 15.5 | 59 | 24 | 67 | 25 | 77 | 40 | 66 | 44 | 86 | 55 | 89 | 56 |
| 8 | ..... | ..... | 94 | 76 | 88 | 67 | 91 | 43 | 71 | 33 | 55 | 32 | 63 | 25 | 60 | 28 | 57 | 38 | 76 | 46 | 82 | 52 | 93 | 50 |
| 9 | ..... | ..... | 94 | 72 | 89 | 69 | 94 | 47 | 63 | 33 | 57 | 36 | 65 | 24 | 58 | 19 | 66 | 31 | 75 | 53 | 83 | 54 | 96 | 54 |
| 10 | ..... | ..... | 93 | 70 | 92 | 67 | 90 | 46 | 71 | 28 | 47 | 33 | 65 | 28 | 54 | 20 | 65 | 32 | 77 | 45 | 63 | 54 | 97 | 53 |
| 11 | ..... | ..... | 94 | 70 | 91 | 69 | 90 | 52 | 78 | 33 | 64 | 37 | 53 | 23 | 59 | 17 | 66 | 35 | 85 | 42 | (†) | ..... | 79 | 66 |
| 12 | ..... | ..... | 94 | 67 | 88 | 68 | 87 | 52 | 82 | 34 | 74 | 38 | 53 | 26 | 68 | 17 | 71 | 33 | 84 | 44 | 86 | 50 | 94 | 53 |
| 13 | ..... | ..... | 94 | 67 | 84 | 64 | 76 | 45 | 69 | 38 | 66 | 44 | 56 | 16.5 | 66 | 31 | 76 | 40 | 76 | 48 | 92 | 48 | 96 | 54 |
| 14 | ..... | ..... | 94 | 75 | 83 | 64 | 75 | 39 | 74 | 35.5 | 63 | 47 | 52 | 21 | 69 | 41 | 81 | 36 | 75 | 47 | 92 | 53 | 99.5 | 53 |
| 15 | ..... | ..... | 95 | 69 | 85 | 55 | 71 | 47 | 82 | 33 | 73 | 38 | 62 | 22 | 70 | 23 | 82 | 36 | 75 | 45 | 89 | 56 | 90 | 66 |
| 16 | ..... | ..... | 90 | 74 | 87 | 55 | 62 | 49 | 84 | 31 | 71 | 39 | 69 | 23 | 63 | 37 | 83 | 36 | 77 | 40 | 87 | 51 | 91 | 54 |
| 17 | ..... | ..... | 94 | 71 | 86 | 55 | 60 | 46 | 84 | 32 | 72 | 36 | 65 | 22.5 | 75 | 28 | 82 | 38 | 64 | 38 | 85 | 54 | 98.5 | 58 |
| 18 | ..... | ..... | 82 | 72 | 86 | 58 | 71 | 39 | 63 | 33 | 73 | 38 | 61 | 28 | 75 | 26 | 65 | 40 | 75 | 30 | 79 | 52 | 104 | 57 |
| 19 | ..... | ..... | 90 | 68 | 81 | 57 | 65 | 38 | 63 | 41 | 60 | 40 | 63 | 26 | 73 | 42 | 60 | 45 | 80 | 35 | 85 | 49 | 100 | 66 |
| 20 | ..... | ..... | 95 | 68 | 89 | 59 | 65 | 35 | 78 | 33 | 69 | 34 | 66 | 22 | 68 | 42 | 64 | 40 | 81 | 39 | 88 | 48 | 91 | 62 |
| 21 | ..... | ..... | 93 | 66 | 89 | 61 | 67 | 38 | 65 | 27 | 67 | 31 | 59 | 21 | 70 | 26 | 74 | 36 | 76 | 45 | 88 | 50 | 98 | 69 |
| 22 | ..... | ..... | 95 | 63 | 90 | 62 | 74 | 37 | 74 | 29 | 66 | 27 | 69 | 20 | 59 | 34 | 75 | 38 | 63 | 44 | 88 | 52 | 99 | 64 |
| 23 | ..... | ..... | 96 | 64 | 90 | 60 | 77 | 41 | 79 | 28 | 65 | 26 | 61 | 21 | 60 | 30 | 65 | 46 | 76 | 34 | 86 | 51 | 102 | 60 |
| 24 | ..... | ..... | 97 | 64 | 88 | 61 | 65 | 50 | 73 | 35 | 69 | 28 | 73 | 27 | 64 | 30 | 77 | 38 | 82 | 41 | 93 | 53 | 101 | 61 |
| 25 | ..... | ..... | 98 | 62 | 85 | 61 | 72 | 41 | 75 | 28 | 64 | 28 | 75 | 31 | 59 | 49 | 78 | 42 | 84 | 41 | 84 | 48 | 101 | 60 |
| 26 | ..... | ..... | 98 | 63 | 84 | 50 | 83 | 38 | 81 | 25 | 62 | 26 | 72 | 30 | 56 | 40 | 68 | 43 | 84 | 42 | 88 | 47 | 97 | 63 |
| 27 | ..... | ..... | 98 | 65 | 85 | 54 | 81 | 42 | 70 | 28 | 60 | 27 | 67 | 25 | 75 | 30 | 71 | 44 | 84 | 43 | 93 | 51 | 87 | 58 |
| 28 | ..... | ..... | 97 | 70 | 90 | 54 | 82 | 48 | 42 | 23 | 37 | 27 | 67 | 24 | 63 | 33 | 70 | 38 | 87 | 44 | 89 | 50 | 100 | 62 |
| 29 | ..... | ..... | 95 | 70 | 88 | 65 | 80 | 42 | 52 | 15 | 40 | 26 | 67 | 35 | ..... | ..... | 59 | 33 | 90 | 44 | 92 | 52 | 101 | 63.5 |
| 30 | ..... | ..... | 93 | 68 | 88 | 61 | 78 | 52 | 58 | 14 | 41 | 27 | 69 | 24 | ..... | ..... | 69 | 35 | 93 | 50 | 92 | 53 | 103 | 67 |
| 31 | ..... | ..... | 94 | 67 | ..... | ..... | 75 | 50 | ..... | ..... | 49 | 21 | 69 | 23 | ..... | ..... | 63 | 45 | ..... | ..... | 92 | 54 | ..... | ..... |
| Range | ..... | ..... | ..... | ..... | 44° | | 59° | | 70° | | 60° | | 62° | | 58° | | 52° | | 63° | | ..... | | 54° | |
| Monthly means | ..... | ..... | ..... | ..... | 73°.8 | | 60°.1 | | 45°.4 | | 41°.5 | | 38°.1 | | 44°.3 | | 53°.2 | | ..... | | ..... | | ..... | |

* Observations commenced August 4, 1877.

† No observations taken.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, LAREDO, TEX.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 101 | 80 | 102 | 80 | 103 | 79 | 93 | 73 | 83 | 63 | 55 | 37 | 53 | 33 | 70 | 43 | 77 | 58 | 74 | 60 | 91 | 69 | 100 | 80 |
| 2 | 102 | 81 | 103 | 80 | 100 | 80 | 97 | 72 | 69 | 54 | 54 | 41 | 57 | 40 | 63 | 42 | 77 | 50 | 75 | 60 | 92 | 72 | 100 | 81 |
| 3 | 102 | 79 | 103 | 76 | 101 | 80 | 99 | 77 | 64 | 52 | 61 | 50 | 61 | 46 | 60 | 35 | 73 | 46 | 80 | 53 | 86 | 71 | 102 | 78 |
| 4 | 98 | 77 | 102 | 82 | 101 | 79 | 82 | 66 | 65 | 55 | 71 | 48 | 55 | 35 | 66 | 37 | 77 | 44 | 78 | 52 | 85 | 64 | 97 | 78 |
| 5 | 94 | 74 | 102 | 79 | 103 | 77 | 85 | 60 | 72 | 59 | 62 | 39 | 50 | 33 | 72 | 43 | 81 | 58 | 85 | 53 | 85 | 59 | 94 | 77 |
| 6 | 95 | 75 | 103 | 82 | 102 | 74 | 92 | 75 | 64 | 43 | 58 | 26 | 48 | 42 | 77 | 55 | 78 | 65 | 87 | 60 | 92 | 66 | 96 | 77 |
| 7 | 97 | 75 | 104 | 83 | 94 | 75 | 96 | 74 | 76 | 44 | 61 | 28 | 43 | 36 | 78 | 43 | 84 | 56 | 76 | 65 | 95 | 71 | 96 | 79 |
| 8 | 100 | 75 | 100 | 77 | 97 | 76 | 89 | 72 | 72 | 44 | 64 | 37 | 47 | 40 | 75 | 52 | 88 | 65 | 88 | 66 | 88 | 78 | 87 | 80 |
| 9 | 100 | 76 | 98 | 74 | 98 | 77 | 90 | 71 | 66 | 37 | 65 | 55 | 56 | 46 | 64 | 49 | 76 | 55 | 91 | 60 | 82 | 68 | 97 | 77 |
| 10 | 101 | 76 | 94 | 76 | 99 | 79 | 90 | 72 | 64 | 33 | 60 | 53 | 55 | 49 | 61 | 41 | 77 | 49 | 87 | 64 | 87 | 69 | 93 | 68 |
| 11 | 91 | 73 | 99 | 71 | 98 | 80 | 90 | 69 | 67 | 37 | 64 | 53 | 61 | 48 | 62 | 46 | 82 | 60 | 87 | 66 | 79 | 68 | 86 | 76 |
| 12 | 98 | 77 | 98 | 77 | 98 | 80 | 88 | 66 | 77 | 73 | 60 | 53 | 65 | 50 | 67 | 52 | 83 | 63 | 83 | 68 | 85 | 69 | 94 | 77 |
| 13 | 98 | 74 | 100 | 78 | 99 | 81 | 91 | 73 | 80 | 58 | 67 | 59 | 58 | 40 | 81 | 53 | 82 | 62 | 84 | 73 | 84 | 72 | 97 | 80 |
| 14 | 98 | 76 | 100 | 80 | 99 | 79 | 93 | 74 | 80 | 56 | 69 | 60 | 60 | 34 | 81 | 45 | 77 | 66 | 90 | 75 | 85 | 70 | 100 | 73 |
| 15 | 103 | 79 | 101 | 80 | 98 | 78 | 93 | 76 | 72 | 51 | 77 | 64 | 63 | 37 | 71 | 45 | 71 | 67 | 90 | 70 | 78 | 68 | 96 | 82 |
| 16 | 101 | 79 | 101 | 79 | 95 | 76 | 86 | 71 | 78 | 53 | 76 | 67 | 65 | 47 | 74 | 45 | 77 | 60 | 88 | 70 | 93 | 71 | 97 | 80 |
| 17 | 100 | 80 | 102 | 80 | 97 | 74 | 74 | 64 | 80 | 53 | 74 | 67 | 70 | 51 | 85 | 54 | 77 | 60 | 95 | 73 | 93 | 78 | 102 | 83 |
| 18 | 103 | 80 | 99 | 81 | 90 | 71 | 73 | 65 | 82 | 61 | 76 | 66 | 74 | 59 | 83 | 57 | 78 | 60 | 84 | 67 | 96 | 79 | 102 | 83 |
| 19 | 102 | 79 | 100 | 81 | 91 | 65 | 80 | 57 | 77 | 59 | 76 | 67 | 71 | 45 | 80 | 62 | 65 | 58 | 83 | 74 | 95 | 74 | 102 | 82 |
| 20 | 100 | 84 | 101 | 79 | 90 | 60 | 72 | 52 | 75 | 46 | 71 | 56 | 75 | 42 | 85 | 61 | 68 | 55 | 92 | 76 | 91 | 77 | 101 | 81 |
| 21 | 90 | 75 | 104 | 78 | 90 | 55 | 73 | 44 | 74 | 46 | 71 | 56 | 70 | 42 | 78 | 54 | 74 | 51 | 95 | 75 | 96 | 81 | 100 | 80 |
| 22 | 92 | 62 | 102 | 77 | 90 | 60 | 76 | 44 | 74 | 47 | 68 | 56 | 66 | 41 | 80 | 54 | 77 | 49 | 101 | 78 | 97 | 81 | 100 | 81 |
| 23 | 94 | 67 | 101 | 80 | 90 | 67 | 82 | 53 | 78 | 49 | 69 | 55 | 67 | 36 | 68 | 47 | 77 | 49 | 88 | 66 | 97 | 78 | 99 | 80 |
| 24 | 95 | 66 | 103 | 81 | 95 | 70 | 79 | 69 | 85 | 61 | 71 | 50 | 73 | 48 | 73 | 44 | 75 | 61 | 89 | 58 | 94 | 77 | 100 | 82 |
| 25 | 100 | 77 | 102 | 80 | 90 | 75 | 87 | 64 | 70 | 45 | 71 | 53 | 75 | 45 | 69 | 57 | 82 | 57 | 88 | 62 | 95 | 77 | 100 | 82 |
| 26 | 104 | 76 | 99 | 80 | 95 | 76 | 85 | 52 | 82 | 39 | 74 | 57 | 75 | 59 | 69 | 54 | (*) | ..... | 89 | 64 | 95 | 70 | 99 | 82 |
| 27 | 102 | 80 | 98 | 79 | 94 | 75 | 91 | 60 | 68 | 45 | 67 | 54 | 73 | 45 | 64 | 50 | 90 | 61 | 90 | 67 | 90 | 71 | 99 | 82 |
| 28 | 102 | 80 | 96 | 75 | 92 | 70 | 92 | 68 | 60 | 45 | 63 | 49 | 72 | 47 | 70 | 46 | 89 | 64 | 83 | 64 | 92 | 78 | 100 | 82 |
| 29 | 102 | 79 | 94 | 77 | 92 | 66 | 89 | 77 | 60 | 30 | 53 | 41 | 73 | 57 | ..... | ..... | 82 | 66 | 81 | 62 | 95 | 77 | 97 | 81 |
| 30 | 100 | 76 | 93 | 79 | 92 | 70 | 71 | 64 | 45 | 26 | 50 | 34 | 67 | 53 | ..... | ..... | 81 | 56 | 90 | 61 | 94 | 81 | 97 | 80 |
| 31 | 100 | 80 | 97 | 74 | ..... | ..... | 66 | 59 | ..... | ..... | 50 | 34 | 73 | 39 | ..... | ..... | 81 | 54 | ..... | ..... | 96 | 80 | ..... | ..... |
| Range | 42° | | 33° | | 48° | | 55° | | 59° | | 51° | | 42° | | 50° | | ..... | | 49° | | 38° | | 34° | |
| Monthly means | | | | | | | | | | | | | | | | | ..... | | 75°.6 | | 80°.3 | | 86°.7 | |

* No observations taken.

STATION, LEAVENWORTH, KANS.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 78 | 68 | 89 | 72 | 80 | 63 | 77 | 67 | 48 | 39 | 36 | 13 | 44 | 28 | 37 | 27 | 54 | 43 | 60 | 42 | 82 | 57 | 91 | 68 |
| 2 | 85 | 72 | 88 | 69 | 69 | 55 | 78 | 65 | 47 | 37 | 50 | 26 | 31 | 23 | 38 | 32 | 48 | 35 | 47 | 39 | 73 | 52 | 90 | 72 |
| 3 | 86 | 74 | 84 | 70 | 70 | 55 | 70 | 45 | 61 | 35 | 40 | 35 | 36 | 19 | 40 | 31 | 47 | 32 | 56 | 36 | 63 | 48 | 79 | 61 |
| 4 | 90 | 72 | 82 | 72 | 70 | 51 | 56 | 36 | 59 | 48 | 41 | 34 | 23 | 7 | 50 | 26 | 51 | 28 | 61 | 35 | 66 | 43 | 77 | 57 |
| 5 | 94 | 77 | 83 | 71 | 71 | 60 | 62 | 41 | 36 | 26 | 34 | 28 | 28 | 15 | 61 | 35 | 62 | 44 | 66 | 45 | 76 | 44 | 76 | 56 |
| 6 | 94 | 74 | 86 | 72 | 76 | 60 | 56 | 45 | 42 | 24 | 44 | 26 | 22 | 6 | 55 | 42 | 65 | 40 | 63 | 40 | 82 | 60 | 69 | 63 |
| 7 | 94 | 76 | 83 | 71 | 78 | 57 | 59 | 50 | 38 | 35 | 49 | 30 | 34 | 9 | 51 | 44 | 68 | 37 | 76 | 48 | 79 | 56 | 70 | 59 |
| 8 | 93 | 76 | 85 | 69 | 75 | 58 | 73 | 41 | 38 | 32 | 44 | 27 | 42 | 32 | 45 | 33 | 66 | 47 | 63 | 58 | 72 | 52 | 69 | 49 |
| 9 | 84 | 71 | 83 | 65 | 71 | 61 | 63 | 48 | 35 | 30 | 56 | 33 | 52 | 34 | 34 | 29 | 57 | 46 | 61 | 44 | 65 | 49 | 66 | 52 |
| 10 | 85 | 68 | 93 | 70 | 72 | 58 | 62 | 42 | 46 | 24 | 57 | 35 | 41 | 26 | 31 | 23 | 53 | 38 | 55 | 40 | 66 | 42 | 76 | 50 |
| 11 | 77 | 65 | 90 | 71 | 78 | 52 | 65 | 38 | 57 | 32 | 66 | 44 | 50 | 27 | 37 | 18 | 63 | 37 | 74 | 38 | 62 | 44 | 79 | 53 |
| 12 | 82 | 63 | 83 | 73 | 89 | 59 | 77 | 57 | 59 | 35 | 67 | 43 | 42 | 37 | 48 | 33 | 56 | 45 | 77 | 52 | 56 | 39 | 76 | 58 |
| 13 | 84 | 64 | 79 | 63 | 87 | 72 | 77 | 57 | 60 | 45 | 56 | 36 | 38 | 31 | 48 | 39 | 54 | 37 | 66 | 51 | 56 | 44 | 76 | 62 |
| 14 | 89 | 66 | 79 | 58 | 81 | 70 | 68 | 56 | 60 | 49 | 57 | 32 | 37 | 26 | 39 | 35 | 56 | 36 | 65 | 50 | 60 | 37 | 80 | 66 |
| 15 | 88 | 74 | 81 | 58 | 79 | 59 | 62 | 46 | 60 | 38 | 66 | 46 | 47 | 24 | 44 | 34 | 71 | 40 | 72 | 50 | 56 | 40 | 82 | 64 |
| 16 | 83 | 64 | 80 | 61 | 74 | 58 | 55 | 49 | 64 | 40 | 63 | 55 | 52 | 28 | 46 | 35 | 57 | 42 | 80 | 54 | 59 | 49 | 77 | 61 |
| 17 | 75 | 63 | 79 | 63 | 68 | 51 | 55 | 48 | 56 | 37 | 63 | 50 | 54 | 33 | 52 | 31 | 56 | 33 | 78 | 60 | 59 | 49 | 76 | 65 |
| 18 | 80 | 64 | 81 | 61 | 72 | 45 | 53 | 47 | 53 | 39 | 65 | 58 | 56 | 36 | 54 | 31 | 56 | 37 | 73 | 48 | 66 | 57 | 83 | 63 |
| 19 | 71 | 56 | 83 | 64 | 78 | 47 | 54 | 49 | 53 | 41 | 62 | 57 | 49 | 43 | 66 | 44 | 78 | 46 | 74 | 53 | 73 | 58 | 89 | 64 |
| 20 | 70 | 55 | 85 | 63 | 82 | 54 | 47 | 44 | 47 | 41 | 64 | 49 | 45 | 36 | 54 | 45 | 73 | 49 | 76 | 47 | 71 | 50 | 77 | 65 |
| 21 | 77 | 56 | 72 | 60 | 80 | 50 | 55 | 35 | 50 | 38 | 63 | 52 | 36 | 28 | 50 | 42 | 62 | 55 | 80 | 62 | 71 | 52 | 80 | 58 |
| 22 | 80 | 57 | 75 | 53 | 85 | 60 | 65 | 36 | 48 | 32 | 59 | 51 | 40 | 29 | 50 | 36 | 67 | 50 | 72 | 62 | 70 | 61 | 82 | 57 |
| 23 | 82 | 60 | 78 | 56 | 85 | 58 | 66 | 43 | 51 | 30 | 52 | 43 | 41 | 20 | 40 | 32 | 80 | 48 | 66 | 53 | 85 | 66 | 87 | 58 |
| 24 | 84 | 64 | 79 | 58 | 84 | 58 | 60 | 53 | 48 | 40 | 50 | 35 | 54 | 37 | 33 | 28 | 63 | 43 | 69 | 47 | 78 | 57 | 81 | 65 |
| 25 | 84 | 68 | 77 | 64 | 81 | 63 | 64 | 54 | 42 | 38 | 43 | 35 | 43 | 27 | 42 | 25 | 62 | 40 | 71 | 47 | 76 | 63 | 82 | 68 |
| 26 | 86 | 68 | 89 | 66 | 74 | 62 | 62 | 53 | 41 | 33 | 42 | 36 | 42 | 33 | 48 | 29 | 77 | 53 | 70 | 43 | 79 | 53 | 85 | 60 |
| 27 | 84 | 64 | 92 | 69 | 81 | 55 | 66 | 50 | 35 | 27 | 42 | 36 | 51 | 32 | 58 | 33 | 68 | 47 | 68 | 44 | 80 | 58 | 90 | 63 |
| 28 | 80 | 64 | 92 | 68 | 83 | 58 | 68 | 46 | 25 | 18 | 43 | 35 | 41 | 29 | 62 | 42 | 52 | 39 | 71 | 44 | 82 | 59 | 80 | 71 |
| 29 | 84 | 63 | 93 | 71 | 83 | 61 | 58 | 41 | 16 | 9 | 40 | 32 | 38 | 31 | ..... | ..... | 45 | 34 | 76 | 52 | 79 | 64 | 86 | 71 |
| 30 | 86 | 66 | 92 | 72 | 86 | 67 | 50 | 41 | 26 | 10 | 37 | 29 | 35 | 30 | ..... | ..... | 43 | 35 | 69 | 52 | 77 | 61 | 78 | 66 |
| 31 | 93 | 69 | 96 | 72 | ..... | ..... | 55 | 36 | ..... | ..... | 38 | 27 | 37 | 25 | ..... | ..... | 56 | 34 | ..... | ..... | 80 | 63 | ..... | ..... |
| Range | 39° | | 43° | | 44° | | 43° | | 55° | | 54° | | 50° | | 48° | | 52° | | 45° | | 48° | | 42° | |
| Monthly means | 76°.3 | | 75°.1 | | 67°.9 | | 54°.5 | | 39°.5 | | 44°.2 | | 33°.8 | | 40°.2 | | 50°.9 | | 58°.8 | | 62°.3 | | 70°.5 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, LOS ANGELES, CAL.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 79 | 57 | 76 | 61 | 93 | 69 | 80 | 59 | 74 | 46 | 65 | 44 | 60 | 38 | 65 | 45 | 66 | 42 | 80 | 50 | 69 | 56 | 71 | 48 |
| 2 | 76 | 59 | 78 | 61 | 86 | 63 | 77 | 59 | 74 | 51 | 65 | 50 | 58 | 37 | 70 | 49 | 75 | 46 | 76 | 48 | 72 | 55 | 75 | 47 |
| 3 | 78 | 60 | 81 | 58 | 83 | 58 | 78 | 63 | 71 | 49 | 66 | 46 | 61 | 37 | 71 | 48 | 69 | 50 | 66 | 52 | 84 | 54 | 75 | 55 |
| 4 | 79 | 57 | 81 | 59 | 80 | 62 | 77 | 63 | 72 | 48 | 73 | 44 | 63 | 38 | 64 | 49 | 65 | 50 | 68 | 50 | 89 | 57 | 74 | 59 |
| 5 | 82 | 57 | 82 | 60 | 84 | 63 | 78 | 60 | 75 | 52 | 72 | 47 | 67 | 48 | 64 | 47 | 67 | 46 | 67 | 48 | 75 | 53 | 72 | 58 |
| 6 | 85 | 55 | 81 | 56 | 79 | 62 | 78 | 59 | 71 | 53 | 81 | 51 | 68 | 46 | 54 | 41 | 64 | 46 | 68 | 53 | 66 | 57 | 69 | 59 |
| 7 | 88 | 58 | 81 | 56 | 77 | 60 | 79 | 60 | 80 | 52 | 71 | 54 | 66 | 47 | 59 | 42 | 65 | 51 | 65 | 54 | 66 | 56 | 69 | 60 |
| 8 | 85 | 60 | 79 | 58 | 83 | 55 | 77 | 60 | 86 | 53 | 70 | 50 | 64 | 44 | 61 | 45 | 68 | 43 | 64 | 57 | 70 | 49 | 73 | 59 |
| 9 | 85 | 60 | 83 | 59 | 88 | 57 | 76 | 58 | 85 | 60 | 76 | 45 | 69 | 47 | 63 | 42 | 69 | 41 | 70 | 55 | 71 | 54 | 77 | 59 |
| 10 | 85 | 60 | 84 | 60 | 87 | 64 | 75 | 61 | 80 | 59 | 75 | 52 | 63 | 44 | 66 | 44 | 67 | 41 | 71 | 59 | 74 | 57 | 75 | 60 |
| 11 | 87 | 63 | 86 | 63 | 81 | 59 | 73 | 60 | 69 | 50 | 71 | 49 | 66 | 48 | 65 | 42 | 65 | 45 | 66 | 59 | 71 | 57 | 73 | 60 |
| 12 | 86 | 66 | 87 | 65 | 74 | 60 | 70 | 58 | 67 | 53 | 79 | 49 | 67 | 43 | 63 | 49 | 65 | 47 | 65 | 57 | 76 | 59 | 75 | 59 |
| 13 | 86 | 64 | 85 | 65 | 77 | 57 | 70 | 54 | 69 | 48 | 75 | 56 | 64 | 44 | 60 | 47 | 65 | 48.5 | 64 | 54 | 72 | 58 | 69 | 60 |
| 14 | 85 | 61 | 83 | 63 | 86 | 56 | 74 | 54 | 72 | 50 | 65 | 58 | 58 | 49 | 60 | 43 | 68 | 47 | 58 | 48 | 72 | 59 | 70 | 60 |
| 15 | 82 | 61 | 84 | 64 | 90 | 57 | 71 | 51 | 79 | 50 | 61 | 56 | 62 | 52 | 57 | 50 | 71 | 48 | 59 | 49 | 70 | 53 | 69 | 60 |
| 16 | 76 | 63 | 81 | 63 | 90 | 60 | 74 | 53 | 75 | 53 | 66 | 50 | 64 | 51 | 66 | 50 | 76 | 47.5 | 62 | 41.5 | 65 | 58 | 74 | 60 |
| 17 | 82 | 62 | 80 | 60 | 84 | 61 | 75 | 52 | 76 | 50 | 65 | 48 | 63 | 49 | 66 | 51 | 63 | 55 | 63 | 43 | 70 | 58 | 75 | 60 |
| 18 | 84 | 63 | 81 | 61 | 83 | 64 | 75 | 51 | 76 | 52 | 61 | 52 | 63 | 44 | 62 | 56 | 64 | 55 | 65 | 41.5 | 77 | 48 | 75 | 54 |
| 19 | 90 | 64 | 81 | 58 | 81 | 64 | 79 | 50 | 76 | 50 | 65 | 46 | 67 | 44 | 64 | 54 | 68 | 49 | 57 | 44 | 67 | 57 | 76 | 60 |
| 20 | 93 | 67 | 85 | 56 | 76 | 64 | 76 | 50 | 73 | 45 | 64 | 51 | 69 | 45 | 63 | 45 | 67 | 50 | 59 | 45 | 65 | 52 | 78 | 60 |
| 21 | 91 | 70 | 85 | 59 | 78 | 64 | 73 | 50 | 66 | 49 | 63 | 45 | 72 | 51 | 65 | 48 | 64 | 53 | 62 | 47 | 64 | 48 | 79 | 61 |
| 22 | 92 | 70 | 84 | 57 | 78 | 64 | 71 | 52 | 67 | 48 | 66 | 45.5 | 65 | 47 | 65 | 45 | 66 | 49 | 66 | 46 | 67 | 47 | 78 | 61 |
| 23 | 89 | 68 | 83 | 63 | 76 | 59 | 71 | 56 | 67 | 51 | 57 | 48 | 63 | 53 | 67 | 46 | 69 | 48 | 66 | 48 | 77 | 50 | 78 | 58 |
| 24 | 85 | 67 | 81 | 60 | 77 | 55 | 74 | 52 | 80 | 48 | 55 | 43 | 65 | 53 | 63 | 52 | 64 | 54 | 68 | 51 | 77 | 54 | 77 | 55 |
| 25 | 83 | 65 | 86 | 61 | 82 | 58 | 77 | 54 | 83 | 48 | 58 | 42 | 62 | 48 | 68 | 45 | 61 | 45 | 66 | 54 | 76 | 60 | 80 | 61 |
| 26 | 79 | 64 | 87 | 63 | 88 | 58 | 75 | 52 | 84 | 54 | 59 | 41 | 64 | 43 | 62 | 49 | 61 | 45 | 65 | 54 | 75 | 59 | 78 | 61 |
| 27 | 80 | 63 | 83 | 61 | 86 | 54 | 75 | 57 | 84 | 55 | 61 | 40 | 65 | 45 | 60 | 47 | 60 | 48 | 77 | 49 | 73 | 60 | 79 | 61 |
| 28 | 80 | 59 | 84 | 60 | 87 | 59 | 71 | 51 | 73 | 51 | 60 | 42 | 62 | 45 | 62 | 45 | 59 | 42 | 78 | 49 | 71 | 58 | 75 | 60 |
| 29 | 80 | 60 | 83 | 60 | 84 | 58 | 60 | 47 | 75 | 47 | 62 | 48 | 65 | 50 | ..... | ..... | 62 | 44 | 77 | 51 | 70 | 50 | 77 | 62 |
| 30 | 77 | 60 | 85 | 57 | 78 | 52 | 63 | 43 | 73 | 48 | 59 | 38 | 61 | 52 | ..... | ..... | 60 | 49 | 67 | 56 | 69 | 48 | 81 | 55.5 |
| 31 | 77 | 62 | 80 | 59 | ..... | ..... | 63 | 44 | ..... | ..... | 58 | 36.5 | 63 | 47 | ..... | ..... | 67 | 44 | ..... | ..... | 71 | 55 | ..... | ..... |
| Range | 38° | | 31° | | 41° | | 37° | | 41° | | 44°.5 | | 35° | | 30° | | 35° | | 38°.5 | | 42° | | 34° | |
| Monthly means | 71°.1 | | 70°.1 | | 69°.8 | | 63°.4 | | 62°.1 | | 55°.3 | | 54°.1 | | 54°.6 | | 55°.8 | | 58° | | 62° | | 64°.7 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, LOUISVILLE, KY.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 90 | 75 | 91 | 72 | 80 | 62 | 85 | 64 | 55 | 40 | 32 | 27 | 47 | 36 | 40 | 33 | 65 | 36 | 58 | 43 | 81 | 57 | 84 | 57 |
| 2 | 93 | 74 | 89 | 74 | 74 | 57 | 85 | 64 | 56 | 47 | 38 | 26 | 40 | 30 | 37 | 30 | 64 | 51 | 65 | 45 | 82 | 62 | 91 | 62 |
| 3 | 93 | 78 | 86 | 67 | 74 | 54 | 83 | 65 | 55 | 40 | 50 | 32 | 40 | 26 | 33 | 30 | 55 | 38 | 65 | 45 | 72 | 57 | 89 | 71 |
| 4 | 95 | 77 | 81 | 64 | 78 | 58 | 72 | 52 | 63 | 41 | 56 | 42 | 38 | 20 | 37 | 30 | 43 | 36 | 61 | 48 | 67 | 50 | 82 | 67 |
| 5 | 92 | 71 | 84 | 63 | 74 | 65 | 62 | 43 | 59 | 39 | 55 | 39 | 30 | 13 | 45 | 29 | 61 | 36 | 64 | 45 | 68 | 57 | 74 | 55 |
| 6 | 87 | 70 | 87 | 64 | 68 | 62 | 67 | 45 | 43 | 30 | 39 | 32 | 25 | 16 | 56 | 35 | 63 | 52 | 60 | 49 | 78 | 48 | 74 | 57 |
| 7 | 90 | 67 | 90 | 70 | 75 | 59 | 72 | 53 | 58 | 34 | 50 | 30 | 22 | 6 | 53 | 35 | 70 | 58 | 63 | 42 | 79 | 63 | 79 | 55 |
| 8 | 93 | 70 | 88 | 71 | 74 | 55 | 58 | 54 | 60 | 48 | 46 | 34 | 40 | 10 | 50 | 43 | 74 | 56 | 74 | 48 | 74 | 61 | 73 | 64 |
| 9 | 89 | 70 | 84 | 71 | 75 | 59 | 71 | 49 | 50 | 37 | 43 | 29 | 46 | 35 | 52 | 39 | 73 | 59 | 79 | 58 | 71 | 53 | 73 | 56 |
| 10 | 88 | 72 | 84 | 67 | 79 | 66 | 65 | 50 | 40 | 34 | 54 | 36 | 42 | 38 | 40 | 30 | 68 | 56 | 66 | 53 | 62 | 48 | 72 | 54 |
| 11 | 82 | 66 | 86 | 65 | 74 | 66 | 61 | 46 | 46 | 30 | 63 | 46 | 45 | 36 | 39 | 25 | 69 | 51 | 67 | 49 | 63 | 47 | 74 | 55 |
| 12 | 80 | 63 | 88 | 70 | 78 | 67 | 65 | 42 | 58 | 33 | 64 | 47 | 45 | 32 | 51 | 31 | 60 | 51 | 76 | 55 | 53 | 45 | 72 | 60 |
| 13 | 85 | 63 | 84 | 68 | 81 | 63 | 75 | 53 | 62 | 37 | 60 | 43 | 50 | 37 | 48 | 41 | 61 | 48 | 72 | 56 | 54 | 41 | 78 | 57 |
| 14 | 89 | 66 | 79 | 66 | 83 | 64 | 78 | 54 | 68 | 45 | 49 | 38 | 46 | 38 | 50 | 37 | 54 | 46 | 65 | 55 | 58 | 44 | 86 | 64 |
| 15 | 93 | 69 | 75 | 63 | 82 | 66 | 78 | 56 | 62 | 56 | 62 | 40 | 38 | 35 | 51 | 38 | 55 | 39 | 73 | 56 | 63 | 43 | 83 | 68 |
| 16 | 82 | 74 | 80 | 63 | 83 | 70 | 78 | 56 | 64 | 49 | 64 | 55 | 43 | 35 | 55 | 38 | 66 | 45 | 73 | 51 | 57 | 52 | 86 | 71 |
| 17 | 86 | 73 | 82 | 62 | 74 | 59 | 77 | 57 | 62 | 51 | 61 | 57 | 51 | 34 | 51 | 40 | 53 | 42 | 77 | 55 | 64 | 53 | 75 | 64 |
| 18 | 80 | 66 | 84 | 65 | 66 | 50 | 78 | 63 | 51 | 36 | 67 | 58 | 55 | 38 | 45 | 37 | 50 | 40 | 70 | 62 | 82 | 51 | 75 | 61 |
| 19 | 77 | 66 | 86 | 64 | 70 | 49 | 70 | 66 | 55 | 38 | 67 | 54 | 52 | 35 | 56 | 35 | 62 | 36 | 76 | 61 | 81 | 66 | 81 | 60 |
| 20 | 74 | 63 | 86 | 66 | 76 | 53 | 72 | 61 | 61 | 41 | 67 | 43 | 55 | 48 | 57 | 49 | 68 | 45 | 73 | 64 | 85 | 66 | 83 | 63 |
| 21 | 79 | 60 | 90 | 67 | 74 | 55 | 67 | 46 | 56 | 50 | 66 | 47 | 48 | 40 | 65 | 51 | 73 | 46 | 80 | 57 | 76 | 64 | 71 | 59 |
| 22 | 83 | 61 | 85 | 66 | 78 | 53 | 59 | 42 | 55 | 47 | 63 | 54 | 45 | 36 | 56 | 43 | 63 | 43 | 82 | 68 | 75 | 54 | 71 | 55 |
| 23 | 85 | 66 | 76 | 66 | 82 | 59 | 65 | 44 | 52 | 46 | 62 | 52 | 40 | 28 | 50 | 41 | 75 | 46 | 77 | 64 | 85 | 62 | 79 | 61 |
| 24 | 87 | 71 | 79 | 68 | 83 | 64 | 68 | 50 | 53 | 49 | 60 | 54 | 55 | 30 | 49 | 37 | 64 | 31 | 71 | 56 | 83 | 73 | 83 | 62 |
| 25 | 92 | 75 | 81 | 61 | 84 | 63 | 66 | 55 | 54 | 47 | 59 | 54 | 50 | 47 | 45 | 34 | 47 | 26 | 67 | 53 | 79 | 67 | 87 | 64 |
| 26 | 92 | 76 | 86 | 64 | 84 | 65 | 65 | 58 | 50 | 46 | 59 | 50 | 50 | 38 | 45 | 29 | 68 | 38 | 62 | 52 | 77 | 65 | 90 | 73 |
| 27 | 90 | 76 | 89 | 66 | 79 | 66 | 68 | 56 | 50 | 42 | 50 | 46 | 56 | 41 | 51 | 32 | 75 | 55 | 59 | 50 | 76 | 58 | 91 | 73 |
| 28 | 92 | 77 | 91 | 69 | 85 | 63 | 73 | 54 | 44 | 32 | 48 | 45 | 43 | 35 | 56 | 35 | 68 | 42 | 61 | 49 | 76 | 56 | 91 | 69 |
| 29 | 87 | 75 | 90 | 73 | 86 | 65 | 67 | 54 | 32 | 23 | 48 | 43 | 37 | 32 | ..... | ..... | 54 | 38 | 70 | 53 | 85 | 59 | 87 | 71 |
| 30 | 88 | 74 | 89 | 73 | 88 | 64 | 61 | 50 | 28 | 20 | 46 | 37 | 35 | 30 | ..... | ..... | 70 | 42 | 76 | 54 | 78 | 63 | 86 | 72 |
| 31 | 90 | 76 | 92 | 71 | ..... | ..... | 61 | 48 | ..... | ..... | 42 | 34 | 36 | 31 | ..... | ..... | 58 | 42 | ..... | ..... | 76 | 56 | ..... | ..... |
| Range | 35° | | 31° | | 39° | | 43° | | 48° | | 41° | | 50° | | 40° | | 49° | | 40° | | 44° | | 37° | |
| Monthly means | 78°.9 | | 76°.1 | | 69°.2 | | 61°.3 | | 47°.0 | | 48°.8 | | 37°.9 | | 42°.2 | | 52°.8 | | 61°.2 | | 64°.8 | | 71°.7 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, LYNCHBURG, VA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 92 | 75 | 88 | 76 | 90 | 73 | 76 | 60 | 63 | 44 | 40 | 24 | 43 | 31 | 45 | 33 | 62 | 30 | 62 | 44 | 82 | 54 | 73 | 60 |
| 2 | 95 | 79 | 83 | 74 | 82 | 71 | 76 | 63 | 68 | 55 | 41 | 33 | 46 | 29 | 43 | 30 | 61 | 36 | 67 | 43 | 86 | 55 | 78 | 63 |
| 3 | 96 | 77 | 87 | 73 | 76 | 62 | 72 | 66 | 58 | 47 | 44 | 26 | 37 | 24 | 39 | 30 | 63 | 49 | 63 | 42 | 84 | 65 | 80 | 64 |
| 4 | 90 | 74 | 87 | 73 | 78 | 59 | 74 | 61 | 58 | 40 | 42 | 32 | 40 | 22 | 47 | 29 | 50 | 40 | 53 | 41 | 75 | 55 | 87 | 64 |
| 5 | 86 | 76 | 85 | 67 | 72 | 65 | 65 | 52 | 52 | 43 | 61 | 40 | 38 | 18 | 47 | 27 | 58 | 36 | 66 | 44 | 70 | 50 | 85 | 65 |
| 6 | 86 | 72 | 88 | 69 | 75 | 68 | 66 | 50 | 51 | 43 | 50 | 38 | 30 | 13 | 49 | 26 | 66 | 35 | 60 | 47 | 76 | 47 | 73 | 53 |
| 7 | 85 | 70 | 87 | 74 | 80 | 69 | 65 | 49 | 51 | 34 | 45 | 34 | 23 | 10 | 52 | 28 | 69 | 50 | 66 | 47 | 84 | 55 | 77 | 51 |
| 8 | 89 | 68 | 90 | 75 | 75 | 66 | 60 | 52 | 58 | 46 | 52 | 36 | 26 | 1 | 55 | 43 | 71 | 44 | 72 | 46 | 85 | 59 | 76 | 63 |
| 9 | 93 | 72 | 85 | 75 | 75 | 61 | 67 | 52 | 66 | 54 | 44 | 29 | 36 | 24 | 60 | 43 | 68 | 51 | 68 | 54 | 77 | 62 | 77 | 59 |
| 10 | 87 | 74 | 87 | 72 | 75 | 64 | 72 | 50 | 57 | 45 | 54 | 26 | 43 | 35 | 54 | 44 | 71 | 52 | 66 | 49 | 70 | 54 | 73 | 63 |
| 11 | 89 | 75 | 85 | 69 | 71 | 65 | 64 | 54 | 52 | 39 | 62 | 36 | 44 | 37 | 47 | 32 | 69 | 58 | 72 | 60 | 64 | 49 | 73 | 53 |
| 12 | 86 | 71 | 88 | 69 | 81 | 69 | 64 | 47 | 58 | 39 | 63 | 43 | 48 | 35 | 46 | 26 | 65 | 44 | 74 | 41 | 56 | 46 | 72 | 51 |
| 13 | 86 | 65 | 86 | 73 | 81 | 68 | 66 | 48 | 60 | 37 | 62 | 43 | 42 | 32 | 54 | 34 | 74 | 46 | 81 | 48 | 63 | 44 | 78 | 53 |
| 14 | 90 | 67 | 83 | 69 | 77 | 67 | 75 | 50 | 63 | 37 | 54 | 35 | 53 | 36 | 49 | 39 | 63 | 47 | 76 | 53 | 56 | 46 | 79 | 58 |
| 15 | 93 | 69 | 82 | 71 | 80 | 69 | 78 | 53 | 65 | 41 | 60 | 28 | 48 | 37 | 42 | 34 | 59 | 44 | 62 | 52 | 57 | 44 | 82 | 58 |
| 16 | 93 | 73 | 82 | 68 | 85 | 67 | 82 | 53 | 67 | 54 | 64 | 45 | 43 | 34 | 43 | 36 | 65 | 38 | 63 | 48 | 63 | 41 | 84 | 56 |
| 17 | 87 | 72 | 81 | 68 | 76 | 72 | 73 | 55 | 67 | 46 | 66 | 41 | 46 | 25 | 50 | 38 | 56 | 48 | 68 | 50 | 63 | 53 | 84 | 68 |
| 18 | 83 | 73 | 83 | 68 | 75 | 64 | 77 | 58 | 61 | 46 | 57 | 48 | 53 | 27 | 48 | 36 | 58 | 38 | 70 | 46 | 64 | 53 | 77 | 67 |
| 19 | 80 | 72 | 85 | 67 | 66 | 61 | 75 | 56 | 54 | 38 | 57 | 43 | 54 | 28 | 45 | 27 | 67 | 42 | 74 | 50 | 67 | 55 | 78 | 60 |
| 20 | 81 | 72 | 87 | 68 | 65 | 58 | 73 | 66 | 52 | 38 | 66 | 38 | 51 | 43 | 58 | 30 | 67 | 45 | 80 | 58 | 80 | 60 | 83 | 59 |
| 21 | 82 | 68 | 87 | 68 | 74 | 59 | 73 | 62 | 48 | 39 | 53 | 45 | 50 | 43 | 65 | 43 | 67 | 42 | 86 | 62 | 86 | 65 | 71 | 66 |
| 22 | 85 | 72 | 85 | 68 | 68 | 57 | 63 | 54 | 50 | 42 | 52 | 44 | 53 | 40 | 68 | 54 | 62 | 44 | 86 | 56 | 77 | 58 | 74 | 61 |
| 23 | 80 | 74 | 82 | 72 | 73 | 52 | 66 | 45 | 60 | 50 | 52 | 47 | 44 | 33 | 58 | 45 | 72 | 39 | 84 | 70 | 74 | 60 | 74 | 56 |
| 24 | 90 | 73 | 87 | 73 | 75 | 52 | 70 | 46 | 62 | 58 | 51 | 46 | 43 | 23 | 56 | 40 | 65 | 43 | 76 | 62 | 83 | 63 | 80 | 59 |
| 25 | 93 | 77 | 84 | 71 | 78 | 56 | 67 | 48 | 62 | 50 | 50 | 46 | 46 | 31 | 48 | 38 | 53 | 33 | 73 | 58 | 85 | 70 | 84 | 58 |
| 26 | 95 | 76 | 85 | 68 | 80 | 59 | 65 | 58 | 58 | 51 | 51 | 45 | 60 | 38 | 52 | 35 | 59 | 29 | 72 | 53 | 84 | 70 | 88 | 61 |
| 27 | 96 | 81 | 87 | 72 | 80 | 68 | 65 | 55 | 53 | 42 | 58 | 47 | 44 | 38 | 57 | 32 | 76 | 38 | 70 | 56 | 82 | 65 | 93 | 67 |
| 28 | 96 | 79 | 91 | 73 | 76 | 69 | 70 | 52 | 55 | 42 | 57 | 45 | 51 | 39 | 63 | 32 | 68 | 56 | 67 | 55 | 80 | 61 | 90 | 72 |
| 29 | 93 | 77 | 93 | 72 | 80 | 66 | 74 | 54 | 50 | 31 | 47 | 39 | 42 | 29 | ..... | ..... | 68 | 53 | 66 | 52 | 80 | 57 | 86 | 68 |
| 30 | 92 | 78 | 91 | 74 | 77 | 66 | 63 | 56 | 31 | 23 | 42 | 37 | 36 | 25 | ..... | ..... | 55 | 43 | 75 | 57 | 87 | 57 | 88 | 69 |
| 31 | 90 | 75 | 92 | 74 | ..... | ..... | 67 | 55 | ..... | ..... | 42 | 36 | 38 | 27 | ..... | ..... | 67 | 43 | ..... | ..... | 73 | 58 | ..... | ..... |
| Range | 31° | | 26° | | 38° | | 37° | | 45° | | 42° | | 59° | | 42° | | 47° | | 45° | | 46° | | 42° | |
| Monthly means | 82°.7 | | 79°.4 | | 71° | | 62°.6 | | 51°.1 | | 46°.4 | | 37°.1 | | 44°.0 | | 34°.3* | | 62°.0 | | 66°.5 | | 71°.4 | |

* 30 days only.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, MARICOPA WELLS, ARIZ.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | *106 | †57 | *104 | †80 | *107 | 69 | *95 | 63 | *65 | 28 | *47 | 24 | *51 | 23 | *62 | 30 | *61 | 44 | ..... | ..... | ..... | ..... | ..... | ..... |
| 2 | 110 | 68 | 107 | 78 | 104 | 70 | 94 | 58 | 74 | 26 | 61 | 26 | 45 | 21 | 65 | 30 | 65 | 36 | ..... | ..... | ..... | ..... | ..... | ..... |
| 3 | 108 | 67 | 106 | 78 | 100 | 76 | 94 | 60 | 78 | 30 | 60 | 22 | 46 | 16 | 69 | 33 | 78 | 35 | ..... | ..... | ..... | ..... | ..... | ..... |
| 4 | 109 | 67 | 106 | 84 | 92 | 68 | 92 | 56 | 71 | 34 | 60 | 20 | 50 | 17 | 74 | 35 | 78 | 35 | ..... | ..... | ..... | ..... | ..... | ..... |
| 5 | 112 | 82 | 107 | 78 | 100 | 68 | 94 | 54 | 72 | 30 | 60 | 20 | 59 | 18 | 64 | 35 | 74 | 34 | ..... | ..... | ..... | ..... | ..... | ..... |
| 6 | 112 | 86 | 108 | 72 | 104 | 67 | 94 | 57 | 74 | 31 | 66 | 20 | 62 | 33 | 65 | 30 | 77 | 37 | ..... | ..... | ..... | ..... | ..... | ..... |
| 7 | 110 | 83 | 107 | 74 | 103 | 65 | 94 | 57 | 74 | 32 | 70 | 21 | 61 | 35 | 65 | 30 | 72 | 40 | ..... | ..... | ..... | ..... | ..... | ..... |
| 8 | 110 | 85 | 107 | 74 | 105 | 72 | 94 | 57 | 73 | 20 | 55 | 47 | 60 | 25 | 61 | 30 | 62 | 45 | ..... | ..... | ..... | ..... | ..... | ..... |
| 9 | 110 | 81 | 109 | 82 | 103 | 71 | 96 | 57 | 77 | 40 | 64 | 29 | 61 | 24 | 61 | 27 | 62 | 40 | ..... | ..... | ..... | ..... | ..... | ..... |
| 10 | 106 | 81 | 108 | 89 | 96 | 77 | 94 | 51 | 80 | 40 | 70 | 33 | 61 | 24 | 62 | 27 | (‡) | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 11 | 110 | 89 | 109 | 88 | 85 | 68 | 95 | 57 | 81 | 38 | 71 | 40 | 60 | 20 | 64 | 25 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 12 | 102 | 82 | 110 | 87 | 77 | 71 | 82 | 65 | 68 | 41 | 71 | 42 | 58 | 26 | 63 | 25 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 13 | 110 | 82 | 112 | 87 | 82 | 63 | 87 | 50 | 67 | 38 | 77 | 43 | 64 | 26 | 54 | 25 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 14 | 111 | 91 | 108 | 79 | 87 | 50 | 75 | 57 | 74 | 30 | 78 | 52 | 62 | 31 | 65 | 25 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 15 | 110 | 87 | 102 | 85 | 93 | 52 | 75 | 43 | 77 | 32 | 68 | 50 | 61 | 25 | 69 | 33 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 16 | 103 | 83 | 101 | 85 | 98 | 54 | 75 | 42 | 77 | 32 | 65 | 40 | 65 | 25 | 70 | 40 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 17 | 105 | 86 | 103 | 83 | 101 | 58 | 76 | 48 | 74 | 32 | 66 | 35 | 61 | 30 | 65 | 36 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 18 | 104 | 98 | 104 | 78 | 100 | 63 | 78 | 45 | 70 | 30 | 52 | 44 | 61 | 30 | 74 | 35 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 19 | 110 | 85 | 107 | 77 | 101 | 63 | 80 | 38 | 71 | 32 | 60 | 42 | 64 | 30 | 73 | 33 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 20 | 104 | 88 | 106 | 76 | 104 | 61 | 78 | 39 | 70 | 28 | 61 | 42 | 63 | 25 | 69 | 31 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 21 | 104 | 85 | 106 | 64 | 98 | 65 | 83 | 40 | 70 | 27 | 61 | 40 | 68 | 26 | 57 | 34 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 22 | 107 | 85 | 110 | 67 | 98 | 56 | 83 | 41 | 70 | 26 | 60 | 39 | 67 | 28 | 63 | 30 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 23 | 110 | 80 | 109 | 62 | 93 | 55 | 62 | 41 | 71 | 26 | 62 | 38 | 67 | 30 | 66 | 34 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 24 | 95 | 73 | 109 | 69 | 77 | 45 | 78 | 49 | 72 | 30 | 49 | 35 | 64 | 29 | 72 | 25 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 25 | 105 | 73 | 107 | 64 | 90 | 46 | 77 | 48 | 72 | 33 | 49 | 31 | 64 | 30 | 72 | 27 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 26 | 102 | 76 | 106 | 65 | 92 | 45 | 81 | 41 | 73 | 30 | 53 | 30 | 62 | 25 | 70 | 31 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 27 | 103 | 75 | 110 | 65 | 95 | 47 | 83 | 44 | 72 | 27 | 51 | 30 | 65 | 25 | 71 | 35 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 28 | 106 | 71 | 109 | 69 | 96 | 56 | 77 | 45 | 59 | 39 | 51 | 31 | 69 | 25 | 50 | 48 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 29 | 105 | 72 | 105 | §67 | 78 | 68 | 81 | 41 | 65 | 19 | 52 | 27 | 69 | 28 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 30 | 101 | 80 | 104 | 68 | 91 | 60 | 64 | 44 | 64 | 19 | 54 | 29 | 68 | 25 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 31 | 107 | 70 | 106 | 70 | ..... | ..... | 65 | 26 | ..... | ..... | 52 | 28 | 67 | 27 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Range | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Monthly means | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |

* No maximum thermometer on station; the highest *observed* readings given.
‡ Station closed.
† No minimum thermometer on station; the lowest *observed* readings given.
§ Observations of minimum thermometer commenced August 29, 1878.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, MARQUETTE, MICH.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 79 | 52 | 89 | 66 | 63 | 50 | 57 | 44 | 49 | 33 | 35 | 18 | 32 | 18 | 40 | 30 | 41 | 30 | 48 | 37 | 72 | 47 | 73 | 56 |
| 2 | 70 | 55 | 80 | 61 | 57 | 47 | 59 | 45 | 45 | 32 | 30 | 16 | 21 | 10 | 44 | 15 | 41 | 34 | 42 | 33 | 56 | 44 | 63 | 53 |
| 3 | 61 | 47 | 71 | 52 | 79 | 47 | 62 | 48 | 35 | 28 | 41 | 25 | 27 | 10 | 50 | 20 | 34 | 24 | 45 | 33 | 48 | 38 | 76 | 48 |
| 4 | 75 | 53 | 80 | 48 | 65 | 50 | 51 | 36 | 31 | 24 | 41 | 29 | 22 | 4 | 46 | 28 | 49 | 22 | 52 | 31 | 46 | 35 | 62 | 44 |
| 5 | 70 | 55 | 81 | 59 | 66 | 43 | 51 | 36 | 31 | 22 | 40 | 24 | 19 | 0 | 45 | 27 | 55 | 34 | 41 | 34 | 53 | 34 | 57 | 43 |
| 6 | 76 | 50 | 84 | 59 | 69 | 37 | 64 | 35 | 44 | 17 | 22 | 13 | 8 | 2 | 52 | 36 | 59 | 41 | 48 | 30 | 73 | 43 | 51 | 45 |
| 7 | 69 | 59 | 85 | 63 | 74 | 39 | 62 | 38 | 39 | 22 | 30 | 14 | 12 | — 4 | 47 | 36 | 55 | 39 | 50 | 27 | 62 | 45 | 62 | 41 |
| 8 | 88 | 63 | 78 | 62 | 82 | 48 | 60 | 47 | 40 | 28 | 27 | 18 | 28 | 9 | 36 | 25 | 61 | 39 | 57 | 38 | 61 | 44 | 65 | 36 |
| 9 | 73 | 58 | 72 | 59 | 81 | 61 | 55 | 45 | 32 | 24 | 31 | 18 | 36 | 18 | 25 | 19 | 70 | 48 | 50 | 46 | 47 | 36 | 68 | 41 |
| 10 | 74 | 56 | 78 | 55 | 80 | 60 | 50 | 40 | 49 | 22 | 42 | 27 | 39 | 30 | 25 | 20 | 56 | 38 | 48 | 40 | 45 | 32 | 60 | 45 |
| 11 | 79 | 55 | 79 | 50 | 85 | 58 | 50 | 36 | 51 | 25 | 45 | 33 | 37 | 30 | 30 | 13 | 63 | 42 | 49 | 37 | 43 | 32 | 63 | 46 |
| 12 | 76 | 62 | 69 | 58 | 83 | 59 | 54 | 30 | 53 | 29 | 43 | 34 | 39 | 24 | 34 | 21 | 47 | 34 | 51 | 38 | 49 | 31 | 68 | 45 |
| 13 | 90 | 59 | 69 | 58 | 87 | 58 | 59 | 47 | 54 | 29 | 38 | 30 | 50 | 32 | 36 | 18 | 39 | 31 | 52 | 36 | 50 | 31 | 70 | 42 |
| 14 | 88 | 64 | 74 | 56 | 89 | 60 | 56 | 47 | 49 | 35 | 46 | 26 | 42 | 28 | 39 | 19 | 48 | 36 | 42 | 32 | 55 | 31 | 71 | 43 |
| 15 | 90 | 66 | 76 | 55 | 82 | 60 | 64 | 48 | 50 | 32 | 49 | 34 | 35 | 20 | 41 | 27 | 67 | 38 | 47 | 34 | 65 | 41 | 67 | 57 |
| 16 | 86 | 62 | 86 | 52 | 69 | 55 | 53 | 42 | 51 | 31 | 52 | 29 | 32 | 19 | 35 | 30 | 51 | 31 | 52 | 29 | 56 | 38 | 57 | 47 |
| 17 | 82 | 61 | 83 | 55 | 61 | 45 | 60 | 44 | 40 | 29 | 43 | 32 | 42 | 26 | 30 | 22 | 32 | 29 | 60 | 33 | 55 | 35 | 67 | 45 |
| 18 | 66 | 56 | 80 | 58 | 68 | 42 | 58 | 44 | 33 | 27 | 39 | 30 | 37 | 33 | 42 | 12 | 59 | 29 | 52 | 46 | 58 | 32 | 73 | 42 |
| 19 | 57 | 50 | 83 | 57 | 64 | 43 | 45 | 36 | 39 | 25 | 45 | 31 | 40 | 32 | 39 | 30 | 45 | 35 | 63 | 43 | 54 | 45 | 68 | 62 |
| 20 | 69 | 49 | 93 | 60 | 67 | 45 | 54 | 35 | 46 | 30 | 49 | 36 | 37 | 31 | 42 | 37 | 45 | 28 | 52 | 44 | 52 | 42 | 62 | 47 |
| 21 | 75 | 59 | 88 | 62 | 71 | 39 | 54 | 33 | 46 | 38 | 53 | 39 | 38 | 29 | 40 | 36 | 45 | 36 | 54 | 34 | 57 | 38 | 52 | 43 |
| 22 | 75 | 56 | 74 | 53 | 79 | 45 | 68 | 33 | 49 | 34 | 55 | 40 | 36 | 3 | 36 | 32 | 66 | 33 | 51 | 40 | 71 | 35 | 62 | 46 |
| 23 | 84 | 59 | 71 | 50 | 63 | 50 | 56 | 34 | 45 | 32 | 53 | 40 | 26 | 2 | 33 | 30 | 53 | 23 | 54 | 46 | 59 | 50 | 70 | 43 |
| 24 | 89 | 63 | 71 | 47 | 62 | 55 | 49 | 40 | 48 | 37 | 52 | 40 | 33 | 18 | 32 | 26 | 26 | 9 | 51 | 45 | 73 | 53 | 75 | 52 |
| 25 | 89 | 67 | 78 | 44 | 69 | 54 | 45 | 37 | 46 | 37 | 43 | 34 | 34 | 22 | 36 | 26 | 45 | 26 | 47 | 36 | 64 | 53 | 77 | 56 |
| 26 | 88 | 64 | 85 | 48 | 60 | 49 | 51 | 38 | 47 | 36 | 38 | 34 | 36 | 18 | 53 | 26 | 42 | 34 | 43 | 35 | 55 | 45 | 65 | 58 |
| 27 | 93 | 65 | 84 | 59 | 74 | 50 | 53 | 40 | 40 | 31 | 45 | 36 | 30 | 15 | 54 | 33 | 42 | 27 | 54 | 36 | 54 | 40 | 83 | 60 |
| 28 | 90 | 68 | 79 | 60 | 73 | 44 | 51 | 36 | 31 | 24 | 43 | 35 | 24 | 11 | 46 | 24 | 40 | 25 | 61 | 40 | 60 | 37 | 94 | 67 |
| 29 | 87 | 64 | 75 | 58 | 81 | 50 | 43 | 38 | 33 | 19 | 40 | 33 | 34 | 6 | ..... | ..... | 52 | 24 | 61 | 39 | 54 | 36 | 86 | 68 |
| 30 | 86 | 60 | 78 | 56 | 86 | 55 | 54 | 34 | 30 | 24 | 40 | 28 | 37 | 10 | ..... | ..... | 45 | 23 | 71 | 47 | 63 | 35 | 87 | 71 |
| 31 | 87 | 60 | 68 | 52 | ..... | ..... | 47 | 33 | ..... | ..... | 33 | 25 | 37 | 27 | ..... | ..... | 48 | 34 | ..... | ..... | 70 | 46 | ..... | ..... |
| Range | 46° | | 49° | | 52° | | 38° | | 37° | | 42° | | 54° | | 42° | | 61° | | 44° | | 42° | | 58° | |
| Monthly means | 64°.2 | | 66°.4 | | 60°.7 | | 47°.1 | | 35°.6 | | 35°.3 | | 24°.7 | | 33°.1 | | 39°.7 | | 44°.6 | | 47°.9 | | 59°.0 | |

*Maximum, minimum, and mean temperatures—Continued.*

STATION, MASON, TEX.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 94 | 73 | 94 | 71 | ..... | 72 | ..... | 67 | 73 | 53 | 49 | 14 | 47 | 24 | 60 | 32 | 69 | 52 | 67 | 42 | 80 | 63 | 93 | 75 |
| 2 | 92 | 71 | 95 | 69 | ..... | 71 | ..... | 63 | 60 | 45 | 54 | 31 | 45 | 28 | 45 | 34 | 69 | 49 | 67 | 51 | 83 | 67 | 98 | 73 |
| 3 | 92 | 72 | 97 | 70 | ..... | 70 | ..... | 61 | 66 | 40 | (†) | ..... | 43 | 29 | 53 | 23 | 67 | 41 | 71 | 47 | 72 | 57 | 95 | 67 |
| 4 | 91 | 68 | 96 | 71 | ..... | 68 | ..... | 49 | 65 | 52 | ..... | ..... | 39 | 26 | 65 | 27 | 76 | 36 | (†) | ..... | 80 | 45 | 82 | 65 |
| 5 | 90 | 73 | 98 | 74 | ..... | 66 | ..... | 49 | 65 | 40 | ..... | ..... | 42 | 18 | 65 | 41 | 73 | 51 | 81 | 39 | 83 | 54 | 79 | 68 |
| 6 | 94 | 72 | 100 | 77 | ..... | 68 | ..... | 64 | 57 | 31 | 50 | 19 | 38 | 28 | 68 | 45 | 72 | 60 | 82 | 47 | 84 | 60 | 85 | 66 |
| 7 | 96 | 73 | 100 | 78 | ..... | 64 | ..... | 60 | 74 | 41 | 57 | 20 | 38 | 31 | 68 | 41 | 78 | 58 | 72 | 59 | 85 | 68 | 84 | 64 |
| 8 | 100 | 69 | 90 | 73 | ..... | 73 | ..... | 49 | 59 | 44 | 54 | 25 | 43 | 33 | 68 | 42 | 70 | 54 | 72 | 54 | 72 | 58 | 85 | 62 |
| 9 | 98 | 69 | 97 | 68 | ..... | 72 | ..... | 64 | 53 | 33 | 57 | 39 | 60 | 41 | 50 | 32 | 66 | 48 | 70 | 58 | 77 | 56 | 93 | 64 |
| 10 | 91 | 72 | 93 | 65 | ..... | 69 | ..... | 63 | 55 | 23 | 62 | 41 | 55 | 35 | 50 | 26 | 72 | 35 | 69 | 47 | 73 | 60 | 92 | 68 |
| 11 | 91 | 70 | 96 | 68 | ..... | 70 | ..... | 59 | 58 | 21 | 64 | 34 | 54 | 37 | 62 | 22 | 76 | 46 | 79 | 45 | 63 | 60 | 89 | 67 |
| 12 | 91 | 70 | 95 | 65 | ..... | 72 | ..... | 64 | 67 | 29 | 58 | 44 | 56 | 40 | 63 | 43 | 77 | 44 | 81 | 58 | 75 | 59 | 92 | 70 |
| 13 | 94 | 71 | 94 | 71 | ..... | 73 | ..... | 67 | 73 | 56 | 65 | 51 | 50 | 32 | 71 | 43 | 81 | 42 | 75 | 65 | 82 | 62 | 96 | 74 |
| 14 | 94 | 72 | 92 | 74 | ..... | 73 | 87 | 73 | 68 | 48 | 67 | 45 | 52 | 25 | 76 | 36 | (†) | ..... | 79 | 64 | 78 | 59 | 95 | 74 |
| 15 | 93 | 75 | 88 | 66 | ..... | 70 | 86 | 73 | 70 | 36 | 66 | 58 | 57 | 29 | 63 | 33 | 77 | 50 | 86 | 54 | 79 | 64 | 95 | 73 |
| 16 | 92 | 74 | 91 | 73 | ..... | 70 | 77 | 55 | 71 | 36 | 69 | 60 | 60 | 31 | 72 | 40 | 78 | 51 | 86 | 57 | 93 | 63 | 95 | 67 |
| 17 | 94 | 75 | 90 | 67 | ..... | 68 | 65 | 57 | 72 | 38 | 69 | 62 | 62 | 38 | 77 | 45 | 80 | 51 | 85 | 64 | 87 | 71 | 99 | 74 |
| 18 | 97 | 73 | 91 | 66 | ..... | 57 | 63 | 54 | 72 | 51 | 66 | 62 | 66 | 49 | 77 | 38 | 76 | 44 | 83 | 48 | 88 | 65 | 96 | 69 |
| 19 | 86 | 74 | 92 | 67 | ..... | 50 | 58 | 45 | 69 | 52 | 66 | 61 | 62 | 42 | 79 | 53 | 67 | 52 | 80 | 64 | 93 | 58 | 97 | 74 |
| 20 | 87 | 61 | 91 | 74 | ..... | 47 | 57 | 43 | 60 | 45 | 63 | 51 | 62 | 33 | 71 | 50 | 69 | 48 | 86 | 68 | 90 | 65 | 95 | 67 |
| 21 | 85 | 66 | (*) | 72 | ..... | 51 | 61 | 41 | 60 | 41 | 61 | 52 | 57 | 32 | 67 | 45 | 75 | 43 | 80 | 69 | 86 | 72 | 81 | 71 |
| 22 | 84 | 55 | ..... | 74 | ..... | 49 | 65 | 33 | 64 | 34 | 63 | 50 | 63 | 31 | 57 | 42 | 78 | 43 | 83 | 70 | 85 | 69 | 97 | 66 |
| 23 | 84 | 57 | ..... | 71 | ..... | 52 | 71 | 36 | 68 | 43 | 61 | 53 | 64 | 30 | 60 | 43 | 74 | 46 | 73 | 54 | 90 | 72 | 92 | 67 |
| 24 | 89 | 58 | ..... | 76 | ..... | 53 | 68 | 56 | 75 | 51 | 66 | 42 | 68 | 35 | 64 | 31 | 78 | 50 | 82 | 44 | 87 | 67 | 94 | 68 |
| 25 | 90 | 72 | ..... | 64 | ..... | 64 | 76 | 55 | 60 | 34 | 65 | 42 | 69 | 33 | 56 | 44 | 80 | 46 | 80 | 48 | 84 | 66 | 94 | 70 |
| 26 | 98 | 74 | ..... | 75 | ..... | 66 | 77 | 50 | 62 | 37 | 65 | 42 | 69 | 52 | 55 | 41 | 74 | 59 | 83 | 55 | 78 | 66 | 93 | 69 |
| 27 | 95 | 72 | ..... | 70 | ..... | 66 | 83 | 49 | 54 | 30 | 60 | 49 | 62 | 40 | 59 | 41 | 79 | 54 | 84 | 60 | 89 | 63 | 86 | 69 |
| 28 | 86 | 68 | ..... | 69 | ..... | 64 | 84 | 59 | 46 | 25 | 52 | 38 | 69 | 30 | 64 | 37 | 73 | 45 | 73 | 60 | 88 | 60 | 96 | 71 |
| 29 | 91 | 72 | ..... | 64 | ..... | 61 | 88 | 53 | 43 | 14 | 44 | 32 | 63 | 49 | ..... | ..... | 76 | 48 | 75 | 53 | 85 | 71 | 93 | 72 |
| 30 | 93 | 74 | ..... | 71 | ..... | 64 | 58 | 52 | 39 | 12 | 39 | 27 | 57 | 38 | ..... | ..... | 74 | 53 | 82 | 53 | 86 | 74 | 93 | 72 |
| 31 | 93 | 74 | ..... | 73 | ..... | ..... | 61 | 52 | ..... | ..... | 42 | 26 | 70 | 27 | ..... | ..... | 70 | 49 | ..... | ..... | 90 | 73 | ..... | ..... |
| Range | 45° | | ..... | | ..... | | ..... | | 63° | | ..... | | 52° | | 57° | | ..... | | ..... | | 48° | | 37° | |
| Monthly means | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | |

* Maximum thermometer broken.

† No observations taken.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, MEMPHIS, TENN.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 94.5 | 77 | 88 | 74 | 83 | 69 | 83 | 66 | 60 | 53 | 35 | 20 | 45 | 33 | 40 | 32 | 70 | 46 | 64 | 47 | 84 | 59 | 89 | 68 |
| 2 | 95 | 76 | 90 | 75 | 79 | 65 | 84 | 67 | 60 | 46 | 41 | 20 | 42 | 34 | 41 | 34 | 63 | 54 | 68 | 45 | 82 | 68 | 93 | 75 |
| 3 | 94 | 77 | 87 | 73 | 74 | 60 | 78 | 69 | 58 | 40 | 52 | 28 | 36 | 30 | 37 | 33 | 55 | 42 | 60 | 47 | 73 | 59 | 93 | 76 |
| 4 | 96 | 76 | 88 | 68 | 70 | 63 | 71 | 52 | 63 | 38 | 65 | 46 | 33 | 23 | 39 | 32 | 52 | 38 | 64 | 44 | 74 | 53 | 85 | 72 |
| 5 | 96 | 76 | 87 | 72 | 68 | 63 | 64 | 43 | 60 | 40 | 57 | 38 | 32 | 16 | 52 | 30 | 67 | 38 | 72 | 48 | 79 | 54 | 78 | 67 |
| 6 | 94 | 79 | 91 | 70 | 73 | 65 | 72 | 48 | 45 | 31 | 44 | 34 | 32 | 21 | 57 | 37 | 70 | 52 | 75 | 53 | 84 | 63 | 78 | 64 |
| 7 | 90 | 68 | 85 | 70 | 76 | 62 | 63 | 57 | 56 | 30 | 52 | 32 | 26 | 14 | 58 | 36 | 74 | 58 | 78 | 54 | 79 | 67 | 78 | 65 |
| 8 | 93 | 74 | 83 | 69 | 79 | 61 | 69 | 53 | 54 | 43 | 52 | 34 | 38 | 18 | 52 | 46 | 75 | 62 | 67 | 61 | 74 | 62 | 81 | 69 |
| 9 | 93 | 76 | 85 | 70 | 80 | 67 | 74 | 49 | 43 | 39 | 53 | 30 | 42 | 30 | 48 | 41 | 67 | 60 | 82 | 61 | 75 | 57 | 75 | 62 |
| 10 | 86 | 74 | 86 | 69 | 78 | 67 | 67 | 56 | 46 | 37 | 57 | 36 | 48 | 31 | 41 | 33 | 66 | 54 | 67 | 52 | 72 | 58 | 73 | 61 |
| 11 | 84 | 71 | 90 | 71 | 80 | 67 | 67 | 47 | 49 | 29 | 62 | 39 | 48 | 29 | 40 | 30 | 70 | 47 | 71 | 47 | 75 | 54 | 79 | 58 |
| 12 | 84 | 67 | 92 | 73 | 86 | 63 | 76 | 53 | 58 | 30 | 63 | 40 | 51 | 36 | 53 | 30 | 76 | 54 | 80 | 52 | 80 | 58 | 79 | 64 |
| 13 | 87 | 68 | 86 | 72 | 88 | 69 | 77 | 55 | 63 | 38 | 66 | 48 | 47 | 39 | 47 | 39 | 71 | 51 | 81 | 61 | 66 | 52 | 78 | 65 |
| 14 | 88 | 66 | 82 | 69 | 89 | 70 | 78 | 61 | 63 | 54 | 58 | 41 | 42 | 37 | 48 | 41 | 67 | 53 | 80 | 61 | 60 | 47 | 82 | 73 |
| 15 | 93 | 72 | 81 | 65 | 88 | 72 | 81 | 59 | 62 | 52 | 66 | 43 | 44 | 33 | 52 | 41 | 67 | 48 | 70 | 62 | 69 | 46 | 85 | 72 |
| 16 | 87 | 75 | 84 | 67 | 86 | 69 | 83 | 63 | 68 | 44 | 68 | 54 | 48 | 29 | 60 | 41 | 76 | 49 | 81 | 57 | 80 | 57 | 87 | 70 |
| 17 | 87 | 74 | 85 | 65 | 73 | 58 | 81 | 67 | 67 | 49 | 69 | 56 | 54 | 31 | 60 | 48 | 67 | 51 | 83 | 63 | 88 | 63 | 88 | 71 |
| 18 | 81 | 72 | 75 | 70 | 65 | 55 | 76 | 69 | 63 | 45 | 70 | 53 | 56 | 35 | 59 | 42 | 60 | 43 | 75 | 67 | 88 | 65 | 80 | 70 |
| 19 | 81 | 69 | 87 | 66 | 68 | 53 | 71 | 59 | 65 | 44 | 70 | 51 | 55 | 46 | 60 | 43 | 67 | 44 | 78 | 64 | 82 | 66 | 82 | 66 |
| 20 | 77 | 64 | 88 | 66 | 76 | 57 | 62 | 54 | 61 | 52 | 68 | 52 | 52 | 46 | 59 | 51 | 74 | 49 | 75 | 63 | 87 | 72 | 84 | 69 |
| 21 | 78 | 62 | 87 | 70 | 80 | 58 | 57 | 51 | 59 | 51 | 62 | 55 | 53 | 42 | 61 | 52 | 78 | 52 | 80 | 66 | 85 | 69 | 81 | 60 |
| 22 | 61 | 63 | 74 | 67 | 80 | 57 | 60 | 46 | 52 | 45 | 65 | 58 | 54 | 36 | 57 | 50 | 77 | 56 | 81 | 69 | 81 | 71 | 81 | 65 |
| 23 | 83 | 68 | 79 | 65 | 79 | 62 | 64 | 41 | 54 | 43 | 63 | 58 | 48 | 31 | 51 | 45 | 80 | 57 | 73 | 61 | 88 | 73 | 83 | 62 |
| 24 | 83 | 70 | 81 | 63 | 78 | 66 | 63 | 46 | 53 | 36 | 69 | 58 | 61 | 36 | 48 | 37 | 72 | 61 | 72 | 55 | 91 | 69 | 85 | 68 |
| 25 | 83 | 72 | 85 | 62 | 82 | 66 | 67 | 52 | 52 | 41 | 59 | 52 | 62 | 47 | 55 | 36 | 63 | 47 | 75 | 59 | 87 | 70 | 88 | 67 |
| 26 | 76 | 69 | 90 | 70 | 84 | 67 | 69 | 60 | 54 | 41 | 55 | 48 | 62 | 45 | 50 | 36 | 75 | 48 | 76 | 55 | 77 | 68 | 91 | 72 |
| 27 | 90 | 72 | 90 | 70 | 78 | 62 | 73 | 51 | 52 | 40 | 55 | 50 | 59 | 43 | 53 | 34 | 67 | 61 | 72 | 53 | 79 | 64 | 94 | 75 |
| 28 | 91 | 72 | 92 | 72 | 83 | 64 | 75 | 57 | 42 | 33 | 52 | 48 | 58 | 47 | 59 | 34 | 64 | 50 | 69 | 50 | 84 | 62 | 92 | 75 |
| 29 | 91 | 76 | 92 | 74 | 85 | 66 | 68 | 61 | 33 | 21 | 50 | 42 | 58 | 38 | ..... | ..... | 56 | 42 | 73 | 54 | 89 | 65 | 86 | 72 |
| 30 | 90 | 75 | 92 | 74 | 86 | 66 | 62 | 53 | 30 | 16 | 43 | 40 | 53 | 37 | ..... | ..... | 76 | 53 | 78 | 55 | 90 | 71 | 87 | 72 |
| 31 | 93 | 75 | 94 | 75 | ..... | ..... | 64 | 52 | ..... | ..... | 48 | 38 | 40 | 34 | ..... | ..... | 62 | 45 | ..... | ..... | 90 | 69 | ..... | ..... |
| Range | 34° | | 32° | | 36° | | 43° | | 52° | | 50° | | 48° | | 39° | | 42° | | 49° | | 43° | | 36° | |
| Monthly means | 80°.4 | | 78°.0 | | 71°.0 | | 62°.8 | | 47°.6 | | 50°.5 | | 40°.8 | | 45°.4 | | 59°.7 | | 65°.2 | | 71°.3 | | 76°.4 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, MILWAUKEE, WIS.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 76 | 64 | 80 | 68 | 68 | 53 | 72 | 50 | 45 | 29 | 29 | 18 | 31 | 25 | 35 | 29 | 41 | 34 | 52 | 36.5 | 62 | 46 | 66 | 56 |
| 2 | 66 | 58 | 81 | 67 | 62 | 49 | 64 | 53 | 38 | 32 | 32 | 15 | 28 | 14 | 35 | 21 | 44 | 37 | 49 | 37 | 65 | 45 | 73 | 57 |
| 3 | 78 | 57 | 69 | 61 | 73 | 48 | 71 | 49 | 40 | 27 | 39 | 26 | 27 | 13 | 36 | 15 | 37 | 32 | 45 | 39 | 54 | 44 | 74 | 60 |
| 4 | 65 | 54 | 69 | 53 | 80 | 53 | 51 | 39 | 34 | 27 | 42 | 34 | 27 | 0 | 36 | 16 | 43 | 28 | 54 | 35 | 51 | 41 | 63 | 55 |
| 5 | 70 | 60 | 88 | 58 | 65 | 58 | 54 | 33 | 34 | 20 | 41 | 31 | 13 | −6 | 41 | 21 | 55 | 32 | 57 | 44 | 57 | 41 | 64 | 53 |
| 6 | 70 | 54 | 75 | 63 | 65 | 55 | 60 | 33 | 32 | 11 | 31 | 18 | 8 | −1 | 50 | 33 | 52 | 38 | 50 | 35 | 59 | 47 | 70 | 54 |
| 7 | 84 | 56 | 84 | 65 | 66 | 51 | 52 | 46 | 37 | 22 | 37 | 17 | 13 | −8 | 47 | 37 | 55 | 38 | 47 | 38 | 61 | 50 | 58 | 47 |
| 8 | 85 | 62 | 83 | 62 | 68 | 49 | 55 | 47 | 42 | 33 | 30 | 21 | 34 | 13 | 38 | 32 | 50 | 38 | 50 | 42 | 66 | 50 | 52 | 47 |
| 9 | 84 | 65 | 75 | 58 | 67 | 57 | 51 | 37 | 34 | 27 | 34 | 15 | 34 | 24 | 32 | 24 | 51 | 42 | 59 | 43 | 55 | 45 | 62 | 47.5 |
| 10 | 67 | 57 | 72 | 56 | 68 | 59 | 50 | 44 | 35 | 21 | 42 | 32 | 35 | 31 | 26 | 20 | 51 | 43 | 55 | 41 | 50 | 41 | 59 | 50 |
| 11 | 72 | 52 | 73 | 62 | 67 | 54 | 48 | 36 | 43 | 23 | 48 | 37 | 38 | 25 | 32 | 15 | 50 | 36 | 60 | 43 | 48 | 40 | 68 | 45 |
| 12 | 81 | 59 | 86 | 59 | 71 | 57 | 50 | 34 | 50 | 30 | 52 | 30 | 36 | 27 | 33 | 23 | 44 | 35 | 61 | 43 | 52 | 39 | 61 | 49 |
| 13 | 83 | 60 | 71 | 60 | 72 | 55 | 69 | 48 | 53 | 32 | 43 | 33 | 35 | 30 | 34 | 29 | 40 | 34 | 52 | 40 | 53 | 39 | 65 | 53 |
| 14 | 86 | 66 | 70 | 59 | 77 | 63 | 66 | 54 | 50 | 45 | 44 | 28 | 35 | 28 | 35 | 29 | 43 | 34 | 48 | 42 | 52 | 42 | 67 | 56 |
| 15 | 87 | 64 | 75 | 58 | 81 | 65 | 69 | 54 | 49 | 40 | 52 | 37 | 30 | 19 | 37 | 29 | 54 | 34 | 47 | 39 | 58 | 46 | 81 | 60 |
| 16 | 78 | 66 | 74 | 58 | 73 | 53 | 54 | 45 | 50 | 36 | 50 | 32 | 32 | 26 | 41 | 31.5 | 50 | 40 | 49.5 | 41 | 60 | 51 | 68 | 58 |
| 17 | 87 | 60 | 76 | 58 | 65 | 48 | 66 | 52 | 43 | 31 | 50 | 35 | 31 | 22 | 36 | 27 | 40 | 33 | 52 | 44 | 54 | 46 | 62 | 55 |
| 18 | 77 | 61 | 80 | 61 | 69 | 40 | 55 | 50 | 36 | 26 | 54 | 38 | 36 | 29 | 34 | 24 | 46 | 34 | 60 | 47 | 55 | 47 | 69 | 56 |
| 19 | 65 | 57 | 86 | 64 | 73 | 48 | 53 | 46 | 40 | 32 | 55 | 45 | 46 | 28 | 39 | 29 | 52 | 38 | 69 | 53 | 72.5 | 48 | 74 | 56 |
| 20 | 64 | 54 | 79 | 63 | 66 | 54 | 48 | 43 | 46 | 38 | 63 | 44 | 38 | 33 | 47 | 31 | 40 | 33 | 66 | 53 | 67 | 55 | 75 | 55 |
| 21 | 77 | 51 | 75 | 65 | 67 | 53 | 48 | 39 | 47 | 38 | 53 | 39 | 33 | 30 | 38 | 36 | 43 | 34 | 58 | 44 | 67 | 45 | 61 | 51 |
| 22 | 75 | 58 | 69 | 59 | 72 | 50 | 64 | 35 | 38 | 35 | 44 | 41 | 33 | 14 | 36 | 33 | 50 | 31 | 58 | 45 | 54 | 44 | 66 | 48 |
| 23 | 75 | 61 | 69 | 59 | 71 | 56 | 65 | 48 | 43 | 37 | 47 | 43 | 24 | 6 | 41 | 30 | 70 | 33 | 66 | 47 | 65 | 49 | 71 | 47 |
| 24 | 76 | 58 | 79 | 58 | 84 | 59 | 64 | 49 | 48 | 43 | 47 | 44 | 44 | 24 | 34 | 29 | 33 | 22 | 59 | 47 | 78 | 57 | 75 | 61 |
| 25 | 75 | 64 | 85 | 63 | 83 | 62 | 55 | 46 | 43 | 38 | 46 | 40 | 37 | 27 | 34 | 25.5 | 43 | 21 | 56 | 44 | 72 | 59 | 83 | 65 |
| 26 | 75 | 67 | 76 | 58 | 73 | 57 | 51 | 47 | 44 | 38 | 40 | 36 | 33 | 24 | 38 | 24 | 52 | 38 | 46 | 40 | 65 | 52 | 77 | 65 |
| 27 | 84 | 67 | 75 | 64 | 67 | 58 | 58 | 48 | 38 | 29 | 39 | 35 | 35 | 20 | 48 | 27 | 47 | 35 | 49 | 45 | 56 | 49 | 74 | 61 |
| 28 | 84 | 67 | 79 | 65 | 67 | 55 | 52 | 43 | 29 | 15 | 39 | 35 | 24 | 12 | 52 | 31 | 40 | 31 | 59 | 44 | 55 | 48 | 77 | 63 |
| 29 | 79 | 65 | 80 | 64 | 86 | 55 | 52 | 37 | 15 | 10 | 39 | 36 | 28 | 18 | ..... | ..... | 40 | 32 | 61 | 48 | 54 | 46 | 76 | 67 |
| 30 | 77 | 60 | 74 | 61 | 86 | 64 | 47 | 30 | 33 | 14 | 38 | 31 | 33 | 26 | ..... | ..... | 39 | 33 | 72 | 53 | 56 | 46 | 82 | 67 |
| 31 | 75 | 62 | 84 | 63 | ..... | ..... | 45 | 30 | ..... | ..... | 36 | 30 | 33 | 26 | ..... | ..... | 46 | 34 | ..... | ..... | 65 | 50 | ..... | ..... |
| Range | 36° | | 35° | | 46° | | 42° | | 43° | | 48° | | 54° | | 37° | | 49° | | 37° | | 39° | | 38° | |
| Monthly means | 69°.2 | | 69°.5 | | 63°.9 | | 50°.4 | | 35°.3 | | 37°.4 | | 26°.2 | | 32°.5 | | 40°.3 | | 50°.1 | | 53° | | 62°.2 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, MOBILE, ALA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 95 | 81 | 99 | 80 | 94 | 75 | 79 | 71 | 75 | 60 | 44 | 26 | 54 | 38 | 61 | 38 | 69 | 46 | 71 | 56 | 86 | 61 | 93.5 | 75 |
| 2 | 95 | 80 | 94 | 78 | 89 | 73.5 | 76 | 70 | 76 | 54 | 48.5 | 26 | 56 | 39 | 55 | 41 | 76 | 61 | 71.5 | 56 | 83.5 | 64 | 95 | 76.5 |
| 3 | 96 | 75 | 97 | 75 | 85 | 72 | 79.5 | 71 | 58.5 | 51 | 58 | 37 | 62 | 45 | 49 | 33 | 66 | 54 | 75.5 | 56 | 81 | 63 | 92 | 78 |
| 4 | 96 | 79 | 94 | 78 | 88 | 73 | 80 | 64 | 69 | 44 | 64 | 56 | 52 | 37 | 45 | 35.5 | 63 | 42 | 63 | 51 | 77 | 62 | 92.5 | 73 |
| 5 | 98 | 77 | 94 | 75 | 88 | 74 | 72 | 53 | 68 | 62 | 65 | 46 | 44 | 28.5 | 52 | 30 | 65 | 42 | 74 | 50 | 84.5 | 55.5 | 93 | 72 |
| 6 | 99 | 76 | 92 | 76 | 89 | 77 | 76 | 52 | 62 | 44 | 51 | 37 | 46 | 28 | 59 | 37 | 69 | 55 | 80.5 | 58 | 84 | 63 | 91 | 72 |
| 7 | 97 | 82 | 91 | 77 | 86 | 74 | 80 | 62 | 66 | 43 | 52 | 33 | 44 | 31 | 61 | 51 | 72.5 | 58 | 73 | 60 | 84 | 66 | 92 | 73 |
| 8 | 97 | 81 | 87 | 73 | 87 | 73 | 75.5 | 62.5 | 74 | 53 | 56 | 34 | 44 | 36 | 58 | 46.5 | 73 | 57.5 | 73 | 66 | 85.5 | 69 | 90 | 74 |
| 9 | 94 | 76 | 91 | 75 | 88 | 73 | 74 | 56 | 54 | 45 | 57 | 38 | 46 | 40 | 68 | 51 | 70 | 62 | 80 | 68 | 81 | 66 | 87 | 76 |
| 10 | 94 | 78 | 91 | 74 | 86 | 76 | 78 | 55 | 51 | 43 | 63 | 36 | 52 | 41 | 55 | 40 | 71.5 | 63.5 | 79 | 64 | 82 | 64.5 | 90 | 74 |
| 11 | 95 | 74 | 93 | 70 | 89 | 71 | 77 | 57 | 55 | 34 | 67 | 42 | 57 | 38 | 48 | 34.5 | 73 | 64 | 79.5 | 63.5 | 81 | 61 | 87 | 67.5 |
| 12 | 96 | 78 | 94 | 71 | 90 | 73 | 77 | 54 | 61 | 36 | 67 | 43 | 60 | 40 | 52 | 34 | 82 | 65 | 78 | 54 | 80 | 62 | 87 | 73 |
| 13 | 96 | 78 | 94 | 74 | 93 | 73 | 81 | 55 | 72 | 42 | 69 | 48 | 59 | 48 | 59 | 44 | 81 | 61.5 | 81 | 56.5 | 86 | 60.5 | 84 | 74 |
| 14 | 94 | 79 | 87 | 69 | 93 | 74.5 | 81 | 65 | 72 | 54 | 68 | 52.5 | 53 | 40 | 61 | 46.5 | 78 | 54.5 | 83.5 | 68 | 83 | 66 | 84 | 74 |
| 15 | 88 | 81 | 89 | 71 | 91 | 74.5 | 82 | 68 | 74 | 56 | 68 | 49 | 53 | 40 | 70 | 50.5 | 80 | 59 | 82.5 | 70.5 | 79 | 57.5 | 86 | 74 |
| 16 | 91 | 81 | 89 | 71 | 90 | 77 | 83 | 70 | 71 | 61 | 70 | 53 | 53 | 35 | 64 | 45 | 71 | 58.5 | 85 | 67 | 82 | 62 | 83 | 76.5 |
| 17 | 94 | 76 | 90 | 71 | 88 | 77 | 81 | 70 | 73 | 56 | 71 | 49 | 56 | 35 | 66 | 48 | 76 | 54 | 82.5 | 68 | 86.5 | 71 | 90 | 76.5 |
| 18 | 91 | 78 | 87 | 72 | 80 | 69 | 80 | 71 | 71 | 49 | 72 | 52 | 60.5 | 35 | 71 | 50.5 | 67 | 51 | 74 | 70 | 91 | 71.5 | 94 | 78 |
| 19 | 85 | 76 | 89 | 70 | 78 | 65 | 80 | 71 | 66 | 52 | 69 | 55 | 61 | 50 | 66 | 50 | 70 | 46 | 82 | 69 | 78.5 | 66 | 92 | 78 |
| 20 | 90 | 74 | 89 | 71 | 69 | 62 | 73 | 60 | 67 | 64 | 64 | 56 | 61 | 48 | 68 | 55.5 | 72.5 | 49 | 82.5 | 70.5 | 85 | 70 | 95 | 74 |
| 21 | 85 | 69 | 85 | 75 | 78 | 66.5 | 64 | 54 | 70 | 56 | 65 | 60.5 | 59 | 44 | 70 | 60 | 70 | 56 | 82.5 | 70 | 87 | 70 | 93 | 73 |
| 22 | 86 | 68 | 87 | 75 | 75 | 69 | 64 | 50 | 65 | 54 | 73 | 62 | 59 | 43.5 | 67 | 51.5 | 79 | 61 | 86 | 71.5 | 88 | 70.5 | 89 | 72.5 |
| 23 | 85 | 73 | 88 | 71 | 73 | 68 | 64 | 54 | 63 | 50 | 65.5 | 63 | 60 | 43 | 69 | 53 | 77 | 55.5 | 83.5 | 74 | 93 | 73.5 | 90.5 | 68 |
| 24 | 91 | 77 | 90 | 73 | 81 | 69 | 71 | 48 | 60 | 43 | 70 | 60 | 60 | 39 | 63 | 45.5 | 82 | 62 | 79 | 63.5 | 97 | 73.5 | 91 | 69 |
| 25 | 90 | 77 | 90 | 72 | 81 | 68 | 67 | 61 | 65 | 51 | 67 | 53 | 62 | 43 | 63 | 43 | 74 | 59 | 82 | 60 | 96 | 75 | 92.5 | 70.5 |
| 26 | 91 | 75 | 92 | 73 | 85 | 68 | 73 | 64 | 63 | 44 | 64 | 52 | 66 | 52 | 57 | 45 | 76 | 50 | 83.5 | 65 | 96 | 74.5 | 92 | 72 |
| 27 | 94 | 76 | 82 | 76 | 86 | 72 | 76 | 60 | 66 | 48 | 62 | 50.5 | 72 | 58 | 62 | 45.5 | 75 | 64.5 | 84 | 62.5 | 87 | 69 | 94 | 75.5 |
| 28 | 97 | 80 | 91 | 73 | 85 | 69 | 79 | 62 | 60 | 47 | 63 | 50 | 60 | 45.5 | 66 | 43 | 83 | 67 | 82.5 | 59.5 | 87 | 68 | 90 | 75 |
| 29 | 100 | 77 | 93 | 72.5 | 86 | 70 | 74 | 69 | 47 | 34 | 58 | 47 | 61 | 41 | ..... | ..... | 79 | 59 | 76 | 61.5 | 94 | 69 | 90.5 | 78 |
| 30 | 98 | 79 | 95 | 76 | 85 | 68.5 | 76 | 69 | 44 | 27 | 49 | 44 | 60 | 48 | ..... | ..... | 75 | 67 | 83 | 57 | 95.5 | 73 | 93 | 75 |
| 31 | 96 | 80 | 95 | 76 | ..... | ..... | 74 | 64 | ..... | ..... | 49 | 41 | 53 | 44 | ..... | ..... | 77 | 62 | ..... | ..... | 98 | 75 | ..... | ..... |
| Range | 32° | | 30° | | 32° | | 35° | | 49° | | 47° | | 44° | | 40° | | 41° | | 36° | | 42°.5 | | 27°.5 | |
| Monthly means | 84°.8 | | 82°.0 | | 77°.6 | | 68°.1 | | 56°.1 | | 54°.3 | | 48°.4 | | 52°.3 | | 64°.5 | | 69°.7 | | 75°.3 | | 81°.6 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, MONTGOMERY, ALA.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 99 | 79 | 96 | 77.5 | 95.5 | 76 | 80 | 70 | 76 | 54.5 | 44.5 | 24 | 55.5 | 34.5 | 60 | 40 | 73 | 38 | 71 | 56 | 83 | 58 | 90 | 69 |
| 2 | 99 | 80 | 94 | 77.5 | 91 | 72.5 | 75 | 71 | 73 | 51.5 | 50 | 25 | 56 | 36 | 51 | 39 | 71 | 61 | 74 | 52.5 | 83 | 62 | 95 | 70 |
| 3 | 99.5 | 79 | 95.5 | 75.5 | 86 | 65 | 75.5 | 67.5 | 61 | 47 | 58.5 | 32 | 51 | 36.5 | 51.5 | 32 | 67 | 47 | 75 | 54 | 80 | 65 | 95 | 76 |
| 4 | 102.5 | 78 | 97.5 | 75.5 | 92 | 70 | 78 | 59.5 | 67.5 | 39.5 | 64 | 49.5 | 58 | 35 | 43 | 35 | 58 | 42 | 61.5 | 47.5 | 72 | 62 | 93 | 74 |
| 5 | 102 | 80 | 98.5 | 76 | 90 | 72 | 70.5 | 50 | 62 | 55 | 65.5 | 44 | 40.5 | 25.5 | 53 | 33.5 | 66 | 37.5 | 42.5 | 45.5 | 77 | 53 | 92 | 72 |
| 6 | 100 | 79.5 | 97 | 76 | 94 | 73 | 72 | 48.5 | 59.5 | 45 | 49.5 | 36 | 43.5 | 27.5 | 58.5 | 35.5 | 71.5 | 44.5 | 85 | 56 | 83 | 58 | 88 | 72 |
| 7 | 95 | 75 | 95 | 77 | 82 | 71 | 76 | 53 | 59 | 44 | 55 | 32 | 44 | 25.5 | 64.5 | 51 | 75 | 53.5 | 78.5 | 55.5 | 83 | 61 | 90 | 71 |
| 8 | 94 | 75 | 93 | 75 | 87 | 67 | 73 | 59.5 | 72 | 48.5 | 58 | 30 | 43 | 31 | 63 | 51 | 76 | 54.5 | 71.5 | 61 | 84 | 64 | 91 | 71 |
| 9 | 98 | 73 | 93 | 75 | 91.5 | 66 | 74 | 52 | 53 | 44 | 59 | 33 | 46 | 34.5 | 68 | 50 | 77 | 59.5 | 81 | 63 | 80 | 64 | 90 | 74 |
| 10 | 99.5 | 76 | 92 | 73 | 88.5 | 73 | 78 | 52.5 | 51.5 | 41 | 61 | 32.5 | 57 | 43 | 51.5 | 40 | 71 | 60.5 | 82 | 64 | 80 | 61 | 86 | 71 |
| 11 | 97 | 74 | 93 | 69 | 88 | 70.5 | 75 | 57 | 53.5 | 34 | 65 | 34.5 | 55 | 36.5 | 40.5 | 35 | 71.5 | 61.5 | 75.5 | 61 | 78 | 56 | 80 | 63 |
| 12 | 98 | 75.5 | 97.5 | 69 | 90 | 68.5 | 73.5 | 50.5 | 62 | 35 | 66 | 39 | 58.5 | 34 | 51 | 29 | 79 | 63.5 | 78.5 | 51 | 79 | 57 | 87 | 65 |
| 13 | 100.5 | 73 | 95.5 | 70.5 | 92 | 70 | 77 | 49.5 | 66 | 38 | 67 | 40 | 58 | 48 | 49 | 38 | 76.5 | 58 | 82.5 | 53 | 82 | 58 | 77 | 71 |
| 14 | 100 | 76.5 | 83.5 | 72 | 97 | 70.5 | 79.5 | 59 | 73 | 47.5 | 66 | 45 | 48 | 41.5 | 57.5 | 45 | 79 | 49 | 88.0 | 60 | 76 | 60 | 73 | 68 |
| 15 | 90 | 77.5 | 87.5 | 67.5 | 93.5 | 68.5 | 80.5 | 62.5 | 71.5 | 55 | 66 | 47.5 | 47 | 38 | 61 | 41 | 73 | 55 | 80 | 64.5 | 74 | 52 | 75 | 68 |
| 16 | 89 | 75.5 | 87 | 68 | 95 | 70.5 | 82 | 63 | 65 | 56.5 | 68.5 | 45 | 52.5 | 30.5 | 61.5 | 41 | 72.5 | 50.5 | 82.5 | 64.5 | 81 | 58 | 85 | 70 |
| 17 | 87.5 | 76 | 88 | 66.5 | 91 | 75 | 82.5 | 63 | 70.5 | 55 | 70.5 | 46 | 57 | 32 | 66.5 | 41 | 72 | 50.5 | 74.5 | 63 | 87 | 65 | 87 | 71 |
| 18 | 94 | 73 | 90 | 68 | 79.5 | 66.5 | 83.5 | 66 | 72 | 46 | 71 | 45.5 | 59.5 | 33 | 67 | 47.5 | 67 | 44 | 66 | 59.5 | 92 | 70 | 87 | 72 |
| 19 | 83.5 | 73 | 88 | 72 | 70 | 62.5 | 80.5 | 68.5 | 70 | 45.5 | 70 | 48.5 | 66 | 46 | 65 | 42 | 70 | 42 | 76 | 63 | 82 | 67 | 90 | 74 |
| 20 | 87 | 72.5 | 90.5 | 68.5 | 67 | 61 | 73 | 60.5 | 66 | 58.5 | 68 | 49 | 64.5 | 51 | 69.5 | 46 | 73 | 46 | 80 | 64 | 88 | 67 | 91 | 72 |
| 21 | 86.5 | 65 | 92 | 67 | 78 | 65 | 65 | 53 | 71 | 57 | 63 | 57.5 | 58.5 | 44.5 | 73 | 56 | 72 | 50.5 | 85.5 | 56.5 | 91 | 69 | 88 | 73 |
| 22 | 86 | 67.5 | 83 | 72 | 75 | 66.5 | 61 | 52 | 63.5 | 52.5 | 71 | 61.5 | 59 | 42 | 67 | 56.5 | 79 | 56 | 82.5 | 67 | 90 | 71 | 87 | 68 |
| 23 | 82.5 | 73.5 | 87 | 71 | 74.5 | 65 | 65 | 44 | 61.5 | 52 | 67 | 62 | 58.5 | 42 | 67 | 50 | 79.5 | 55 | 78.5 | 69 | 92 | 73 | 88 | 66 |
| 24 | 92.5 | 73.5 | 88 | 68 | 77.5 | 66 | 71 | 46 | 61 | 49 | 66.5 | 62 | 62 | 37 | 61 | 42 | 83.5 | 57 | 78 | 62 | 93 | 74 | 89 | 64 |
| 25 | 91 | 74 | 90.5 | 67 | 83.5 | 65 | 63 | 56.5 | 69 | 44 | 66 | 56 | 64 | 40.5 | 60 | 39 | 71.5 | 51 | 78 | 57 | 94 | 76 | 91 | 68 |
| 26 | 89 | 74 | 92.5 | 66 | 83 | 66.5 | 68 | 59 | 61 | 46 | 64 | 54 | 66 | 48 | 53 | 38.5 | 76 | 45 | 79 | 59 | 89 | 76 | 94 | 69 |
| 27 | 91 | 73.5 | 92.5 | 75.5 | 81 | 69 | 74.5 | 58 | 64 | 46.5 | 61 | 54 | 70.5 | 51 | 60 | 39.5 | 83 | 56.5 | 79 | 57 | 82 | 69 | 93 | 74 |
| 28 | 97 | 75 | 92 | 74 | 84.5 | 69.5 | 76 | 53 | 60 | 41.5 | 63.5 | 52 | 59 | 47 | 62 | 36 | 77 | 60 | 77 | 55 | 87 | 66 | 92 | 75 |
| 29 | 99 | 78 | 96 | 73.5 | 85 | 68 | 79 | 58.5 | 45.5 | 32 | 59 | 48 | 59 | 37.5 | ..... | ..... | 74 | 54 | 74 | 54 | 90 | 66 | 93 | 75 |
| 30 | 98 | 79 | 97 | 74 | 84 | 66.5 | 73 | 66 | 44 | 26.5 | 48 | 42.5 | 57 | 43 | ..... | ..... | 81 | 60 | 81 | 57 | 94 | 68 | 88 | 74 |
| 31 | 97 | 77.5 | 98.5 | 75.5 | ..... | ..... | 74 | 61.5 | ..... | ..... | 50 | 41 | 50 | 41 | ..... | ..... | 79.5 | 56.5 | ..... | ..... | 90 | 67 | ..... | ..... |
| Range | 37°.5 | | 32°.5 | | 36° | | 39°.5 | | 49°.5 | | 47° | | 45° | | 44° | | 46°.0 | | 42°.5 | | 42° | | 32° | |
| Monthly means | 84°.2 | | 81°.8 | | 75°.3 | | 65°.5 | | 53°.9 | | 52°.5 | | 46°.4 | | 50°.2 | | 63°.1 | | 67°.8 | | 74°.6 | | 79°.5 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, MONTREAL, CANADA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 80.0 | 66.8 | 85.3 | 59.3 | 70.6 | 58.6 | 79.3 | 58.5 | 45.1 | 34.6 | 30.0 | 11.0 | 22.5 | 6.7 | 15.0 | 5.5 | 19.4 | 0.1 | 46.1 | 32.6 | 61.7 | 45.2 | 74.3 | 55.9 |
| 2 | 75.0 | 61.8 | 80.5 | 68.2 | 68.0 | 52.0 | 60.8 | 47.7 | 48.0 | 35.1 | 21.2 | 7.3 | 22.0 | − 1.0 | 16.8 | 2.5 | 27.0 | 7.1 | 47.0 | 31.3 | 67.1 | 47.5 | 77.2 | 56.0 |
| 3 | 77.7 | 65.0 | 80.6 | 67.0 | 61.2 | 50.9 | 51.2 | 44.3 | 45.0 | 34.0 | 34.2 | 15.9 | 8.5 | − 5.5 | 25.5 | 1.9 | 32.0 | 26.0 | 55.0 | 32.2 | 70.6 | 53.7 | 77.1 | 62.0 |
| 4 | 80.6 | 62.7 | 71.7 | 60.5 | 69.8 | 50.8 | 63.2 | 46.8 | 40.0 | 28.7 | 38.0 | 32.1 | 20.2 | 4.8 | 31.8 | 21.6 | 33.5 | 18.5 | 48.2 | 35.0 | 69.5 | 55.0 | 75.3 | 62.5 |
| 5 | 78.2 | 63.8 | 74.0 | 57.7 | 62.2 | 53.7 | 54.5 | 40.7 | 43.2 | 30.5 | 44.1 | 35.5 | 20.2 | − 8.5 | 34.5 | 12.7 | 34.0 | 16.5 | 41.6 | 33.0 | 55.3 | 46.9 | 66.2 | 46.0 |
| 6 | 75.0 | 60.5 | 75.6 | 55.9 | 62.8 | 46.2 | 55.0 | 38.5 | 31.5 | 20.5 | 43.0 | 18.0 | −3.0 | −15.6 | 35.5 | 24.9 | 43.0 | 29.6 | 41.3 | 35.2 | 59.6 | 45.0 | 56.1 | 40.0 |
| 7 | 80.7 | 60.3 | 70.0 | 60.7 | 66.1 | 46.6 | 56.1 | 43.4 | 44.7 | 27.2 | 26.8 | 13.0 | −1.0 | −16.5 | 42.7 | 22.9 | 45.0 | 39.0 | 42.0 | 34.2 | 65.6 | 46.0 | 55.3 | 41.8 |
| 8 | 81.0 | 63.8 | 71.5 | 58.7 | 69.0 | 50.2 | 55.7 | 44.0 | 45.0 | 33.8 | 37.4 | 25.3 | 0.5 | −17.8 | 45.0 | 30.7 | 52.0 | 36.5 | 48.4 | 36.1 | 75.6 | 52.5 | 63.6 | 46.9 |
| 9 | 81.2 | 65.6 | 77.1 | 59.6 | 76.1 | 51.6 | 54.3 | 46.8 | 41.6 | 25.5 | 30.3 | 14.0 | 25.3 | − 2.8 | 33.0 | 16.0 | 49.4 | 32.3 | 60.7 | 32.6 | 62.0 | 53.0 | 64.2 | 48.0 |
| 10 | 76.2 | 63.0 | 76.0 | 61.5 | 73.8 | 53.9 | 55.1 | 46.9 | 28.2 | 18.6 | 27.0 | 15.0 | 32.6 | 18.3 | 17.1 | 11.6 | 46.8 | 34.0 | 50.8 | 45.8 | 59.6 | 46.1 | 64.1 | 48.0 |
| 11 | 74.6 | 60.4 | 75.4 | 62.2 | 78.0 | 57.0 | 56.3 | 46.8 | 31.8 | 18.5 | 34.0 | 23.4 | 37.2 | 32.0 | 18.0 | 4.5 | 35.0 | 22.5 | 54.0 | 47.0 | 49.9 | 40.3 | 64.1 | 52.4 |
| 12 | 74.0 | 59.0 | 79.0 | 61.8 | 79.6 | 64.4 | 51.1 | 44.7 | 38.0 | 29.0 | 37.5 | 25.2 | 40.0 | 32.5 | 26.2 | 4.9 | 36.5 | 23.5 | 48.0 | 41.0 | 46.1 | 38.3 | 65.5 | 50.9 |
| 13 | 66.0 | 55.0 | 75.9 | 62.9 | 84.3 | 65.6 | 46.6 | 41.0 | 36.0 | 26.2 | 35.0 | 25.0 | 34.2 | 29.8 | 30.8 | 12.0 | 35.8 | 30.2 | 44.9 | 38.5 | 47.2 | 34.8 | 71.2 | 54.8 |
| 14 | 76.2 | 56.8 | 78.6 | 62.0 | 81.7 | 60.4 | 50.5 | 43.0 | 48.0 | 27.0 | 26.0 | 11.0 | 34.0 | 27.8 | 20.6 | 2.5 | 38.6 | 29.4 | 50.1 | 38.5 | 48.2 | 38.0 | 77.8 | 53.9 |
| 15 | 76.2 | 61.3 | 75.6 | 65.7 | 84.1 | 61.8 | 49.3 | 41.9 | 48.1 | 41.7 | 40.1 | 20.6 | 32.0 | 8.0 | 21.0 | −2.0 | 43.2 | 29.4 | 53.3 | 38.5 | 55.0 | 39.2 | 79.4 | 61.6 |
| 16 | 83.7 | 66.0 | 68.0 | 60.0 | 81.8 | 68.6 | 48.0 | 41.6 | 52.3 | 41.3 | 40.8 | 25.6 | 8.1 | − 6.0 | 31.0 | 6.5 | 50.0 | 32.0 | 59.8 | 39.6 | 60.9 | 43.0 | 73.0 | 62.2 |
| 17 | 85.7 | 67.9 | 68.6 | 59.3 | 80.4 | 55.1 | 55.3 | 38.0 | 46.0 | 36.3 | 40.3 | 19.8 | 11.8 | − 6.5 | 31.0 | 14.6 | 49.3 | 35.0 | 63.7 | 46.5 | 64.1 | 46.7 | 68.1 | 58.4 |
| 18 | 83.0 | 65.8 | 77.0 | 60.9 | 63.1 | 50.2 | 53.7 | 38.2 | 49.0 | 31.0 | 26.0 | 13.0 | 24.0 | 0.7 | 16.8 | 1.5 | 46.0 | 33.3 | 65.5 | 42.3 | 64.0 | 50.0 | 67.9 | 53.3 |
| 19 | 76.3 | 67.0 | 79.7 | 65.7 | 65.3 | 47.1 | 49.7 | 40.0 | 33.0 | 25.4 | 36.8 | 16.5 | 33.8 | 17.0 | 23.3 | 3.2 | 42.0 | 30.5 | 62.0 | 44.5 | 69.2 | 47.5 | 77.2 | 55.2 |
| 20 | 79.0 | 64.6 | 79.5 | 60.7 | 67.4 | 53.0 | 43.2 | 30.5 | 35.5 | 23.4 | 38.2 | 24.0 | 41.9 | 31.5 | 26.2 | 11.3 | 36.0 | 18.0 | 64.0 | 41.0 | 62.1 | 50.0 | 79.1 | 59.3 |
| 21 | 74.2 | 61.5 | 80.4 | 60.3 | 61.2 | 47.6 | 40.0 | 28.1 | 33.7 | 19.7 | 27.2 | 16.8 | 35.3 | 33.0 | 34.2 | 21.9 | 28.0 | 12.5 | 57.0 | 43.0 | 62.9 | 44.0 | 77.5 | 63.0 |
| 22 | 79.8 | 62.1 | 86.1 | 59.9 | 63.3 | 42.0 | 49.1 | 31.3 | 38.0 | 20.0 | 29.7 | 21.6 | 34.8 | 32.8 | 34.0 | 21.6 | 35.5 | 14.5 | 53.8 | 35.8 | 60.0 | 41.5 | 75.3 | 61.5 |
| 23 | 81.2 | 64.5 | 88.0 | 64.3 | 70.6 | 47.2 | 46.8 | 40.2 | 37.0 | 33.7 | 27.4 | 17.6 | 33.0 | − 7.5 | 37.5 | 28.0 | 52.0 | 30.7 | 58.0 | 38.9 | 64.9 | 44.4 | 76.1 | 58.2 |
| 24 | 84.4 | 59.9 | 76.8 | 69.3 | 75.0 | 57.7 | 42.1 | 32.3 | 42.0 | 33.0 | 27.0 | 22.5 | 8.1 | − 9.3 | 38.7 | 27.5 | 42.8 | 14.0 | 66.0 | 50.0 | 65.4 | 47.2 | 71.1 | 61.5 |
| 25 | 88.3 | 66.7 | 77.4 | 64.2 | 79.7 | 58.4 | 33.3 | 27.6 | 40.2 | 34.0 | 27.0 | 21.0 | 17.0 | 2.3 | 29.2 | 21.0 | 27.0 | 7.5 | 67.3 | 56.0 | 72.6 | 53.3 | 68.9 | 50.1 |
| 26 | 88.5 | 61.5 | 78.3 | 66.1 | 76.4 | 51.2 | 33.9 | 22.9 | 50.0 | 38.8 | 32.0 | 21.5 | 20.0 | 12.9 | 34.0 | 20.1 | 41.0 | 22.4 | 63.4 | 53.6 | 69.3 | 55.4 | 69.1 | 48 |
| 27 | 81.6 | 59.9 | 80.0 | 66.5 | 59.0 | 45.0 | 41.6 | 24.2 | 52.2 | 41.3 | 34.0 | 23.8 | 31.4 | 19.0 | 42.7 | 26.7 | 41.0 | 32.3 | 73.0 | 54.2 | 65.9 | 52.0 | 81.2 | 55.7 |
| 28 | 78.2 | 68.4 | 83.6 | 69.5 | 70.1 | 50.6 | 43.4 | 25.5 | 44.6 | 37.0 | 36.3 | 21.8 | 31.2 | 0.1 | 37.2 | 13.7 | 38.0 | 33.0 | 60.4 | 53.6 | 65.5 | 54.9 | 81.0 | 66.2 |
| 29 | 84.8 | 68.6 | 78.0 | 65.0 | 62.2 | 48.5 | 63.3 | 40.1 | 42.9 | 29.3 | 33.0 | 21.0 | 11.0 | − 6.5 | ..... | ..... | 48.0 | 31.1 | 62.6 | 48.0 | 63.6 | 53.2 | 88.0 | 67.2 |
| 30 | 82.9 | 67.8 | 76.6 | 61.8 | 74.0 | 51.3 | 48.3 | 38.6 | 32.0 | 25.3 | 25.0 | 18.7 | 12.2 | − 3.1 | ..... | ..... | 52.0 | 31.0 | 62.1 | 47.1 | 64.1 | 51.1 | 90.0 | 74.6 |
| 31 | 76.0 | 58.2 | 75.0 | 58.1 | ..... | ..... | 41.0 | 35.9 | ..... | ..... | 22.0 | 11.0 | 11.0 | − 8.9 | ..... | ..... | 45.0 | 30.6 | ..... | ..... | 75.0 | 53.7 | ..... | ..... |
| Range | 33°.5 | | 32° 1 | | 42°.3 | | 56°.4 | | 33°.8 | | 36°.8 | | 59°.7 | | 47°.0 | | 51°.9 | | 41°.7 | | 40°.8 | | 50° | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, MORGANTOWN, W. VA.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 87 | 65 | 85 | 67 | 71 | 62 | 81 | 56 | 58 | 38 | 29 | 18 | 34 | 28. | 34 | 26 | 62 | 31 | 49 | 39 | 78 | 49 | 76 | 49 |
| 2 | 82 | 64 | 83 | 68 | 68 | 57 | 79 | 50 | 60 | 41 | 31 | 23 | 36 | 20 | 34 | 26 | 61 | 40 | 57 | 39 | 81 | 54 | 81 | 58 |
| 3 | 84 | 64 | 85 | 65 | 64 | 54 | 79 | 53 | 47 | 38 | 43 | 16 | 31 | 10. 5 | 37 | 26 | 53 | 43 | 61 | 32 | 82 | 60 | 87 | 60 |
| 4 | 77 | 67 | 75 | 56 | 73 | 53 | 67 | 52 | 55 | 34 | 52 | 26 | 33 | 21 | 38 | 21 | 44 | 31 | 60 | 37 | 66 | 52 | 82 | 65 |
| 5 | 84 | 63 | 79 | 55 | 73 | 57 | 55 | 47 | 58 | 41 | 60 | 40 | 30 | 15 | 39 | 23 | 51 | 31 | 58 | 35 | 63 | 50 | 65 | 52 |
| 6 | 77 | 66 | 85 | 60 | 71 | 61 | 60 | 38 | 41 | 30 | 40 | 31 | 21 | 13 | 50 | 24 | 65 | 36 | 53 | 42 | 69 | 47 | 68 | 41 |
| 7 | 84 | 59 | 86 | 65 | 66 | 59 | 66 | 42 | 55 | 27 | 36 | 28 | 15 | 1 | 62 | 26 | 66 | 48 | 54 | 39 | 79 | 52 | 78 | 42 |
| 8 | 85 | 61 | 84 | 67 | 68 | 57 | 61 | 51 | 64 | 38 | 40 | 28 | 29 | — 3 | 51 | 42 | 68 | 40 | 67 | 34 | 75 | 62 | 71 | 58 |
| 9 | 82 | 71 | 85 | 66 | 77 | 54 | 64 | 52 | 57 | 36 | 35 | 27 | 46 | 20 | 54 | 44 | 75 | 44 | 70 | 58 | 68 | 56 | 67 | 51 |
| 10 | 83 | 67 | 78 | 63 | 77 | 59 | 64 | 46 | 38 | 31 | 48 | 23 | 42 | 35 | 46 | 27 | 73 | 44 | 75 | 59 | 59 | 44 | 58 | 51 |
| 11 | 76 | 63 | 82 | 59 | 78 | 62 | 56 | 47 | 43 | 29 | 53 | 41 | 37 | 34 | 32 | 24 | 73 | 55 | 63 | 49 | 51 | 39 | 62 | 50 |
| 12 | 77 | 54 | 82 | 66 | 82 | 61 | 56 | 43 | 48 | 30 | 57 | 32 | 40 | 33 | 37 | 21 | 63 | 48 | 64 | 45 | 49 | 39 | 69 | 45 |
| 13 | 80 | 57 | 77 | 66 | 81 | 63 | 66 | 42 | 55 | 29 | 57 | 40 | 43 | 28 | 48 | 34 | 61 | 50 | 65 | 50 | 53 | 38 | 71 | 45 |
| 14 | 85 | 60 | 79 | 65 | 81 | 62 | 75 | 46 | 64 | 31 | 46 | 34 | 43 | 36 | 42 | 36 | 53 | 42 | 66 | 46 | 45 | 41 | 81 | 49 |
| 15 | 90 | 61 | 77 | 62 | 82 | 64 | 75 | 49 | 61 | 42 | 56 | 31 | 37 | 32 | 42 | 35 | 49 | 40 | 58 | 50 | 52 | 40 | 83 | 57 |
| 16 | 89 | 67 | 73 | 62 | 79 | 66 | 75 | 52 | 58 | 46 | 59 | 48 | 36 | 28 | 47 | 39 | 57 | 34 | 59 | 49 | 61 | 36 | 79 | 60 |
| 17 | 82 | 69 | 72 | 61 | 72 | 58 | 75 | 54 | 63 | 41 | 56 | 52 | 41 | 30 | 48 | 37 | 48 | 42 | 66 | 47 | 57 | 48 | 75 | 63 |
| 18 | 83 | 62 | 80 | 59 | 63 | 53 | 77 | 52 | 54 | 32 | 59 | 45 | 50 | 35 | 38 | 27 | 49 | 38 | 77 | 45 | 70 | 42 | 73 | 58 |
| 19 | 80 | 66 | 82 | 58 | 68 | 50 | 67 | 55 | 41 | 29 | 63 | 44 | 53 | 29 | 43 | 22 | 54 | 33 | 75 | 59 | 82 | 53 | 76 | 51 |
| 20 | 78 | 62 | 83 | 59 | 71 | 49 | 74 | 60 | 56 | 32 | 63 | 45 | 54 | 39 | 56 | 35 | 51 | 40 | 76 | 63 | 82 | 63 | 82 | 51 |
| 21 | 78 | 60 | 85 | 61 | 65 | 46 | 62 | 52 | 46 | 40 | 60 | 42 | 48 | 41 | 64 | 44 | 49 | 28 | 74 | 55 | 74 | 58 | 73 | 62 |
| 22 | 82 | 63 | 86 | 60 | 70 | 45 | 54 | 39 | 49 | 40 | 55 | 36 | 45 | 36 | 59 | 50 | 53 | 34 | 84 | 49 | 66 | 50 | 63 | 54 |
| 23 | 83 | 68 | 78 | 62 | 74 | 48 | 61 | 42 | 55 | 48 | 63 | 38 | 38 | 12 | 50 | 39 | 64 | 32 | 89 | 60 | 78 | 48 | 66 | 53 |
| 24 | 85 | 70 | 81 | 67 | 77 | 52 | 66 | 43 | 64 | 53 | 56 | 41 | 46 | 14 | 41 | 35 | 52 | 19 | 78 | 58 | 81 | 60 | 75 | 58 |
| 25 | 86 | 71 | 80 | 64 | 80 | 51 | 66 | 49 | 59 | 51 | 59 | 38 | 52 | 35 | 38 | 28 | 30 | 18 | 68 | 50 | 76 | 56 | 83 | 53 |
| 26 | 90 | 71 | 82 | 61 | 81 | 57 | 60 | 49 | 56 | 46 | 57 | 48 | 46 | 36 | 33 | 26 | 47 | 21 | 64 | 52 | 75 | 62 | 86 | 57 |
| 27 | 90 | 72 | 87 | 61 | 80 | 58 | 65 | 44 | 51 | 42 | 53 | 48 | 48 | 31 | 46 | 22 | 70 | 42 | 65 | 49 | 74 | 54 | 87 | 63 |
| 28 | 90 | 71 | 88 | 63 | 81 | 60 | 70 | 46 | 43 | 38 | 53 | 46 | 45 | 19 | 53 | 26 | 62 | 41 | 60 | 52 | 73 | 52 | 90 | 63 |
| 29 | 86 | 74 | 87 | 64 | 78 | 61 | 67 | 55 | 39 | 26 | 50 | 40 | 26 | 15 | ..... | ..... | 50 | 38 | 67 | 52 | 76 | 51 | 00 | 67 |
| 30 | 84 | 68 | 83 | 70 | 83 | 58 | 60 | 46 | 26 | 13 | 45 | 31 | 38 | 21 | ..... | ..... | 55 | 33 | 69 | 47 | 73 | 53 | 89 | 67 |
| 31 | 88 | 64 | 84 | 63 | ..... | ..... | 57 | 45 | ..... | ..... | 36 | 25 | 32 | 26 | ..... | ..... | 51 | 41 | ..... | ..... | 71 | 45 | ..... | ..... |
| Range | 36° | | 33° | | 38° | | 43° | | 51° | | 47° | | 57° | | 43° | | 57° | | 57° | | 46° | | 49° | |
| Monthly means | 75°. 4 | | 72°. 3 | | 65°. 3 | | 57°. 6 | | 44°. 8 | | 43°. 9 | | 32°. 8 | | 38°. 2 | | 47°. 8 | | 57°. 9 | | 60°. 3 | | 66°. 8 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, MOUNT WASHINGTON, N. H.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 53 | 48 | 62 | 47 | 49 | 35 | 57 | 47 | 26 | 19 | 9 | − 7 | 12 | − 1 | 9 | 0 | 12 | − 2 | 27 | 16 | 40 | 33 | 55 | 34 |
| 2 | 48 | 40 | 60 | 45 | 45 | 32 | 57 | 47 | 36 | 20 | − 2 | − 4 | 11 | − 5 | 8 | 1 | 27 | 8 | 26 | 19 | 40 | 34 | 61 | 42 |
| 3 | 58 | 37 | 58 | 46 | 38 | 27 | 51 | 43 | 25 | 12 | 13 | − 2 | 5 | −19 | 11 | 4 | 35 | 27 | 30 | 21 | 54 | 39 | 55 | 46 |
| 4 | 54 | 44 | 48 | 37 | 40 | 28 | 46 | 39 | 13 | 6 | 27 | 9 | 10 | − 5 | 15 | 5 | 30 | − 3 | 32 | 25 | 50 | 45 | 59 | 46 |
| 5 | 55 | 44 | 41 | 34 | 49 | 39 | 45 | 18 | 30 | 10 | 39 | 25 | 16 | −19 | 16 | 9 | 12 | − 8 | 27 | 21 | 45 | 29 | 48 | 27 |
| 6 | 50 | 40 | 43 | 35 | 45 | 38 | 22 | 16 | 29 | − 1 | 39 | 8 | −13 | −20 | 20 | 8 | 30 | 12 | 28 | 21 | 30 | 26 | 27 | 20 |
| 7 | 53 | 38 | 50 | 40 | 45 | 33 | 32 | 20 | 21 | 4 | 8 | − 9 | −16 | −30 | 31 | 19 | 33 | 24 | 24 | 17 | 42 | 25 | 33 | 15 |
| 8 | 52 | 45 | 53 | 45 | 46 | 34 | 38 | 27 | 35 | 20 | 11 | 4 | − 4 | −26 | 31 | 25 | 25 | 19 | 30 | 23 | 58 | 36 | 37 | 31 |
| 9 | 55 | 48 | 56 | 47 | 53 | 37 | 42 | 27 | 43 | 20 | 11 | − 5 | 14 | − 4 | 30 | 20 | 28 | 19 | 35 | 27 | 49 | 36 | 38 | 29 |
| 10 | 50 | 45 | 54 | 46 | 53 | 41 | 40 | 33 | 25 | 15 | 11 | − 5 | 29 | 14 | 25 | 11 | 32 | 22 | 37 | 33 | 38 | 26 | 33 | 28 |
| 11 | 50 | 42 | 50 | 43 | 54 | 43 | 39 | 33 | 22 | 14 | 19 | 9 | 24 | 15 | 11 | −15 | 28 | 23 | 38 | 34 | 26 | 19 | 37 | 29 |
| 12 | 51 | 40 | 54 | 43 | 58 | 47 | 35 | 26 | 20 | 6 | 15 | 8 | 19 | 9 | 0 | −17 | 35 | 27 | 34 | 22 | 19 | 14 | 37 | 31 |
| 13 | 43 | 34 | 54 | 47 | 53 | 50 | 33 | 25 | 16 | 4 | 23 | 11 | 23 | 15 | 5 | − 3 | 31 | 19 | 24 | 20 | 20 | 13 | 41 | 33 |
| 14 | 46 | 34 | 59 | 47 | 53 | 47 | 38 | 28 | 31 | 14 | 13 | −13 | 27 | 19 | 10 | − 2 | 19 | 14 | 24 | 19 | 19 | 13 | 49 | 36 |
| 15 | 54 | 40 | 54 | 48 | 60 | 49 | 40 | 33 | 37 | 28 | 24 | 5 | 19 | − 8 | 12 | 7 | 17 | 12 | 29 | 23 | 27 | 15 | 51 | 42 |
| 16 | 63 | 48 | 55 | 46 | 58 | 50 | 41 | 19 | 37 | 25 | 23 | 10 | − 8 | −28 | 11 | 5 | 24 | 12 | 32 | 29 | 28 | 20 | 55 | 45 |
| 17 | 59 | 53 | 53 | 44 | 59 | 49 | 30 | 18 | 31 | 23 | 25 | 4 | − 5 | −18 | 12 | 4 | 30 | 17 | 32 | 27 | 33 | 23 | 47 | 41 |
| 18 | 59 | 47 | 52 | 44 | 51 | 30 | 40 | 22 | 31 | 9 | 16 | 3 | 13 | − 6 | 10 | −10 | 18 | 14 | 33 | 26 | 36 | 28 | 45 | 37 |
| 19 | 53 | 51 | 55 | 45 | 34 | 28 | 40 | 35 | 9 | 0 | 32 | 14 | 22 | 11 | 0 | −11 | 18 | 15 | 31 | 26 | 42 | 30 | 48 | 34 |
| 20 | 55 | 49 | 58 | 44 | 43 | 32 | 36 | 22 | 13 | 3 | 28 | 10 | 28 | 19 | 16 | 0 | 15 | − 6 | 36 | 25 | 34 | 29 | 58 | 42 |
| 21 | 54 | 48 | 56 | 45 | 41 | 22 | 36 | 23 | 22 | 12 | 22 | 12 | 33 | 26 | 24 | 16 | − 4 | −13 | 36 | 24 | 36 | 31 | 64 | 45 |
| 22 | 55 | 44 | 60 | 45 | 28 | 20 | 33 | 13 | 32 | 20 | 25 | 19 | 28 | 16 | 19 | 10 | 5 | − 8 | 24 | 15 | 35 | 20 | 46 | 40 |
| 23 | 51 | 43 | 63 | 49 | 43 | 20 | 32 | 12 | 36 | 32 | 25 | 19 | 16 | −28 | 33 | 13 | 24 | 5 | 34 | 22 | 34 | 22 | 52 | 44 |
| 24 | 48 | 38 | 60 | 50 | 52 | 39 | 34 | 30 | 35 | 27 | 24 | 17 | 6 | −35 | 29 | 11 | 30 | 24 | 47 | 34 | 44 | 27 | 45 | 41 |
| 25 | 53 | 44 | 60 | 48 | 54 | 44 | 32 | 20 | 31 | 21 | 24 | 17 | 21 | 6 | 11 | 0 | 24 | −18 | 44 | 38 | 44 | 37 | 44 | 32 |
| 26 | 55 | 48 | 59 | 47 | 50 | 41 | 21 | 10 | 36 | 26 | 28 | 23 | 27 | 20 | 12 | − 1 | 13 | − 5 | 41 | 39 | 44 | 36 | 45 | 24 |
| 27 | 63 | 49 | 52 | 46 | 46 | 33 | 23 | 17 | 38 | 29 | 25 | 22 | 20 | 6 | 23 | 9 | 26 | 12 | 41 | 38 | 37 | 34 | 57 | 42 |
| 28 | 59 | 51 | 55 | 48 | 48 | 41 | 33 | 17 | 29 | 15 | 27 | 22 | 23 | − 8 | 21 | 4 | 34 | 25 | 43 | 36 | 36 | 33 | 54 | 49 |
| 29 | 61 | 51 | 54 | 45 | 44 | 32 | 38 | 24 | 21 | 16 | 25 | 17 | − 8 | −23 | ..... | ..... | 34 | 15 | 45 | 35 | 35 | 32 | 64 | 51 |
| 30 | 55 | 51 | 47 | 38 | 49 | 36 | 25 | 17 | 17 | 4 | 26 | 16 | 11 | −28 | ..... | ..... | 20 | 12 | 36 | 33 | 40 | 31 | 71 | 54 |
| 31 | 60 | 49 | 50 | 37 | ..... | ..... | 30 | 16 | ..... | ..... | 16 | 1 | 15 | 9 | ..... | ..... | 30 | 19 | ..... | ..... | 42 | 33 | ..... | ..... |
| Range | 29° | | 29° | | 40° | | 47° | | 44° | | 52° | | 68° | | 50° | | 53° | | 32° | | 45° | | 56° | |
| Monthly means | 49°.2 | | 48°.9 | | 42°.4 | | 31°.6 | | 21°.4 | | 14°.4 | | 5°.7 | | 10°.2 | | 17°.5 | | 30°.0 | | 32°.8 | | 42°.7 | |

*Maximum, minimum, and mean temperature—Continued.*

*STATION, NASHVILLE, TENN.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 96 | 77 | 91 | 72 | 83 | 68 | 83 | 60 | 59 | 45 | 35 | 17 | 48 | 35 | 43 | 33 | 67 | 34 | 59 | 44 | 81 | 52 | 85 | 60 |
| 2 | 96 | 74 | 90 | 73 | 76 | 60 | 83 | 60 | 64 | 44 | 37 | 17.5 | 38 | 32 | 40 | 31 | 70 | 34 | 64 | 39 | 82 | 60 | 91 | 61 |
| 3 | 95 | 76 | 90 | 71 | 76 | 54 | 75 | 64 | 54 | 35.5 | 50 | 20 | 41 | 27 | 41 | 32 | 51 | 40 | 70 | 49 | 73 | 63 | 94 | 71 |
| 4 | 98 | 73 | 90 | 70 | 79 | 61 | 69 | 52 | 64 | 33.5 | 59 | 40 | 38 | 24 | 40 | 31 | 47 | 36 | 60 | 46 | 72 | 55 | 83 | 68 |
| 5 | 96 | 76 | 87 | 63 | 71 | 61 | 63 | 44 | 60 | 41 | 59 | 38 | 25 | 10 | 49 | 29.5 | 61 | 31 | 66 | 44 | 72 | 50 | 77 | 63 |
| 6 | 92 | 76 | 89 | 62 | 74 | 66 | 69 | 41.5 | 44 | 29 | 40 | 31 | 26 | 11 | 56 | 29 | 63 | 49 | 68 | 49 | 82 | 49 | 76 | 61 |
| 7 | 91 | 70 | 88 | 70 | 74 | 64 | 68 | 46 | 62 | 30.5 | 50 | 23 | 20 | 7 | 54 | 30 | 70 | 57 | 68 | 41 | 82 | 64 | 82 | 58 |
| 8 | 92 | 68 | 81 | 70 | 78 | 57 | 67 | 53 | 61 | 49 | 50 | 31 | 36 | 9 | 54 | 46 | 74 | 52 | 73 | 54 | 74 | 64 | 79 | 67 |
| 9 | 93 | 70 | 87 | 67 | 77 | 58 | 71 | 43 | 50 | 42 | 44 | 23 | 45 | 30 | 57 | 41 | 70 | 56 | 79 | 56 | 75 | 54 | 79 | 57 |
| 10 | 88 | 69 | 86 | 65 | 82 | 65 | 67 | 57 | 42 | 33 | 57 | 27 | 42 | 35 | 52 | 31 | 68 | 53 | 72 | 53 | 69 | 55 | 71 | 56 |
| 11 | 89 | 67 | 89 | 64 | 77 | 62 | 63.5 | 45 | 48 | 24 | 61 | 34 | 43 | 34.5 | 41 | 27 | 73 | 49 | 69 | 50 | 72 | 46 | 78 | 52 |
| 12 | 87 | 67 | 91 | 68 | 83 | 65 | 68 | 39.5 | 57 | 26 | 64 | 33.5 | 52 | 28 | 50 | 25 | 71 | 51 | 79 | 54 | 76 | 50 | 76 | 52 |
| 13 | 88 | 63 | 81 | 67 | 84 | 60 | 74 | 43.5 | 61 | 30 | 59 | 38 | 52 | 41 | 53 | 34 | 69 | 52 | 82 | 57 | 61 | 48 | 75 | 62 |
| 14 | 92 | 66 | 83 | 67 | 84 | 60 | 76 | 51 | 69 | 37 | 55.5 | 35.5 | 42 | 36 | 49 | 38 | 68 | 49 | 71.5 | 56 | 53 | 45 | 73 | 65 |
| 15 | 93 | 69 | 81 | 61 | 86 | 61 | 77 | 51 | 66 | 53 | 63 | 31 | 40 | 34 | 52 | 43 | 63 | 40 | 77 | 57 | 65 | 41 | 78 | 65 |
| 16 | 83 | 71 | 84 | 61 | 88 | 69 | 78 | 53 | 64 | 40 | 66 | 45.5 | 41 | 31 | 55 | 34 | 72 | 41 | 81 | 57 | 67 | 51 | 85 | 68 |
| 17 | 89 | 71 | 83 | 60 | 77 | 62 | 78 | 52.5 | 66 | 42 | 69 | 52 | 50 | 25 | 58 | 34 | 58 | 42 | 83 | 57 | 80 | 59 | 77 | 70 |
| 18 | 81 | 71 | 86 | 60 | 66 | 53 | 73 | 59.5 | 58 | 38 | 69 | 48 | 54 | 27 | 52 | 36 | 57 | 38 | 73 | 62 | 87 | 60 | 79 | 68 |
| 19 | 83 | 69 | 88 | 61 | 64 | 53 | 73 | 64 | 59 | 37 | 67 | 42 | 55 | 36 | 58 | 36 | 64 | 35.5 | 70 | 63 | 79 | 65 | 83 | 65 |
| 20 | 77 | 62 | 89 | 62 | 76 | 57 | 73 | 57 | 64 | 47 | 68 | 41 | 55 | 46 | 55 | 49 | 69 | 42 | 72 | 63 | 85 | 65 | 85 | 63 |
| 21 | 80 | 60 | 89 | 62 | 77 | 52 | 60 | 52 | 62 | 51.5 | 64 | 43 | 50 | 41 | 67 | 53 | 75 | 45 | 81 | 57 | 85 | 67 | 80 | 68 |
| 22 | 84 | 63 | 75 | 66 | 80 | 52 | 59 | 46.5 | 56 | 46.5 | 66 | 56 | 54 | 41 | 60 | 46 | 75 | 50 | 81 | 66 | 80 | 64 | 78 | 59 |
| 23 | 80 | 69 | 76 | 66 | 77 | 59 | 66 | 38 | 52 | 44.5 | 64 | 53.5 | 51 | 31 | 52 | 41 | 78 | 47.5 | 73 | 62 | 90 | 66 | 81 | 56 |
| 24 | 84 | 69 | 81 | 61 | 81 | 60 | 68 | 40 | 58 | 43 | 61 | 54 | 55 | 26 | 53 | 36 | 68 | 50 | 70 | 58 | 92 | 73 | 83 | 57 |
| 25 | 90 | 69 | 83 | 61 | 81 | 58 | 68 | 48 | 53 | 39 | 58 | 53 | 52 | 40 | 52 | 31 | 54 | 35 | 75 | 53 | 88 | 70 | 86 | 60 |
| 26 | 89 | 69 | 87 | 63 | 82 | 59 | 63 | 48 | 47 | 40 | 60 | 51.5 | 52 | 36 | 46 | 31 | 70 | 35 | 69 | 53 | 78 | 67 | 89 | 65 |
| 27 | 92 | 72 | 89 | 64 | 79 | 64 | 70 | 50 | 53 | 36 | 56 | 49 | 59 | 42 | 54 | 32 | 72 | 57 | 59 | 52 | 79.5 | 59 | 89 | 68 |
| 28 | 94 | 74 | 91 | 69 | 83 | 60 | 72 | 48 | 44 | 36 | 56 | 48 | 55 | 39.5 | 58 | 32 | 65 | 46 | 65 | 43 | 80 | 57 | 92.5 | 69 |
| 29 | 94 | 74 | 92 | 71 | 86 | 60 | 74 | 55 | 36 | 24 | 50 | 46 | 60 | 38 | ..... | ..... | 52 | 42 | 71 | 48 | 86 | 58 | 82 | 70 |
| 30 | 90 | 71 | 93 | 70 | 86 | 58 | 66 | 55 | 31 | 17 | 47 | 40 | 48 | 37 | ..... | ..... | 75 | 42 | 76 | 50 | 86 | 64 | 86 | 70 |
| 31 | 91 | 72 | 91 | 70 | ..... | ..... | 66 | 51 | ..... | ..... | 42 | 35.5 | 43 | 34 | ..... | ..... | 63 | 44 | ..... | ..... | 82 | 63 | ..... | ..... |
| Range | 36° | | 33° | | 36° | | 45° | | 52° | | 52° | | 53° | | 42° | | 47° | | 44° | | 51° | | 42° | |
| Monthly means | 81°.1 | | 77°.4 | | 70°.6 | | 60°.9 | | 47°.3 | | 48°.2 | | 38°.8 | | 43°.4 | | 56°.2 | | 63°.3 | | 69°.2 | | 73°.4 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, NEW HAVEN, CONN.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 78 | 67 | 75 | 66 | 79 | 66 | 72 | 50 | 54 | 39 | 40 | 26 | 33 | 18 | 29 | 21 | 45 | 29 | 53 | 40 | 60 | 50 | 67 | 52 |
| 2 | 78 | 66 | 78 | 63 | 74 | 60 | 73 | 55 | 62 | 42 | 32 | 15 | 43 | 22 | 33 | 15 | 50 | 32 | 57 | 41 | 73 | 51 | 72 | 52 |
| 3 | 78 | 61 | 82 | 63 | 70 | 55 | 71 | 59 | 55 | 44 | 44 | 19 | 28 | 6 | 31 | 8 | 55 | 44 | 55 | 37 | 74 | 53 | 71 | 59 |
| 4 | 80 | 64 | 78 | 65 | 76 | 55 | 71 | 53 | 50 | 37 | 45 | 25 | 36 | 9 | 37 | 10 | 48 | 25 | 53 | 37 | 71 | 58 | 70 | 58 |
| 5 | 81 | 60 | 80 | 60 | 77 | 60 | 62 | 48 | 60 | 38 | 60 | 38 | 42 | 19 | 41 | 22 | 45 | 25 | 47 | 40 | 64 | 53 | 77 | 51 |
| 6 | 77 | 63 | 82 | 59 | 72 | 60 | 59 | 40 | 60 | 33 | 59 | 38 | 32 | 14 | 46 | 21 | 53 | 36 | 56 | 40 | 67 | 48 | 66 | 47 |
| 7 | 77 | 60 | 80 | 66 | 64 | 52 | 60 | 39 | 53 | 30 | 44 | 32 | 28 | 4 | 52 | 29 | 62 | 40 | 53 | 42 | 65 | 48 | 65 | 45 |
| 8 | 79 | 63 | 84 | 67 | 68 | 52 | 58 | 38 | 60 | 35 | 52 | 33 | 33 | — 2 | 51 | 30 | 63 | 41 | 59 | 42 | 69 | 49 | 68 | 50 |
| 9 | 82 | 68 | 75 | 68 | 73 | 53 | 69 | 50 | 70 | 53 | 42 | 29 | 42 | 20 | 47 | 39 | 55 | 40 | 58 | 38 | 59 | 51 | 68 | 55 |
| 10 | 86 | 70 | 81 | 65 | 74 | 52 | 65 | 50 | 55 | 37 | 47 | 23 | 42 | 31 | 41 | 28 | 65 | 36 | 50 | 41 | 67 | 49 | 58 | 48 |
| 11 | 80 | 64 | 82 | 61 | 73 | 56.5 | 65 | 54 | 50 | 34 | 52 | 37 | 48 | 36 | 33 | 17 | 53 | 36 | 58 | 48 | 60 | 43 | 62 | 48 |
| 12 | 80 | 63 | 82 | 62 | 78 | 60 | 63 | 47 | 53 | 32 | 51 | 33 | 48 | 36 | 36 | 17 | 38 | 32 | 64 | 50 | 57 | 41 | 70 | 47 |
| 13 | 81 | 61 | 80 | 68 | 79 | 63 | 63 | 45 | 50 | 34 | 56 | 33 | 44 | 32 | 45 | 29 | 53 | 33 | 59 | 48 | 53 | 39 | 72 | 52 |
| 14 | 75 | 59 | 81 | 68 | 81 | 64 | 65 | 41 | 63 | 31 | 49 | 28 | 50 | 34 | 36 | 19 | 54 | 38 | 59 | 44 | 58 | 36 | 72 | 55 |
| 15 | 80 | 59 | 78 | 69 | 79 | 65 | 69 | 46 | 62 | 39 | 53 | 31 | 46 | 36 | 35 | 15 | 51 | 35 | 61 | 40 | 53 | 43 | 73 | 55 |
| 16 | 85 | 66 | 80 | 67 | 80 | 70 | 75 | 52 | 65 | 49 | 58 | 39 | 36 | 11 | 45 | 29 | 48 | 32 | 56 | 44 | 61 | 40 | 78 | 57 |
| 17 | 83 | 69 | 82 | 63 | 80 | 71 | 68 | 41 | 58 | 42 | 53 | 33 | 37 | 14 | 45 | 31 | 43 | 33 | 54 | 39 | 64 | 43 | 73 | 63 |
| 18 | 83 | 65 | 82 | 65 | 75 | 55 | 63 | 48 | 59 | 38 | 43 | 25 | 38 | 21 | 38 | 15 | 47 | 35 | 60 | 37 | 68 | 46 | 68 | 58 |
| 19 | 80 | 70 | 83 | 63 | 67 | 50 | 70 | 57 | 46 | 28 | 50 | 29 | 44 | 23 | 36 | 11 | 56 | 39 | 68 | 46 | 69 | 47 | 75 | 53 |
| 20 | 81 | 70 | 82 | 64 | 69 | 47 | 65 | 44 | 40 | 25 | 56 | 33 | 47 | 35 | 45 | 21 | 45 | 35 | 64 | 50 | 58 | 51 | 78 | 58 |
| 21 | 80 | 70 | 81 | 66 | 66 | 48 | 55 | 40 | 38 | 23 | 39 | 25 | 49 | 42 | 45 | 34 | 41 | 27 | 73 | 49 | 65 | 48 | 77 | 58 |
| 22 | 83 | 69 | 85 | 62 | 65 | 44 | 50 | 37 | 47 | 30 | 48 | 37 | 49 | 41 | 44 | 34 | 46 | 30 | 66 | 45 | 62 | 51 | 67 | 61 |
| 23 | 82 | 69 | 85 | 66 | 70 | 42 | 60 | 36 | 52 | 37 | 44 | 31 | 47 | 10 | 46 | 35 | 57 | 35 | 58 | 48 | 70 | 45 | 73 | 62 |
| 24 | 84 | 66 | 82 | 67 | 73 | 50 | 66 | 48 | 56 | 39 | 45 | 25 | 37 | 15 | 47 | 34 | 53 | 25 | 62 | 47 | 67 | 46 | 77 | 60 |
| 25 | 87 | 65 | 76 | 70 | 76 | 55 | 66 | 53 | 57 | 44 | 44 | 28 | 46 | 30 | 45 | 30 | 40 | 17 | 65 | 55 | 74 | 51 | 77 | 63 |
| 26 | 90 | 70 | 80 | 70 | 77 | 60 | 56 | 35 | 59 | 45 | 48 | 28 | 52 | 36 | 41 | 28 | 50 | 31 | 58 | 53 | 80 | 62 | 79 | 60 |
| 27 | 80 | 67 | 82 | 69 | 76 | 62 | 48 | 35 | 57 | 50 | 46 | 29 | 47 | 35 | 54 | 33 | 55 | 38 | 61 | 53 | 75 | 56 | 83 | 63 |
| 28 | 77 | 66 | 85 | 66 | 70 | 63 | 54 | 35 | 56 | 44 | 47 | 31 | 44 | 15 | 55 | 35 | 55 | 44 | 61 | 53 | 76 | 56 | 83 | 65 |
| 29 | 80 | 69 | 86 | 70 | 70 | 58 | 68 | 52 | 47 | 35 | 45 | 28 | 27 | 12 | ..... | ..... | 54 | 39 | 67 | 51 | 71 | 54 | 83 | 67 |
| 30 | 79 | 68 | 80 | 68 | 69 | 50 | 61 | 46 | 40 | 30 | 38 | 28 | 27 | 13 | ..... | ..... | 55 | 34 | 58 | 52 | 61 | 52 | 86 | 67 |
| 31 | 80 | 69 | 80 | 60 | ..... | ..... | 56 | 37 | ..... | ..... | 33 | 21 | 32 | 15 | ..... | ..... | 55 | 43 | ..... | ..... | 56 | 52 | ..... | ..... |
| Range | 31° | | 27° | | 39° | | 40° | | 47° | | 45° | | 54° | | 47° | | 48° | | 36° | | 44° | | 41° | |
| Monthly means | 74°.0 | | 73°.9 | | 65°.6 | | 55°.5 | | 46°.0 | | 39°.2 | | 31°.9 | | 34°.2 | | 43°.5 | | 52°.4 | | 58°.7 | | 66°.1 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, NEW LONDON, CONN.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 72 | 61 | 75 | 66 | 79 | 68 | 71 | 50 | 55 | 39 | 40 | 27 | 36 | 20 | 35 | 21 | 45 | 31 | 53 | 41 | 61 | 49 | 65 | 53 |
| 2 | 78 | 63 | 76 | 62 | 74 | 64 | 75 | 58 | 61 | 43 | 34 | 12 | 38 | 23 | 30 | 18 | 46 | 29 | 56 | 40 | 73 | 49 | 70 | 51 |
| 3 | 75 | 59 | 82 | 65 | 70 | 56 | 64 | 60 | 54 | 42 | 40 | 21 | 31 | 12 | 31 | 7 | 50 | 43 | 57 | 38 | 73 | 53 | 67 | 56 |
| 4 | 77 | 61 | 80 | 66 | 74 | 55 | 68 | 59 | 49 | 36 | 47 | 30 | 42 | 10 | 37 | 12 | 48 | 27 | 51 | 41 | 70 | 57 | 65 | 53 |
| 5 | 79 | 56 | 79 | 59 | 76 | 64 | 67 | 45 | 58 | 36 | 58 | 43 | 41 | 19 | 40 | 20 | 43 | 25 | 48 | 37 | 63 | 51 | 77 | 52 |
| 6 | 72 | 62 | 80 | 59 | 74 | 60 | 60 | 41 | 59 | 32 | 60 | 38 | 27 | 15 | 43 | 24 | 49 | 35 | 52 | 39 | 68 | 49 | 67 | 48 |
| 7 | 74 | 59 | 78 | 66 | 62 | 56 | 60 | 41 | 49 | 29 | 43 | 27 | 22 | 10 | 47 | 30 | 59 | 39 | 53 | 41 | 65 | 49 | 65 | 47 |
| 8 | 75 | 61 | 80 | 65 | 68 | 55 | 58 | 43 | 58 | 36 | 46 | 34 | 29 | 3 | 50 | 31 | 64 | 39 | 61 | 42 | 71 | 51 | 61 | 51 |
| 9 | 77 | 64 | 75 | 67 | 73 | 56 | 64 | 54 | 63 | 56 | 40 | 27 | 39 | 20 | 47 | 38 | 53 | 38 | 50 | 41 | 59 | 52 | 68 | 56 |
| 10 | 80 | 65 | 79 | 65 | 73 | 54 | 66 | 51 | 59 | 40 | 42 | 25 | 47 | 35 | 40 | 30 | 63 | 35 | 47 | 41 | 67 | 51 | 58 | 50 |
| 11 | 76 | 65 | 80 | 62 | 75 | 57 | 60 | 49 | 45 | 35 | 48 | 35 | 47 | 36 | 35 | 18 | 52 | 32 | 52 | 45 | 57 | 44 | 60 | 49 |
| 12 | 80 | 64 | 80 | 64 | 76 | 61 | 60 | 47 | 50 | 35 | 49 | 35 | 48 | 36 | 33 | 16 | 39 | 32 | 62 | 46 | 55 | 41 | 67 | 49 |
| 13 | 81 | 60 | 75 | 69 | 80 | 64 | 62 | 46 | 47 | 34 | 52 | 33 | 45 | 31 | 41 | 28 | 49 | 35 | 59 | 46 | 55 | 42 | 71 | 50 |
| 14 | 75 | 60 | 80 | (*) | 81 | 65 | 61 | 42 | 54 | 31 | 47 | 29 | 49 | 37 | 39 | 25 | 52 | 37 | 61 | 42 | 57 | 40 | 70 | 51 |
| 15 | 78 | 57 | 74 | ..... | 71 | 65 | 66 | 49 | 62 | 45 | 49 | 30 | 44 | 34 | 35 | 19 | 52 | 35 | 60 | 42 | 51 | 43 | 72 | 51 |
| 16 | 75 | 64 | 80 | ..... | 76 | 67 | 74 | 53 | 61 | 52 | 59 | 39 | 38 | 17 | 43 | 28 | 45 | 33 | 53 | 42 | 61 | 43 | 76 | 55 |
| 17 | 73 | 65 | 81 | ..... | 76 | 69 | 62 | 42 | 56 | 43 | 51 | 32 | 33 | 15 | 40 | 30 | 44 | 36 | 49 | 39 | 61 | 45 | 71 | 59 |
| 18 | 76 | 64 | 81 | ..... | 72 | 58 | 63 | 48 | 54 | 37 | 45 | 29 | 39 | 24 | 41 | 18 | 45 | 33 | 62 | 39 | 70 | 48 | 65 | 59 |
| 19 | 77 | 67 | 83 | 64 | 65 | 52 | 69 | 56 | 43 | 29 | 48 | 30 | 43 | 25 | 32 | 13 | 54 | 34 | 66 | 43 | 64 | 48 | 77 | 54 |
| 20 | 78 | 67 | 83 | 67 | 68 | 49 | 64 | 46 | 40 | 24 | 57 | 36 | 47 | 34 | 41 | 22 | 47 | 33 | 60 | 48 | 53 | 48 | 80 | 56 |
| 21 | 74 | 67 | 81 | 67 | 67 | 51 | 48 | 43 | 39 | 25 | 41 | 29 | 48 | 43 | 44 | 34 | 40 | 26 | 72 | 49 | 64 | 46 | 73 | 58 |
| 22 | 80 | 68 | 79 | 65 | 65 | 42 | 46 | 39 | 45 | 35 | 48 | 35 | 47 | 40 | 45 | 36 | 45 | 31 | 63 | 45 | 65 | 50 | 66 | 60 |
| 23 | 79 | 68 | 84 | 67 | 70 | 45 | 59 | 36 | 51 | 37 | 45 | 30 | 45 | 8 | 44 | 37 | 55 | 33 | 55 | 46 | 70 | 45 | 67 | 56 |
| 24 | 81 | 65 | 83 | 67 | 74 | 55 | 65 | 50 | 50 | 39 | 46 | 26 | 33 | 8 | 45 | 33 | 50 | 24 | 55 | 45 | 68 | 53 | 74 | 59 |
| 25 | 87 | 64 | 79 | 69 | 75 | 59 | 66 | 49 | 54 | 44 | 44 | 27 | 46 | 32 | 40 | 30 | 33 | 15 | 57 | 50 | 70 | 53 | 77 | 61 |
| 26 | 87 | 68 | 80 | 69 | 77 | 61 | 51 | 40 | 58 | 50 | 48 | 27 | 49 | 37 | 41 | 28 | 48 | 28 | 58 | 50 | 77 | 59 | 79 | 58 |
| 27 | 77 | 65 | 79 | 71 | 75 | 63 | 48 | 37 | 59 | 50 | 49 | 29 | 47 | 34 | 56 | 33 | 50 | 37 | 58 | 50 | 75 | 58 | 82 | 61 |
| 28 | 71 | 65 | 85 | 67 | 66 | 62 | 54 | 36 | 54 | 47 | 49 | 29 | 44 | 19 | 54 | 34 | 53 | 42 | 57 | 52 | 74 | 56 | 85 | 65 |
| 29 | 74 | 66 | 87 | 71 | 69 | 57 | 64 | 51 | 49 | 37 | 45 | 27 | 30 | 12 | ..... | ..... | 51 | 40 | 64 | 47 | 73 | 54 | 86 | 68 |
| 30 | 74 | 66 | 83 | 67 | 68 | 51 | 62 | 44 | 41 | 28 | 41 | 32 | 27 | 13 | ..... | ..... | 58 | 37 | 59 | 51 | 61 | 53 | 86 | 64 |
| 31 | 78 | 69 | 79 | 62 | ..... | ..... | 56 | 36 | ..... | ..... | 37 | 23 | 34 | 19 | ..... | ..... | 50 | 41 | ..... | ..... | 66 | 52 | ..... | ..... |
| Range | 31° | | 28° | | 29° | | 39° | | 39° | | 48° | | 46° | | 49° | | 49° | | 35° | | 37° | | 39° | |
| Monthly means | 70°.4 | | 72°.4 | | 64°.7 | | 53°.9 | | 44°.9 | | 38°.4 | | 31°.7 | | 33°.7 | | 41°.6 | | 50°.1 | | 57°.8 | | 63°.7 | |

* Minimum thermometer broken.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, NEW ORLEANS, LA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 93 | 79 | 96.5 | 82 | 92 | 78 | 82 | 71 | 78 | 64 | 44 | 34 | 53 | 42 | 70 | 44 | 71 | 55 | 70 | 61 | 81 | 66 | 88 | 74 |
| 2 | 92 | 79 | 94 | 81 | 89 | 77 | 81 | 73.5 | 75 | 58 | 46 | 34 | 57 | 45 | 56 | 49 | 76 | 62 | 68 | 61 | 83 | 63 | 90 | 74 |
| 3 | 91 | 77 | 92 | 80 | 86 | 76 | 83 | 72 | 59 | 53 | 60 | 41 | 63 | 44 | 51 | 40 | 67 | 54 | 74 | 57 | 82 | 66 | 87 | 75 |
| 4 | 92 | 78 | 92 | 79 | 87 | 75 | 84 | 72 | 69 | 49 | 66 | 59 | 48 | 42 | 49 | 41 | 65 | 49 | 65 | 50 | 76 | 64 | 88 | 75 |
| 5 | 93 | 79 | 93.5 | 81 | 88 | 73 | 73 | 61 | 71 | 63 | 60 | 48 | 44 | 33 | 55 | 37 | 68 | 46 | 72 | 51 | 80 | 60 | 91 | 75 |
| 6 | 96 | 80 | 93 | 82 | 86 | 77.5 | 75 | 60 | 64 | 47 | 50 | 40 | 45 | 36 | 59 | 41 | 71 | 53 | 77 | 58 | 80 | 61 | 88 | 74 |
| 7 | 94 | 81 | 92 | 81 | 89 | 76 | 81 | 66 | 69 | 48 | 53 | 39 | 45 | 36 | 60 | 49 | 75 | 59 | 72 | 59 | 80 | 65 | 89 | 75 |
| 8 | 91 | 79 | 88 | 78 | 89 | 76 | 74 | 63 | 71 | 56 | 55 | 38 | 47 | 38 | 68 | 45 | 75 | 61 | 73 | 65 | 82 | 71 | 87 | 76 |
| 9 | 90 | 80 | 88 | 77 | 91 | 77 | 74 | 60 | 56 | 48 | 56 | 42 | 55 | 40 | 62 | 49 | 72 | 66 | 81 | 66 | 81 | 68 | 86 | 75 |
| 10 | 93 | 81 | 90 | 79 | 84 | 74 | 77 | 62 | 52 | (*) | 61 | 44 | 61 | 42 | 50 | 42 | 69 | 58 | 83 | 66 | 80 | 70 | 89 | 75 |
| 11 | 92 | 81 | 91 | 78 | 86 | 71 | 78 | 65 | 53 | ..... | 65 | 50 | 59 | 38 | 49 | 37 | 74 | 58 | 77 | 67 | 79 | 65 | 82 | 71 |
| 12 | 91 | 81 | 91 | 75 | 88 | 76 | 77 | 62 | 60 | ..... | 65 | 47 | 65 | 47 | 53 | 38 | 78 | 65 | 78 | 58 | 79 | 67 | 84 | 74 |
| 13 | 95 | 81.5 | 91 | 77 | 88 | 77 | 79 | 64 | 68 | ..... | 68 | 54 | 57 | 47 | 68 | 50 | 80 | 59 | 81 | 61 | 81 | 67 | 88 | 76 |
| 14 | 94.5 | 81 | 89 | 78 | 89 | 77 | 81 | 68 | 73 | ..... | 65 | 56 | 52 | 42 | 69 | 53 | 81 | 59 | 84 | 69 | 79 | 65 | 88 | 78 |
| 15 | 90 | 79 | 89 | 76 | 89 | 75 | 81 | 71 | 73 | ..... | 68 | 52 | 53 | 41 | 64 | 54 | 78 | 62 | 84 | 72 | 76 | 63 | 88 | 74 |
| 16 | 89 | 78 | 87 | 76 | 88 | 78 | 80 | 72 | 73 | ..... | 68 | 55 | 56 | 41 | 65 | 49 | 70 | 63 | 80 | 71 | 88 | 65 | 85 | 75 |
| 17 | 91 | 79 | 89 | 75 | 86 | 79 | 82 | 69 | 71 | ..... | 67 | 53 | 56 | 42 | 69 | 52 | 78 | 61 | 80 | 65 | 83 | 67 | 90 | 77 |
| 18 | 92 | 77 | 87 | 77 | 81 | 69 | 77 | 73 | 71 | ..... | 70 | 55 | 62 | 39 | 71 | 56 | 68 | 56 | 84 | 73 | 83 | 68 | 91 | 77 |
| 19 | 87 | 77 | 85 | 73 | 71 | 64 | 76 | 67 | 69 | ..... | 67 | 55 | 62 | 54 | 69 | 57 | 70 | 54 | 82 | 73 | 78 | 67 | 91 | 78 |
| 20 | 88 | 77 | 86 | 75 | 71 | 63 | 70 | 59 | 70 | 62 | 64 | 61 | 62 | 48 | 72 | 61 | 70 | 55 | 80 | 69 | 78 | 71 | 90 | 78 |
| 21 | 84 | 73 | 88 | 77 | 80 | 66 | 62 | 53 | 67 | 56 | 71 | 61 | 61 | 46 | 70 | 61 | 70 | 61 | 81 | 68 | 86 | 70 | 92 | 78 |
| 22 | 84 | 73 | 85 | 75 | 80 | 68 | 62 | 55 | 65 | 57 | 71 | 54 | 58 | 46 | 69 | 55 | 77 | 59 | 79 | 72 | 86 | 71 | 87 | 77 |
| 23 | 81 | 74 | 87 | 73 | 76 | 70 | 63 | 56 | 64 | 56 | 69 | 62 | 61 | 46 | 67 | 56 | 79 | (*) | 80 | 73 | 86 | 71 | 88 | 74 |
| 24 | 81 | 75 | 89 | 75.5 | 79 | 70 | 72 | 56 | 65 | 49 | 68 | 61 | 64 | 42 | 62 | 51 | 77 | ..... | 76 | 64 | 86 | 72 | 89 | 74 |
| 25 | 79 | 70 | 89 | 76 | 83 | 71 | 71 | 64 | 63 | 50 | 68 | 57 | 68 | 45 | 63 | 47 | 73 | ..... | 81 | 63 | 86 | 73 | 87 | 74 |
| 26 | 86 | 74 | 89 | 75 | 84 | 71 | 73 | 64 | 65 | 48 | 65 | 53 | 71 | 50 | 58 | 50 | 78 | ..... | 81 | 66 | 87 | 71 | 89 | 73 |
| 27 | 89 | 76 | 81 | 75 | 86 | 72 | 75 | 61 | 60 | 52 | 62 | 53 | 73 | 53 | 61 | 47 | 76 | ..... | 83 | 66 | 87 | 71 | 89 | 75 |
| 28 | 89 | 77 | 85 | 76 | 85 | 73 | 78 | 62 | 59 | 48 | 59 | 53 | 59 | 49 | 66 | 48 | 82 | ..... | 82 | 66 | 88 | 71 | 88 | 76 |
| 29 | 90 | 76 | 88 | 75 | 84 | 73 | 77 | 69 | 48 | 40 | 57 | 47 | 63 | 44 | ..... | ..... | 77 | ..... | 77 | 66 | 87 | 71 | 86 | 75 |
| 30 | 93 | 79 | 92 | 78 | 83 | 73 | 76 | 67 | 46 | 38 | 49 | 44 | 61 | 50 | ..... | ..... | 78 | ..... | 81 | 65 | 89 | 72 | 88 | 75 |
| 31 | 95.5 | 80 | 92 | 79 | ..... | ..... | 72 | 67 | ..... | ..... | 48 | 42 | 55 | 46 | ..... | ..... | 76 | 62 | ..... | ..... | 88 | 74 | ..... | ..... |
| Range | 26° | | 23°.5 | | 29° | | 31° | | 40° | | 37° | | 40° | | 35° | | 36° | | 34° | | 29° | | 21° | |
| Monthly means | 83°.7 | | 83°.1 | | 78°.4 | | 70°.2 | | 58°.3 | | 55°.5 | | 51°.0 | | 55°.5 | | 66°.4 | | 71°.5 | | 75°.5 | | 82° | |

* Minimum thermometer broken.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, NEWPORT, R. I.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 70 | 62 | 77 | 65 | 75 | 68 | 69 | 55 | 55 | 41 | 38 | 24 | 36 | 19.5 | 35 | 20 | 43 | 28 | 50 | 38 | 60 | 45 | 67 | 52 |
| 2 | 75.5 | 63 | 75.5 | 61 | 72 | 60.5 | 71 | 60 | 62 | 44 | 33 | 19 | 39 | 26 | 28 | 15 | 45 | 27.5 | 49.5 | 38 | 68 | 48 | 71 | 50 |
| 3 | 75 | 63 | 84 | 64 | 70 | 60 | 66 | 57 | 55 | 43.5 | 41 | 23 | 35 | 12 | 33 | 15 | 47 | 39 | 51.5 | 38 | 61 | 52 | 65 | 54 |
| 4 | 75 | 62 | 83 | 66 | 72 | 57 | 69 | 58 | 50 | 37.5 | 48 | 32 | 48 | 14 | 42 | 19 | 46 | 29 | 50 | 37 | 62 | 53 | 65 | 54 |
| 5 | 79 | 60 | 77 | 63 | 73 | 63 | 67 | 48 | 57 | 40 | 57 | 47 | 43 | 19 | 42 | 24 | 43 | 24.5 | 45 | 35 | 64 | 51 | 76 | 54 |
| 6 | 73 | 60 | 79 | 63 | 70 | 59 | 59 | 44 | 57 | 33 | 56 | 39 | 28 | 15 | 43.5 | 27 | 46.5 | 34 | 46 | 38 | 66 | 47 | 69 | 50 |
| 7 | 75 | 59 | 75 | 65 | 63 | 56 | 59 | 44 | 48 | 33 | 40 | 31 | 24 | 11 | 45 | 33 | 49 | 39 | 49 | 39 | 65 | 49 | 63 | 49 |
| 8 | 73 | 62 | 78 | 64.5 | 68 | 55 | 57 | 47.5 | 59 | 41 | 46 | 35 | 35 | 8.5 | 50 | 36 | 63 | 40 | 58 | 40 | 72 | 52 | 63 | 51 |
| 9 | 70 | 64 | 74 | 66 | 69.5 | 55 | 62.5 | 54 | 62 | 54 | 39 | 28 | 42 | 23.5 | 45.5 | 37 | 50 | 38 | 51 | 39 | 60 | 53 | 69 | 56 |
| 10 | 75 | 64 | 78 | 65 | 74 | 56 | 64 | 53.5 | 54 | 40 | 45 | 26 | 48 | 34 | 39 | 26 | 56 | 37 | 46 | 40 | 67 | 53 | 58 | 49 |
| 11 | 75 | 65.5 | 78 | 63 | 74 | 59 | 61 | 53 | 43 | 34 | 48 | 33 | 45 | 37 | 34 | 20 | 50 | 32 | 53 | 42 | 57 | 46 | 60.5 | 48 |
| 12 | 78 | 64 | 77 | 64 | 74 | 61 | 62 | 49 | 48 | 32 | 48 | 35 | 47 | 36 | 33 | 16 | 40 | 32 | 58 | 43 | 56 | 42 | 66 | 52 |
| 13 | 81 | 62 | 77 | 67 | 74.5 | 64 | 61 | 46 | 45 | 34 | 51 | 34 | 45 | 32 | 39 | 29 | 47 | 36 | 56 | 45 | 57 | 43 | 68 | 53 |
| 14 | 79 | 58 | 78 | 67 | 82.5 | 64 | 59 | 44 | 52 | 35 | 44 | 30.5 | 49.5 | 38 | 41 | 21 | 51 | 39 | 58 | 44 | 56 | 41.5 | 70.5 | 52.5 |
| 15 | 76 | 60 | 76 | 68 | 73 | 63 | 65 | 51.5 | 58 | 50 | 49 | 32 | 43 | 35 | 39 | 19 | 51 | 35 | 59 | 41 | 53 | 40 | 63 | 53 |
| 16 | 76 | 64 | 76 | 67 | 75 | 67 | 72 | 47 | 58 | 52 | 54.5 | 40 | 36 | 17 | 43 | 28 | 46 | 32 | 56 | 41.5 | 58 | 41 | 68 | 56 |
| 17 | 73 | 66.5 | 78 | 67 | 77.5 | 67 | 63 | 43 | 57 | 45 | 51 | 36 | 35 | 14 | 41 | 29 | 45 | 35 | 50 | 40 | 62 | 44 | 68 | 58 |
| 18 | 80 | 65 | 78 | 68 | 71 | 57 | 61 | 46 | 54 | 37 | 43 | 27 | 42 | 25.5 | 41 | 18 | 44 | 34 | 59 | 41 | 69 | 47 | 64 | 58.5 |
| 19 | 75 | 67 | 78 | 63.5 | 64 | 54 | 65 | 55 | 41 | 31 | 49 | 33 | 43 | 28 | 38 | 12 | 53.5 | 33.5 | 59 | 40 | 68 | 48 | 75 | 55 |
| 20 | 73 | 66 | 81 | 66 | 68 | 52 | 62 | 45 | 40 | 27 | 55 | 35 | 47 | 38 | 41 | 23 | 46 | 32 | 54 | 46 | 55 | 47 | 80 | 58 |
| 21 | 73 | 65 | 80 | 64.5 | 68 | 53 | 48 | 44 | 41 | 29 | 40 | 27 | 49 | 41 | 47 | 37 | 41 | 24 | 67 | 46 | 65 | 45 | 73 | 59 |
| 22 | 82 | 67 | 79 | 66 | 65 | 47.5 | 48 | 37.5 | 46 | 34 | 44 | 34 | 48 | 39.5 | 46 | 36 | 43 | 27 | 59 | 45 | 65 | 51 | 67 | 61 |
| 23 | 80 | 68 | 81 | 67 | 66.5 | 49 | 57 | 39 | 50 | 39 | 43 | 30 | 42 | 7 | 48 | 36 | 48 | 37 | 51 | 46 | 65 | 47 | 73 | 58 |
| 24 | 79 | 67 | 83 | 68 | 70 | 57.5 | 63 | 52 | 49 | 38 | 45 | 28 | 37 | 8 | 46 | 34 | 47.5 | 25 | 57 | 45 | 66 | 50 | 68 | 60 |
| 25 | 85 | 65 | 82 | 69 | 70 | 60 | 62 | 44 | 53 | 44 | 44 | 29 | 44 | 35 | 38 | 30 | 31 | 15 | 62 | 50 | 65 | 51 | 76 | 61 |
| 26 | 81 | 64 | 80 | 68 | 71 | 61 | 45 | 38 | 57 | 50 | 47 | 32 | 48 | 39 | 41 | 28 | 46 | 26.5 | 56 | 50 | 69 | 54 | 81 | 59 |
| 27 | 73 | 63.5 | 79.5 | 69 | 75 | 61.5 | 49 | 36 | 57 | 50 | 47 | 28 | 46 | 37 | 54 | 33 | 46 | 35 | 58 | 49 | 73 | 56.5 | 76 | 61 |
| 28 | 73 | 63.5 | 83 | 68 | 67 | 61 | 52 | 36.5 | 53 | 47 | 47 | 32 | 42 | 18 | 51.5 | 34 | 49 | 41 | 58.5 | 48 | 73 | 56 | 87 | 65 |
| 29 | 78 | 66 | 80 | 69 | 68 | 55 | 61 | 51 | 48 | 37 | 43.5 | 31 | 29 | 11 | ..... | ..... | 47 | 38 | 63 | 45 | 72 | 56 | 80 | 68 |
| 30 | 79 | 67 | 84.5 | 68 | 67.5 | 51 | 59 | 44 | 39 | 32 | 41 | 31 | 32 | 10 | ..... | ..... | 56 | 36.5 | 61 | 47 | 60 | 53 | 81 | 65 |
| 31 | 74 | 65 | 79 | 63 | ..... | ..... | 56 | 40 | ..... | ..... | 37 | 23 | 34 | 17 | ..... | ..... | 50 | 38 | ..... | ..... | 55 | 52 | ..... | ..... |
| Range | 27° | | 23°.5 | | 35° | | 36° | | 35° | | 38° | | 42°.5 | | 42° | | 48° | | 32° | | 33° | | 39° | |
| Monthly means | 69°.9 | | 72°0 | | 64°.6 | | 54°.4 | | 46°.1 | | 39°.3 | | 33°.2 | | 34°.8 | | 40°.4 | | 48°.5 | | 55°.8 | | 62°.9 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, NEW YORK CITY, N. Y.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 85 | 66 | 76 | 67 | 80 | 68 | 74 | 57 | 57 | 42 | 38 | 24 | 36 | 18 | 33 | 22 | 47 | 34 | 59 | 40 | 62 | 47 | 62 | 53 |
| 2 | 79 | 66 | 78 | 65 | 75 | 62 | 75 | 60 | 63 | 48 | 35 | 22 | 37 | 24 | 35 | 13 | 47 | 31 | 63 | 42 | 73 | 50 | 65 | 56 |
| 3 | 73 | 60 | 82 | 66 | 69 | 55 | 74 | 60 | 50 | 39 | 39 | 25 | 31 | 9 | 41 | 10 | 59 | 44 | 60 | 43 | 81 | 57 | 67 | 56 |
| 4 | 81 | 64 | 81 | 67 | 77 | 57 | 70 | 57 | 51 | 35 | 42 | 30 | 46 | 15 | 44 | 14 | 46 | 30 | 51 | 42 | 76 | 62 | 70 | 54 |
| 5 | 82 | 65 | 80 | 64 | 78 | 62 | 60 | 49 | 59 | 42 | 58 | 40 | 34 | 21 | 44 | 21 | 47 | 28 | 60 | 42 | 64 | 53 | 76 | 50 |
| 6 | 83 | 62 | 84 | 63 | 77 | 63 | 59 | 44 | 54 | 33 | 57 | 38 | 25 | 15 | 41 | 24 | 56 | 35 | 62 | 42 | 68 | 48 | 68 | 47 |
| 7 | 83 | 63 | 82 | 70 | 63 | 55 | 65 | 44 | 50 | 32 | 40 | 28 | 21 | 11 | 47 | 28 | 68 | 44 | 52 | 43 | 62 | 53 | 65 | 51 |
| 8 | 80 | 62 | 87 | 68.5 | 66 | 54 | 60 | 51 | 60 | 39 | 45 | 31 | 29 | 10 | 43 | 34 | 63 | 43 | 67 | 44 | 74 | 53 | 62 | 55 |
| 9 | 85 | 66 | 79 | 71 | 76 | 57 | 70 | 57 | 70 | 56 | 38 | 30 | 41 | 23 | 48 | 36 | 62 | 45 | 51 | 42 | 60 | 54 | 71 | 57 |
| 10 | 84 | 68 | 85 | 69 | 79 | 58 | 67 | 53 | 56 | 35 | 41 | 28 | 44 | 33 | 40 | 33 | 64 | 38 | 51 | 42 | 66 | 49 | 60 | 51 |
| 11 | 84 | 70 | 83 | 65 | 73 | 61 | 62 | 50 | 42 | 34 | 47 | 33 | 45 | 35 | 35 | 19 | 57 | 35 | 57 | 48 | 54 | 44 | 62 | 49 |
| 12 | 85 | 67 | 85 | 67 | 76 | 65 | 60 | 47 | 54 | 33 | 54 | 38 | 50 | 39 | 33 | 17 | 40 | 33 | 63 | 50 | 55 | 41 | 70 | 52 |
| 13 | 85 | 66 | 80 | 66 | 78 | 61 | 67 | 47 | 57 | 38 | 56 | 37 | 45 | 32 | 42 | 29 | 55 | 35 | 60 | 46 | 56 | 41 | 75 | 54 |
| 14 | 80 | 60 | 82 | 67 | 85 | 66 | 69 | 49 | 56 | 39 | 46 | 32 | 49 | 37 | 41 | 29 | 56 | 42 | 64 | 45 | 56 | 41 | 77 | 57 |
| 15 | 83 | 63 | 74 | 69 | 77 | 67 | 79 | 55 | 63 | 43 | 51 | 33 | 42 | 35 | 38 | 24 | 55 | 37 | 63 | 43 | 51 | 46 | 77 | 57 |
| 16 | 85 | 69 | 79 | 68 | 82 | 69 | 76 | 59 | 65 | 54 | 58 | 42 | 37 | 18 | 44 | 30 | 54 | 38 | 60 | 46 | 67 | 43 | 77 | 60 |
| 17 | 85 | 71 | 81 | 60 | 77 | 66 | 62 | 46 | 61 | 48 | 53 | 39 | 33 | 18 | 48 | 33 | 42 | 35 | 61 | 40 | 66 | 52 | 75 | 63 |
| 18 | 83 | 69 | 81 | 66 | 71 | 59 | 65 | 52 | 51 | 34 | 49 | 31 | 41 | 30 | 40 | 19 | 50 | 36 | 60 | 43 | 70 | 49 | 70 | 60 |
| 19 | 77 | 70 | 87 | 66 | 64 | 54 | 67 | 58 | 44 | 32 | 49 | 34 | 45 | 26 | 36 | 13 | 56 | 40 | 68 | 45 | 71 | 51 | 80 | 57 |
| 20 | 78 | 69 | 87 | 68 | 68 | 54 | 64 | 49 | 48 | 28 | 61 | 40 | 49 | 34 | 41 | 25 | 48 | 38 | 62 | 53 | 56 | 49 | 82 | 61 |
| 21 | 78 | 70 | 81 | 70 | 67 | 54 | 51 | 45 | 41 | 27 | 41 | 31 | 50 | 41 | 50 | 37 | 47 | 31 | 75 | 50 | 73 | 50 | 75 | 62 |
| 22 | 83 | 69 | 81 | 66 | 72 | 47 | 50 | 40 | 50 | 35 | 51 | 35 | 49 | 37 | 43 | 35 | 53 | 35 | 64 | 48 | 65 | 53 | 69 | 64 |
| 23 | 81 | 67 | 85 | 67 | 73 | 52 | 61 | 40 | 52 | 44 | 47 | 32 | 42 | 14 | 48 | 35 | 57 | 35 | 57 | 47 | 75 | 48 | 72 | 59 |
| 24 | 87 | 71 | 80 | 70 | 77 | 54 | 68 | 48 | 50 | 44 | 50 | 28 | 32 | 11 | 44 | 36 | 50 | 22 | 63 | 45 | 63 | 52 | 75 | 60 |
| 25 | 90 | 68 | 80 | 72 | 77 | 57 | 68 | 51 | 54 | 46 | 47 | 32 | 49 | 28 | 42 | 33 | 32 | 18 | 60 | 55 | 72 | 56 | 78 | 63 |
| 26 | 93 | 71 | 85 | 70 | 77 | 60 | 60 | 40 | 57 | 46 | 45 | 35 | 51 | 39 | 42 | 28 | 48 | 27 | 60 | 52 | 79 | 61 | 83 | 64 |
| 27 | 83 | 67 | 90 | 67 | 78 | 62 | 48 | 39 | 54 | 48 | 53 | 37 | 44 | 32 | 57 | 33 | 58 | 34 | 61 | 48 | 75 | 59 | 87 | 65 |
| 28 | 77 | 66 | 88 | 70 | 73 | 66 | 55 | 44 | 52 | 44 | 56 | 35 | 42 | 16 | 56 | 35 | 59 | 48 | 62 | 51 | 74 | 60 | 88 | 70 |
| 29 | 83 | 70 | 89 | 72 | 75 | 62 | 69 | 53 | 47 | 34 | 52 | 37 | 31 | 13 | ..... | ..... | 57 | 42 | 62 | 49 | 74 | 55 | 86 | 72 |
| 30 | 83 | 70 | 84 | 71 | 77 | 58 | 61 | 49 | 36 | 26 | 39 | 32 | 35 | 21 | ..... | ..... | 58 | 38 | 61 | 49 | 64 | 54 | 82 | 68 |
| 31 | 84 | 70 | 82 | 66 | ..... | ..... | 56 | 44 | ..... | ..... | 38 | 25 | 33 | 22 | ..... | ..... | 53 | 39 | ..... | ..... | 56 | 52 | ..... | ..... |
| Range | 33° | | 27° | | 38° | | 40° | | 44° | | 39° | | 42° | | 47° | | 55° | | 35° | | 40° | | 41° | |
| Monthly means | 74°.1 | | 74°.5 | | 66°.6 | | 58°.6 | | 46°.0 | | 39°.9 | | 32°.0 | | 34°.4 | | 43°.7 | | 52°.4 | | 58°.1 | | 65°.5 | |

*Maximum, minimum, and mean temperatures—Continued.*

STATION, NORFOLK, VA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 94 | 72 | 81 | 72 | 93 | 72 | 75 | 63 | 61 | 50 | 37 | 25 | 39 | 27 | 46 | 38 | 52 | 39 | 59 | 45 | 77 | 56 | 66 | 56 |
| 2 | 95.5 | 78 | 78 | 71 | 76 | 64 | 75 | 64 | 77 | 55 | 37 | 32 | 43 | 30 | 40 | 35 | 65 | 40 | 62 | 46 | 85 | 59 | 65 | 58 |
| 3 | 98 | 71.5 | 76 | 71.5 | 72 | 62 | 79 | 68 | 58 | 46 | 45 | 29 | 38 | 26 | 38 | 32 | 66 | 54 | 62 | 48 | 86 | 65 | 74 | 60 |
| 4 | 87 | 73 | 81 | 71 | 80 | 61 | 78 | 62 | 54 | 44 | 54 | 32 | 55 | 31 | 39 | 31 | 54 | 38 | 50 | 42 | 85 | 68 | 88 | 62 |
| 5 | 89 | 70 | 80 | 68 | 82 | 64 | 64 | 55 | 67 | 44 | 64 | 51 | 33 | 28 | 43 | 30 | 52 | 34 | 62 | 42 | 71 | 55 | 81 | 67 |
| 6 | 80 | 71 | 88.5 | 66 | 76 | 67 | 64 | 52 | 61 | 41 | 52 | 38 | 33 | 22 | 48 | 30 | 65 | 39 | 63 | 47 | 71 | 55 | 70 | 57 |
| 7 | 80 | 68 | 86 | 72 | 76 | 65 | 63 | 51 | 59 | 39 | 46 | 34 | 28 | 18 | 57 | 33 | 70 | 54 | 63 | 45 | 85 | 56 | 75 | 57 |
| 8 | 84 | 65 | 92 | 69 | 66 | 60 | 73 | 54.5 | 69 | 48 | 53 | 34 | 36 | 19 | 64 | 52 | 66 | 50 | 66 | 47 | 89 | 64 | 78 | 61 |
| 9 | 96 | 66.5 | 82 | 73 | 70 | 60 | 68 | 60 | 72 | 57 | 43 | 32 | 50 | 32 | 64 | 47 | 65 | 46 | 61 | 52 | 76 | 66 | 79 | 64 |
| 10 | 99 | 73 | 88 | 69.5 | 76 | 58 | 71 | 54 | 60 | 40 | 51 | 30 | 54 | 44 | 58 | 48 | 74 | 48 | 63 | 56 | 77 | 60 | 81 | 64 |
| 11 | 82 | 65 | 84 | 71 | 77 | 66 | 66 | 54 | 44 | 38 | 62 | 39 | 48 | 39 | 48 | 35 | 71 | 57 | 72 | 55 | 66 | 54 | 75 | 57 |
| 12 | 78 | 68 | 90 | 69 | 84 | 69 | 61 | 48.5 | 52 | 38 | 54 | 44 | 49 | 35 | 45 | 29 | 74 | 59 | 72 | 53 | 66 | 51 | 80 | 58 |
| 13 | 83 | 68 | 92 | 73 | 77.5 | 67 | 62 | 50 | 56 | 37 | 65 | 42 | 58 | 34 | 52 | 34 | 78 | 54 | 77 | 55 | 59 | 49 | 73 | 59 |
| 14 | 83 | 69 | 89 | 71 | 78 | 69 | 71 | 50 | 63 | 39 | 47 | 34 | 58 | 43 | 44 | 40 | 70 | 52 | 64 | 54 | 57 | 49 | 75 | 59 |
| 15 | 90 | 66 | 84 | 70.5 | 84 | 66 | 76 | 54 | 71 | 49 | 59 | 34 | 48 | 39 | 41 | 39 | 53 | 47 | 56 | 52 | 53 | 48 | 78 | 59 |
| 16 | 94 | 71 | 88 | 68 | 81 | 69 | 78 | 57 | 70 | 56 | 64 | 49 | 42 | 31 | 47 | 39 | 60 | 41 | 53 | 49 | 62 | 44 | 86 | 57 |
| 17 | 92 | 60 | 88 | 69 | 86 | 68 | 68 | 59 | 68 | 49 | 67 | 45 | 46 | 30 | 56 | 36 | 59 | 49 | 51 | 46 | 64 | 55 | 89 | 66 |
| 18 | 91 | 73 | 84 | 68 | 73 | 62 | 75 | 56 | 59 | 45 | 57 | 47 | 49 | 32 | 50 | 35 | 53 | 43 | 55 | 44 | 62 | 53 | 78 | 66 |
| 19 | 91 | 73 | 83 | 68.5 | 67 | 62 | 78.5 | 59 | 46 | 38 | 50 | 44 | 54 | 32 | 38 | 29 | 64 | 44 | 73 | 44 | 71 | 51 | 74 | 64 |
| 20 | 82 | 73 | 82 | 71 | 65 | 62 | 78 | 64 | 50 | 39 | 61 | 47 | 62 | 42 | 59 | 30 | 61 | 48 | 80 | 55 | 70 | 61 | 82 | 63 |
| 21 | 86 | 71 | 85 | 68.5 | 71 | 62 | 79 | 62 | 57 | 44 | 53 | 46 | 56 | 37 | 67 | 47 | 59 | 42 | 81 | 63 | 86 | 62 | 86 | 62 |
| 22 | 82 | 74 | 86 | 67 | 65 | 55 | 66 | 51 | 63 | 50 | 51 | 46 | 56 | 46 | 70 | 55 | 50 | 43 | 82 | 61 | 67 | 58 | 88 | 67 |
| 23 | 92 | 73 | 86 | 68.5 | 72 | 54 | 64 | 50 | 67 | 58 | 52 | 46 | 47 | 28 | 61 | 49 | 66 | 39 | 86 | 67 | 75 | 54 | 81 | 61 |
| 24 | 91 | 73 | 87 | 73 | 79 | 57 | 68 | 48 | 70 | 55 | 47 | 44 | 42 | 24 | 52 | 42 | 78 | 40 | 81 | 69 | 80 | 60 | 80 | 64 |
| 25 | 92 | 75 | 89 | 72.5 | 80 | 65 | 70 | 49 | 65 | 51 | 50 | 44 | 59 | 35 | 47 | 38 | 44 | 30 | 75 | 59 | 82 | 68 | 90 | 66 |
| 26 | 91 | 77 | 86 | 71 | 82 | 66 | 65 | 56 | 64 | 49 | 51 | 45 | 57 | 42 | 46 | 34 | 52 | 33 | 80 | 59 | 88 | 69 | 95 | 68 |
| 27 | 99.5 | 77 | 88 | 72 | 82 | 68 | 61 | 54 | 61 | 45 | 51 | 44 | 58 | 40 | 51 | 35 | 75 | 42 | 73 | 59 | 81 | 68 | 97 | 72 |
| 28 | 94 | 71 | 90 | 73 | 73 | 64 | 66 | 51 | 58 | 47 | 48 | 44 | 53 | 37 | 59 | 37 | 68 | 48 | 77 | 58 | 79 | 66 | 91 | 70 |
| 29 | 89 | 73 | 94 | 72 | 75 | 64.5 | 74 | 54 | 53 | 35 | 51 | 43 | 37 | 28 | ..... | ..... | 59 | 49 | 73 | 54 | 80 | 66 | 82 | 70 |
| 30 | 86 | 77.5 | 85 | 74 | 77 | 64 | 71 | 59 | 37 | 28 | 50 | 38 | 43 | 27 | ..... | ..... | 55 | 42 | 72 | 60 | 89 | 62 | 81 | 70 |
| 31 | 82.5 | 74 | 92 | 69 | ..... | ..... | 72 | 57 | ..... | ..... | 43 | 34 | 59 | 36 | ..... | ..... | 59 | 45 | ..... | ..... | 66 | 58 | ..... | ..... |
| Range | 39°.5 | | 28° | | 39° | | 31° | | 49° | | 42° | | 44° | | 41° | | 48° | | 44° | | 45° | | 41° | |
| Monthly means | 79°.6 | | 77°.4 | | 68°.7 | | 62°.0 | | 52°.2 | | 45°.9 | | 40°.4 | | 44°.2 | | 53°.8 | | 60°.1 | | 66°.2 | | 71°.6 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, NORTH PLATTE, NEBR.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 79 | 53 | 91 | 61 | 75 | 52 | 72 | 38 | 43 | 29 | 50 | 11 | 21 | 0 | 29 | 25 | 39 | 32 | 61 | 28 | 57 | 50 | 82 | 63 |
| 2 | 84 | 48 | 90 | 60 | 73 | 52 | 75 | 43 | 52 | 22 | 53 | 15 | 20 | — 1 | 44 | 27 | 49 | 31 | 56 | 32 | 60 | 44 | 72 | 52 |
| 3 | 94 | 55 | 83 | 65 | 64 | 54 | 63 | 34 | 45 | 28 | 37 | 20 | 25 | 3 | 50 | 20 | 49 | 27 | 59 | 31 | 59 | 33 | 70 | 46 |
| 4 | 102 | 65 | 78 | 61 | 79 | 49 | 58 | 25 | 35 | 22 | 31 | 24 | 16 | — 8 | 60 | 24 | 62 | 28 | 75 | 35 | 68 | 32 | 76 | 45 |
| 5 | 107 | 67 | 95 | 65 | 79 | 52 | 54 | 35 | 38 | 18 | 29 | 9 | 15 | — 1 | 63 | 27 | 61 | 34 | 77 | 34 | 80 | 43 | 66 | 57 |
| 6 | 104 | 68 | 83 | 59 | 85 | 51 | 61 | 39 | 43 | 23 | 45 | 7 | 21 | — 4 | 50 | 30 | 63 | 31 | 72 | 34 | 74 | 51 | 67 | 55 |
| 7 | 101 | 69 | 89 | 54 | 90 | 58 | 63 | 35 | 42 | 30 | 48 | 13 | 22 | 2 | 47 | 23 | 65 | 35 | 63 | 42 | 58 | 44 | 69 | 50 |
| 8 | 84 | 64 | 89 | 59 | 73 | 55 | 76 | 39 | 37 | 24 | 42 | 17 | 35 | 3 | 38 | 20 | 57 | 35 | 73 | 39 | 68 | 37 | 76 | 48 |
| 9 | 90 | 55 | 95 | 62 | 74 | 51 | 53 | 39 | 44 | 14 | 53 | 16 | 41 | 19 | 26 | 16 | 37 | 29 | 48 | 33 | 60 | 41 | 66 | 50 |
| 10 | 95 | 62 | 97 | 65 | 88 | 48 | 68 | 36 | 63 | 26 | 63 | 23 | 46 | 15 | 42 | 12 | 36 | 29 | 54 | 33 | 73 | 33 | 73 | 45 |
| 11 | 93 | 62 | 90 | 58 | 92 | 53 | 68 | 40 | 66 | 24 | 62 | 18 | 40 | 21 | 54 | 23 | 42 | 29 | 73 | 35 | 63 | 37 | 84 | 53 |
| 12 | 94 | 66 | 83 | 56 | 95 | 59 | 65 | 39 | 68 | 28 | 59 | 23 | 36 | 25 | 50 | 25 | 41 | 25 | 69 | 42 | 42 | 34 | 81 | 59 |
| 13 | 100 | 65 | 75 | 55 | 91 | 67 | 49 | 41 | 54 | 28 | 55 | 18 | 34 | 15 | 44 | 25 | 48 | 26 | 54 | 33 | 47 | 35 | 75 | 58 |
| 14 | 105 | 66 | 80 | 51 | 74 | 55 | 45 | 35 | 56 | 32 | 57 | 30 | 36 | 8 | 50 | 21 | 65 | 26 | 40 | 33 | 64 | 38 | 80 | 62 |
| 15 | 86 | 59 | 84 | 56 | 79 | 43 | 48 | 28 | 62 | 30 | 59 | 24 | 38 | 7 | 47 | 22 | 69 | 35 | 53 | 36 | 53 | 46 | 77 | 56 |
| 16 | 87 | 54 | 83 | 58 | 61 | 47 | 57 | 33 | 60 | 32 | 58 | 24 | 39 | 11 | 52 | 24 | 65 | 33 | 70 | 29 | 55 | 44 | 74 | 56 |
| 17 | 80 | 62 | 94 | 58 | 71 | 40 | 57 | 32 | 54 | 29 | 48 | 26 | 55 | 14 | 57 | 29 | 61 | 31 | 67 | 40 | 51 | 44 | 72 | 53 |
| 18 | 81 | 55 | 91 | 60 | 82 | 43 | 44 | 32 | 41 | 29 | 59 | 26 | 45 | 16 | 60 | 32 | 74 | 35 | 58 | 36 | 54 | 43 | 84 | 57 |
| 19 | 74 | 50 | 85 | 62 | 80 | 44 | 42 | 34 | 57 | 22 | 47 | 24 | 42 | 26 | 64 | 29 | 73 | 39 | 63 | 34 | 59 | 42 | 82 | 62 |
| 20 | 72 | 45 | 81 | 64 | 87 | 42 | 50 | 27 | 53 | 31 | 43 | 34 | 41 | 27 | 50 | 33 | 73 | 44 | 75 | 38 | 61 | 38 | 80 | 53 |
| 21 | 85 | 50 | 85 | 48 | 91 | 48 | 61 | 24 | 47 | 21 | 42 | 36 | 44 | 23 | 50 | 23 | 69 | 41 | 69 | 49 | 62 | 46 | 88 | 57 |
| 22 | 89 | 54 | 77 | 54 | 81 | 51 | 67 | 29 | 49 | 26 | 39 | 30 | 46 | 19 | 46 | 23 | 74 | 41 | 63 | 35 | 81 | 54 | 90 | 61 |
| 23 | 86 | 59 | 84 | 53 | 86 | 47 | 68 | 36 | 49 | 30 | 47 | 25 | 46 | 24 | 45 | 20 | 76 | 38 | 62 | 34 | 72 | 47 | 92 | 62 |
| 24 | 85 | 58 | 95 | 54 | 80 | 55 | 69 | 33 | 48 | 28 | 48 | 25 | 48 | 30 | 43 | 21 | 77 | 35 | 65 | 36 | 76 | 47 | 80 | 63 |
| 25 | 89 | 61 | 92 | 62 | 70 | 52 | 66 | 30 | 54 | 19 | 47 | 22 | 55 | 25 | 47 | 17 | 77 | 38 | 75 | 33 | 72 | 47 | 80 | 51 |
| 26 | 93 | 58 | 82 | 63 | 83 | 53 | 60 | 34 | 36 | 23 | 35 | 27 | 50 | 24 | 57 | 28 | 74 | 39 | 74 | 39 | 76 | 43 | 82 | 62 |
| 27 | 79 | 61 | 86 | 57 | 66 | 48 | 55 | 28 | 27 | 11 | 33 | 23 | 49 | 23 | 66 | 32 | 53 | 30 | 75 | 43 | 82 | 47 | 82 | 63 |
| 28 | 91 | 52 | 87 | 58 | 86 | 43 | 41 | 31 | 26 | 1 | 27 | 10 | 28 | 23 | 44 | 28 | 39 | 26 | 70 | 50 | 86 | 56 | 83 | 62 |
| 29 | 95 | 61 | 95 | 63 | 91 | 49 | 42 | 28 | 13 | —10 | 20 | 4 | 45 | 25 | ..... | ..... | 35 | 29 | 76 | 43 | 78 | 58 | 91 | 67 |
| 30 | 92 | 64 | 102 | 65 | 65 | 47 | 49 | 29 | 31 | 1 | 21 | — 2 | 48 | 22 | ..... | ..... | 59 | 30 | 71 | 47 | 83 | 58 | 73 | 56 |
| 31 | 88 | 59 | 85 | 66 | ..... | ..... | 50 | 23 | ..... | ..... | 21 | — 1 | 34 | 24 | ..... | ..... | 62 | 33 | ..... | ..... | 79 | 54 | ..... | ..... |
| Range | 62° | | 54° | | 55° | | 53° | | 78° | | 65° | | 63° | | 54° | | 52° | | 49° | | 54° | | 47° | |
| Monthly means | 75°.5 | | 72°.8 | | 64°.6 | | 44°.6 | | 33°.4 | | 30°.7 | | 24°.9 | | 34°.6 | | 44°.3 | | 51° | | 54°.9 | | 66° | |

*Maximum, minimum, and mean temperatures—Continued.*

STATION, OLYMPIA, WASH.

| Day of month. | 1877 | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 63 | 48 | 70 | 56 | 81 | 50 | 52 | 44 | 55 | 30 | 46 | 38 | 41 | 26 | 48 | 37 | 49 | 40 | 65 | 47 | 57 | 40 | 64 | 50 |
| 2 | 63 | 53 | 64 | 54 | 76 | 54 | 56 | 39 | 55 | 36 | 46 | 38 | 35 | 28 | 52 | 43 | 48 | 35 | 71 | 47 | 60 | 34 | 70 | 44 |
| 3 | 67 | 45 | 67 | 53 | 71 | 54 | 53 | 40 | 55 | 43 | 47 | 34 | 41 | 32 | 54 | 42 | 53 | 40 | 66 | 46 | 66 | 42 | 75 | 47 |
| 4 | 67 | 45 | 68 | 55 | 68 | 48 | 51 | 47 | 53 | 39 | 41 | 30 | 39 | 30 | 51 | 46 | 48 | 40 | 63 | 44 | 65 | 44 | 77 | 48 |
| 5 | 71 | 43 | 76 | 46 | 71 | 53 | 59 | 50 | 54 | 45 | 43 | 31 | 39 | 25 | 52 | 41 | 46 | 37 | 64 | 45 | 60 | 44 | 87 | 50 |
| 6 | 74 | 49 | 79 | 47 | 68 | 48 | 62 | 52 | 55 | 43 | 47 | 40 | 39 | 29 | 47 | 40 | 45 | 38 | 59 | 49 | 65 | 37 | 95 | 55 |
| 7 | 80 | 49 | 80 | 51 | 67 | 42 | 66 | 55 | 53 | 45 | 45 | 36 | 39 | 28 | 47 | 40 | 45 | 35 | 53 | 46 | 78 | 40 | 77 | 58 |
| 8 | 88 | 50 | 79 | 49 | 63 | 52 | 57 | 50 | 53 | 41 | 47 | 37 | 48 | 39 | 44 | 34 | 50 | 38 | 55 | 44 | 82 | 45 | 69 | 49 |
| 9 | 81 | 57 | 74 | 54 | 63 | 51 | 56 | 48 | 49 | 40 | 49 | 43 | 50 | 37 | 43 | 33 | 51 | 41 | 57 | 32 | 87 | 47 | 67 | 45 |
| 10 | 70 | 51 | 78 | 48 | 63 | 51 | 57 | 47 | 55 | 43 | 49 | 44 | 49 | 41 | 48 | 42 | 52 | 44 | 54 | 42 | 65 | 51 | 64 | 47 |
| 11 | 71 | 45 | 83 | 47 | 63 | 50 | 58 | 48 | 54 | 46 | 52 | 42 | 45 | 40 | 50 | 40 | 48 | 32 | 52 | 39 | 61 | 52 | 68 | 43 |
| 12 | 75 | 47 | 85 | 52 | 61 | 47 | 55 | 46 | 51 | 40 | 48 | 45 | 42 | 34 | 49 | 41 | 53 | 39 | 47 | 36 | 63 | 52 | 72 | 42 |
| 13 | 75 | 45 | 77 | 52 | 61 | 53 | 57 | 44 | 53 | 41 | 55 | 41 | 39 | 32 | 47 | 36 | 43 | 35 | 48 | 33 | 62 | 47 | 76 | 47 |
| 14 | 75 | 54 | 80 | 51 | 63 | 54 | 51 | 37 | 53 | 45 | 53 | 48 | 47 | 35 | 49 | 35 | 50 | 38 | 48 | 31 | 62 | 51 | 79 | 47 |
| 15 | 85 | 44 | 83 | 49 | 63 | 53 | 55 | 38 | 57 | 47 | 57 | 44 | 44 | 35 | 45 | 35 | 60 | 47 | 54 | 30 | 52 | 48 | 67 | 54 |
| 16 | 92 | 51 | 82 | 54 | 62 | 48 | 58 | 42 | 51 | 48 | 51 | 45 | 52 | 39 | 44 | 35 | 58 | 41 | 56 | 36 | 58 | 38 | 60 | 43 |
| 17 | 78 | 57 | 72 | 58 | 69 | 40 | 62 | 42 | 51 | 42 | 52 | 47 | 50 | 39 | 52 | 43 | 58 | 41 | 58 | 35 | 59 | 41 | 61 | 45 |
| 18 | 81 | 59 | 77 | 55 | 67 | 48 | 60 | 44 | 57 | 51 | 49 | 39 | 51 | 44 | 49 | 45 | 57 | 49 | 60 | 46 | 54 | 46 | 77 | 55 |
| 19 | 85 | 50 | 67 | 57 | 67 | 49 | 53 | 47 | 54 | 41 | 47 | 38 | 47 | 40 | 48 | 40 | 55 | 46 | 64 | 45 | 57 | 50 | 87 | 49 |
| 20 | 80 | 52 | 73 | 59 | 64 | 50 | 56 | 50 | 44 | 36 | 49 | 35 | 47 | 37 | 47 | 40 | 62 | 44 | 58 | 48 | 62 | 44 | 70 | 59 |
| 21 | 75 | 54 | 72 | 52 | 61 | 40 | 59 | 49 | 47 | 34 | 47 | 38 | 47 | 38 | 48 | 35 | 62 | 46 | 55 | 47 | 73 | 42 | 71 | 42 |
| 22 | 72 | 57 | 67 | 49 | 58 | 39 | 62 | 46 | 52 | 44 | 44 | 34 | 47 | 43 | 47 | 40 | 65 | 43 | 55 | 43 | 71 | 47 | 78 | 44 |
| 23 | 76 | 47 | 66 | 51 | 59 | 52 | 57 | 49 | 47 | 40 | 44 | 39 | 50 | 41 | 49 | 45 | 61 | 46 | 59 | 35 | 68 | 48 | 67 | 55 |
| 24 | 77 | 50 | 61 | 55 | 63 | 48 | 58 | 50 | 51 | 42 | 43 | 39 | 45 | 39 | 49 | 38 | 59 | 46 | 53 | 44 | 73 | 44 | 69 | 45 |
| 25 | 70 | 59 | 63 | 54 | 57 | 48 | 54 | 47 | 50 | 42 | 42 | 38 | 47 | 39 | 45 | 32 | 55 | 51 | 55 | 39 | 80 | 45 | 72 | 42 |
| 26 | 67 | 48 | 65 | 48 | 55 | 44 | 50 | 41 | 47 | 36 | 46 | 36 | 46 | 35 | 48 | 41 | 56 | 49 | 60 | 34 | 64 | 49 | 65 | 56 |
| 27 | 79 | 46 | 71 | 45 | 54 | 45 | 48 | 37 | 46 | 30 | 44 | 38 | 50 | 43 | 53 | 41 | 60 | 44 | 55 | 41 | 61 | 39 | 65 | 49 |
| 28 | 71 | 55 | 76 | 43 | 56 | 46 | 50 | 35 | 46 | 29 | 38 | 32 | 50 | 44 | 53 | 34 | 60 | 39 | 53 | 41 | 64 | 48 | 68 | 50 |
| 29 | 71 | 55 | 78 | 45 | 52 | 43 | 48 | 29 | 47 | 28 | 40 | 31 | 49 | 40 | ..... | ..... | 53 | 46 | 54 | 41 | 63 | 47 | 65 | 47 |
| 30 | 67 | 50 | 74 | 44 | 59 | 36 | 49 | 31 | 49 | 36 | 41 | 31 | 50 | 43 | ..... | ..... | 53 | 35 | 56 | 35 | 58 | 52 | 67 | 43 |
| 31 | 67 | 58 | 74 | 49 | ..... | ..... | 49 | 32 | ..... | ..... | 39 | 31 | 46 | 41 | ..... | ..... | 55 | 41 | ..... | ..... | 58 | 51 | ..... | ..... |
| Range | 49° | | 42° | | 45° | | 37° | | 20° | | 27° | | 27° | | 22° | | 33° | | 41° | | 53° | | 53° | |
| Monthly means | 63°.4 | | 62°.5 | | 55°.6 | | 49°.1 | | 45°.8 | | 42°.2 | | 41°.1 | | 44°.1 | | 47°.5 | | 49°.1 | | 55°.2 | | 60°.4 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, OMAHA, NEBR.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 79 | 62 | 87 | 66 | 70 | 58 | 64 | 52 | 46 | 37 | 32 | 5 | 34 | 24 | 37 | 24 | 52 | 44 | 59 | 39 | 58 | 50 | 86 | 66 |
| 2 | 83 | 64 | 87 | 67 | 70 | 50 | 72 | 56 | 46 | 34 | 47 | 20 | 28 | 10 | 34 | 15 | 44 | 33 | 56 | 42 | 68 | 49 | 79 | 65 |
| 3 | 89 | 63 | 83 | 61 | 76 | 51 | 64 | 41 | 49 | 34 | 46 | 26 | 33 | 13 | 35 | 9 | 38 | 28 | 56 | 34 | 60 | 41 | 73 | 57 |
| 4 | 94 | 74 | 83 | 68 | 76 | 56 | 57 | 33 | 40 | 27 | 39 | 30 | 17 | Zero | 43 | 16 | 51 | 22 | 62 | 35 | 63 | 38 | 75 | 54 |
| 5 | 96 | 75 | 83 | 69 | 78 | 58 | 55 | 42 | 29 | 15 | 30 | 25 | 20 | 9 | 48 | 33 | 63 | 36 | 64 | 42 | 74 | 43 | 77 | 56 |
| 6 | 96 | 74 | 85 | 64 | 77 | 60 | 62 | 46 | 40 | 16 | 38 | 20 | 11 | Zero | 50 | 40 | 61 | 43 | 60 | 35 | 82 | 57 | 75 | 63 |
| 7 | 99 | 77 | 87 | 67 | 78 | 60 | 66 | 49 | 42 | 34 | 44 | 26 | 34 | 3 | 49 | 32 | 66 | 38 | 57 | 43 | 68 | 53 | 64 | 52 |
| 8 | 88 | 70 | 81 | 66 | 75 | 64 | 67 | 38 | 36 | 26 | 39 | 23 | 44 | 30 | 37 | 28 | 65 | 50 | 59 | 42 | 71 | 51 | 59 | 48 |
| 9 | 84 | 67 | 81 | 61 | 67 | 60 | 60 | 47 | 26 | 20 | 48 | 32 | 51 | 30 | 29 | 24 | 56 | 44 | 58 | 36 | 60 | 44 | 67 | 46 |
| 10 | 81 | 67 | 93 | 65 | 72 | 55 | 59 | 38 | 42 | 20 | 54 | 31 | 31 | 23 | 31 | 18 | 52 | 42 | 52 | 39 | 63 | 37 | 73 | 48 |
| 11 | 78 | 60 | 87 | 73 | 77 | 57 | 63 | 42 | 53 | 30 | 57 | 31 | 50 | 23 | 43 | 18 | 57 | 34 | 66 | 38 | 51 | 39 | 77 | 52 |
| 12 | 85 | 66 | 84 | 69 | 85 | 62 | 73 | 55 | 54 | 35 | 52 | 40 | 40 | 31 | 44 | 32 | 52 | 38 | 67 | 47 | 55 | 33 | 75 | 59 |
| 13 | 88 | 67 | 74 | 58 | 86 | 72 | 70 | 55 | 57 | 42 | 49 | 33 | 33 | 26 | 38 | 30 | 49 | 35 | 56 | 44 | 58 | 46 | 64 | 60 |
| 14 | 92 | 71 | 79 | 56 | 79 | 61 | 64 | 48 | 52 | 41 | 49 | 31 | 29 | 12 | 39 | 34 | 56 | 38 | 48 | 42 | 60 | 47 | 75 | 60 |
| 15 | 82 | 71 | 79 | 56 | 75 | 54 | 48 | 40 | 54 | 31 | 57 | 33 | 37 | 9 | 45 | 34 | 68 | 44 | 57 | 43 | 60 | 48 | 75 | 63 |
| 16 | 85 | 66 | 77 | 59 | 69 | 56 | 50 | 44 | 61 | 40 | 49 | 31 | 45 | 20 | 43 | 33 | 56 | 35 | 69 | 52 | 56 | 46 | 74 | 56 |
| 17 | 80 | 66 | 80 | 60 | 65 | 44 | 57 | 45 | 52 | 34 | 57 | 38 | 48 | 30 | 40 | 30 | 56 | 32 | 74 | 56 | 55 | 46 | 79 | 59 |
| 18 | 76 | 64 | 81 | 60 | 75 | 46 | 51 | 47 | 51 | 39 | 59 | 40 | 49 | 30 | 54 | 35 | 61 | 38 | 69 | 48 | 68 | 52 | 82 | 62 |
| 19 | 69 | 60 | 83 | 62 | 80 | 49 | 50 | 44 | 51 | 38 | 46 | 37 | 44 | 40 | 61 | 40 | 72 | 47 | 65 | 47 | 66 | 48 | 86 | 64 |
| 20 | 73 | 56 | 74 | 65 | 79 | 52 | 44 | 35 | 51 | 34 | 61 | 41 | 40 | 28 | 49 | 35 | 68 | 46 | 71 | 43 | 65 | 48 | 76 | 60 |
| 21 | 79 | 53 | 70 | 56 | 79 | 57 | 55 | 34 | 47 | 37 | 60 | 49 | 43 | 25 | 47 | 32 | 58 | 46 | 82 | 60 | 68 | 45 | 77 | 57 |
| 22 | 83 | 57 | 74 | 49 | 81 | 64 | 64 | 39 | 49 | 29 | 59 | 52 | 37 | 24 | 46 | 32 | 62 | 50 | 76 | 55 | 65 | 57 | 81 | 56 |
| 23 | 85 | 58 | 76 | 53 | 79 | 54 | 66 | 44 | 49 | 33 | 54 | 38 | 36 | 17 | 40 | 30 | 74 | 49 | 63 | 46 | 78 | 62 | 89 | 63 |
| 24 | 85 | 62 | 79 | 59 | 80 | 67 | 70 | 47 | 47 | 40 | 43 | 37 | 44 | 28 | 36 | 28 | 53 | 35 | 65 | 45 | 80 | 53 | 83 | 66 |
| 25 | 86 | 66 | 77 | 61 | 79 | 64 | 61 | 44 | 44 | 35 | 37 | 27 | 32 | 19 | 44 | 25 | 61 | 36 | 68 | 45 | 73 | 57 | 78 | 64 |
| 26 | 89 | 66 | 85 | 66 | 73 | 62 | 63 | 48 | 37 | 30 | 37 | 30 | 41 | 23 | 50 | 25 | 80 | 50 | 67 | 43 | 73 | 49 | 83 | 57 |
| 27 | 87 | 68 | 84 | 71 | 70 | 57 | 60 | 43 | 33 | 21 | 38 | 32 | 45 | 21 | 58 | 34 | 66 | 40 | 67 | 44 | 73 | 52 | 86 | 64 |
| 28 | 83 | 63 | 82 | 70 | 81 | 55 | 54 | 40 | 22 | 9 | 39 | 33 | 33 | 23 | 61 | 42 | 46 | 31 | 71 | 45 | 76 | 56 | 78 | 71 |
| 29 | 87 | 64 | 84 | 68 | 86 | 64 | 51 | 36 | 15 | — 2 | 34 | 27 | 31 | 27 | ..... | ..... | 45 | 35 | 75 | 49 | 72 | 60 | 84 | 66 |
| 30 | 85 | 67 | 91 | 73 | 81 | 61 | 50 | 33 | 22 | 6 | 34 | 26 | 35 | 25 | ..... | ..... | 42 | 33 | 68 | 52 | 69 | 55 | 79 | 63 |
| 31 | 89 | 70 | 84 | 68 | ..... | ..... | 53 | 30 | ..... | ..... | 37 | 20 | 35 | 18 | ..... | ..... | 59 | 34 | ..... | ..... | 73 | 58 | ..... | ..... |
| Range | 46° | | 44° | | 42° | | 43° | | 63° | | 56° | | 51° | | 52° | | 58° | | 48° | | 49° | | 43° | |
| Monthly means | 76°.0 | | *73°.2 | | 66°.6 | | 51°.1 | | 36°.3 | | 39°.2 | | 28°.9 | | 36°.9 | | 48°.1 | | 55°.0 | | 58°.5 | | 68°.4 | |

*Thirty days only.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, OSWEGO, N. Y.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 80 | 63 | 88 | 68 | 71 | 63 | 84 | 61 | 48 | 42 | 31 | 24 | 36 | 17 | 24 | 12 | 33 | 15 | 49 | 40 | 65 | 50 | 73 | 52 |
| 2 | 67 | 57 | 89 | 67 | 66 | 55 | 67 | 59 | 55 | 43 | 31 | 9 | 35 | 11 | 23 | 11 | 49 | 33 | 55 | 41 | 73 | 51 | 83 | 58 |
| 3 | 79 | 59 | 77 | 68 | 62 | 52 | 68 | 56 | 46 | 38 | 42 | 23 | 25 | 5 | 26 | — 3 | 55 | 42 | 52 | 43 | 77 | 55 | 87 | 63 |
| 4 | 73 | 58 | 74 | 65 | 74 | 58 | 66 | 54 | 46 | 36 | 43 | 26 | 33 | 15 | 38 | 3 | 43 | 25 | 48 | 41 | 61 | 50 | 76 | 60 |
| 5 | 75 | 60 | 75 | 65 | 71 | 57 | 55 | 45 | 53 | 31 | 53 | 40 | 28 | 18 | 38 | 22 | 51 | 27 | 49 | 37 | 57 | 48 | 61 | 49 |
| 6 | 72 | 60 | 76 | 65 | 68 | 57 | 55 | 47 | 40 | 26 | 42 | 29 | 22 | 8 | 41 | 13 | 59 | 40 | 46 | 37 | 60 | 45 | 60 | 47 |
| 7 | 79 | 58 | 79 | 66 | 67 | 58 | 61 | 46 | 50 | 31 | 37 | 24 | 17 | 5 | 47 | 27 | 55 | 43 | 46 | 39 | 69 | 48 | 63 | 43 |
| 8 | 89 | 65 | 81 | 66 | 69 | 56 | 59 | 50 | 60 | 38 | 40 | 32 | 27 | 5 | 48 | 32 | 53 | 40 | 51 | 38 | 67 | 53 | 55 | 50 |
| 9 | 85 | 72 | 83 | 67 | 72 | 52 | 63 | 50 | 60 | 30 | 34 | 24 | 39 | 22 | 37 | 24 | 63 | 38 | 60 | 43 | 65 | 48 | 66 | 50 |
| 10 | 73 | 62 | 76 | 63 | 74 | 53 | 64 | 46 | 36 | 26 | 41 | 29 | 43 | 32 | 28 | 19 | 61 | 44 | 60 | 48 | 54 | 44 | 63 | 52 |
| 11 | 72 | 61 | 78 | 64 | 78 | 62 | 57 | 46 | 41 | 31 | 44 | 38 | 42 | 33 | 25 | 14 | 55 | 39 | 59 | 51 | 46 | 39 | 65 | 52 |
| 12 | 82 | 57 | 81 | 62 | 81 | 65 | 53 | 48 | 45 | 38 | 43 | 36 | 41 | 38 | 38 | 20 | 50 | 40 | 54 | 49 | 45 | 39 | 66 | 47 |
| 13 | 72 | 58 | 74 | 67 | 79 | 65 | 57 | 49 | 43 | 29 | 50 | 31 | 42 | 35 | 35 | 28 | 47 | 37 | 49 | 40 | 46 | 38 | 66 | 53 |
| 14 | 81 | 55 | 81 | 62 | 78 | 62 | 68 | 50 | 57 | 36 | 37 | 27 | 45 | 36 | 35 | 15 | 42 | 35 | 53 | 39 | 52 | 38 | 75 | 53 |
| 15 | 83 | 64 | 75 | 63 | 85 | 64 | 68 | 48 | 59 | 38 | 52 | 35 | 38 | 21 | 36 | 15 | 41 | 36 | 48 | 39 | 54 | 39 | 80 | 55 |
| 16 | 88 | 69 | 74 | 64 | 80 | 66 | 63 | 49 | 57 | 43 | 50 | 39 | 23 | 10 | 38 | 28 | 56 | 33 | 56 | 44 | 59 | 43 | 82 | 62 |
| 17 | 82 | 68 | 75 | 63 | 76 | 56 | 54 | 44 | 53 | 38 | 49 | 30 | 32 | 14 | 39 | 26 | 50 | 41 | 62 | 44 | 61 | 41 | 70 | 57 |
| 18 | 89 | 65 | 81 | 64 | 63 | 57 | 59 | 47 | 51 | 32 | 38 | 21 | 39 | 25 | 27 | 11 | 45 | 36 | 65 | 44 | 60 | 42 | 69 | 53 |
| 19 | 78 | 67 | 81 | 63 | 71 | 51 | 57 | 48 | 34 | 27 | 51 | 35 | 51 | 28 | 33 | 5 | 44 | 40 | 63 | 50 | 70 | 50 | 79 | 55 |
| 20 | 74 | 63 | 80 | 64 | 68 | 53 | 48 | 40 | 36 | 26 | 51 | 34 | 47 | 35 | 41 | 24 | 41 | 32 | 73 | 51 | 71 | 54 | 79 | 57 |
| 21 | 78 | 62 | 79 | 59 | 61 | 53 | 45 | 39 | 44 | 25 | 45 | 32 | 47 | 39 | 46 | 36 | 37 | 26 | 62 | 45 | 61 | 48 | 77 | 65 |
| 22 | 83 | 60 | 85 | 62 | 63 | 49 | 46 | 37 | 45 | 34 | 44 | 39 | 42 | 35 | 45 | 38 | 42 | 32 | 56 | 40 | 55 | 44 | 69 | 62 |
| 23 | 82 | 65 | 83 | 67 | 72 | 47 | 58 | 38 | 50 | 41 | 47 | 37 | 38 | 3 | 45 | 38 | 57 | 38 | 71 | 53 | 63 | 46 | 73 | 58 |
| 24 | 83 | 67 | 80 | 69 | 76 | 53 | 64 | 54 | 49 | 44 | 39 | 33 | 35 | 10 | 41 | 34 | 50 | 12 | 73 | 56 | 69 | 47 | 68 | 60 |
| 25 | 85 | 67 | 77 | 65 | 81 | 59 | 58 | 37 | 52 | 44 | 39 | 31 | 45 | 31 | 34 | 28 | 33 | 11 | 73 | 55 | 72 | 53 | 71 | 59 |
| 26 | 85 | 69 | 79 | 64 | 76 | 63 | 47 | 36 | 55 | 47 | 40 | 32 | 45 | 36 | 38 | 22 | 44 | 31 | 62 | 51 | 70 | 55 | 82 | 54 |
| 27 | 89 | 72 | 84 | 64 | 68 | 54 | 45 | 39 | 54 | 45 | 40 | 34 | 44 | 34 | 45 | 34 | 52 | 39 | 69 | 52 | 64 | 50 | 79 | 66 |
| 28 | 84 | 73 | 79 | 67 | 74 | 61 | 59 | 39 | 49 | 39 | 40 | 35 | 39 | 9 | 49 | 27 | 48 | 37 | 63 | 50 | 60 | 49 | 83 | 63 |
| 29 | 82 | 72 | 78 | 71 | 67 | 51 | 65 | 49 | 45 | 31 | 37 | 27 | 28 | 10 | ..... | ..... | 44 | 35 | 65 | 53 | 61 | 48 | 83 | 64 |
| 30 | 82 | 70 | 75 | 62 | 81 | 56 | 50 | 42 | 34 | 28 | 31 | 26 | 23 | 2 | ..... | ..... | 49 | 38 | 65 | 50 | 57 | 50 | 95 | 67 |
| 31 | 78 | 67 | 74 | 58 | ..... | ..... | 50 | 38 | ..... | ..... | 27 | 20 | 33 | 17 | ..... | ..... | 51 | 42 | ..... | ..... | 67 | 50 | ..... | ..... |
| Range | 34° | | 31° | | 38° | | 48° | | 35° | | 44° | | 49° | | 52° | | 52° | | 36° | | 39° | | 52° | |
| Monthly means | 70°.5 | | 71°.3 | | 64°.3 | | 52°.9 | | 43°.2 | | 37°.2 | | 30°.5 | | 31°.5 | | 42°.0 | | 52°.0 | | 54°.4 | | 64° | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, PARRY SOUND, CANADA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 74.8 | 54.1 | 89.0 | 54.1 | 62.8 | 43.7 | 73.8 | 49.1 | 43.7 | 33.5 | 24.3 | 12.5 | 33.0 | 6.2 | 30.3 | 18.5 | 33.0 | 2.2 | 55.3 | 23.3 | 59.0 | 43.2 | 78.0 | 45.2 |
| 2 | 72.3 | 53.1 | 78.7 | 66.2 | 59.3 | 43.7 | 56.0 | 47.1 | 40.7 | 33.0 | 32.0 | 11.5 | 24.8 | — 6.0 | 28.8 | 1.2 | 37.7 | 21.8 | 55.3 | 24.8 | 59.8 | 37.0 | 82.2 | 50.1 |
| 3 | 69.8 | 54.1 | 71.3 | 57.7 | 61.0 | 37.0 | 69.0 | 50.1 | 38.0 | 28.8 | 36.3 | 29.8 | 23.0 | — 6.0 | 34.0 | — 2.0 | 38.0 | 22.8 | 59.0 | 28.8 | 59.8 | 41.2 | 80.7 | 64.2 |
| 4 | 75.8 | 50.1 | 73.8 | 48.1 | 69.3 | 53.1 | 61.0 | 38.2 | 37.2 | 26.3 | 38.0 | 29.8 | 27.8 | 11.5 | 36.3 | 13.5 | 25.3 | 14.3 | 57.3 | 29.8 | 54.8 | 37.1 | 69.8 | 43.2 |
| 5 | 77.0 | 52.1 | 73.8 | 60.2 | 64.8 | 47.2 | 48.8 | 28.3 | 35.8 | 17.5 | 45.2 | 34.1 | 13.1 | —18.3 | 34.0 | 16.5 | 43.0 | 20.8 | 53.0 | 24.0 | 53.3 | 36.3 | 54.8 | 38.2 |
| 6 | 76.8 | 45.7 | 73.8 | 53.6 | 67.8 | 41.2 | 53.3 | 33.0 | 40.0 | 7.7 | 36.8 | 8.2 | 3.2 | —16.2 | 39.0 | 17.5 | 50.0 | 36.1 | 48.8 | 22.8 | 57.3 | 40.4 | 59.8 | 32.0 |
| 7 | 75.0 | 46.2 | 77.3 | 63.7 | 72.0 | 45.0 | 64.8 | 34.0 | 40.7 | 32.0 | 33.3 | 6.2 | 3.2 | —21.4 | 44.7 | 29.0 | 43.7 | 29.0 | 45.7 | 29.3 | 57.8 | 41.2 | 51.0 | 38.2 |
| 8 | 76.0 | 62.0 | 80.7 | 57.2 | 69.3 | 43.2 | 53.8 | 46.7 | 38.7 | 32.5 | 33.0 | 11.0 | 22.0 | 0.2 | 40.7 | 23.8 | 54.3 | 27.8 | 54.8 | 24.8 | 62.2 | 36.1 | 65.0 | 36.1 |
| 9 | 78.0 | 54.1 | 71.8 | 57.2 | 72.0 | 44.2 | 53.8 | 37.0 | 36.0 | 16.5 | 24.8 | 1.2 | 33.0 | 20.8 | 25.2 | 6.2 | 64.1 | 28.8 | 53.0 | 35.0 | 54.8 | 40.2 | 65.8 | 35.0 |
| 10 | 69.8 | 51.0 | 71.8 | 56.1 | 70.6 | 50.1 | 53.3 | 36.0 | 31.8 | 11.5 | 37.0 | 22.8 | 38.0 | 29.8 | 19.6 | 4.2 | 59.0 | 33.8 | 53.3 | 46.7 | 44.7 | 37.1 | 65.8 | 38.6 |
| 11 | 70.3 | 46.5 | 73.8 | 55.1 | 80.0 | 59.2 | 48.8 | 39.2 | 39.7 | 22.8 | 40.7 | 29.5 | 39.2 | 32.0 | 22.8 | — 5.0 | 44.7 | 34.0 | 55.8 | 40.2 | 42.4 | 34.0 | 64.8 | 46.0 |
| 12 | 74.8 | 55.3 | 71.3 | 52.7 | 78.0 | 59.2 | 48.8 | 37.1 | 43.0 | 25.6 | 39.0 | 23.3 | 35.8 | 29.0 | 29.8 | 16.0 | 42.7 | 33.0 | 54.8 | 34.0 | 44.7 | 33.0 | 66.8 | 42.2 |
| 13 | 73.3 | 47.2 | 78.3 | 50.1 | 75.0 | 55.1 | 52.8 | 42.2 | 37.0 | 21.8 | 41.0 | 17.5 | 33.8 | 28.8 | 28.0 | 1.7 | 38.7 | 33.0 | 47.7 | 33.0 | 45.0 | 33.4 | 73.0 | 42.7 |
| 14 | 77.5 | 47.6 | 74.0 | 59.2 | 80.0 | 52.1 | 59.8 | 48.1 | 50.8 | 32.0 | 39.0 | 10.5 | 31.8 | 21.8 | 28.0 | — 4.0 | 42.7 | 28.8 | 51.8 | 29.8 | 48.8 | 31.0 | 73.3 | 42.2 |
| 15 | 85.0 | 56.4 | 75.0 | 60.0 | 83.7 | 59.2 | 64.0 | 53.1 | 50.8 | 43.2 | 43.7 | 37.1 | 31.8 | 3.2 | 30.8 | 0.2 | 43.7 | 23.1 | 55.3 | 32.0 | 53.0 | 28.0 | 78.7 | 44.2 |
| 16 | 90.0 | 59.2 | 74.8 | 60.2 | 76.8 | 57.1 | 62.0 | 43.2 | 47.0 | 32.0 | 40.7 | 28.3 | 9.2 | —11.2 | 33.8 | 0.2 | 46.8 | 26.3 | 59.3 | 31.0 | 62.6 | 28.8 | 64.0 | 55.1 |
| 17 | 79.0 | 62.2 | 78.8 | 59.7 | 66.8 | 50.1 | 55.8 | 40.2 | 49.0 | 33.0 | 41.7 | 19.0 | 21.3 | 2.2 | 31.8 | 8.2 | 47.8 | 32.0 | 57.6 | 35.0 | 57.8 | 40.1 | 63.0 | 48.1 |
| 18 | 72.0 | 60.2 | 78.0 | 55.1 | 57.3 | 44.2 | 46.5 | 41.2 | 39.7 | 21.8 | 27.8 | 12.8 | 32.8 | 16.5 | 19.6 | — 7.0 | 40.2 | 25.0 | 67.8 | 33.0 | 60.0 | 39.3 | 68.8 | 40.2 |
| 19 | 63.8 | 56.1 | 78.7 | 57.2 | 65.8 | 42.2 | 48.8 | 35.0 | 27.8 | 15.5 | 42.0 | 25.8 | 35.8 | 26.8 | 30.8 | — 6.0 | 42.7 | 33.0 | 68.8 | 48.1 | 59.8 | 46.3 | 74.7 | 49.7 |
| 20 | 63.5 | 55.1 | 81.7 | 51.1 | 63.8 | 44.2 | 43.7 | 29.8 | 34.0 | 13.5 | 38.7 | 33.0 | 41.7 | 29.0 | 34.0 | 20.8 | 38.7 | 22.8 | 66.8 | 43.0 | 70.0 | 47.6 | 76.7 | 50.1 |
| 21 | 75.0 | 46.2 | 84.9 | 56.2 | 59.8 | 37.1 | 44.7 | 25.8 | 41.7 | 21.8 | 37.7 | 31.0 | 37.7 | 29.8 | 37.0 | 26.8 | 34.0 | 21.0 | 51.8 | 33.8 | 54.8 | 38.2 | 70.8 | 57.2 |
| 22 | 76.0 | 48.1 | 86.5 | 60.2 | 65.0 | 37.1 | 50.8 | 21.8 | 41.7 | 33.0 | 42.2 | 33.0 | 34.6 | 4.2 | 39.9 | 35.1 | 40.7 | 18.0 | 50.8 | 33.0 | 56.0 | 32.0 | 71.8 | 57.2 |
| 23 | 77.0 | 51.1 | 85.7 | 63.0 | 71.0 | 41.2 | 51.8 | 41.0 | 44.2 | 33.5 | 41.3 | 34.1 | 6.7 | —17.2 | 36.8 | 26.8 | 49.0 | 18.5 | 64.1 | 46.2 | 69.0 | 32.0 | 66.8 | 58.1 |
| 24 | 79.4 | 52.1 | 83.7 | 65.2 | 74.8 | 50.0 | 54.8 | 37.7 | 47.0 | 41.2 | 43.2 | 29.8 | 30.1 | 4.2 | 29.0 | 18.5 | 21.8 | 2.2 | 68.3 | 56.1 | 67.0 | 48.1 | 71.8 | 54.6 |
| 25 | 82.0 | 51.6 | 69.8 | 65.2 | 75.8 | 54.1 | 39.2 | 32.0 | 45.2 | 42.2 | 38.7 | 31.0 | 31.8 | 22.8 | 25.3 | 13.8 | 32.6 | 4.2 | 59.3 | 46.2 | 69.0 | 49.1 | 68.8 | 51.1 |
| 26 | 85.7 | 58.2 | 70.8 | 56.1 | 67.3 | 49.1 | 40.2 | 25.8 | 48.7 | 42.2 | 40.0 | 28.8 | 33.8 | 23.3 | 35.8 | 14.0 | 38.0 | 28.8 | 67.8 | 45.2 | 60.8 | 49.6 | 78.7 | 49.1 |
| 27 | 82.2 | 63.7 | 93.7 | 55.1 | 65.8 | 45.2 | 46.2 | 22.8 | 47.7 | 39.2 | 39.0 | 33.0 | 32.3 | 11.5 | 38.7 | 25.8 | 40.7 | 28.8 | 63.8 | 41.7 | 57.0 | 45.2 | 68.8 | 57.1 |
| 28 | 82.7 | 66.2 | 75.8 | 62.2 | 68.0 | 45.5 | 51.0 | 37.1 | 47.7 | 30.3 | 41.0 | 27.8 | 14.6 | —10.0 | 38.7 | 13.5 | 39.7 | 24.8 | 68.3 | 48.2 | 59.3 | 46.2 | 80.7 | 50.1 |
| 29 | 79.7 | 64.4 | 74.8 | 56.1 | 69.0 | 41.2 | 55.3 | 42.8 | 34.0 | 23.8 | 35.8 | 24.8 | 19.6 | —18.2 | ..... | ..... | 40.7 | 20.8 | 68.8 | 53.1 | 56.0 | 45.2 | 86.7 | 54.1 |
| 30 | 82.7 | 60.2 | 72.8 | 53.6 | 79.0 | 54.1 | 44.0 | 34.0 | 30.0 | 21.3 | 30.8 | 20.8 | 16.6 | —12.2 | ..... | ..... | 51.8 | 18.5 | 70.0 | 54.1 | 69.8 | 47.2 | 90.5 | 59.7 |
| 31 | 85.0 | 58.7 | 70.8 | 53.1 | ..... | ..... | 44.7 | 36.0 | ..... | ..... | 26.8 | 8.2 | 24.3 | 0.2 | ..... | ..... | 57.0 | 31.0 | ..... | ..... | 74.7 | 44.0 | ..... | ..... |
| Range | 44°.3 | | 45°.6 | | 46°.7 | | 52°.0 | | 43°.1 | | 44°.0 | | 60°.6 | | 51°.7 | | 61°.7 | | 47°.2 | | 46°.7 | | 58°.5 | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, PEMBINA, DAK.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 79 | 57 | 71 | 53 | 70 | 33 | 51 | 27 | 37 | 27.5 | 21.5 | — 3 | 21 | — 6 | 37 | 4 | 32 | 24 | 59 | 24 | 69 | 39 | 65 | 46 |
| 2 | 80 | 60 | 77 | 45 | 81 | 34 | 58 | 35 | 30 | 21 | 37 | 15 | 14 | —10 | 44 | 6 | 35 | 21 | 62 | 35 | 58 | 37 | 70 | 45 |
| 3 | 78 | 55 | 83 | 50 | 83 | 51 | 48 | 34 | 26 | 12 | 38 | 11 | 17 | —12 | 45 | 18 | 41 | 19 | 62 | 25 | 36 | 26 | 73 | 50 |
| 4 | 90 | 61 | 87 | 66 | 72 | 37 | 42.5 | 24 | 22 | 11 | 27 | 10 | 5 | —22 | 45 | 18 | 47 | 20 | 60 | 34 | 57 | 30 | 66 | 37 |
| 5 | 88 | 62 | 83 | 63 | 71 | 31 | 55 | 28 | 30 | 8 | 24 | 1 | 9 | —17 | 46 | 22 | 55 | 28 | 55 | 21 | 72 | 31 | 62 | 38 |
| 6 | 87 | 62 | 81 | 55 | 77 | 46.5 | 62 | 20 | 41 | 10 | 23.5 | — 5 | — 8 | —26 | 39 | 26 | 58 | 31 | 60 | 32 | 62 | 40 | 75 | 41 |
| 7 | 88 | 61 | 78 | 53 | 71 | 58 | 50 | 43 | 43.5 | 28 | 28 | 14 | 17 | —12 | 32 | 13 | 57 | 28 | 65 | 32 | 71 | 32 | 72 | 50 |
| 8 | 85 | 59 | 73.5 | 57.5 | 78 | 46 | 58 | 32 | 28 | 5.5 | 18 | 0 | 28 | 5 | 23 | 8 | 50 | 32 | 53 | 43 | 53 | 36 | 69 | 51 |
| 9 | 75 | 59 | 83 | 46 | 76.5 | 39 | 53 | 24 | 35 | — 3 | 40 | 12 | 31 | 1 | 25 | — 3 | 44 | 31 | 47 | 35.5 | 52 | 30 | 70 | 54 |
| 10 | 83 | 55 | 81 | 53 | 84 | 49 | 65 | 25 | 54 | 25 | 45 | 21 | 15 | — 5 | 26 | 6 | 51 | 39 | 37 | 32 | 48 | 32 | 78 | 44 |
| 11 | 82 | 59 | 74 | 53 | 84 | 57 | 65 | 23.5 | 49 | 24.5 | 41 | 25 | 38 | 10 | 31 | 8 | 47 | 38 | 43 | 32 | 51 | 25 | 80 | 45 |
| 12 | 77.5 | 62 | 73.5 | 55 | 78 | 46 | 56 | 40 | 50 | 23.5 | 47 | 23 | 25 | 8 | 23 | 7 | 43 | 33 | 52 | 29 | 57 | 24 | 81 | 41 |
| 13 | 85 | 64 | 82 | 47 | 89 | 54 | 61 | 29 | 49 | 25 | 35 | 18 | 23 | 7 | 34 | 5 | 40 | 30 | 50 | 25 | 63 | 20 | 80 | 45 |
| 14 | 81 | 58 | 87 | 54 | 74 | 51.5 | 43 | 31 | 50 | 22 | 42 | 29 | 33 | 5 | 35 | 17 | 51 | 31 | 49 | 24 | 72 | 32 | 60 | 48 |
| 15 | 74 | 55 | 87 | 51 | 64 | 43 | 49.5 | 31 | 46 | 27 | 47 | 25 | 27 | 11 | 26 | 8 | 45 | 36 | 55 | 25 | 59 | 35 | 68 | 54 |
| 16 | 79 | 57 | 85 | 53 | 56 | 38 | 46 | 25 | 36 | 17 | 45 | 22 | 25 | 12 | 29 | 18 | 46 | 29 | 56 | 34 | 67 | 25 | 74 | 40 |
| 17 | 66 | 52 | 89.5 | 57 | 57 | 37 | 59 | 32 | 26 | 11 | 37 | 10 | 33 | 11 | 35 | 5 | 47 | 24 | 58 | 35 | 70 | 36 | 80 | 46 |
| 18 | 58 | 51 | 87 | 49 | 63 | 36 | 53 | 27 | 32 | 6 | 39 | 26 | 30 | 10 | 38 | 21 | 57 | 32 | 57 | 47 | 62 | 43.5 | 86 | 63 |
| 19 | 70 | 48 | 88 | 54 | 67 | 36 | 47.5 | 19 | 38 | 29 | 35.5 | 20 | 35 | 5 | 37 | 30 | 53 | 27 | 67 | 43 | 52 | 44 | 70 | 55 |
| 20 | 81 | 51 | 80 | 54 | 70 | 32 | 67 | 28 | 50 | 34.5 | 33 | 20 | 39 | 7 | 37 | 29 | 58 | 30 | 63 | 37 | 58 | 36 | 80 | 45 |
| 21 | 87 | 54 | 64 | 43 | 83 | 44 | 68 | 32 | 42 | 25.5 | 41 | 29 | 34 | 12.5 | 37 | 31 | 56 | 30.5 | 63 | 34 | 71 | 30 | 82 | 53 |
| 22 | 86 | 60 | 78 | 40 | 66.5 | 42.5 | 63.5 | 25 | 41 | 11.5 | 47 | 39 | 12.5 | —11 | 35 | 26 | 71 | 31 | 57 | 43 | 58 | 49 | 80 | 61 |
| 23 | 83 | 57 | 83 | 49 | 54 | 30 | 55 | 22 | 48 | 33 | 50 | 36 | 20 | —11 | 30 | 22 | 45 | 22 | 48 | 41 | 64 | 52 | 81 | 53 |
| 24 | 84 | 62 | 73 | 50 | 60 | 46 | 42 | 24 | 42 | 27 | 40 | 30 | 15 | 1.5 | 36 | 23 | 37 | 14 | 63 | 40 | 61 | 49 | 89 | 60 |
| 25 | 83 | 63.5 | 85 | 50 | 70 | 39 | 51 | 39 | 38 | 23 | 40 | 29 | 16 | — 7 | 40 | 15 | 48 | 20 | 62 | 32.5 | 52 | 43 | 75 | 56 |
| 26 | 92 | 54 | 81 | 58 | 70 | 46 | 59 | 33 | 32 | 20.5 | 36 | 31 | 23 | 9 | 49 | 25 | 45 | 27 | 72 | 30 | 60 | 41 | 80 | 46 |
| 27 | 84 | 64 | 72 | 42 | 65 | 36 | 48 | 24 | 22.5 | 6 | 31 | 24 | 13 | —10 | 43 | 24 | 35 | 17 | 76 | 39 | 61 | 42 | 85 | 61 |
| 28 | 83 | 56 | 73 | 50 | 68 | 30 | 43 | 24 | 6 | — 4 | 29 | 20 | 15 | —16 | 29 | 17 | 46 | 14 | 71 | 44 | 65 | 39 | 85 | 68 |
| 29 | 83 | 58 | 78 | 46 | 70 | 48 | 37 | 25 | 13 | 1 | 24 | 15 | 25 | 6 | ..... | ..... | 51 | 18 | 74 | 45 | 72 | 40 | 80 | 65 |
| 30 | 89 | 64 | 83 | 50 | 64.5 | 34 | 39 | 26 | 10 | 0 | 30 | 10 | 30 | 18 | ..... | ..... | 55 | 30 | 64 | 41 | 65 | 44 | 70 | 51 |
| 31 | 80 | 62 | 67 | 40 | ..... | ..... | 41.5 | 22 | ..... | ..... | 38 | 11 | 33 | 11 | ..... | ..... | 50 | 34 | ..... | ..... | 74 | 50 | ..... | ..... |
| Range | 44° | | 49°.5 | | 59° | | 49° | | 58° | | 55° | | 65° | | 52° | | 57° | | 55° | | 54° | | 52° | |
| Monthly means | 68°.1 | | 64°.3 | | 55°.4 | | 40° | | 26°.7 | | 27°.4 | | 11°.2 | | 25°.5 | | 36°.2 | | 45°.5 | | 47°.9 | | 63°.7 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, PHILADELPHIA, PA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 90 | 70 | 73 | 68 | 84 | 70 | 79 | 56 | 59 | 43 | 36 | 22 | 35 | 19 | 35 | 28 | 48 | 35 | 60 | 43 | 74 | 48 | 60 | 55 |
| 2 | 82 | 71 | 75 | 66 | 74 | 62 | 78 | 56 | 66 | 48 | 35 | 26 | 40 | 22 | 38 | 24 | 54 | 31 | 63 | 45 | 82 | 61 | 62 | 57 |
| 3 | 79 | 63 | 82 | 67 | 70 | 56 | 77 | 60 | 52 | 41 | 41 | 25 | 25 | 12 | 31 | 15 | 58 | 46 | 63 | 44 | 82 | 65 | 72 | 55 |
| 4 | 82 | 67 | 79 | 68 | 77 | 54 | 73 | 64 | 51 | 36 | 46 | 31 | 47 | 17 | 35 | 12 | 48 | 32 | 52 | 44 | 78 | 59 | 80 | 57 |
| 5 | 83 | 61 | 79 | 63 | 70 | 55 | 65 | 48 | 58 | 42 | 60 | 41 | 33 | 20 | 38 | 25 | 48 | 31 | 62 | 44 | 60 | 55 | 76 | 53 |
| 6 | 81 | 63 | 85 | 63 | 70 | 58 | 58 | 48 | 55 | 36 | 54 | 37 | 26 | 16 | 43 | 27 | 60 | 36 | 61 | 45 | 67 | 50 | 68 | 49 |
| 7 | 80 | 65 | 82 | 70 | 65 | 56 | 61 | 45 | 50 | 33 | 40 | 32 | 20 | 12 | 50 | 29 | 69 | 47 | 57 | 45 | 75 | 54 | 71 | 53 |
| 8 | 83 | 63 | 89 | 71 | 60 | 52 | 64 | 47 | 66 | 35 | 47 | 32 | 30 | 12 | 47 | 35 | 66 | 48 | 63 | 44 | 77 | 56 | 67 | 56 |
| 9 | 88 | 68 | 80 | 71 | 74 | 52 | 67 | 53 | 68 | 56 | 38 | 31 | 34 | 24 | 55 | 36 | 69 | 47 | 55 | 44 | 64 | 58 | 71 | 59 |
| 10 | 85 | 71 | 86 | 67 | 77 | 57 | 68 | 52 | 56 | 38 | 43 | 27 | 44 | 33 | 43 | 36 | 66 | 42 | 59 | 44 | 66 | 52 | 63 | 55 |
| 11 | 80 | 69 | 84 | 67 | 72 | 61 | 62 | 51 | 43 | 36 | 48 | 34 | 43 | 37 | 40 | 25 | 57 | 38 | 64 | 54 | 55 | 46 | 67 | 50 |
| 12 | 84 | 66 | 87 | 67 | 72 | 64 | 58 | 48 | 54 | 33 | 50 | 39 | 48 | 38 | 35 | 22 | 41 | 37 | 67 | 50 | 56 | 41 | 70 | 53 |
| 13 | 83 | 67 | 79 | 72 | 81 | 66 | 63 | 46 | 56 | 41 | 60 | 37 | 48 | 33 | 44 | 32 | 64 | 38 | 66 | 51 | 56 | 42 | 74 | 55 |
| 14 | 79 | 61 | 85 | 70 | 83 | 68 | 71 | 49 | 59 | 41 | 45 | 33 | 50 | 38 | 36 | 31 | 58 | 45 | 67 | 47 | 56 | 43 | 76 | 58 |
| 15 | 87 | 64 | 79 | 72 | 80 | 68 | 78 | 51 | 65 | 46 | 51 | 31 | 42 | 37 | 38 | 26 | 50 | 40 | 59 | 46 | 53 | 44 | 80 | 59 |
| 16 | 89 | 69 | 83 | 67 | 84 | 68 | 79 | 57 | 66 | 55 | 61 | 42 | 38 | 24 | 47 | 33 | 56 | 37 | 55 | 46 | 63 | 44 | 80 | 61 |
| 17 | 87 | 74 | 82 | 67 | 82 | 68 | 64 | 49 | 66 | 46 | 53 | 39 | 33 | 21 | 53 | 36 | 45 | 37 | 60 | 42 | 65 | 50 | 78 | 65 |
| 18 | 86 | 73 | 82 | 66 | 72 | 58 | 68 | 53 | 54 | 38 | 50 | 35 | 40 | 29 | 45 | 22 | 51 | 38 | 64 | 41 | 68 | 51 | 70 | 61 |
| 19 | 78 | 73 | 87 | 67 | 68 | 54 | 71 | 57 | 43 | 32 | 49 | 32 | 42 | 31 | 34 | 15 | 59 | 42 | 67 | 47 | 72 | 49 | 76 | 56 |
| 20 | 80 | 67 | 83 | 68 | 73 | 55 | 73 | 51 | 44 | 30 | 63 | 41 | 51 | 35 | 46 | 27 | 52 | 42 | 68 | 52 | 58 | 53 | 80 | 60 |
| 21 | 80 | 71 | 85 | 69 | 69 | 54 | 54 | 49 | 40 | 28 | 46 | 32 | 49 | 42 | 57 | 38 | 50 | 35 | 77 | 59 | 76 | 56 | 76 | 63 |
| 22 | 82 | 69 | 85 | 67 | 69 | 48 | 51 | 44 | 52 | 38 | 55 | 37 | 50 | 30 | 50 | 41 | 50 | 36 | 71 | 54 | 67 | 53 | 78 | 64 |
| 23 | 82 | 71 | 84 | 67 | 73 | 56 | 62 | 41 | 58 | 46 | 51 | 39 | 45 | 19 | 52 | 42 | 60 | 37 | 68 | 49 | 72 | 50 | 71 | 60 |
| 24 | 87 | 73 | 86 | 67 | 75 | 53 | 70 | 48 | 55 | 52 | 45 | 37 | 35 | 17 | 45 | 38 | 54 | 28 | 78 | 48 | 71 | 53 | 77 | 60 |
| 25 | 89 | 72 | 82 | 73 | 78 | 52 | 69 | 52 | 59 | 51 | 49 | 32 | 50 | 29 | 44 | 32 | 35 | 16 | 68 | 60 | 75 | 59 | 80 | 65 |
| 26 | 93 | 72 | 86 | 69 | 78 | 60 | 60 | 42 | 60 | 48 | 44 | 33 | 52 | 41 | 43 | 29 | 47 | 25 | 70 | 54 | 77 | 58 | 84 | 67 |
| 27 | 95 | 71 | 87 | 69 | 82 | 63 | 51 | 41 | 55 | 46 | 45 | 39 | 45 | 36 | 57 | 33 | 64 | 38 | 71 | 52 | 75 | 61 | 90 | 68 |
| 28 | 83 | 70 | 91 | 72 | 78 | 64 | 57 | 48 | 54 | 43 | 52 | 38 | 42 | 19 | 58 | 41 | 65 | 53 | 67 | 55 | 75 | 61 | 87 | 73 |
| 29 | 85 | 73 | 93 | 72 | 76 | 62 | 71 | 55 | 42 | 30 | 48 | 36 | 31 | 14 | ..... | ..... | 59 | 42 | 66 | 53 | 71 | 58 | 87 | 72 |
| 30 | 89 | 72 | 84 | 72 | 75 | 57 | 61 | 50 | 32 | 22 | 38 | 33 | 34 | 23 | ..... | ..... | 55 | 35 | 61 | 52 | 76 | 55 | 88 | 67 |
| 31 | 84 | 71 | 85 | 70 | ..... | ..... | 56 | 43 | ..... | ..... | 37 | 24 | 34 | 23 | ..... | ..... | 53 | 40 | ..... | ..... | 59 | 54 | ..... | ..... |
| Range | 34° | | 30° | | 36° | | 38° | | 46° | | 41° | | 40° | | 46° | | 53° | | 37° | | 41° | | 41° | |
| Monthly means | 77°.8 | | 75°.5 | | 66°.8 | | 57°.4 | | 46°.6 | | 40°.6 | | 32°.7 | | 36°.6 | | 46°.4 | | 55°.9 | | 61° | | 67°.9 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, PHŒNIX, ARIZ.*

| Day of month. | 1877. July. | | August. | | September. | | October. | | November. | | December. | | 1878. January. | | February. | | March. | | April. | | May. | | June. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | *102 | *69 | *103 | *74 | *104 | *76 | *92 | *67 | *64 | *43 | *69 | *35 | *50 | *29 | *66 | *39 | *59 | *41 | *72 | *49 | *87 | *64 | *88 | *68 |
| 2 | 104 | 70 | 104 | 79 | 102 | 75 | 92 | 61 | 72 | 36 | 58 | 35 | 45 | 28 | 65 | 35 | 63 | 42 | 78 | 50 | 89 | 66 | 89 | 60 |
| 3 | 104 | 70 | 103 | 80 | 99 | 82 | 91 | 65 | 72 | 43 | 57 | 33 | 46 | 29 | 66 | 36 | 75 | 46 | 82 | 01 | 85 | 55 | 95 | 74 |
| 4 | 103 | 75 | 105 | 83 | 95 | 71 | 91 | 61 | 70 | 37 | 58 | 29 | 50 | 25 | 71 | 37 | 73 | 45 | 85 | 56 | 95 | 59 | 96 | 75 |
| 5 | 109 | 80 | 104 | 79 | 99 | 74 | 90 | 57 | 73 | 42 | 57 | 25 | 58 | 29 | 65 | 48 | 71 | 46 | 91 | 63 | 95 | 65 | 92 | 70 |
| 6 | 108 | 76 | 105 | 77 | 99 | 73 | 90 | 59 | 69 | 41 | 66 | 29 | 60 | 36 | 64 | 35 | 76 | 47 | 78 | 57 | 90 | 61 | 92 | 72 |
| 7 | 106 | 90 | 106 | 77 | 101 | 77 | 90 | 60 | 72 | 40 | 68 | 32 | 60 | 36 | 64 | 48 | 72 | 47 | 85 | 56 | 88 | 62 | 94 | 73 |
| 8 | 106 | 86 | 107 | 72 | 102 | 72 | 91 | 58 | 72 | 39 | 56 | 47 | 61 | 35 | 61 | 35 | 60 | 40 | 82 | 54 | 78 | 56 | 97 | 82 |
| 9 | 101 | 83 | 108 | 83 | 100 | 74 | 92 | 62 | 75 | 49 | 62 | 35 | 60 | 35 | 61 | 36 | 61 | 43 | 77 | 55 | 96 | 62 | 100 | 82 |
| 10 | 104 | 79 | 104 | 84 | 96 | 80 | 92 | 63 | 79 | 49 | 69 | 37 | 60 | 37 | 60 | 32 | 64 | 45 | 80 | 55 | 97 | 66 | 95 | 78 |
| 11 | 106 | 80 | 106 | 84 | 87 | 71 | 91 | 68 | 79 | 46 | 69 | 41 | 58 | 41 | 61 | 32 | 69 | 40 | 85 | 50 | 97 | 70 | 97 | 76 |
| 12 | 105 | 86 | 109 | 80 | 78 | 75 | 82 | 68 | 70 | 55 | 69 | 40 | 57 | 35 | 63 | 37 | 71 | 43 | 82 | 54 | 96 | 63 | 94 | 66 |
| 13 | 108 | 85 | 110 | 82 | 80 | 68 | 77 | 54 | 66 | 44 | 80 | 46 | 61 | 37 | 63 | 39 | 75 | 47 | 72 | 54 | 92 | 62 | 97 | 71 |
| 14 | 110 | 82 | 108 | 80 | 84 | 57 | 77 | 56 | 71 | 38 | 73 | 60 | 60 | 40 | 62 | 36 | 77 | 50 | 68 | 59 | 90 | 64 | 95 | 76 |
| 15 | 106 | 84 | 101 | 84 | 91 | 59 | 74 | 51 | 74 | 39 | 64 | 55 | 59 | 38 | 67 | 46 | 83 | 50 | 73 | 54 | 92 | 62 | 90 | 75 |
| 16 | 102 | 86 | 100 | 85 | 95 | 63 | 76 | 46 | 76 | 41 | 64 | 48 | 62 | 38 | 69 | 45 | 87 | 50 | 56 | 45 | 94 | 63 | 95 | 73 |
| 17 | 103 | 83 | 102 | 81 | 98 | 63 | 76 | 47 | 73 | 41 | 68 | 44 | 61 | 41 | 73 | 47 | 87 | 52 | 63 | 45 | 81 | 62 | 95 | 69 |
| 18 | 110 | 82 | 103 | 80 | 97 | 73 | 76 | 49 | 70 | 48 | 52 | 48 | 60 | 38 | 70 | 42 | 68 | 50 | 68 | 41 | 80 | 56 | 100 | 80 |
| 19 | 111 | 90 | 104 | 80 | 99 | 69 | 79 | 49 | 71 | 40 | 60 | 47 | 62 | 47 | 72 | 54 | 72 | 49 | 77 | 47 | 90 | 54 | 100 | 75 |
| 20 | 104 | 85 | 105 | 70 | 98 | 69 | 79 | 48 | 68 | 37 | 61 | 48 | 65 | 34 | 65 | 40 | 82 | 54 | 58 | 52 | 75 | 63 | 103 | 80 |
| 21 | 107 | 86 | 104 | 66 | 96 | 71 | 79 | 49 | 69 | 36 | 59 | 42 | 65 | 35 | 66 | 43 | 84 | 58 | 61 | 48 | 76 | 57 | 103 | 82 |
| 22 | 107 | 84 | 103 | 71 | 96 | 65 | 80 | 52 | 68 | 36 | 58 | 39 | 69 | 47 | 62 | 40 | 73 | 58 | 68 | 50 | 78 | 49 | 105 | 85 |
| 23 | 107 | 80 | 104 | 71 | 90 | 60 | 77 | 62 | 69 | 39 | (†) | ..... | 68 | 41 | 65 | 34 | 79 | 50 | 72 | 47 | 88 | 51 | 101 | 83 |
| 24 | (†) | ..... | 104 | 75 | 86 | 59 | 75 | 51 | 71 | 40 | ..... | ..... | 65 | 48 | 71 | 46 | 83 | 55 | 69 | 53 | 88 | 58 | 100 | 78 |
| 25 | ..... | ..... | 103 | 72 | 88 | 54 | 76 | 49 | 69 | 38 | ..... | ..... | 60 | 48 | 71 | 46 | 77 | 52 | 82 | 53 | 91 | 60 | 98 | 82 |
| 26 | 101 | 77 | 104 | 73 | 90 | 56 | 77 | 52 | 70 | 36 | ..... | ..... | 61 | 35 | 67 | 44 | 68 | 49 | 82 | 52 | 97 | 62 | 102 | 80 |
| 27 | 101 | 79 | 104 | 67 | 92 | 58 | 79 | 54 | 70 | 36 | ..... | ..... | 61 | 35 | 71 | 46 | 72 | 45 | 81 | 57 | 97 | 70 | 101 | 79 |
| 28 | 103 | 74 | 107 | 69 | 94 | 64 | 74 | 50 | 58 | 32 | ..... | ..... | 66 | 48 | 59 | 46 | 62 | 46 | 88 | 54 | 94 | 61 | 105 | 78 |
| 29 | 102* | 71 | 104 | 72 | 83 | 74 | 76 | 50 | 61 | 29 | ..... | ..... | 66 | 40 | ..... | ..... | 61 | 51 | 92 | 58 | 90 | 71 | 99 | 84 |
| 30 | 100 | 79 | 104 | 70 | 91 | 64 | 67 | 49 | 64 | 36 | 55 | 32 | 67 | 40 | ..... | ..... | 62 | 54 | 92 | 60 | 84 | 67 | 95 | 80 |
| 31 | 101 | 70 | 105 | 72 | ..... | ..... | 63 | 40 | ..... | ..... | 51 | 33 | 69 | 38 | ..... | ..... | 68 | 47 | ..... | ..... | 89 | 63 | ..... | ..... |
| Range | ..... | ..... | 44° | | 50° | | 52° | | 50° | | ..... | | 44° | | 39° | | 47° | | 51° | | 42° | | 45° | |
| Monthly means | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |

* Highest and lowest *observed* readings of exposed thermometer.

† No observation taken.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, PILOT POINT, TEX.

| Day of month. | 1877. July. Max. | July. Min. | August. Max. | August. Min. | September. Max. | September. Min. | October. Max. | October. Min. | November. Max. | November. Min. | December. Max. | December. Min. | 1878. January. Max. | January. Min. | February. Max. | February. Min. | March. Max. | March. Min. | April. Max. | April. Min. | May. Max. | May. Min. | June. Max. | June. Min. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 95 | 72 | 101 | 62 | (*) | ..... | 90 | 63 | 63 | 47 | (*) | ..... | 50 | 21 | 56 | 33 | 71 | 46 | 70 | 42 | 89 | 59 | 91 | 69 |
| 2 | 96 | 72 | 101 | 63 | ..... | ..... | 92 | 60 | 63 | 39 | ..... | ..... | 52 | 23 | 51 | 27 | 71 | 42 | 79 | 44 | 81 | 64 | 96 | 70 |
| 3 | 96 | 71 | 101 | 64 | ..... | ..... | 92 | 64 | 66 | 39 | 51 | 12 | 41 | 23 | 48 | 24 | 67 | 37 | 80 | 36 | 82 | 53 | 96 | 65 |
| 4 | 98 | 72 | 98 | 62 | ..... | ..... | 92 | 40 | 66 | 44 | 64 | 18 | 42 | 21 | 63 | 24 | 63 | 35 | 68 | 35 | 80 | 44 | 84 | 60 |
| 5 | 93 | 71 | 102 | 62 | ..... | ..... | 75 | 43 | 61 | 35 | 58 | 26 | 41 | 16 | 66 | 33 | 76 | 40 | 88 | 45 | 87 | 51 | 83 | 61 |
| 6 | (†) | (†) | 103 | 67 | 76 | 61 | 78 | 48 | 51 | 25 | 55 | 34 | 46 | 20 | 79 | 43 | 77 | 52 | 89 | 53 | 87 | 54 | (*) | ..... |
| 7 | 101 | 71 | 102 | 60 | 83 | 57 | 78 | 54 | 61 | 36 | 60 | 25 | 41 | 26 | 52 | 39 | 81 | 58 | 89 | 55 | 91 | 61 | ..... | ..... |
| 8 | 102 | 70 | 92 | 58 | 82 | 56 | 80 | 48 | 67 | 38 | 60 | 23 | 46 | 33 | 52 | 34 | 82 | 50 | 69 | 49 | 90 | 52 | ..... | ..... |
| 9 | 101 | 82 | 98 | 56 | 87 | 57 | 80 | 52 | 49 | 29 | 60 | 32 | 48 | 33 | 51 | 31 | 82 | 44 | 71 | 50 | 81 | 48 | ..... | ..... |
| 10 | 91 | 65 | 101 | 60 | (*) | ..... | 79 | 53 | 50 | 22 | 70 | 33 | 57 | 28 | 41 | 23 | (*) | ..... | 79 | 44 | 82 | 50 | 87 | 59 |
| 11 | 94 | 57 | 103 | 63 | ..... | ..... | 84 | 69 | 57 | 26 | 70 | 33 | 59 | 32 | 54 | 21 | ..... | ..... | 79 | 41 | 78 | 57 | 85 | 58 |
| 12 | 95 | 59 | 102 | 70 | 91 | 58 | 84 | 57 | 65 | 34 | 67 | 33 | 51 | 36 | 58 | 35 | ..... | ..... | 82 | 51 | 79 | 54 | 91 | 66 |
| 13 | 95 | 64 | 98 | 71 | 94 | 61 | 83 | 62 | 66 | 48 | 64 | 52 | 42 | 33 | 62 | 43 | 81 | 37 | 83 | 60 | 81 | 55 | 95 | 71 |
| 14 | 97 | 61 | 91 | 59 | 90 | 68 | 82 | 56 | 67 | 43 | 77 | 49 | 50 | 25 | 68 | 27 | 83 | 46 | 90 | 64 | 71 | 47 | 96 | 66 |
| 15 | 97 | 64 | 90 | 60 | 91 | 68 | 80 | 61 | 74 | 38 | 71 | 46 | 53 | 21 | 68 | 36 | 84 | 47 | 92 | 62 | 82 | 42 | 96 | 71 |
| 16 | 101 | 65 | 93 | 59 | 92 | 65 | 79 | 57 | 80 | 40 | 70 | 54 | 60 | 30 | 71 | 37 | 83 | 48 | 91 | 60 | 83 | 61 | 95 | 66 |
| 17 | 99 | 70 | (*) | ..... | 90 | 55 | 68 | 52 | 79 | 43 | 74 | 52 | 62 | 32 | 71 | 35 | 82 | 47 | 90 | 61 | 92 | 65 | (*) | ..... |
| 18 | 98 | 66 | ..... | ..... | 79 | 50 | 61 | 50 | 75 | 43 | 72 | 55 | 62 | 42 | 74 | 39 | 80 | 47 | 84 | 44 | 91 | 58 | ..... | ..... |
| 19 | 90 | 59 | ..... | ..... | 76 | 45 | 59 | 43 | 66 | 42 | 71 | 53 | 60 | 42 | 76 | 48 | 79 | 47 | 86 | 64 | 83 | 53 | 94 | 62 |
| 20 | 91 | 53 | 94 | 62 | 84 | 48 | 54 | 40 | 60 | 47 | 69 | 53 | 52 | 33 | (*) | ..... | 75 | 43 | 87 | 66 | 91 | 66 | 94 | 64 |
| 21 | 82 | 46 | (*) | ..... | 86 | 52 | 58 | 40 | 62 | 42 | 63 | 50 | 52 | 28 | ..... | ..... | 82 | 49 | 86 | 66 | 84 | 62 | 85 | 65 |
| 22 | 86 | 49 | 92 | 56 | 89 | 55 | 63 | 35 | 59 | 39 | 66 | 47 | 63 | 29 | ..... | ..... | 82 | 54 | 84 | 64 | 90 | 62 | 85 | 59 |
| 23 | 86 | 49 | 90 | 63 | 88 | 55 | 68 | 39 | 69 | 37 | (*) | ..... | 65 | 32 | ..... | ..... | 82 | 43 | 79 | 66 | 91 | 69 | 90 | 61 |
| 24 | 91 | 51 | (*) | ..... | 88 | 56 | 69 | 44 | 67 | 45 | 67 | 42 | 65 | 38 | 75 | 31 | 82 | 52 | 80 | 45 | 91 | 68 | 93 | 64 |
| 25 | 92 | 54 | 97 | 68 | 87 | 55 | 73 | 55 | 61 | 37 | 67 | 40 | 65 | 33 | 65 | 38 | 81 | 43 | 88 | 49 | 90 | 65 | 93 | 66 |
| 26 | 93 | 60 | 96 | 62 | 87 | 61 | (*) | ..... | 61 | 33 | 65 | 35 | 69 | 45 | 66 | 41 | 78 | 48 | 87 | 51 | 87 | 59 | 94 | 67 |
| 27 | 92 | 61 | (*) | ..... | 94 | 63 | ..... | ..... | 60 | 31 | 62 | 38 | 68 | 36 | 65 | 39 | 82 | 57 | 87 | 54 | 83 | 56 | 93 | 68 |
| 28 | 91 | 60 | ..... | ..... | 94 | 63 | 80 | 49 | 58 | 23 | 56 | 38 | 67 | 33 | 68 | 32 | 80 | 44 | 83 | 57 | 89 | 60 | 88 | 65 |
| 29 | 94 | 62 | ..... | ..... | 90 | 60 | 77 | 51 | 41 | 16 | 44 | 29 | 66 | 41 | ..... | ..... | 79 | 41 | 83 | 54 | 89 | 63 | 90 | 68 |
| 30 | 96 | 62 | ..... | ..... | 91 | 62 | 61 | 48 | 42 | 15 | 42 | 27 | 46 | 32 | ..... | ..... | 77 | 47 | 89 | 54 | 91 | 70 | 92 | 70 |
| 31 | 99 | 65 | ..... | ..... | ..... | ..... | 60 | 46 | ..... | ..... | 41 | 26 | 53 | 29 | ..... | ..... | 70 | 38 | ..... | ..... | 91 | 68 | ..... | ..... |
| Range | | | | | | | | | 65° | | | | 53° | | | | | | 37° | | 50° | | | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

* No observations taken.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, PIKE'S PEAK, ARIZ.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 40 | 26 | 45 | 33 | 50 | 33 | 43 | 27 | 13 | − 2 | 14 | 3 | − 2 | −17 | 6 | − 4 | 12 | − 4 | 13 | 3 | 24 | 10 | 32 | 20 |
| 2 | 41 | 25 | 48 | 34 | 38 | 30 | 43 | 25 | 14 | 2 | 12 | 4 | − 6 | −17 | − 2 | − 6 | − 2 | −10 | 15 | 5 | 15 | 3 | 30 | 16 |
| 3 | 45 | 29 | 48 | 34 | 34 | 23 | 30 | 20 | 16 | 7 | 8 | − 3 | − 3 | −13 | 9 | − 2 | 11 | − 4 | 14 | 6 | 10 | 0 | 30 | 16 |
| 4 | 51 | 33 | 54 | 34 | 32 | 20 | 32 | 17 | 9 | 0 | − 2 | −25 | − 2 | −13 | 15 | 5 | 18 | 7 | 22 | 6 | 24 | 5 | 33 | 20 |
| 5 | 51 | 36 | 53 | 36 | 31 | 19 | 30 | 16 | 11 | − 3 | 7 | −26 | − 2 | − 7 | 11 | 2 | 15 | 2 | 29 | 14 | 33 | 15 | 32 | 20 |
| 6 | 52 | 38 | 59 | 35 | 41 | 26 | 23 | 11 | 13 | 2 | 14 | 3 | 6 | − 3 | 8 | − 2 | 15 | 1 | 27 | 15 | 30 | 16 | 28 | 19 |
| 7 | 46 | 38 | 51 | 32 | 31 | 25 | 29 | 10 | 9 | − 4 | 15 | 4 | 6 | − 2 | 3 | − 5 | 14 | 0 | 29 | 13 | 24 | 9 | 32 | 16 |
| 8 | 40 | 35 | 48 | 32 | 26 | 14 | 29 | 16 | − 1 | −10 | 20 | 10 | 6 | − 2 | − 1 | −10 | 2 | −21 | 23 | 0 | 27 | 9 | 31 | 15 |
| 9 | 43 | 34 | 55 | 32 | 42 | 21 | 33 | 18 | 20 | −10 | 21 | 11 | 10 | − 1 | − 3 | −15 | − 2 | −16 | 1 | −10 | 26 | 14 | 40 | 22 |
| 10 | 45 | 31 | 56 | 36 | 48 | 31 | 40 | 23 | 23 | 16 | 27 | 11 | 16 | 6 | − 5 | −19 | − 2 | −13 | 12 | −19 | 27 | 13 | 37 | 26 |
| 11 | 48.5 | 36 | 53 | 32 | 49 | 33 | 36 | 25 | 23 | 14 | 28 | 13 | 9 | 0 | 10 | − 9 | − 2 | −10 | 25 | − 9 | 29 | 17 | 38 | 27 |
| 12 | 44 | 34 | 52 | 32 | 46 | 31 | 30 | 19 | 21 | 14 | 22 | 10 | 0 | −13 | 10 | 0 | 6 | − 7 | 25 | − 2 | 26 | 18 | 33 | 26 |
| 13 | 52 | 36 | 39 | 29 | 33 | 20 | 27 | 13 | 15 | 7 | 18 | 8 | 2 | −17 | 3 | − 4 | 14 | 4 | 27 | 3 | 30 | 13 | 35 | 24 |
| 14 | 53 | 35 | 41 | 29 | 26 | 11 | 18 | 10 | 14 | 3 | 24 | 10 | 5 | − 4 | − 1 | − 6 | 17 | 5 | 18 | 6 | 30 | 15 | 39 | 25 |
| 15 | 52 | 38 | 41 | 30 | 37 | 23 | 22 | 10 | 20 | 8 | 30 | 17 | 10 | 4 | 4 | − 2 | 24 | 12 | 7 | − 1 | 24 | 12 | 40 | 30 |
| 16 | 54 | 36 | 42 | 30 | 40 | 23 | 19 | 6 | 20 | 15 | 20 | 12 | 16 | 4 | 6 | − 4 | 26 | 15 | 16 | − 1 | 30 | 13 | 35 | 25 |
| 17 | 48 | 34 | 41 | 33 | 40 | 22 | 15 | 5 | 21 | 13 | 18 | 6 | 10 | 6 | 14 | 1 | 29 | 13 | 12 | − 9 | 30 | 15 | 35 | 23 |
| 18 | 41 | 33 | 45 | 29 | 40 | 21 | 13 | 0 | 15 | 8 | 21 | 7 | 7 | 0 | 13 | 7 | 29 | 14 | 7 | − 9 | 17 | − 3 | 38 | 27 |
| 19 | 44 | 32 | 41 | 29 | 44 | 26 | 5 | − 2 | 20 | 4 | 15 | 5 | 2 | − 5 | 14 | 4 | 30 | 11 | 21 | 4 | 27 | 0 | 41 | 26 |
| 20 | 39 | 30 | 38 | 28 | 46 | 26 | 13 | − 6 | 21 | 4 | 15 | 8 | − 4 | −10 | 12 | − 4 | 29 | 12 | 26 | 10 | 28 | 16 | 41 | 26 |
| 21 | 48 | 23 | 41 | 27 | 37 | 22 | 18 | 7 | 12 | 2 | 12 | 3 | 7 | − 6 | 4 | − 4 | 31 | 16 | 15 | − 3 | 32 | 15 | 40 | 27 |
| 22 | 47 | 35 | 47 | 29 | 43 | 23 | 20 | 10 | 16 | 0 | 6 | − 2 | 16 | 6 | 2 | − 5 | 32 | 15 | 15 | − 4 | 28 | 15 | 43 | 32 |
| 23 | 45 | 34 | 51 | 33 | 39 | 20 | 19 | 8 | 20 | 8 | 13 | 3 | 12 | 0 | − 2 | − 9 | 24 | 14 | 16 | 4 | 27 | 10 | 39 | 31 |
| 24 | 45 | 32 | 53 | 37 | 38 | 22 | 19 | 7 | 9 | −12 | 15 | 4 | 4 | − 3 | 13 | − 6 | 30 | 11 | 22 | 7 | 31 | 17 | 38 | 26 |
| 25 | 37 | 31 | 55 | 36 | 28 | 16 | 22 | 6 | 10 | 0 | 13 | 5 | 13 | 3 | 19 | 6 | 30 | 12 | 28 | 9 | 23 | 16 | 40 | 29 |
| 26 | 44 | 30 | 53 | 35 | 38 | 17 | 22 | 10 | 4 | −12 | 8 | − 8 | 7 | 0 | 17 | 7 | 24 | 14 | 27 | 16 | 28 | 16 | 40 | 28 |
| 27 | 41 | 29 | 52 | 35 | 46 | 26 | 19 | 8 | −10 | −25 | 3 | −12 | 10 | − 2 | 18 | 6 | 15 | 9 | 27 | 14 | 30 | 17 | 42 | 27 |
| 28 | 47 | 25 | 55 | 36 | 45 | 30 | 10 | − 2 | −17 | −28 | − 8 | −15 | 10 | − 3 | 15 | 4 | 14 | 7 | 25 | 11 | 32 | 19 | 44 | 28 |
| 29 | 52 | 33 | 58 | 37 | 40 | 27 | 18 | 5 | 3 | −24 | − 8 | −14 | − 2 | − 7 | ..... | ..... | 7 | 4 | 34 | 15 | 35 | 20 | 43 | 28 |
| 30 | 49 | 32 | 58 | 38 | 44 | 27 | 23 | 14 | 6 | − 5 | − 7 | −18 | 18 | − 9 | ..... | ..... | 16 | 3 | 28 | 20 | 31 | 18 | 42 | 29 |
| 31 | 49 | 30 | 54 | 36 | ..... | ..... | 18 | 13 | ..... | ..... | − 2 | −12 | 10 | 3 | ..... | ..... | 15 | 8 | ..... | ..... | 33 | 19 | ..... | ..... |
| Range | 31° | | 32° | | 39° | | 49° | | 51° | | 58° | | 35° | | 38° | | 53° | | 53° | | 38° | | 29° | |
| Monthly means | 39°.1 | | 39°.4 | | 30°.9 | | 17°.0 | | 6°.4 | | 7°.2 | | 1°.4 | | 2°.5 | | 10°.0 | | 12°.4 | | 19°.8 | | 30°.3 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION,* PIOCHE, NEV.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | | | 87 | 55 | 71 | 63 | 75 | 52 | 45 | 23 | 45 | 30 | 24 | 7 | 40 | 22 | 41 | 20 | 56 | 35 | 67 | 43 | 62 | 39 |
| 2 | | | 86 | 57 | 83 | 56 | 75 | 52 | 51 | 28 | 41 | 30 | 28 | 9 | 42 | 22 | 48 | 26 | 64 | 36 | 58 | 33 | 66 | 42 |
| 3 | | | 84 | 64 | 78 | 54 | 62 | 34 | 51 | 36 | 44 | 24 | 31 | 8 | 50 | 25 | 52 | 28 | 65 | 38 | 64 | 32 | 73 | 46 |
| 4 | | | 84 | 62 | 80 | 52 | 70 | 38 | 47 | 28 | 31 | 14 | 32 | 12 | 43 | 32 | 53 | 35 | 66 | 41 | 74 | 42 | 74 | 50 |
| 5 | | | 84 | 56 | 84 | 57 | 72 | 43 | 52 | 32 | 40 | 12 | 32 | 14 | 40 | 27 | 51 | 32 | 72 | 47 | 77 | 51 | 77 | 53 |
| 6 | | | 87 | 56 | 79 | 59 | 67 | 45 | 51 | 36 | 49 | 22 | 35 | 13 | 42 | 21 | 52 | 38 | 72 | 46 | 65 | 32 | 75 | 51 |
| 7 | | | 90 | 56 | 82 | 52 | 72 | 42 | 48 | 31 | 55 | 32 | 39 | 16 | 40 | 19 | 43 | 23 | 64 | 43 | 65 | 32 | 79 | 47 |
| 8 | | | 89 | 57 | 78 | 47 | 75 | 45 | 51 | 31 | 55 | 32 | 40 | 21 | 40 | 17 | 38 | 16 | 66 | 43 | 73 | 43 | 81 | 52 |
| 9 | | | 92 | 63 | 84 | 49 | 78 | 47 | 56 | 33 | 56 | 32 | 46 | 23 | 40 | 16 | 39 | 19 | 51 | 26 | 76 | 50 | 84 | 54 |
| 10 | | | 88 | 66 | 84 | 58 | 73 | 50 | 57 | 42 | 55 | 31 | 43 | 30 | 41 | 18 | 47 | 23 | 59 | 26 | 79 | 48 | 82 | 52 |
| 11 | | | 89 | 61 | 76 | 59 | 71 | 55 | 56 | 41 | 52 | 34 | 35 | 21 | 46 | 25 | 46 | 26 | 68 | 37 | 77 | 54 | 81 | 51 |
| 12 | | | 88 | 61 | 64 | 40 | 59 | 45 | 52 | 40 | 54 | 29 | 35 | 17 | 40 | 28 | 53 | 26 | 65 | 44 | 73 | 49 | 79 | 52 |
| 13 | | | 93 | 64 | 61 | 32 | 56 | 38 | 49 | 32 | 52 | 27 | 37 | 15 | 37 | 25 | 58 | 38 | 55 | 40 | 77 | 50 | 80 | 52 |
| 14 | | | 90 | 63 | 68 | 41 | 52 | 36 | 52 | 28 | 52 | 35 | 38 | 24 | 41 | 19 | 60 | 34 | 42 | 26 | 75 | 54 | 81 | 54 |
| 15 | | | 91 | 63 | 77 | 48 | 54 | 37 | 61 | 34 | 43 | 39 | 42 | 21 | 42 | 29 | 64 | 41 | 35 | 23 | 72 | 45 | 84 | 55 |
| 16 | | | 82 | 62 | 78 | 55 | 56 | 37 | 59 | 36 | 44 | 37 | 40 | 30 | 43 | 32 | 65 | 39 | 39 | 22 | 71 | 31 | 79 | 57 |
| 17 | | | 86 | 58 | 78 | 50 | 58 | 37 | 47 | 29 | 43 | 37 | 40 | 31 | 46 | 33 | 64 | 43 | 42 | 21 | 50 | 26 | 77 | 52 |
| 18 | | | 84 | 61 | 83 | 50 | 64 | 39 | 48 | 25 | 44 | 36 | 41 | 28 | 46 | 37 | 61 | 44 | 49 | 25 | 62 | 37 | 81 | 53 |
| 19 | | | 84 | 58 | 84 | 50 | 62 | 38 | 55 | 30 | 44 | 31 | 46 | 25 | 42 | 29 | 63 | 35 | 52 | 31 | 62 | 43 | 83 | 56 |
| 20 | | | 86 | 55 | 80 | 55 | 60 | 37 | 47 | 30 | 46 | 28 | 40 | 24 | 39 | 22 | 66 | 42 | 45 | 27 | 45 | 36 | 86 | 56 |
| 21 | | | 88 | 58 | 75 | 52 | 60 | 38 | 48 | 26 | 44 | 26 | 43 | 21 | 39 | 24 | 52 | 34 | 42 | 26 | 46 | 32 | 87 | 58 |
| 22 | | | 87 | 56 | 72 | 51 | 58 | 38 | 49 | 27 | 44 | 30 | 41 | 30 | 40 | 21 | 49 | 32 | 52 | 28 | 52 | 33 | 78 | 57 |
| 23 | | | 87 | 64 | 72 | 43 | 50 | 40 | 55 | 36 | 42 | 28 | 46 | 32 | 44 | 21 | 62 | 39 | 57 | 31 | 65 | 36 | 80 | 49 |
| 24 | | | 88 | 60 | 72 | 46 | 54 | 37 | 46 | 26 | 40 | 25 | 42 | 24 | 46 | 31 | 60 | 41 | 63 | 35 | 68 | 48 | 83 | 56 |
| 25 | | | 86 | 60 | 73 | 46 | 64 | 36 | 54 | 31 | 28 | 20 | 37 | 27 | 53 | 33 | 51 | 39 | 63 | 40 | 71 | 48 | 85 | 56 |
| 26 | | | 80 | 57 | 77 | 50 | 63 | 40 | 50 | 35 | 30 | 15 | 39 | 17 | 48 | 32 | 51 | 31 | 61 | 41 | 78 | 48 | 86 | 58 |
| 27 | | | 84 | 56 | 79 | 50 | 52 | 35 | 36 | 21 | 33 | 10 | 44 | 23 | 44 | 24 | 51 | 32 | 61 | 36 | 75 | 54 | 90 | 64 |
| 28 | | | 87 | 56 | 78 | 53 | 39 | 27 | 37 | 13 | 30 | 15 | 42 | 29 | 36 | 19 | 41 | 29 | 66 | 42 | 67 | 51 | 82 | 63 |
| 29 | 85 | 63 | 81 | 57 | 77 | 54 | 37 | 19 | 44 | 21 | 30 | 11 | 46 | 24 | ..... | ..... | 49 | 28 | 75 | 43 | 60 | 30 | 72 | 51 |
| 30 | 79 | 59 | 82 | 52 | 73 | 56 | 33 | 25 | 49 | 24 | 27 | 11 | 43 | 29 | ..... | ..... | 53 | 33 | 71 | 44 | 62 | 34 | 79 | 48 |
| 31 | 83 | 53 | 84 | 55 | ..... | ..... | 35 | 26 | ..... | ..... | 26 | 8 | 43 | 25 | ..... | ..... | 51 | 34 | ..... | ..... | 56 | 42 | ..... | ..... |
| Range | | | 41° | | 52° | | 50° | | 48° | | 48° | | 39° | | 37° | | 50° | | 54° | | 49° | | 51° | |
| Monthly means | | | 73°.9 | | 64°.4 | | 49°.1 | | 39°.5 | | 32°.9 | | 29°.5 | | 32°.7 | | 41°.8 | | 46°.7 | | 55°.4 | | 67°.5 | |

*Observations commenced July 29, 1877.

*Maximum, minimum, and mean temperature—Continued.*

STATION, PITTSBURGH, PA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 90 | 67 | 91 | 70 | 75 | 60 | 83 | 57 | 54 | 34 | 28 | 20 | 34 | 27 | 33 | 28 | 58 | 30 | 53 | 39 | 78 | 51 | 79 | 52 |
| 2 | 78 | 63 | 89 | 69 | 70 | 51 | 84 | 54 | 61 | 40 | 34 | 23 | 34 | 20 | 36 | 24 | 53 | 40 | 60 | 38 | 85 | 59 | 84 | 56 |
| 3 | 88 | 64 | 85 | 67 | 67 | 50 | 82 | 54 | 44 | 35 | 45 | 22 | 27 | 14 | 35 | 17 | 53 | 39 | 62 | 35 | 84 | 61 | 87 | 60 |
| 4 | 83 | 66 | 79 | 55 | 78 | 64 | 71 | 51 | 57 | 29 | 51 | 27 | 31 | 21 | 33 | 9 | 39 | 31 | 65 | 40 | 62 | 52 | 82 | 66 |
| 5 | 85 | 62 | 84 | 53 | 77 | 55 | 56 | 44 | 62 | 39 | 60 | 37 | 29 | 14 | 34 | 12 | 52 | 29 | 62 | 38 | 67 | 50 | 66 | 50 |
| 6 | 82 | 65 | 87 | 67 | 69 | 61 | 63 | 41 | 40 | 29 | 37 | 30 | 18 | 9 | 47 | 19 | 66 | 40 | 51 | 41 | 69 | 46 | 69 | 43 |
| 7 | 82 | 61 | 90 | 66 | 64 | 60 | 67 | 38 | 54 | 24 | 40 | 27 | 16 | 1 | 56 | 23 | 69 | 48 | 56 | 37 | 82 | 55 | 79 | 45 |
| 8 | 90 | 63 | 90 | 66 | 69 | 57 | 62 | 50 | 62 | 40 | 40 | 29 | 29 | − 1 | 47 | 38 | 68 | 37 | 63 | 36 | 72 | 60 | 66 | 53 |
| 9 | 85 | 73 | 85 | 60 | 79 | 53 | 66 | 51 | 57 | 38 | 38 | 24 | 42 | 26 | 49 | 42 | 74 | 44 | 70 | 55 | 71 | 52 | 71 | 51 |
| 10 | 83 | 68 | 80 | 60 | 73 | 61 | 66 | 50 | 38 | 34 | 47 | 28 | 43 | 37 | 45 | 25 | 73 | 49 | 74 | 55 | 60 | 43 | 57 | 49 |
| 11 | 79 | 61 | 86 | 57 | 79 | 65 | 55 | 46 | 44 | 27 | 52 | 39 | 39 | 35 | 28 | 20 | 67 | 55 | 65 | 49 | 51 | 40 | 64 | 51 |
| 12 | 81 | 53 | 85 | 68 | 86 | 62 | 53 | 42 | 51 | 30 | 56 | 33 | 42 | 35 | 34 | 18 | 63 | 45 | 66 | 47 | 55 | 42 | 70 | 49 |
| 13 | 84 | 58 | 80 | 66 | 80 | 65 | 63 | 39 | 57 | 30 | 56 | 40 | 44 | 32 | 42 | 33 | 55 | 43 | 63 | 43 | 55 | 35 | 76 | 45 |
| 14 | 88 | 62 | 81 | 65 | 85 | 63 | 81 | 44 | 65 | 31 | 44 | 31 | 45 | 35 | 46 | 34 | 50 | 42 | 67 | 39 | 55 | 38 | 80 | 50 |
| 15 | 93 | 64 | 81 | 61 | 86 | 65 | 80 | 47 | 61 | 41 | 50 | 29 | 36 | 32 | 40 | 33 | 47 | 38 | 57 | 46 | 56 | 42 | 85 | 55 |
| 16 | 95 | 67 | 74 | 62 | 86 | 68 | 77 | 50 | 56 | 45 | 61 | 48 | 32 | 29 | 47 | 35 | 53 | 33 | 60 | 48 | 61 | 34 | 81 | 67 |
| 17 | 84 | 67 | 71 | 63 | 73 | 56 | 70 | 50 | 63 | 43 | 56 | 49 | 40 | 30 | 45 | 36 | 49 | 41 | 68 | 43 | 62 | 48 | 74 | 64 |
| 18 | 83 | 65 | 84 | 60 | 67 | 47 | 82 | 53 | 52 | 36 | 54 | 36 | 52 | 39 | 36 | 24 | 49 | 38 | 76 | 47 | 71 | 42 | 77 | 59 |
| 19 | 82 | 67 | 88 | 60 | 67 | 47 | 69 | 55 | 43 | 33 | 67 | 45 | 57 | 33 | 41 | 17 | 53 | 35 | 79 | 56 | 76 | 53 | 78 | 52 |
| 20 | 78 | 62 | 86 | 60 | 71 | 46 | 71 | 55 | 52 | 33 | 60 | 52 | 51 | 39 | 55 | 36 | 52 | 37 | 74 | 62 | 84 | 60 | 82 | 53 |
| 21 | 80 | 58 | 92 | 62 | 67 | 48 | 55 | 47 | 49 | 35 | 60 | 43 | 51 | 43 | 60 | 43 | 44 | 31 | 75 | 54 | 71 | 52 | 78 | 62 |
| 22 | 86 | 62 | 92 | 63 | 71 | 42 | 55 | 40 | 46 | 39 | 55 | 38 | 43 | 33 | 58 | 46 | 56 | 31 | 86 | 52 | 69 | 48 | 62 | 54 |
| 23 | 87 | 67 | 80 | 69 | 80 | 45 | 65 | 42 | 55 | 43 | 59 | 39 | 33 | 12 | 46 | 38 | 65 | 33 | 88 | 61 | 77 | 44 | 66 | 54 |
| 24 | 87 | 68 | 84 | 69 | 84 | 50 | 69 | 46 | 60 | 50 | 57 | 42 | 45 | 12 | 38 | 34 | 54 | 18 | 77 | 58 | 84 | 59 | 78 | 59 |
| 25 | 87 | 70 | 84 | 62 | 85 | 57 | 66 | 53 | 58 | 51 | 57 | 40 | 52 | 41 | 36 | 29 | 31 | 16 | 70 | 50 | 80 | 56 | 86 | 56 |
| 26 | 95 | 74 | 87 | 57 | 84 | 58 | 62 | 51 | 58 | 46 | 55 | 44 | 45 | 37 | 39 | 25 | 44 | 26 | 63 | 50 | 78 | 60 | 90 | 59 |
| 27 | 96 | 70 | 91 | 60 | 83 | 59 | 66 | 48 | 51 | 40 | 49 | 45 | 45 | 33 | 49 | 26 | 72 | 41 | 60 | 50 | 75 | 51 | 90 | 69 |
| 28 | 95 | 72 | 94 | 64 | 81 | 63 | 73 | 45 | 42 | 36 | 51 | 45 | 42 | 19 | 56 | 29 | 69 | 41 | 63 | 50 | 73 | 55 | 89 | 65 |
| 29 | 87 | 73 | 93 | 64 | 83 | 57 | 70 | 53 | 36 | 22 | 53 | 41 | 29 | 17 | ..... | ..... | 52 | 36 | 66 | 52 | 72 | 46 | 89 | 67 |
| 30 | 89 | 68 | 86 | 67 | 87 | 56 | 59 | 44 | 23 | 14 | 44 | 32 | 37 | 20 | ..... | ..... | 54 | 33 | 72 | 47 | 63 | 52 | 96 | 67 |
| 31 | 91 | 71 | 85 | 59 | ..... | ..... | 58 | 42 | ..... | ..... | 34 | 29 | 32 | 24 | ..... | ..... | 53 | 40 | ..... | ..... | 76 | 46 | ..... | ..... |
| Range | 43° | | 41° | | 45° | | 46° | | 51° | | 47° | | 58° | | 51° | | 58° | | 53° | | 51° | | 53° | |
| Monthly means | 75°.4 | | 72°.9 | | 65°.7 | | 56°.8 | | 43°.2 | | 43°.2 | | 32°.2 | | 36°.3 | | 46°.6 | | 57°.1 | | 60° | | 66°.9 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, PORT DOVER, CANADA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 75.7 | 65.8 | 90.9 | 59.8 | 67.1 | 55.1 | 75.7 | 61.8 | 46.9 | 32.0 | 28.0 | 21.0 | 32.0 | 16.0 | 26.0 | 21.0 | 37.0 | 25.0 | 52.1 | 32.0 | 64.1 | 49.7 | 78.7 | 49.7 |
| 2 | 69.7 | 55.7 | 85.8 | 71.8 | 59.8 | 49.7 | 75.7 | 57.8 | 52.1 | 40.0 | 33.0 | 11.8 | 32.0 | 4.0 | 25.0 | 6.6 | 41.9 | 26.0 | 50.1 | 36.0 | 66.8 | 51.7 | 79.8 | 55.7 |
| 3 | 79.8 | 60.8 | 77.8 | 59.8 | 61.8 | 45.0 | 76.1 | 55.7 | 39.9 | 33.0 | 38.9 | 30.0 | 24.0 | −1.6 | 28.0 | −3.2 | 41.9 | 33.0 | 55.1 | 34.0 | 64.1 | 51.7 | 74.7 | 61.8 |
| 4 | 71.1 | 57.8 | 75.7 | 52.7 | 72.7 | 52.7 | 68.1 | 45.9 | 44.9 | 30.0 | 42.9 | 37.0 | 29.0 | 24.0 | 30.0 | 7.8 | 33.0 | 25.0 | 59.1 | 38.0 | 56.1 | 47.7 | 71.7 | 52.7 |
| 5 | 73.7 | 55.7 | 81.0 | 49.7 | 69.7 | 55.8 | 54.8 | 36.0 | 38.9 | 26.0 | 45.9 | 34.0 | 25.0 | 8.8 | 30.0 | 10.8 | 39.9 | 28.0 | 58.8 | 36.0 | 60.1 | 47.7 | 62.1 | 43.9 |
| 6 | 76.7 | 59.8 | 78.8 | 61.8 | 65.8 | 55.7 | 57.1 | 38.9 | 37.0 | 20.0 | 35.0 | 26.0 | 15.1 | 2.4 | 38.0 | 27.0 | 46.9 | 36.0 | 48.8 | 38.9 | 57.1 | 47.0 | 61.8 | 38.0 |
| 7 | 80.8 | 57.7 | 78.8 | 63.8 | 60.8 | 53.7 | 60.8 | 35.0 | 44.9 | 23.0 | 37.0 | 25.0 | 11.0 | −1.6 | 39.9 | 29.0 | 56.1 | 39.9 | 52.1 | 33.0 | 73.1 | 49.7 | 68.7 | 45.0 |
| 8 | 77.8 | 60.8 | 83.8 | 59.8 | 67.1 | 53.7 | 57.8 | 51.7 | 51.1 | 43.9 | 37.0 | 28.0 | 28.0 | 8.8 | 36.0 | 21.0 | 58.1 | 31.0 | 59.8 | 35.0 | 61.8 | 53.7 | 52.1 | 46.9 |
| 9 | 80.8 | 67.8 | 79.8 | 63.8 | 76.1 | 52.7 | 58.8 | 47.0 | 51.1 | 28.0 | 35.0 | 25.0 | 37.0 | 27.0 | 35.0 | 22.0 | 65.1 | 38.0 | 54.8 | 45.0 | 61.1 | 45.0 | 65.8 | 42.0 |
| 10 | 75.7 | 58.8 | 77.1 | 57.8 | 71.8 | 58.8 | 58.8 | 47.0 | 30.0 | 22.0 | 41.9 | 32.0 | 37.0 | 34.0 | 240. | 17.0 | 66.8 | 42.0 | 54.8 | 44.9 | 50.8 | 42.9 | 63.8 | 48.7 |
| 11 | 70.7 | 54.7 | 76.7 | 58.8 | 72.7 | 64.8 | 50.1 | 42.9 | 43.9 | 23.0 | 43.9 | 38.0 | 38.9 | 33.0 | 21.1 | 4.6 | 49 1 | 36.0 | 52.1 | 44.0 | 43.9 | 36.0 | 66.1 | 47.0 |
| 12 | 78.8 | 57.8 | 77.8 | 60.8 | 78.8 | 65.8 | 50.8 | 38.0 | 45.9 | 32.0 | 42.9 | 27.0 | 37.0 | 33.0 | 28.0 | 16.0 | 38.0 | 33.0 | 58.8 | 46.0 | 46.9 | 32.0 | 67.1 | 47.0 |
| 13 | 74.7 | 56.7 | 70.7 | 60.8 | 78.1 | 61.8 | 57.8 | 37.0 | 48.8 | 29.0 | 45.9 | 32.0 | 35.0 | 32.0 | 38.0 | 23.0 | 38.0 | 34.0 | 57.8 | 37.0 | 52.1 | 33.0 | 67.7 | 48.7 |
| 14 | 78.8 | 53.7 | 72.7 | 62.8 | 83.0 | 58.8 | 63.1 | 51.7 | 50.1 | 43.0 | 37.9 | 25.0 | 33.0 | 32.0 | 31.0 | 15.0 | 41.9 | 34.0 | 54.8 | 36.0 | 56.8 | 32.0 | 81.0 | 49.7 |
| 15 | 78.8 | 64.8 | 77.8 | 58.8 | 82.8 | 61.8 | 62.8 | 47.0 | 50.1 | 46.0 | 47.8 | 37.0 | 32.0 | 23.0 | 29.0 | 24.0 | 43.9 | 33.0 | 51.1 | 40.0 | 55.8 | 36.0 | 79.8 | 50.7 |
| 16 | 83.8 | 64.8 | 70.7 | 62.8 | 75.7 | 65.8 | 63.8 | 50.7 | 50.1 | 43.9 | 45.9 | 36.0 | 23.0 | 9.8 | 32.0 | 18.0 | 41.9 | 34.0 | 62.1 | 40.0 | 58.8 | 34.0 | 71.1 | 62.8 |
| 17 | 75.7 | 64.8 | 74.7 | 59.8 | 65.8 | 52.7 | 57.8 | 47.0 | 50.8 | 39.9 | 48.8 | 33.0 | 35.0 | 17.0 | 35.0 | 24.0 | 47.8 | 36.0 | 66.8 | 40.0 | 67.1 | 39.0 | 71.1 | 52.7 |
| 18 | 72.7 | 65.8 | 74.7 | 58.8 | 64.8 | 45.0 | 58.1 | 49.7 | 39.9 | 31.0 | 36.0 | 26.0 | 38.9 | 29.0 | 24.0 | 6.6 | 43.9 | 33.0 | 69.7 | 46.0 | 67.8 | 42.0 | 70.7 | 50.7 |
| 19 | 73.7 | 63.8 | 81.8 | 61.8 | 68.1 | 43.0 | 52.1 | 47.0 | 33.0 | 25.0 | 46.9 | 32.0 | 38.9 | 26.0 | 31.0 | −1.2 | 48.1 | 35.0 | 60.8 | 49.7 | 65.1 | 52.7 | 70.7 | 47.7 |
| 20 | 70.7 | 57.8 | 81.8 | 59.8 | 64.8 | 47.7 | 47.1 | 39.9 | 37.9 | 24.0 | 46.9 | 37.0 | 38.9 | 31.0 | 38.9 | 29.0 | 48.8 | 30.0 | 71.1 | 50.7 | 68.7 | 55.7 | 76.7 | 56.7 |
| 21 | 70.7 | 52.7 | 85.0 | 60.8 | 65.1 | 46.7 | 45.9 | 39.0 | 45.9 | 26.0 | 46.9 | 33.0 | 38.9 | 34.0 | 37.0 | 35.0 | 37.0 | 30.0 | 60.8 | 50.7 | 58.1 | 45.9 | 74.7 | 61.8 |
| 22 | 79.8 | 55.7 | 86.0 | 69.8 | 67.7 | 39.0 | 51.8 | 31.0 | 45.9 | 40.0 | 46.9 | 38.0 | 35.0 | 21.0 | 41.9 | 35.0 | 41.9 | 29.0 | 52.1 | 42.9 | 59.8 | 41.0 | 64.8 | 55.7 |
| 23 | 80.8 | 59.8 | 77.8 | 66.8 | 70.1 | 47.0 | 59.8 | 44.0 | 46.9 | 42.9 | 40.9 | 38.0 | 21.0 | 3.6 | 37.0 | 33.0 | 52.1 | 31.0 | 68.7 | 42.0 | 72.1 | 37.0 | 60.1 | 55.7 |
| 24 | 80.8 | 59.8 | 77.8 | 66.8 | 72.1 | 51.7 | 60.8 | 53.7 | 46.9 | 45.9 | 38.9 | 34.0 | 35.0 | 10.8 | 33.0 | 29.0 | 43.9 | 7.8 | 59.8 | 54.7 | 74.7 | 53.7 | 77.1 | 58.8 |
| 25 | 83.8 | 60.8 | 75.7 | 62.8 | 72.1 | 62.8 | 59.8 | 39.9 | 51.8 | 43.9 | 36.0 | 33.0 | 38.9 | 32.0 | 29.0 | 25.0 | 30.0 | 7.8 | 59.8 | 48.7 | 67.7 | 57.8 | 72.1 | 52.7 |
| 26 | 83.8 | 69.8 | 79.8 | 65.8 | 72.7 | 64.8 | 40.9 | 38.0 | 50.1 | 44.9 | 37.9 | 33.0 | 37.0 | 33.0 | 38.9 | 23.0 | 36.0 | 30.0 | 59.1 | 47.7 | 69.1 | 53.7 | 79.8 | 58.8 |
| 27 | 78.8 | 70.8 | 78.8 | 62.8 | 72.7 | 56.7 | 43.9 | 38.0 | 46.9 | 40.9 | 38.9 | 33.0 | 33.0 | 29.0 | 38.0 | 27.0 | 48.8 | 34.0 | 61.8 | 47.0 | 65.8 | 48.7 | 79.8 | 62.8 |
| 28 | 76.8 | 68.8 | 82.8 | 65.8 | 76.7 | 55.7 | 39.8 | 42.0 | 40.9 | 29.0 | 40.9 | 32.0 | 30.0 | 8.8 | 38.0 | 29.0 | 42.9 | 34.0 | 64.8 | 49.7 | 64.8 | 47.0 | 84.8 | 59.8 |
| 29 | 88.2 | 71.8 | 83.0 | 67.8 | 72.7 | 49.7 | 59.1 | 46.1 | 29.0 | 22.0 | 34.0 | 31.0 | 27.0 | 5.6 | ..... | ..... | 44.9 | 30.0 | 64.1 | 50.7 | 53.8 | 41.0 | 93.2 | 64.8 |
| 30 | 83.8 | 62.8 | 77.8 | 57.8 | 74.7 | 55.7 | 58.8 | 37.0 | 25.0 | 18.0 | 31.0 | 26.0 | 21.0 | 11.8 | ..... | ..... | 48.8 | 29.0 | 58.8 | 49.7 | 66.1 | 47.7 | 92.2 | 62.8 |
| 31 | 88.9 | 63.8 | 69.7 | 58.8 | ..... | ..... | 48.8 | 37.0 | ..... | ..... | 27.0 | 18.0 | 23.0 | 15.0 | ..... | ..... | 42.9 | 38.0 | ..... | ..... | 75.7 | 47.0 | ..... | ..... |
| Range | 36°.2 | | 41°.2 | | 44° | | 45°.1 | | 34°.1 | | 37° | | 40°.5 | | 45°.1 | | 59° | | 39°.1 | | 48°.7 | | 55°.2 | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

*Maximum, minimum, and mean temperatures—Continued.*

STATION, PORT HURON, MICH.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | | Max. | Min. | Max. | Min. |
| 1 | 75 | 62 | 85 | 63 | 65 | 51 | 84 | 62 | 45 | 33 | 30 | 21 | 32 | 20 | 29 | 20 | 43 | 32 | 51 | 37 | 67 | 51 | 75 | 56 |
| 2 | 68 | 54 | 85 | 68 | 59 | 48 | 74 | 62 | 45 | 40 | 32 | 18 | 31 | 9 | 28 | 15 | 46 | 33 | 52 | 38 | 75 | 51 | 75 | 58 |
| 3 | 78 | 57 | 71 | 62 | 68 | 42 | 78 | 57 | 40 | 32 | 39 | 28 | 25 | 9 | 29 | 0 | 44 | 31 | 46 | 37 | 66 | 52 | 80 | 63 |
| 4 | 75 | 55 | 70 | 53 | 75 | 49 | 69 | 42 | 40 | 27 | 47 | 34 | 30 | 14 | 31 | 9 | 32 | 26 | 42 | 37 | 55 | 44 | 70 | 50 |
| 5 | 75 | 60 | 79 | 52 | 66 | 57 | 53 | 35 | 41 | 25 | 50 | 34 | 16 | 5 | 33 | 12 | 47 | 29 | 57 | 35 | 58 | 46 | 53 | 46 |
| 6 | 67 | 60 | 85 | 62 | 63 | 56 | 59 | 33 | 34 | 23 | 35 | 25 | 16 | 1 | 41 | 29 | 56 | 41 | 46 | 35 | 63 | 42 | 58 | 41 |
| 7 | 77 | 50 | 80 | 63 | 62 | 55 | 59 | 39 | 45 | 23 | 34 | 21 | 14 | − 2 | 45 | 30 | 59 | 42 | 42 | 33 | 74 | 49 | 61 | 52 |
| 8 | 85 | 64 | 85 | 61 | 66 | 53 | 55 | 49 | 47 | 37 | 35 | 24 | 27 | 9 | 38 | 31 | 59 | 39 | 56 | 39 | 61 | 46 | 54 | 47 |
| 9 | 85 | 65 | 76 | 60 | 72 | 50 | 62 | 47 | 44 | 30 | 31 | 22 | 38 | 25 | 31 | 20 | 68 | 47 | 58 | 50 | 58 | 44 | 62 | 45 |
| 10 | 68 | 59 | 76 | 56 | 67 | 60 | 55 | 42 | 35 | 24 | 44 | 30 | 39 | 33 | 24 | 19 | 64 | 50 | 62 | 53 | 50 | 43 | 58 | 51 |
| 11 | 72 | 54 | 78 | 56 | 73 | 63 | 46 | 39 | 44 | 25 | 48 | 37 | 37 | 33 | 24 | 13 | 58 | 40 | 59 | 46 | 46 | 38 | 59 | 48 |
| 12 | 82 | 56 | 77 | 63 | 78 | 63 | 50 | 36 | 48 | 27 | 49 | 31 | 37 | 29 | 28 | 14 | 40 | 36 | 62 | 41 | 45 | 33 | 61 | 46 |
| 13 | 78 | 58 | 72 | 62 | 76 | 58 | 60 | 46 | 52 | 32 | 49 | 32 | 33 | 29 | 31 | 24 | 39 | 36 | 55 | 39 | 47 | 36 | 63 | 49 |
| 14 | 80 | 60 | 69 | 58 | 82 | 58 | 70 | 53 | 55 | 39 | 38 | 25 | 34 | 27 | 31 | 17 | 40 | 36 | 42 | 39 | 44 | 37 | 65 | 54 |
| 15 | 84 | 65 | 68 | 59 | 81 | 64 | 73 | 55 | 57 | 48 | 49 | 33 | 33 | 26 | 30 | 20 | 51 | 35 | 44 | 39 | 51 | 35 | 78 | 52 |
| 16 | 85 | 66 | 70 | 60 | 80 | 60 | 63 | 48 | 53 | 41 | 51 | 33 | 28 | 19 | 32 | 16 | 50 | 31 | 48 | 39 | 62 | 39 | 73 | 58 |
| 17 | 82 | 59 | 77 | 55 | 67 | 50 | 60 | 46 | 56 | 36 | 45 | 32 | 34 | 24 | 32 | 27 | 43 | 36 | 51 | 41 | 57 | 44 | 60 | 52 |
| 18 | 78 | 65 | 81 | 59 | 63 | 43 | 60 | 54 | 40 | 27 | 42 | 29 | 39 | 32 | 27 | 17 | 44 | 32 | 66 | 46 | 55 | 46 | 67 | 51 |
| 19 | 70 | 59 | 82 | 62 | 68 | 46 | 56 | 48 | 35 | 25 | 58 | 42 | 45 | 31 | 30 | 5 | 52 | 37 | 72 | 55 | 67 | 53 | 76 | 53 |
| 20 | 65 | 52 | 84 | 63 | 61 | 46 | 50 | 40 | 43 | 25 | 49 | 42 | 39 | 36 | 48 | 30 | 39 | 33 | 70 | 58 | 74 | 59 | 69 | 57 |
| 21 | 76 | 52 | 85 | 63 | 61 | 47 | 47 | 40 | 47 | 31 | 54 | 43 | 36 | 33 | 42 | 34 | 47 | 32 | 59 | 48 | 58 | 45 | 66 | 50 |
| 22 | 81 | 60 | 85 | 66 | 70 | 43 | 52 | 38 | 45 | 40 | 51 | 40 | 34 | 12 | 45 | 37 | 44 | 35 | 53 | 47 | 56 | 39 | 56 | 50 |
| 23 | 76 | 58 | 70 | 66 | 75 | 49 | 65 | 42 | 48 | 41 | 51 | 42 | 17 | 4 | 37 | 32 | 59 | 35 | 72 | 46 | 67 | 41 | 64 | 55 |
| 24 | 84 | 59 | 71 | 65 | 79 | 57 | 59 | 49 | 51 | 46 | 43 | 37 | 35 | 13 | 33 | 29 | 35 | 13 | 69 | 55 | 75 | 55 | 77 | 57 |
| 25 | 84 | 61 | 78 | 61 | 79 | 62 | 59 | 44 | 51 | 48 | 42 | 38 | 44 | 34 | 29 | 22 | 33 | 15 | 61 | 51 | 75 | 59 | 80 | 54 |
| 26 | 89 | 68 | 82 | 59 | 69 | 61 | 44 | 39 | 55 | 42 | 41 | 38 | 38 | 32 | 44 | 21 | 39 | 29 | 59 | 46 | 68 | 53 | 83 | 64 |
| 27 | 82 | 69 | 83 | 63 | 75 | 59 | 50 | 39 | 44 | 38 | 42 | 37 | 32 | 30 | 46 | 26 | 44 | 36 | 50 | 43 | 61 | 49 | 82 | 64 |
| 28 | 86 | 69 | 80 | 68 | 65 | 59 | 65 | 49 | 40 | 27 | 41 | 34 | 30 | 13 | 49 | 30 | 36 | 33 | 51 | 45 | 58 | 48 | 85 | 66 |
| 29 | 81 | 71 | 82 | 67 | 78 | 52 | 60 | 43 | 29 | 19 | 41 | 33 | 27 | 12 | ..... | ..... | 38 | 29 | 51 | 47 | 50 | 46 | 82 | 67 |
| 30 | 74 | 63 | 71 | 58 | 82 | 61 | 49 | 33 | 27 | 13 | 34 | 30 | 25 | 18 | ..... | ..... | 44 | 32 | 67 | 46 | 55 | 48 | 90 | 68 |
| 31 | 82 | 67 | 69 | 62 | ..... | ..... | 46 | 39 | ..... | ..... | 33 | 20 | 27 | 20 | ..... | ..... | 41 | 37 | ..... | ..... | 66 | 49 | ..... | ..... |
| Range | 39° | | 33° | | 40° | | 51° | | 44° | | 40° | | 47° | | 49° | | 55° | | 39° | | 42° | | 49° | |
| Monthly means | 70°. 0 | | 69°. 8 | | 63°. 2 | | 52°. 1 | | 38°. 3 | | 37°. 2 | | 26°. 5 | | 28°. 7 | | 39°. 7 | | 49°. 9 | | 53°. 5 | | 63°. 1 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, PORTLAND, ME.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 69 | 57 | 72 | 61 | 75 | 65 | 71 | 53 | 56 | 40 | 33 | 20 | 35 | 19 | 19 | 15 | 42 | 19 | 44 | 37 | 56 | 44 | 71 | 50 |
| 2 | 77 | 61 | 73 | 59 | 75 | 59 | 64 | 56 | 56 | 43 | 24 | 15 | 36 | 23 | 27 | 10 | 44 | 23 | 52 | 38 | 67 | 47 | 73 | 49 |
| 3 | 81 | 59 | 76 | 61 | 67 | 36 | 62 | 54 | 53 | 42 | 35 | 14 | 25 | 9 | 38 | 11 | 42 | 38 | 61 | 39 | 73 | 51 | 71 | 58 |
| 4 | 85 | 64 | 77 | 65 | 72 | 52 | 62 | 53 | 46 | 37 | 42 | 29 | 35 | 8 | 41 | 21 | 44 | 29 | 49 | 38 | 69 | 55 | 77 | 59 |
| 5 | 79 | 60 | 77 | 60 | 73 | 58 | 62 | 46 | 54 | 39 | 53 | 40 | 35 | 19 | 41 | 26 | 44 | 25 | 44 | 37 | 64 | 53 | 82 | 56 |
| 6 | 70 | 62 | 80 | 58 | 71 | 57 | 58 | 39 | 53 | 32 | 53 | 39 | 22 | 10 | 44 | 24 | 46 | 32 | 47 | 37 | 66 | 51 | 68 | 51 |
| 7 | 81 | 58 | 78 | 61 | 62 | 50 | 61 | 40 | 54 | 31 | 40 | 26 | 14 | 2 | 46 | 32 | 48 | 39 | 47 | 39 | 73 | 50 | 74 | 45 |
| 8 | 75 | 59 | 78 | 62 | 69 | 52 | 57 | 41 | 54 | 36 | 43 | 29 | 10 | − 5 | 49 | 28 | 60 | 42 | 53 | 41 | 73 | 50 | 65 | 51 |
| 9 | 77 | 61 | 63 | 59 | 69 | 53 | 55 | 51 | 65 | 50 | 37 | 25 | 27 | 7 | 43 | 34 | 54 | 36 | 57 | 41 | 67 | 53 | 65 | 52 |
| 10 | 80 | 64 | 70 | 61 | 77 | 55 | 65 | 49 | 50 | 35 | 36 | 21 | 36 | 18 | 35 | 19 | 62 | 36 | 51 | 41 | 64 | 53 | 59 | 50 |
| 11 | 74 | 60 | 75 | 63 | 76 | 58 | 57 | 47 | 40 | 30 | 33 | 26 | 41 | 36 | 31 | 17 | 46 | 34 | 54 | 43 | 59 | 48 | 63 | 50 |
| 12 | 83 | 63 | 81 | 60 | 78 | 59 | 58 | 50 | 45 | 31 | 42 | 28 | 45 | 34 | 32 | 14 | 44 | 36 | 47 | 30 | 54 | 45 | 69 | 51 |
| 13 | 78 | 63 | 75 | 66 | 82 | 67 | 58 | 48 | 44 | 34 | 44 | 27 | 44 | 32 | 39 | 22 | 42 | 32 | 57 | 45 | 55 | 45 | 73 | 53 |
| 14 | 80 | 57 | 76 | 63 | 78 | 65 | 58 | 45 | 53 | 31 | 40 | 20 | 46 | 34 | 35 | 15 | 46 | 35 | 57 | 44 | 55 | 45 | 77 | 53 |
| 15 | 82 | 61 | 72 | 64 | 78 | 60 | 61 | 51 | 57 | 41 | 43 | 20 | 48 | 29 | 37 | 18 | 51 | 34 | 61 | 47 | 55 | 41 | 71 | 56 |
| 16 | 86 | 66 | 79 | 64 | 77 | 64 | 56 | 44 | 58 | 51 | 48 | 36 | 29 | 6 | 41 | 20 | 50 | 32 | 58 | 46 | 59 | 43 | 73 | 57 |
| 17 | 72 | 64 | 80 | 64 | 78 | 66 | 57 | 39 | 55 | 43 | 52 | 30 | 22 | 5 | 40 | 23 | 45 | 33 | 59 | 45 | 66 | 45 | 73 | 57 |
| 18 | 85 | 67 | 76 | 65 | 69 | 56 | 61 | 40 | 49 | 36 | 36 | 23 | 33 | 17 | 34 | 15 | 30 | 33 | 59 | 40 | 68 | 48 | 73 | 61 |
| 19 | 76 | 66 | 79 | 64 | 71 | 48 | 56 | 43 | 40 | 32 | 41 | 26 | 42 | 22 | 34 | 12 | 49 | 32 | 69 | 41 | 66 | 51 | 81 | 59 |
| 20 | 75 | 65 | 85 | 63 | 70 | 53 | 51 | 42 | 39 | 30 | 47 | 30 | 48 | 34 | 37 | 17 | 41 | 28 | 61 | 45 | 59 | 47 | 84 | 58 |
| 21 | 78 | 64 | 82 | 64 | 64 | 51 | 48 | 41 | 40 | 26 | 36 | 23 | 42 | 38 | 39 | 29 | 38 | 22 | 67 | 49 | 54 | 50 | 80 | 60 |
| 22 | 82 | 66 | 83 | 61 | 62 | 47 | 43 | 36 | 44 | 29 | 42 | 32 | 49 | 38 | 36 | 26 | 39 | 21 | 63 | 47 | 59 | 50 | 66 | 57 |
| 23 | 83 | 66 | 85 | 63 | 76 | 46 | 58 | 36 | 48 | 38 | 43 | 31 | 40 | 8 | 42 | 33 | 56 | 31 | 53 | 45 | 62 | 47 | 63 | 58 |
| 24 | 83 | 65 | 87 | 67 | 77 | 55 | 64 | 46 | 47 | 36 | 45 | 30 | 24 | 5 | 49 | 36 | 53 | 28 | 52 | 44 | 66 | 48 | 75 | 58 |
| 25 | 79 | 63 | 72 | 63 | 75 | 54 | 47 | 34 | 45 | 39 | 43 | 28 | 39 | 21 | 43 | 31 | 28 | 14 | 67 | 48 | 63 | 51 | 71 | 60 |
| 26 | 68 | 60 | 67 | 61 | 81 | 63 | 46 | 30 | 53 | 43 | 46 | 29 | 37 | 30 | 43 | 27 | 48 | 23 | 59 | 50 | 69 | 50 | 76 | 53 |
| 27 | 61 | 58 | 72 | 61 | 73 | 57 | 50 | 30 | 56 | 50 | 48 | 31 | 43 | 33 | 53 | 32 | 46 | 35 | 54 | 49 | 74 | 52 | 70 | 55 |
| 28 | 69 | 61 | 81 | 64 | 65 | 55 | 53 | 33 | 53 | 45 | 43 | 31 | 41 | 13 | 54 | 33 | 43 | 38 | 52 | 47 | 75 | 55 | 86 | 62 |
| 29 | 73 | 63 | 80 | 67 | 68 | 53 | 60 | 43 | 47 | 36 | 46 | 29 | 25 | 11 | ..... | ..... | 47 | 38 | 52 | 45 | 75 | 55 | 88 | 63 |
| 30 | 69 | 64 | 78 | 64 | 68 | 49 | 59 | 44 | 38 | 28 | 35 | 25 | 25 | 6 | ..... | ..... | 54 | 37 | 52 | 44 | 67 | 54 | 94 | 69 |
| 31 | 77 | 64 | 76 | 58 | ..... | ..... | 54 | 36 | ..... | ..... | 33 | 22 | 21 | 12 | ..... | ..... | 48 | 38 | ..... | ..... | 64 | 51 | ..... | ..... |
| Range | 29° | | 29° | | 36° | | 41° | | 39° | | 30° | | 54° | | 44° | | 48° | | 32° | | 34° | | 49° | |
| Monthly means | 68°.2 | | 68°.3 | | 63°.2 | | 49°.7 | | 43°.5 | | 34°.5 | | 26°.6 | | 31°.5 | | 38°.9 | | 48°.3 | | 56°.1 | | 63°.3 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, PORTLAND, OREG.*

| Day of month. | 1877. July. | | 1877. August. | | 1877. September. | | 1877. October. | | 1877. November. | | 1877. December. | | 1878. January. | | 1878. February. | | 1878. March. | | 1878. April. | | 1878. May. | | 1878. June. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 69 | 52 | 76 | 58 | 88 | 54 | 61 | 44 | 57 | 32 | 49 | 39 | 32 | 23 | 47 | 36 | 54 | 40 | 72 | 44 | 58 | 42 | 65 | 50 |
| 2 | 64 | 55 | 71 | 59 | 83 | 57 | 60 | 45 | 49 | 35 | 49 | 37 | 33 | 18 | 57 | 44 | 58 | 41 | 73 | 47 | 63 | 34 | 71 | 49 |
| 3 | 65 | 51 | 65 | 54 | 75 | 58 | 57 | 40 | 54 | 43 | 48 | 37 | 38 | 28 | 58 | 44 | 57 | 46 | 71 | 44 | 70 | 33 | 81 | 46 |
| 4 | 69 | 49 | 70 | 54 | 73 | 55 | 56 | 47 | 56 | 41 | 48 | 32 | 36 | 24 | 53 | 46 | 52 | 39 | 74 | 53 | 72 | 46 | 80 | 50 |
| 5 | 77 | 47 | 77 | 50 | 73 | 53 | 66 | 50 | 58 | 45 | 45 | 33 | 35 | 23 | 49 | 39 | 48 | 37 | 71 | 48 | 59 | 43 | 90 | 55 |
| 6 | 77 | 52 | 82 | 52 | 69 | 50 | 67 | 52 | 57 | 46 | 47 | 36 | 39 | 23 | 51 | 42 | 47 | 40 | 61 | 41 | 66 | 40 | 97 | 62 |
| 7 | 81 | 52 | 82 | 55 | 73 | 45 | 67 | 57 | 62 | 47 | 53 | 41 | 35 | 24 | 50 | 38 | 52 | 34 | 62 | 43 | 82 | 44 | 86 | 60 |
| 8 | 89 | 55 | 83 | 54 | 69 | 52 | 63 | 49 | 58 | 37 | 45 | 39 | 50 | 31 | 48 | 37 | 55 | 31 | 53 | 40 | 86 | 46 | 75 | 55 |
| 9 | 79 | 58 | 75 | 52 | 71 | 51 | 64 | 49 | 56 | 46 | 52 | 42 | 50 | 37 | 44 | 33 | 58 | 38 | 58 | 33 | 83 | 51 | 72 | 51 |
| 10 | 75 | 56 | 84 | 54 | 66 | 56 | 62 | 52 | 58 | 49 | 62 | 44 | 45 | 39 | 52 | 36 | 54 | 39 | 60 | 38 | 74 | 50 | 65 | 50 |
| 11 | 73 | 53 | 88 | 54 | 66 | 51 | 60 | 45 | 58 | 43 | 58 | 42 | 48 | 35 | 50 | 43 | 54 | 34 | 55 | 43 | 66 | 55 | 68 | 44 |
| 12 | 76 | 53 | 89 | 58 | 67 | 49 | 59 | 42 | 55 | 38 | 55 | 43 | 49 | 32 | 51 | 40 | 54 | 41 | 53 | 36 | 69 | 51 | 75 | 45 |
| 13 | 79 | 51 | 81 | 59 | 65 | 53 | 64 | 47 | 51 | 40 | 54 | 36 | 47 | 39 | 48 | 38 | 58 | 44 | 50 | 34 | 68 | 48 | 80 | 50 |
| 14 | 77 | 52 | 82 | 57 | 65 | 54 | 60 | 40 | 55 | 45 | 51 | 37 | 50 | 40 | 49 | 37 | 59 | 43 | 53 | 32 | 63 | 49 | 83 | 52 |
| 15 | 90 | 53 | 88 | 58 | 67 | 54 | 61 | 41 | 61 | 48 | 54 | 36 | 49 | 40 | 48 | 36 | 63 | 49 | 59 | 36 | 58 | 47 | 72 | 55 |
| 16 | 91 | 63 | 86 | 60 | 68 | 42 | 67 | 41 | 59 | 49 | 58 | 44 | 51 | 38 | 50 | 37 | 60 | 44 | 57 | 37 | 59 | 41 | 65 | 50 |
| 17 | 82 | 63 | 80 | 59 | 75 | 47 | 73 | 47 | 55 | 45 | 54 | 45 | 53 | 41 | 55 | 43 | 66 | 43 | 60 | 38 | 63 | 43 | 73 | 48 |
| 18 | 75 | 60 | 79 | 60 | 73 | 48 | 69 | 45 | 61 | 49 | 49 | 36 | 52 | 43 | 50 | 44 | 63 | 48 | 57 | 45 | 58 | 43 | 82 | 51 |
| 19 | 83 | 59 | 72 | 59 | 75 | 54 | 66 | 47 | 58 | 43 | 46 | 38 | 49 | 41 | 53 | 42 | 65 | 44 | 68 | 46 | 58 | 44 | 92 | 56 |
| 20 | 83 | 59 | 75 | 62 | 65 | 51 | 65 | 47 | 48 | 33 | 53 | 37 | 51 | 38 | 45 | 38 | 68 | 47 | 59 | 46 | 67 | 39 | 71 | 59 |
| 21 | 76 | 60 | 72 | 56 | 63 | 43 | 64 | 47 | 50 | 39 | 48 | 37 | 48 | 41 | 48 | 33 | 69 | 48 | 58 | 48 | 79 | 45 | 74 | 48 |
| 22 | 76 | 57 | 70 | 58 | 66 | 39 | 62 | 47 | 55 | 45 | 44 | 32 | 48 | 38 | 57 | 39 | 67 | 48 | 58 | 44 | 70 | 50 | 83 | 49 |
| 23 | 75 | 51 | 70 | 57 | 65 | 51 | 60 | 49 | 52 | 42 | 45 | 37 | 52 | 39 | 57 | 46 | 67 | 43 | 62 | 37 | 69 | 49 | 72 | 52 |
| 24 | 77 | 54 | 65 | 57 | 68 | 50 | 61 | 52 | 54 | 43 | 45 | 33 | 51 | 41 | 53 | 44 | 63 | 52 | 55 | 45 | 76 | 46 | 72 | 47 |
| 25 | 71 | 60 | 66 | 55 | 64 | 51 | 60 | 48 | 54 | 43 | 45 | 31 | 51 | 36 | 48 | 33 | 59 | 48 | 58 | 37 | 83 | 48 | 77 | 47 |
| 26 | 70 | 57 | 68 | 54 | 64 | 45 | 56 | 45 | 53 | 38 | 46 | 34 | 48 | 36 | 52 | 35 | 62 | 47 | 63 | 36 | 68 | 48 | 77 | 52 |
| 27 | 82 | 49 | 72 | 48 | 62 | 50 | 54 | 43 | 49 | 36 | 45 | 33 | 52 | 40 | 55 | 36 | 64 | 44 | 59 | 45 | 58 | 44 | 67 | 45 |
| 28 | 75 | 58 | 82 | 49 | 63 | 49 | 51 | 37 | 48 | 39 | 40 | 32 | 53 | 44 | 58 | 33 | 66 | 42 | 58 | 47 | 62 | 45 | 68 | 51 |
| 29 | 70 | 55 | 79 | 52 | 61 | 45 | 52 | 33 | 50 | 38 | 41 | 32 | 55 | 42 | ..... | ..... | 57 | 44 | 58 | 42 | 64 | 46 | 70 | 47 |
| 30 | 71 | 57 | 71 | 57 | 63 | 41 | 59 | 34 | 45 | 37 | 42 | 30 | 55 | 44 | ..... | ..... | 55 | 43 | 60 | 36 | 64 | 48 | 83 | 49 |
| 31 | 76 | 58 | 76 | 51 | ..... | ..... | 56 | 31 | ..... | ..... | 36 | 25 | 52 | 42 | ..... | ..... | 62 | 42 | ..... | ..... | 63 | 50 | ..... | ..... |
| Range | 44° | | 41° | | 49° | | 42° | | 30° | | 37° | | 37° | | 25° | | 38° | | 42° | | 53° | | 53° | |
| Monthly means | 69°.4 | | 67°.8 | | 59°.9 | | 52°.7 | | 48°.8 | | 43°.0 | | 41°.7 | | 45°.7 | | 51°.5 | | 52°.1 | | 59°.0 | | 66° | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION. PORT STANLEY, CANADA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 77.6 | 62.5 | 84.4 | 60.5 | 69.2 | 53.2 | 77.8 | 57.8 | 49.9 | 31.8 | 31.0 | 19.2 | 34.0 | 15.2 | 32.0 | 20.4 | 40.0 | 28.2 | 49.6 | 33.2 | 69.0 | 48.5 | 72.4 | 46.2 |
| 2 | 69.2 | 55.8 | 83.2 | 68.1 | 65.0 | 47.4 | 75.2 | 55.2 | 54.4 | 39.2 | 34.2 | 12.6 | 34.0 | 8.7 | 29.8 | 2.9 | 44.8 | 28.8 | 49.8 | 29.0 | 66.0 | 51.6 | 74.0 | 55.2 |
| 3 | 82.5 | 59.0 | 77.0 | 56.2 | 65.4 | 45.2 | 75.0 | 56.6 | 52.4 | 31.8 | 41.4 | 32.8 | 27.0 | 6.1 | 31.8 | −2.8 | 43.4 | 32.2 | 53.0 | 30.0 | 65.0 | 50.2 | 73.0 | 61.2 |
| 4 | 72.5 | 58.0 | 78.4 | 51.7 | 73.6 | 52.6 | 70.0 | 43.2 | 48.0 | 25.2 | 43.6 | 38.2 | 32.0 | 20.6 | 33.0 | −1.5 | 33.2 | 25.4 | 61.6 | 38.2 | 58.0 | 46.2 | 70.0 | 61.1 |
| 5 | 81.0 | 54.2 | 83.0 | 49.2 | 75.0 | 55.3 | 58.0 | 37.7 | 47.5 | 26.8 | 47.8 | 33.4 | 26.0 | 6.9 | 33.2 | 3.9 | 41.6 | 28.8 | 59.0 | 33.2 | 61.0 | 43.8 | 61.0 | 43.3 |
| 6 | 78.2 | 57.2 | 81.2 | 52.4 | 69.4 | 54.2 | 60.0 | 36.2 | 39.0 | 23.0 | 36.8 | 27.8 | 18.0 | −8.3 | 40.0 | 25.0 | 46.6 | 35.2 | 48.6 | 35.6 | 59.0 | 41.2 | 64.8 | 35.7 |
| 7 | 78.2 | 49.2 | 82.8 | 59.8 | 67.0 | 54.6 | 61.0 | 34.0 | 49.0 | 20.0 | 37.0 | 24.0 | 15.4 | 1.7 | 42.2 | 22.0 | 49.0 | 34.2 | 51.0 | 34.2 | 65.0 | 50.8 | 66.8 | 44.3 |
| 8 | 79.0 | 63.9 | 83.4 | 58.4 | 71.6 | 51.6 | 60.0 | 52.0 | 52.5 | 43.4 | 36.4 | 26.0 | 30.5 | 11.3 | 42.0 | 22.0 | 54.2 | 30.0 | 51.6 | 32.2 | 62.0 | 46.4 | 55.0 | 46.2 |
| 9 | 78.0 | 62.1 | 80.0 | 61.0 | 72.0 | 52.0 | 61.4 | 48.4 | 50.0 | 26.8 | 34.4 | 22.8 | 36.8 | 28.2 | 37.0 | 20.6 | 61.8 | 37.7 | 59.0 | 49.0 | 64.3 | 45.2 | 66.0 | 41.3 |
| 10 | 77.6 | 58.6 | 79.0 | 57.0 | 72.0 | 59.6 | 60.8 | 45.7 | 34.5 | 19.2 | 45.4 | 33.0 | 38.8 | 33.0 | 25.0 | 16.4 | 61.0 | 46.7 | 50.8 | 42.4 | 52.0 | 40.0 | 73.0 | 49.8 |
| 11 | 77.0 | 53.2 | 80.0 | 54.7 | 75.2 | 63.6 | 52.0 | 41.4 | 44.8 | 21.2 | 48.0 | 30.0 | 39.6 | 33.2 | 27.2 | −8.2 | 62.4 | 38.2 | 52.4 | 39.6 | 49.4 | 36.0 | 68.0 | 49.6 |
| 12 | 78.4 | 50.2 | 80.0 | 64.5 | 76.0 | 62.9 | 50.0 | 40.2 | 48.0 | 29.0 | 44.4 | 24.0 | 36.8 | 31.6 | 29.4 | 9.9 | 44.6 | 35.2 | 62.5 | 42.2 | 47.4 | 30.5 | 65.0 | 41.8 |
| 13 | 75.8 | 58.2 | 77.0 | 62.6 | 78.6 | 59.2 | 60.0 | 37.0 | 52.0 | 25.2 | 49.6 | 32.8 | 36.2 | 30.0 | 41.0 | 17.0 | 42.5 | 34.7 | 58.4 | 33.2 | 52.8 | 29.5 | 75.0 | 47.0 |
| 14 | 78.4 | 56.2 | 76.0 | 60.7 | 75.0 | 56.6 | 66.0 | 45.2 | 52.2 | 41.6 | 41.4 | 25.0 | 36.8 | 31.0 | 37.0 | 15.0 | 43.0 | 34.2 | 54.4 | 32.6 | 53.4 | 33.7 | 76.6 | 47.2 |
| 15 | 82.0 | 62.5 | 77.0 | 59.2 | 78.0 | 61.1 | 67.0 | 44.6 | 54.4 | 48.2 | 45.0 | 36.6 | 36.4 | 24.0 | 37.6 | 23.0 | 50.5 | 32.4 | 56.0 | 42.4 | 57.5 | 32.4 | 74.6 | 48.3 |
| 16 | 84.6 | 61.3 | 73.8 | 59.8 | 76.0 | 65.5 | 64.2 | 45.2 | 53.0 | 43.2 | 48.0 | 28.0 | 26.4 | 13.4 | 34.0 | 17.0 | 42.8 | 31.8 | 60.0 | 42.0 | 50.0 | 31.4 | 75.2 | 63.0 |
| 17 | 83.8 | 60.5 | 82.0 | 60.1 | 68.0 | 47.8 | 63.2 | 44.8 | 55.0 | 38.2 | 51.2 | 31.2 | 38.0 | 24.6 | 38.8 | 23.8 | 47.4 | 35.4 | 60.2 | 38.2 | 62.0 | 37.7 | 71.0 | 50.7 |
| 18 | 75.0 | 65.1 | 81.0 | 56.2 | 67.6 | 42.2 | 62.0 | 50.7 | 40.0 | 32.2 | 48.8 | 26.4 | 38.5 | 28.5 | 30.8 | 4.6 | 51.0 | 31.6 | 66.0 | 48.2 | 62.0 | 43.0 | 74.4 | 47.7 |
| 19 | 75.5 | 62.5 | 81.0 | 60.0 | 70.0 | 38.2 | 57.2 | 46.6 | 38.0 | 28.0 | 47.0 | 37.2 | 42.4 | 27.6 | 32.4 | −1.9 | 52.6 | 35.2 | 60.6 | 50.2 | 64.4 | 54.2 | 74.0 | 43.7 |
| 20 | 72.0 | 56.6 | 80.2 | 59.2 | 69.8 | 44.2 | 52.0 | 39.0 | 43.6 | 25.0 | 48.8 | 42.2 | 41.6 | 27.0 | 44.0 | 20.4 | 45.0 | 29.5 | 68.0 | 50.2 | 60.8 | 55.2 | 72.0 | 49.4 |
| 21 | 74.2 | 52.4 | 81.0 | 60.0 | 66.2 | 44.4 | 45.4 | 36.4 | 46.6 | 30.0 | 46.8 | 37.0 | 41.0 | 24.2 | 41.5 | 34.0 | 46.5 | 28.0 | 62.8 | 48.2 | 62.0 | 41.8 | 72.8 | 53.1 |
| 22 | 78.8 | 54.8 | 82.4 | 66.1 | 68.8 | 37.6 | 52.8 | 28.2 | 47.4 | 41.2 | 47.2 | 36.2 | 36.0 | 18.0 | 46.0 | 34.0 | 49.5 | 22.6 | 53.2 | 45.0 | 61.0 | 39.2 | 63.9 | 51.4 |
| 23 | 83.5 | 58.0 | 79.4 | 66.9 | 74.0 | 48.2 | 62.4 | 47.2 | 50.4 | 43.2 | 47.6 | 37.2 | 20.0 | −1.7 | 36.6 | 32.2 | 49.5 | 30.8 | 65.5 | 44.7 | 66.0 | 37.8 | 63.0 | 54.7 |
| 24 | 80.6 | 55.0 | 78.0 | 66.5 | 75.2 | 49.2 | 59.4 | 53.6 | 52.0 | 47.2 | 42.0 | 36.2 | 35.4 | −2.3 | 34.6 | 28.0 | 48.6 | 9.3 | 61.8 | 50.2 | 79.2 | 54.8 | 79.0 | 58.0 |
| 25 | 84.0 | 56.2 | 77.2 | 61.9 | 75.6 | 55.2 | 64.0 | 43.3 | 51.0 | 42.6 | 43.6 | 35.2 | 42.6 | 21.0 | 33.6 | 24.0 | 32.5 | 8.9 | 54.0 | 46.2 | 69.2 | 56.2 | 76.8 | 50.2 |
| 26 | 85.6 | 65.1 | 80.0 | 61.1 | 76.6 | 57.0 | 44.8 | 39.2 | 55.2 | 45.2 | 41.8 | 35.2 | 37.2 | 31.6 | 41.0 | 23.8 | 39.5 | 30.6 | 58.0 | 47.3 | 68.0 | 54.2 | 80.0 | 61.0 |
| 27 | 81.4 | 69.1 | 81.6 | 57.4 | 72.8 | 56.6 | 49.0 | 38.8 | 45.4 | 37.0 | 43.6 | 34.4 | 34.8 | 29.0 | 40.0 | 24.8 | 51.4 | 30.6 | 60.0 | 46.8 | 66.5 | 47.4 | 77.8 | 62.6 |
| 28 | 82.0 | 68.5 | 82.2 | 65.5 | 78.2 | 55.2 | 63.0 | 44.6 | 41.8 | 29.0 | 45.0 | 31.0 | 31.6 | 9.3 | 41.8 | 22.8 | 45.2 | 33.2 | 62.6 | 52.0 | 64.8 | 46.1 | 82.8 | 58.4 |
| 29 | 88.2 | 69.0 | 85.5 | 65.4 | 73.2 | 49.2 | 60.0 | 45.0 | 31.0 | 21.0 | 40.0 | 29.0 | 30.0 | 10.0 | ..... | ..... | 47.5 | 27.8 | 62.0 | 52.8 | 61.8 | 42.1 | 83.2 | 56.7 |
| 30 | 88.0 | 61.9 | 78.0 | 58.2 | 77.2 | 53.0 | 51.0 | 35.1 | 26.2 | 16.0 | 39.8 | 26.8 | 36.2 | 12.6 | ..... | ..... | 49.0 | 27.0 | 56.3 | 49.0 | 68.0 | 47.0 | 86.5 | 60.5 |
| 31 | 84.4 | 63.9 | 71.0 | 57.6 | ..... | ..... | 51.4 | 38.7 | ..... | ..... | 32.4 | 18.6 | 36.4 | 19.2 | ..... | ..... | 45.0 | 36.2 | ..... | ..... | 80.2 | 47.0 | ..... | ..... |
| Range | 39° | | 36°.3 | | 41° | | 49°.6 | | 39°.2 | | 38°.6 | | 50°.9 | | 54°.2 | | 53°.5 | | 39° | | 50°.7 | | 40°.9 | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, PRESCOTT, ARIZ.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | *86 | *57 | *88 | *53 | 94 | 50 | 78 | 42 | 57 | 22 | 58 | 22 | 54 | 1 | 52 | 23 | 54 | 24 | 64 | 33 | 71 | 50 | 74 | 41 |
| 2 | 85 | 54 | 90 | 62 | 90 | 50 | 79 | 45 | 63 | 22 | 54 | 31 | 53 | 3 | 54 | 18 | 55 | 23 | 67 | 31 | 75 | 45 | 80 | 37 |
| 3 | 85 | 58 | 86 | 65 | 93 | 64 | 79 | 42 | 64 | 30 | 64 | 20 | 54 | — 1 | 54 | 16 | 63 | 24 | 69 | 30 | 69 | 36 | 85 | 38 |
| 4 | 89 | 56 | 86 | 66 | 83 | 55 | 79 | 44 | 60 | 28 | 53 | 21 | 53 | 3 | 59 | 21 | 64 | 27 | 70 | 35 | 78 | 34 | 87 | 42 |
| 5 | 91 | 66 | 88 | 65 | 86 | 52 | 78 | 42 | 65 | 25 | 54 | 8 | 54 | 2 | 58 | 29 | 64 | 29 | 75 | 37 | 83 | 41 | 87 | 37 |
| 6 | 93 | 68 | 88 | 62 | 86 | 55 | 81 | 41 | 68 | 30 | 58 | 13 | 53 | 2 | 55 | 19 | 60 | 28 | 66 | 40 | 74 | 54 | 83 | 48 |
| 7 | 89 | 68 | 90 | 64 | 81 | 58 | 82 | 43 | 61 | 32 | 63 | 17 | 52 | 7 | 55 | 27 | 51 | 27 | 73 | 38 | 76 | 44 | 82 | 46 |
| 8 | 86 | 67 | 92 | 61 | 84 | 53 | 83 | 42 | 63 | 24 | 62 | 27 | 53 | 10 | 52 | 17 | 46 | 19 | 75 | 36 | 79 | 42 | 85 | 46 |
| 9 | 87 | 69 | 95 | 67 | 88 | 53 | 85 | 43 | 66 | 24 | 61 | 24 | 51 | 12 | 54 | 18 | 46 | 19 | 68 | 45 | 83 | 41 | 87 | 48 |
| 10 | 84 | 71 | 92 | 68 | 82 | 51 | 86 | 43 | 74 | 21 | 61 | 23 | 54 | 15 | 50 | 15 | 63 | 19 | 68 | 28 | 83 | 44 | 89 | 48 |
| 11 | 77 | 69 | 89 | 68 | 78 | 52 | 79 | 42 | 67 | 29 | 60 | 23 | 49 | 23 | 54 | 17 | 64 | 21 | 74 | 34 | 78 | 44 | 89 | 49 |
| 12 | 88 | 68 | 90 | 64 | 70 | 52 | 73 | 55 | 68 | 32 | 61 | 23 | 49 | 12 | 54 | 31 | 64 | 22 | 74 | 39 | 86 | 49 | 72 | 44 |
| 13 | 90 | 70 | 94 | 66 | 68 | 42 | 74 | 36 | 70 | 29 | 62 | 24 | 48 | 14 | 52 | 23 | 66 | 28 | 63 | 44 | 84 | 49 | 88 | 46 |
| 14 | 94 | 72 | 93 | 68 | 72 | 39 | 74 | 36 | 66 | 22 | 63 | 23 | 52 | 19 | 52 | 23 | 69 | 30 | 60 | 40 | 77 | 39 | 93 | 49 |
| 15 | 93 | 70 | 89 | 71 | 79 | 43 | 73 | 31 | 66 | 26 | 60 | 35 | 51 | 18 | 57 | 30 | 74 | 32 | 57 | 30 | 83 | 49 | 70 | 54 |
| 16 | 86 | 71 | 74 | 67 | 84 | 52 | 70 | 31 | 67 | 27 | 60 | 30 | 54 | 28 | 59 | 38 | 73 | 35 | 50 | 30 | 74 | 45 | 86 | 56 |
| 17 | 91 | 70 | 82 | 63 | 84 | 48 | 68 | 31 | 68 | 33 | 62 | 28 | 52 | 31 | 63 | 29 | 71 | 34 | 47 | 13 | 65 | 46 | 91 | 48 |
| 18 | 89 | 73 | 83 | 60 | 83 | 47 | 68 | 30 | 63 | 32 | 57 | 28 | 51 | 29 | 65 | 30 | 63 | 40 | 63 | 20 | 72 | 32 | 98 | 48 |
| 19 | 93 | 72 | 86 | 62 | 82 | 44 | 69 | 32 | 62 | 20 | 59 | 29 | 53 | 27 | 53 | 35 | 71 | 33 | 62 | 30 | 70 | 33 | 100 | 57 |
| 20 | 93 | 70 | 88 | 60 | 83 | 51 | 70 | 29 | 63 | 26 | 57 | 27 | 51 | 25 | 61 | 30 | 69 | 40 | 51 | 34 | 72 | 46 | 81 | 55 |
| 21 | 85 | 71 | 90 | 54 | 79 | 53 | 72 | 31 | 66 | 25 | 58 | 25 | 49 | 18 | 52 | 34 | 65 | 38 | 50 | 23 | 57 | 41 | 102 | 53 |
| 22 | 78 | 68 | 89 | 51 | 78 | 39 | 73 | 32 | 64 | 24 | 59 | 24 | 48 | 21 | 53 | 27 | 65 | 39 | 51 | 31 | 65 | 30 | 80 | 62 |
| 23 | 89 | 69 | 89 | 55 | 74 | 40 | 72 | 44 | 64 | 30 | 59 | 22 | 56 | 27 | 51 | 19 | 64 | 30 | 64 | 32 | 72 | 32 | 89 | 47 |
| 24 | 83 | 70 | †89 | 52 | 80 | 37 | 72 | 35 | 63 | 25 | 54 | 28 | 56 | 28 | 53 | 26 | 68 | 36 | 67 | 36 | 79 | 39 | 86 | 46 |
| 25 | 82 | 63 | 91 | 54 | 74 | 40 | 72 | 31 | 63 | 24 | 55 | 13 | 57 | 34 | 59 | 27 | 63 | 34 | 68 | 35 | 80 | 47 | 95 | 51 |
| 26 | 82 | 60 | 90 | 54 | 82 | 42 | 71 | 35 | 62 | 24 | 53 | 8 | 58 | 23 | 52 | 27 | 59 | 36 | 69 | 36 | 90 | 45 | 95 | 52 |
| 27 | 85 | 60 | 90 | 51 | 84 | 44 | 68 | 42 | 62 | 21 | 53 | 7 | 57 | 21 | 53 | 30 | 57 | 30 | 70 | 38 | 78 | 45 | 96 | 52 |
| 28 | 87 | 62 | 93 | 51 | 85 | 42 | 67 | 37 | 58 | 19 | 54 | 6 | 57 | 29 | 44 | 31 | 47 | 30 | 74 | 37 | 77 | 49 | 96 | 54 |
| 29 | 88 | 61 | 94 | 52 | 77 | 52 | 62 | 27 | 58 | 15 | 53 | 6 | 57 | 26 | ..... | ..... | 51 | 30 | 80 | 39 | 75 | 46 | 88 | 48 |
| 30 | 83 | 58 | 92 | 51 | 74 | 48 | 62 | 30 | 55 | 17 | 53 | 4 | 58 | 23 | ..... | ..... | 50 | 35 | 78 | 43 | 74 | 37 | 96 | 50 |
| 31 | 84 | 50 | 91 | 50 | ..... | ..... | 60 | 23 | ..... | ..... | 52 | 12 | 59 | 24 | ..... | ..... | 59 | 34 | ..... | ..... | 70 | 36 | ..... | ..... |
| Range | | | | | 57° | | 63° | | 59° | | 60° | | 60° | | 50° | | 55° | | 67° | | 60° | | 65° | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

*Highest and lowest observed readings of exposed thermometer. †Observations of maximum and minimum thermometers commenced August 2, 1877.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, PUNTA RASSA, FLA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 89 | 70 | 86 | 76 | 90 | 80 | 84 | 74 | 83 | 73 | 54 | 41 | 56 | 45 | 68 | 59 | 76 | 59 | 82 | 75 | 81 | 65 | 87 | 73 |
| 2 | 89 | 74 | 86 | 74 | 89 | 78 | 86 | 80 | 85 | 74 | 84? | 41 | 61 | 44 | 72 | 57 | 76 | 64 | 83 | 75 | 83 | 67 | 87 | 72 |
| 3 | 91 | 77 | 85 | 74 | 88 | 74 | 85 | 79 | 85 | 72 | 74 | 50 | 67 | 46 | 70 | 61 | 69 | 66 | 78 | 71 | 84 | 66 | 89 | 72 |
| 4 | 93 | 78 | 88 | 75 | 89 | 79 | 83 | 76 | 83 | 68 | 72 | 61 | 68 | 57 | 61 | 55 | 66 | 58 | 72 | 65 | 83 | 68 | 88 | 73 |
| 5 | 92 | 75 | 87 | 76 | 89 | 77 | 81 | 76 | 87 | 71 | 72 | 61 | 59 | 49 | 55 | 49 | 68 | 50 | 66 | 62 | 76 | 68 | 85 | 73 |
| 6 | 92 | 78 | 86 | 80 | 89 | 79 | 83 | 65 | 85 | 73 | 67 | 49 | 53 | 44 | 61 | 48 | 73 | 59 | 73 | 64 | 81 | 64 | 86 | 76 |
| 7 | 90 | 74 | 88 | 74 | 89 | 75 | 82 | 70 | 86 | 74 | 61 | 44 | 60 | 44 | 64 | 61 | 76 | 62 | 74 | 68 | 82 | 64 | 86 | 74 |
| 8 | 93 | 77 | 87 | 77 | 89 | 77 | 83 | 72 | (*) | (*) | 72 | 55 | 66 | 56 | 71 | 62 | 76 | 63 | 79 | 64 | 82 | 65 | 87 | 80 |
| 9 | 88 | 75 | 87 | 73 | 91 | 80 | 79 | 73 | 79 | 64 | 72 | 55 | 65 | 63 | 70 | 64 | 78 | 64 | 81 | 73 | 83 | 70 | 90 | 82 |
| 10 | 83 | 75 | 89 | 79 | 91 | 76 | 84 | 71 | 64 | 56 | 73 | 57 | 60 | 53 | 68 | 60 | 78 | 65 | 77 | 70 | 82 | 71 | 90 | 83 |
| 11 | (*) | (*) | 87 | 76 | 92 | 75 | 84 | 70 | 62 | 46 | 73 | 57 | 61 | 46 | 60 | 55 | 76 | 68 | 79 | 73 | 83 | 71 | 88 | 78 |
| 12 | 84 | 73 | 88 | 75 | 90 | 73 | 85 | 72 | 72 | 52 | 76 | 57 | 71 | 50 | 56 | 48 | 77 | 66 | 77 | 70 | 86 | 70 | 89 | 79 |
| 13 | 85 | 80 | 87 | 73 | 91 | 74 | 81 | 71 | 77 | 59 | 76 | 56 | 72 | 63 | 69 | 57 | 77 | 64 | 83 | 69 | 85 | 73 | 92 | 76 |
| 14 | 90 | 78 | 90 | 76 | 90 | 73 | 84 | 73 | (*) | (*) | 72 | 56 | 66 | 59 | 71 | 62 | 77 | 65 | 83 | 74 | 84 | 74 | 88 | 74 |
| 15 | 88 | 75 | 89 | 76 | 89 | 75 | 84 | 72 | ..... | ..... | 74 | 56 | 59 | 50 | 70 | 56 | 81 | 65 | 84 | 75 | 81 | 76 | 82 | 75 |
| 16 | 88 | 79 | 90 | 78 | 91 | 78 | 81 | 72 | ..... | ..... | 77 | 56 | 59 | 42 | 67 | 61 | 73 | 64 | 82 | 68 | 86 | 71 | 85 | 73 |
| 17 | 88 | 78 | 89 | 76 | 91 | 78 | 84 | 70 | 79 | 62 | 76 | 57 | 65 | 51 | 68 | 56 | 68 | 62 | 83 | 69 | 86 | 71 | 83 | 73 |
| 18 | 92 | 76 | 89 | 73 | 90 | 77 | 83 | 70 | 79 | 68 | 78 | 62 | 71 | 51 | 75 | 61 | 72 | 61 | 82 | 67 | 89 | 74 | 85 | 75 |
| 19 | 90 | 78 | 85 | 74 | 89 | 80 | 89 | 72 | 80 | 64 | 77 | 62 | 71 | 55 | 74 | 57 | 74 | 57 | 81 | 66 | 88 | 67 | 86 | 79 |
| 20 | 89 | 74 | 89 | 73 | 87 | 82 | 86 | 73 | 73 | 67 | 77 | 61 | 70 | 60 | 72 | 65 | 74 | 60 | 82 | 68 | 85 | 67 | 86 | 81 |
| 21 | 88 | 80 | 90 | 78 | 87 | 80 | 83 | 76 | 78 | 68 | 76 | 62 | 66 | 57 | 70 | 68 | 74 | 66 | 82 | 66 | 84 | 71 | 87 | 78 |
| 22 | 87 | 77 | 91 | 77 | 87 | 76 | 77 | 68 | 78 | 64 | 75 | 65 | 65 | 54 | 74 | 67 | 74 | 68 | 83 | 68 | 86 | 69 | 86 | 78 |
| 23 | 92 | 76 | 88 | 78 | 86 | 74 | 75 | 64 | 78 | 60 | 77 | 67 | 63 | 53 | 73 | 66 | 74 | 66 | 83 | 70 | 87 | 70 | 85 | 73 |
| 24 | 92 | 79 | 91 | 75 | 86 | 70 | 83 | 65 | 71 | 63 | 72 | 66 | 68 | 52 | 70 | 63 | 73 | 66 | 82 | 73 | 85 | 70 | 85 | 74 |
| 25 | 89 | 77 | 84 | 75 | 87 | 74 | 86 | 72 | 73 | 59 | 72 | 65 | 74 | 59 | 70 | 57 | 74 | 68 | 78 | 72 | 86 | 75 | 87 | 74 |
| 26 | 91 | 76 | 88 | 74 | (*) | (*) | 85 | 77 | 72 | 63 | 69 | 62 | 74 | 59 | 62 | 56 | 78 | 67 | 79 | 68 | 86 | 76 | 89 | 76 |
| 27 | 92 | 77 | 92 | 73 | 85 | 75 | 83 | 76 | 72 | 62 | 69 | 57 | 72 | 59 | 67 | 56 | 78 | 66 | 78 | 67 | 87 | 75 | 85 | 74 |
| 28 | 90 | 75 | 89 | 77 | 85 | 75 | 84 | 72 | 71 | 68 | 65 | 57 | 70 | 58 | 68 | 60 | 79 | 72 | 83 | 66 | 81 | 75 | 86 | 76 |
| 29 | 93 | 79 | 90 | 78 | 84 | 72 | 85 | 70 | 72 | 56 | 70 | 58 | 65 | 51 | ..... | ..... | 82 | 72 | 76 | 68 | 86 | 77 | 85 | 76 |
| 30 | 90 | 78 | 90 | 75 | 83 | 74 | 84 | 72 | 57 | 42 | 67 | 62 | 68 | 63 | ..... | ..... | 84 | 70 | 77 | 65 | 85 | 75 | 88 | 72 |
| 31 | 90 | 78 | 93 | 77 | ..... | ..... | 83 | 71 | ..... | ..... | 63 | 54 | 67 | 61 | ..... | ..... | 82 | 75 | ..... | ..... | 86 | 73 | ..... | ..... |
| Range | | | 20° | | | | 25° | | | | 37° | | 32° | | 27° | | 34° | | 22° | | 25° | | 20° | |
| Monthly means | 88°.3 | | 82°.9 | | 82°.5 | | 77°.9 | | 70°.1 | | 64°.9 | | 60°.4 | | 63°.4 | | 70°.1 | | 74°.8 | | 78°.4 | | 81°.4 | |

* No observation taken. † 29 days only. ‡ 27 days only.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, QUEBEC, QUEBEC.*

| Day of month. | 1877. July. | | August. | | September. | | October. | | November. | | December. | | 1878. January. | | February. | | March. | | April. | | May. | | June. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 76 | 58 | 82 | 54 | 70 | 53 | 81 | 52 | 46 | 33 | 29 | 10 | 17 | − 1 | 15 | 4 | 14 | − 6.2 | 35 | 28 | 46 | 37 | 78 | 51 |
| 2 | 70 | 59 | 84 | 61 | 64 | 44 | 56 | 48 | 42 | 31 | 21 | 10 | 16 | 9 | 13 | − 1 | 25 | 1 | 34 | 28 | 67 | 40 | 79 | 54 |
| 3 | 77 | 50 | 84 | 63 | 61 | 49 | 47 | 40 | 40 | 33 | 34 | 14 | 15 | − 6 | 15 | − 5 | 29 | 19.5 | 40 | 30 | 56 | 46 | 78 | 59.5 |
| 4 | 83 | 52 | 80 | 58 | 64 | 44 | 66 | 41 | 39 | 26 | 35.5 | 30 | 16 | − 5 | 25.5 | 12 | 27 | 11 | 37 | 29 | 59 | 43 | 75 | 61 |
| 5 | 80 | 53 | 67 | 50 | 59 | 50 | 55 | 38 | 34 | 24.5 | 36 | 32 | 30 | − 3 | 27 | 17 | 24 | 4 | 37 | 30 | 55 | 39.5 | 68 | 46 |
| 6 | 74 | 58 | 76 | 52 | 61 | 43 | 53 | 36 | 33 | 18 | 40 | 14 | 0 | − 1.8 | 27.5 | 15 | 36 | 20 | 37 | 30 | 58 | 45 | 51 | 41 |
| 7 | 84 | 53 | 60 | 53 | 70 | 42 | 56 | 38 | 38 | 24 | 23 | 14 | − 9 | −22 | 35 | 16 | 37 | 30 | 37 | 31 | 66 | 43 | 63 | 35 |
| 8 | 83 | 58 | 64 | 51 | 73 | 46 | 56 | 38 | 44 | 23 | 30 | 17 | 0 | − 2.4 | 37 | 21 | 48 | 29.5 | 38.5 | 30 | 64 | 43 | 66.5 | 46 |
| 9 | 86 | 59 | 66 | 54 | 74 | 50 | 52 | 42 | 37 | 25 | 28.5 | 11 | 24 | − 1.5 | 34 | 13 | 42 | 28 | 49 | 28 | 66 | 42 | 58 | 43 |
| 10 | 89 | 59 | 63 | 56 | 78 | 54 | 54 | 42 | 31 | 19 | 24 | 11 | 31.5 | 16 | 15 | 8 | 46 | 25 | 48 | 34 | 58 | 45 | 64 | 42 |
| 11 | 77 | 50 | 75 | 55 | 79 | 57 | 49 | 45 | 32 | 24 | 26 | 18 | 32 | 25 | 18 | 3 | 28 | 16 | 48 | 33 | 50 | 39 | 61 | 48.5 |
| 12 | 76 | 56 | 77 | 57 | 80 | 58 | 47 | 42 | 36 | 32 | 40 | 22 | 40 | 23 | 20 | 2 | 32 | 19 | 43 | 33 | 48 | 31.5 | 71 | 46 |
| 13 | 74 | 50 | 77 | 59 | 80 | 63 | 46 | 39 | 43 | 25 | 30 | 19 | 31.5 | 28 | 25 | 5 | 34 | 14.5 | 41.5 | 30 | 51 | 31 | 71 | 48.5 |
| 14 | 81 | 53 | 71 | 58 | 79 | 52 | 47 | 39 | 43 | 25 | 29 | 7 | 30 | 25 | 14 | − 2 | 32 | 24 | 46 | 31 | 49 | 34.5 | 79 | 50 |
| 15 | 81 | 56 | 79 | 60 | 84 | 58 | 51 | 40 | 51 | 40 | 42 | 11 | 29 | 5 | 17 | − 6 | 35 | 21 | 47 | 36.5 | 55 | 33 | 82 | 56 |
| 16 | 91 | 62 | 59 | 55 | 83 | 54 | 51 | 38 | 44 | 35 | 42 | 15 | 7 | −11 | 21 | 1 | 40 | 15.5 | 52 | 33 | 59 | 41 | 81.5 | 57.5 |
| 17 | 93 | 66 | 64 | 55 | 84 | 59 | 52 | 34 | 41 | 32 | 31 | 14 | 1 | −26.5 | −27 | 7 | 41 | 27 | 49 | 36 | 65 | 41 | 74 | 57 |
| 18 | 86 | 61 | 80 | 54 | 64 | 51 | 57 | 35 | 39 | 32 | 31 | 10 | 13 | − 8.5 | 16 | − 3 | 36 | 25 | 60 | 33 | 69 | 43 | 65 | 53 |
| 19 | 81 | 64 | 80 | 55 | 64 | 43 | 50 | 37 | 37 | 27 | 43 | 12 | 24 | 2 | 18 | − 5 | 33 | 23 | 55 | 35 | 66 | 43 | 76 | 53.5 |
| 20 | 85 | 64 | 83 | 55 | 69 | 48 | 48 | 33 | 37 | 20 | 44 | 18 | 35 | 12 | 28 | 3 | 33 | 10.7 | 59 | 31.5 | 61 | 49 | 79 | 56 |
| 21 | 75 | 62 | 84 | 54 | 54 | 46 | 47 | 28 | 29 | 20 | 20.5 | 10 | 32 | 25 | 30 | 14.5 | 24 | 0.1 | 55 | 38 | 55 | 46.5 | 76 | 61 |
| 22 | 81 | 55 | 87 | 56 | 61 | 42 | 49 | 34 | 40.5 | 20.5 | 24 | 15 | 33 | 26 | 26.5 | 15 | 27 | 2.5 | 52 | 32 | 52 | 39 | 68 | 50.5 |
| 23 | 79 | 58 | 89 | 55 | 70 | 46 | 47 | 36.5 | 40 | 33 | 25 | 10 | 30 | − 8 | 29 | 21 | 35 | 20 | 48 | 34 | 60 | 41.5 | 64 | 50 |
| 24 | 78 | 47 | 72 | 64 | 62 | 46 | 44 | 32 | 40 | 35 | 22 | 15 | 0 | −18 | 33 | 25 | 26 | 18 | 56 | 37 | 56 | 44 | 69 | 55 |
| 25 | 63 | 47 | 67 | 58 | 61 | 53 | 40 | 24 | 36 | 32.5 | 22 | 14 | 11 | − 2 | 33 | 23 | 24 | 15 | 60 | 42 | 58 | 49 | 67 | 46 |
| 26 | 63 | 52 | 66 | 54 | 71 | 50 | 44 | 23 | 41.5 | 34 | 27 | 14 | 21 | 8 | 36 | 21 | 34 | 18 | 49 | 40 | 63 | 47 | 8.5 | 46 |
| 27 | 76 | 55 | 67 | 52 | 64 | 44 | 48 | 25 | 46 | 40 | 24 | 11 | 30 | 14 | 37 | 24 | 35 | 29 | 56 | 39 | 66 | 50 | 75 | 50 |
| 28 | 85 | 59 | 79 | 58 | 56 | 49 | 47 | 26 | 45 | 37 | 24 | 10 | 22 | − 4 | 36 | 6.5 | 39 | 30 | 55 | 42 | 65 | 51 | 85 | 59 |
| 29 | 82 | 64 | 68 | 58 | 68 | 47 | 55 | 35 | 38 | 30 | 24 | 16 | 5 | −11 | ..... | ..... | 48 | 28 | 52 | 43 | 65 | 50 | 89 | 64 |
| 30 | 86 | 63 | 74 | 55 | 68 | 46 | 47 | 36 | 40 | 26 | 21.5 | 16.5 | 6 | − 8 | ..... | ..... | 39 | 22 | 49 | 39 | 66 | 50 | 92 | 72 |
| 31 | 72 | 55 | 77 | 49 | ..... | ..... | 44 | 30 | ..... | ..... | 21 | 6 | 14 | −11 | ..... | ..... | 37 | 25 | ..... | ..... | 79 | 46 | ..... | ..... |
| Range | 46° | | 40° | | 42° | | 58° | | 33°.0 | | 38°.0 | | 66°.5 | | 43° | | 54°.2 | | 32° | | 48° | | 47° | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, RED BLUFF, CAL.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 94 | 63 | 99 | 68 | 97 | 62 | 81 | 55 | 64 | 38 | 57 | 44 | 51 | 31 | 55 | 43 | 58 | 44 | 77 | 48 | 73 | 52 | 77 | 53 |
| 2 | 94 | 70 | 96 | 68 | 99 | 63 | 73 | 52 | 54 | 46 | 58 | 38 | 51 | 29 | 61 | 46 | 64 | 42 | 74 | 49 | 83 | 56 | 87 | 56 |
| 3 | 82 | 62 | 89 | 62 | 106 | 73 | 83 | 53 | 61 | 46 | 57 | 36 | 49 | 26 | 59 | 50 | 57 | 45 | 72 | 50 | 87 | 52 | 94 | 59 |
| 4 | 79 | 60 | 96 | 68 | 102 | 70 | 83 | 57 | 57 | 48 | 59 | 39 | 50 | 25 | 56 | 49 | 56 | 41 | 71 | 51 | 92 | 52 | 95 | 65 |
| 5 | 88 | 61 | 98 | 67 | 100 | 70 | 85 | 60 | 61 | 52 | 56 | 33 | 55 | 27 | 53 | 39 | 58 | 46 | 90 | 49 | 84 | 57 | 98.5 | 68 |
| 6 | 90 | 58 | 100 | 66 | 95 | 66 | 89 | 65 | 67 | 52 | 58 | 34 | 52 | 28 | 55 | 41 | 58 | 46 | 84 | 60 | 82 | 54 | 102 | 70 |
| 7 | 97 | 64 | 101 | 68 | 97 | 69 | 94 | 64 | 67 | 48 | 55 | 36 | 48 | 40 | 55 | 43 | 56 | 37 | 84 | 61 | 78 | 54 | 94 | 65 |
| 8 | 100 | 64 | 96 | 68 | 99 | 65 | 94 | 62 | 67 | 47 | 57 | 33 | 55 | 41 | 54 | 43 | 60 | 34 | 78 | 59 | 83 | 56 | 97 | 65 |
| 9 | 99 | 65 | 99 | 65 | 97 | 66 | 90 | 59 | 68 | 47 | 56 | 34 | 58 | 46 | 52 | 37 | 62 | 40 | 75 | 54 | 86 | 56 | 101 | 68 |
| 10 | 98 | 64 | 96 | 64 | 89 | 68 | 87 | 56 | 61 | 47 | 54 | 34 | 56 | 41 | 53 | 42 | 66 | 46 | 80 | 49 | 82 | 55 | 98 | 70 |
| 11 | 103 | 68 | 98 | 60 | 79 | 59 | 76 | 56 | 58 | 51 | 49 | 35 | 54 | 35 | 52 | 45 | 64 | 42 | 78 | 52 | 82 | 62 | 92 | 66 |
| 12 | 106 | 73 | 102 | 63 | 78 | 57 | 67 | 52 | 62 | 44 | 61 | 41 | 52 | 34 | 54 | 38 | 62 | 43 | 72 | 49 | 84 | 55 | 96 | 64 |
| 13 | 108 | 75 | 103 | 67 | 86 | 58 | 70 | 55 | 58 | 40 | 59 | 39 | 55 | 35 | 58 | 42 | 58 | 51 | 60 | 43 | 83 | 56 | 100 | 70 |
| 14 | 107 | 74 | 102 | 68 | 88 | 67 | 76 | 56 | 56 | 48 | 63 | 43 | 54 | 40 | 54 | 43 | 63 | 54 | 62 | 38 | 80 | 54 | 100 | 70 |
| 15 | 98 | 76 | 100 | 67 | 93 | 72 | 81 | 51 | 58 | 47 | 62 | 44 | 56 | 48 | 51 | 40 | 69 | 51 | 54 | 35 | 82 | 56 | 90 | 66 |
| 16 | 89 | 72 | 96 | 69 | 97 | 74 | 84 | 52 | 63 | 53 | 59 | 49 | 50 | 42 | 56 | 47 | 71 | 53 | 59 | 41 | 70 | 54 | 84 | 60 |
| 17 | 95 | 66 | 97 | 69 | 99 | 74 | 81 | 51 | 63 | 43 | 58 | 51 | 52 | 38 | 56 | 51 | 68 | 49 | 65 | 42 | 79 | 52 | 88 | 58.5 |
| 18 | 99 | 67 | 96 | 66 | 99 | 64 | 80 | 50 | 68 | 47 | 66 | 46 | 51 | 43 | 60 | 49 | 65 | 52 | 58 | 47 | 81 | 54 | 96 | 67 |
| 19 | 102 | 67 | 92 | 65 | 90 | 64 | 80 | 49 | 63 | 45 | 56 | 47 | 55 | 43 | 61 | 47 | 68 | 51 | 58 | 45 | 78 | 57 | 97 | 69 |
| 20 | 95 | 69 | 94 | 62 | 86 | 62 | 78 | 47 | 63 | 45 | 57 | 37 | 58 | 40 | 54 | 38 | 70 | 50 | 56 | 46 | 67 | 51 | 94 | 66 |
| 21 | 100 | 69 | 96 | 64 | 83 | 59 | 69 | 54 | 58 | 43 | 55 | 48 | 53 | 44 | 60 | 38 | 68 | 52 | 64 | 46 | 64.5 | 52 | 101 | 69 |
| 22 | 100 | 68 | 95 | 66 | 83 | 60 | 62 | 54 | 57 | 46 | 54 | 39 | 53 | 47 | 62 | 42 | 76 | 49 | 70 | 45 | 74 | 53 | 100 | 70 |
| 23 | 97 | 69 | 90 | 64 | 83 | 55 | 63 | 51 | 63 | 51 | 50 | 42 | 57 | 47 | 58 | 38 | 66 | 51 | 75 | 52 | 89 | 54 | 94 | 61 |
| 24 | 101 | 68 | 85 | 61 | 87 | 58 | 73 | 54 | 59 | 41 | 56 | 38 | 56 | 46 | 56 | 43 | 63 | 53 | 74 | 55 | 93 | 64 | 96 | 68 |
| 25 | 99 | 71 | 83 | 56 | 86 | 58 | 70 | 59 | 65 | 42 | 49 | 43 | 53 | 42 | 60 | 38 | 56 | 46 | 67 | 52 | 97 | 66 | 97 | 69 |
| 26 | 101 | 67 | 92 | 62 | 86 | 61 | 68 | 50 | 72 | 48 | 54 | 35 | 50 | 41 | 55 | 44 | 61 | 49 | 66 | 47 | 92 | 67 | 105 | 76 |
| 27 | 103 | 67 | 94 | 58 | 92 | 62 | 64 | 47 | 67 | 55 | 53 | 33 | 53 | 44 | 50 | 41 | 58 | 47 | 68 | 50 | 81 | 60 | 100 | 73 |
| 28 | 101 | 71 | 92 | 62 | 89 | 61 | 59 | 41 | 66 | 46 | 50 | 36 | 54 | 46 | 52 | 41 | 57 | 46 | 76 | 50 | 70 | 50 | 84 | 62 |
| 29 | 96 | 68 | 88 | 64 | 81 | 65 | 62 | 44 | 62 | 39 | 55 | 34 | 58 | 47 | ..... | ..... | 58 | 46 | 73 | 50 | 68 | 48 | 91 | 65 |
| 30 | 92 | 67 | 94 | 59 | 81 | 52 | 66 | 48 | 62 | 38 | 54 | 35 | 58 | 50 | ..... | ..... | 65 | 46 | 78 | 57 | 68 | 51 | 102 | 67 |
| 31 | 101 | 70 | 95 | 62 | ..... | ..... | 65 | 40 | ..... | ..... | 52 | 32 | 59 | 47 | ..... | ..... | 71 | 45 | ..... | ..... | 76 | 50 | ..... | ..... |
| Range | 50° | | 47° | | 54° | | 54° | | 34° | | 34° | | 34° | | 25° | | 42° | | 55° | | 49° | | 52° | |
| Monthly means | 83°.4 | | 79°.5 | | 77°.1 | | 63°.8 | | 53°.6 | | 46°.9 | | 47°.2 | | 49°.9 | | 55°.3 | | 60°.3 | | 68° | | 82°.2 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, RIO GRANDE CITY, TEX.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 104 | 78 | 108 | 79 | 107 | 77 | 101 | 70 | 98 | 76 | 59 | 39 | (*) | ..... | (*) | ..... | 82 | 49 | 73 | 66 | 94 | 62 | 103 | 78 |
| 2 | 105 | 78 | 108 | 77 | 106 | 78 | 105 | 70 | 68 | 63 | 59 | 42 | ..... | ..... | ..... | ..... | 83 | 52 | 78 | 64 | 101 | 74 | 103 | 75 |
| 3 | 104 | 78 | 107 | 76 | 107 | 77 | 108 | 72 | 64 | 52 | 67 | 48 | ..... | ..... | ..... | ..... | 83 | 56 | 85 | 56 | 91 | 75 | 102 | 74 |
| 4 | 101 | 78 | 108 | 80 | 106 | 78 | 92 | 65 | 69 | 41 | 71 | 47 | ..... | ..... | ..... | ..... | (*) | ..... | 83 | 55 | 90 | 62 | 97 | 74 |
| 5 | 88 | 77 | 109 | 80 | 103 | 80 | 92 | 65 | 65 | 49 | 62 | 39 | ..... | ..... | ..... | ..... | ..... | ..... | 89 | 51 | 91 | 53 | 97 | 75 |
| 6 | 99 | 70 | 110 | 81 | 101 | 76 | 101 | 77 | 61 | 47 | 60 | 43 | ..... | ..... | ..... | ..... | ..... | ..... | 95 | 64 | 94 | 69 | 96 | 75 |
| 7 | 103 | 78 | 112 | 81 | 102 | 76 | 105 | 79 | 91 | 56 | 69 | 30 | ..... | ..... | ..... | ..... | 90 | 63 | 87 | 69 | 106 | 74 | 101 | 74 |
| 8 | 101 | 78 | 110 | 74 | 101 | 78 | 97 | 76 | 75 | 64 | 70 | 44 | ..... | ..... | ..... | ..... | 96 | 64 | 97 | 69 | 95 | 68 | 101 | 79 |
| 9 | 105 | 78 | 106 | 73 | 106 | 77 | 100 | 70 | 72 | 39 | 80 | 50 | ..... | ..... | ..... | ..... | 82 | 56 | 102 | 57 | 85 | 64 | 103 | 81 |
| 10 | 105 | 80 | 101 | 74 | 108 | 78 | 94 | 68 | 69 | 35 | 61 | 39 | ..... | ..... | ..... | ..... | 86 | 66 | 95 | 63 | 85 | 65 | 102 | 75 |
| 11 | 104 | 78 | 102 | 74 | 106 | 78 | 98 | 65 | 76 | 53 | 62 | 42 | ..... | ..... | ..... | ..... | 90 | 55 | 92 | 67 | 84 | 67 | 89 | 74 |
| 12 | 93 | 73 | 103 | 75 | 104 | 79 | 95 | 60 | 82 | 58 | 63 | 47 | ..... | ..... | ..... | ..... | 92 | 64 | 92 | 66 | 89 | 70 | 99 | 75 |
| 13 | 102 | 74 | 105 | 76 | 105 | 80 | 97 | 72 | 88 | 54 | 69 | 57 | ..... | ..... | ..... | ..... | 88 | 62 | 99 | 71 | 90 | 72 | 104 | 79 |
| 14 | 101 | 76 | 103 | 76 | 107 | 78 | 99 | 73 | 85 | 60 | 74 | 56 | ..... | ..... | ..... | ..... | 79 | 69 | 94 | 74 | 90 | 72 | 101 | 76 |
| 15 | 104 | 78 | 106 | 77 | 99 | 75 | 99 | 77 | 85 | 61 | 77 | 52 | ..... | ..... | ..... | ..... | 74 | 67 | 102 | 76 | 87 | 72 | 105 | 80 |
| 16 | 99 | 88 | 106 | 78 | 98 | 75 | 101 | 74 | 81 | 59 | 81 | 52 | ..... | ..... | ..... | ..... | 82 | 63 | 94 | 72 | 95 | 71 | 104 | 80 |
| 17 | 105 | 80 | 108 | 78 | 100 | 77 | 77 | 63 | 85 | 54 | 80 | 67 | ..... | ..... | ..... | ..... | 86 | 57 | 103 | 70 | 95 | 80 | 106 | 81 |
| 18 | 106 | 78 | 107 | 78 | 94 | 75 | 82 | 62 | 89 | 58 | 80 | 62 | ..... | ..... | ..... | ..... | 84 | 60 | 97 | 74 | 100 | 76 | 105 | 80 |
| 19 | 108 | 79 | 103 | 81 | 97 | 68 | 79 | 58 | 83 | 52 | 78 | 58 | ..... | ..... | ..... | ..... | 71 | 54 | 85 | 76 | 96 | 74 | 103 | 75 |
| 20 | 101 | 81 | 107 | 76 | 94 | 59 | 79 | 58 | 79 | 49 | 77 | 56 | ..... | ..... | ..... | ..... | 67 | 56 | 97 | 74 | 97 | 76 | 105 | 75 |
| 21 | 94 | 71 | 112 | 78 | 97 | 54 | 78 | 51 | 79 | 46 | 80 | 47 | ..... | ..... | ..... | ..... | 79 | 52 | 102 | 75 | 95 | 79 | 103 | 77 |
| 22 | 96 | 62 | 106 | 77 | 98 | 58 | 82 | 56 | 84 | 49 | 79 | 47 | ..... | ..... | ..... | ..... | 85 | 49 | 109 | 74 | 97 | 79 | 102 | 76 |
| 23 | 98 | 66 | 109 | 77 | 98 | 59 | 84 | 58 | 72 | 53 | 72 | 49 | ..... | ..... | ..... | ..... | 82 | 56 | 93 | 73 | 95 | 76 | 102 | 76 |
| 24 | 104 | 71 | 109 | 80 | 100 | 66 | 85 | 71 | 90 | 55 | 76 | 52 | ..... | ..... | ..... | ..... | 83 | 62 | 96 | 55 | 94 | 76 | 103 | 77 |
| 25 | 108 | 66 | 110 | 79 | 96 | 77 | 94 | 71 | 78 | 37 | 72 | 54 | ..... | ..... | ..... | ..... | 87 | 59 | 95 | 62 | 95 | 75 | 103 | 77 |
| 26 | 109 | 68 | 109 | 78 | 101 | 77 | 92 | 60 | 84 | 48 | 74 | 51 | ..... | ..... | ..... | ..... | 91 | 67 | 94 | 66 | 93 | 74 | 102 | 77 |
| 27 | 104 | 81 | 103 | 79 | 105 | 77 | 95 | 70 | 75 | 44 | 78 | 56 | ..... | ..... | ..... | ..... | 92 | 66 | 94 | 66 | 91 | 68 | 101 | 77 |
| 28 | 102 | 82 | 101 | 72 | 102 | 71 | 96 | 77 | 60 | 36 | 65 | 48 | ..... | ..... | ..... | ..... | 94 | 59 | 92 | 61 | 95 | 73 | 100 | 78 |
| 29 | 105 | 81 | 100 | 74 | 100 | 62 | 92 | 79 | 55 | 33 | 55 | 42 | ..... | ..... | ..... | ..... | 86 | 67 | 84 | 56 | 94 | 73 | 96 | 78 |
| 30 | 105 | 80 | 93 | 76 | 100 | 70 | 77 | 66 | 52 | 34 | 57 | 36 | ..... | ..... | ..... | ..... | 90 | 59 | 96 | 64 | 95 | 77 | 96 | 76 |
| 31 | 105 | 78 | 104 | 75 | ..... | ..... | 74 | 63 | ..... | ..... | 54 | 41 | ..... | ..... | ..... | ..... | 90 | 55 | ..... | ..... | 98 | 76 | ..... | ..... |
| Mean | 46° | | 40° | | 54° | | 57° | | 65° | | 51° | | ..... | | ..... | | ..... | | 58° | | 53° | | 32° | |
| Monthly range | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | |

* No observations taken.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, ROCHESTER, N. Y.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 82 | 68 | 85 | 62 | 69 | 56 | 86 | 65 | 50 | 35 | 31 | 22 | 33 | 13 | 26 | 22 | 31 | 17 | 57 | 35 | 71 | 53 | 72 | 53 |
| 2 | 73 | 60 | 87 | 68 | 63 | 49 | 70 | 58 | 56 | 41 | 30 | 16 | 31 | 13 | 23 | 8 | 49 | 24 | 58 | 38 | 78 | 53 | 80 | 59 |
| 3 | 81 | 60 | 76 | 65 | 62 | 47 | 70 | 54 | 43 | 35 | 39 | 24 | 20 | Zero. | 23 | Zero. | 51 | 37 | 54 | 37 | 70 | 59 | 84 | 63 |
| 4 | 81 | 60 | 75 | 58 | 74 | 56 | 70 | 49 | 45 | 31 | 45 | 32 | 24 | 11 | 33 | 4 | 38 | 25 | 52 | 36 | 61 | 50 | 79 | 58 |
| 5 | 78 | 58 | 76 | 54 | 74 | 58 | 54 | 43 | 56 | 30 | 58 | 37 | 28 | 14 | 32 | 11 | 49 | 27 | 57 | 36 | 61 | 46 | 58 | 47 |
| 6 | 75 | 59 | 82 | 58 | 63 | 57 | 55 | 41 | 36 | 24 | 38 | 27 | 16 | 7 | 43 | 18 | 62 | 42 | 52 | 35 | 62 | 44 | 62 | 40 |
| 7 | 79 | 53 | 84 | 66 | 67 | 56 | 50 | 37 | 48 | 27 | 33 | 26 | 12 | 4 | 50 | 32 | 57 | 44 | 50 | 38 | 73 | 46 | 64 | 42 |
| 8 | 87 | 64 | 81 | 64 | 66 | 55 | 60 | 50 | 58 | 40 | 37 | 32 | 26 | 4 | 42 | 34 | 64 | 38 | 55 | 38 | 71 | 56 | 53 | 47 |
| 9 | 81 | 69 | 82 | 64 | 71 | 48 | 61 | 49 | 58 | 31 | 32 | 26 | 41 | 23 | 35 | 23 | 66 | 39 | 60 | 41 | 65 | 50 | 68 | 45 |
| 10 | 75 | 63 | 77 | 63 | 74 | 55 | 65 | 46 | 31 | 26 | 41 | 25 | 40 | 34 | 29 | 19 | 62 | 45 | 63 | 51 | 55 | 42 | 61 | 51 |
| 11 | 73 | 58 | 80 | 59 | 77 | 59 | 52 | 46 | 43 | 24 | 45 | 36 | 39 | 32 | 20 | 10 | 46 | 38 | 62 | 48 | 49 | 37 | 65 | 50 |
| 12 | 81 | 55 | 80 | 59 | 82 | 65 | 51 | 46 | 45 | 31 | 46 | 30 | 38 | 34 | 30 | 7 | 54 | 37 | 59 | 43 | 44 | 37 | 67 | 45 |
| 13 | 71 | 58 | 72 | 63 | 82 | 66 | 58 | 46 | 43 | 34 | 52 | 30 | 35 | 32 | 33 | 25 | 41 | 36 | 53 | 41 | 49 | 32 | 75 | 50 |
| 14 | 80 | 53 | 80 | 63 | 84 | 61 | 73 | 52 | 58 | 37 | 39 | 25 | 40 | 33 | 31 | 13 | 41 | 36 | 54 | 42 | 50 | 31 | 78 | 51 |
| 15 | 87 | 63 | 78 | 62 | 83 | 64 | 74 | 50 | 58 | 48 | 53 | 36 | 34 | 23 | 30 | 17 | 47 | 35 | 50 | 39 | 55 | 38 | 82 | 53 |
| 16 | 90 | 67 | 78 | 62 | 81 | 68 | 68 | 52 | 54 | 44 | 51 | 38 | 23 | 12 | 36 | 25 | 55 | 34 | 54 | 38 | 60 | 35 | 76 | 61 |
| 17 | 80 | 66 | 72 | 60 | 80 | 54 | 54 | 45 | 54 | 27 | 51 | 34 | 33 | 11 | 35 | 27 | 45 | 37 | 61 | 43 | 65 | 43 | 69 | 56 |
| 18 | 83 | 64 | 79 | 60 | 63 | 50 | 58 | 45 | 49 | 31 | 37 | 22 | 37 | 28 | 30 | 7 | 51 | 35 | 68 | 43 | 63 | 41 | 72 | 51 |
| 19 | 78 | 66 | 84 | 62 | 70 | 45 | 55 | 46 | 32 | 27 | 54 | 35 | 51 | 30 | 27 | 1 | 45 | 38 | 65 | 55 | 68 | 50 | 75 | 47 |
| 20 | 75 | 62 | 79 | 62 | 70 | 52 | 49 | 41 | 34 | 21 | 54 | 35 | 44 | 37 | 42 | 16 | 41 | 32 | 74 | 53 | 74 | 56 | 80 | 53 |
| 21 | 73 | 59 | 79 | 58 | 60 | 49 | 44 | 41 | 44 | 22 | 47 | 33 | 45 | 38 | 42 | 37 | 40 | 27 | 60 | 50 | 62 | 48 | 76 | 62 |
| 22 | 80 | 57 | 80 | 62 | 66 | 41 | 48 | 38 | 45 | 37 | 45 | 38 | 38 | 31 | 42 | 38 | 43 | 30 | 53 | 42 | 60 | 43 | 67 | 61 |
| 23 | 82 | 64 | 85 | 68 | 76 | 49 | 59 | 37 | 51 | 40 | 45 | 36 | 31 | 3 | 42 | 35 | 56 | 33 | 76 | 48 | 66 | 41 | 67 | 55 |
| 24 | 85 | 61 | 80 | 64 | 80 | 54 | 64 | 54 | 51 | 42 | 38 | 32 | 37 | 11 | 35 | 30 | 49 | 11 | 75 | 62 | 75 | 49 | 71 | 58 |
| 25 | 89 | 63 | 80 | 64 | 82 | 62 | 56 | 39 | 52 | 41 | 35 | 30 | 46 | 33 | 33 | 25 | 28 | 7 | 67 | 52 | 74 | 55 | 76 | 55 |
| 26 | 88 | 67 | 80 | 62 | 80 | 64 | 56 | 37 | 54 | 46 | 38 | 31 | 40 | 33 | 37 | 22 | 42 | 26 | 68 | 49 | 72 | 56 | 83 | 54 |
| 27 | 86 | 72 | 85 | 63 | 71 | 55 | 43 | 38 | 51 | 42 | 41 | 34 | 38 | 31 | 46 | 30 | 53 | 33 | 68 | 48 | 66 | 52 | 84 | 67 |
| 28 | 85 | 71 | 86 | 66 | 77 | 62 | 60 | 39 | 45 | 36 | 41 | 34 | 33 | 13 | 48 | 31 | 46 | 36 | 64 | 50 | 65 | 47 | 82 | 60 |
| 29 | 85 | 72 | 82 | 70 | 70 | 54 | 66 | 43 | 39 | 26 | 36 | 26 | 24 | 7 | ..... | ..... | 43 | 32 | 63 | 51 | 61 | 43 | 87 | 62 |
| 30 | 84 | 67 | 77 | 63 | 84 | 57 | 52 | 38 | 34 | 23 | 31 | 28 | 20 | 8 | ..... | ..... | 49 | 33 | 70 | 51 | 59 | 47 | 93 | 67 |
| 31 | 77 | 68 | 70 | 56 | ..... | ..... | 50 | 36 | ..... | ..... | 31 | 20 | 24 | 11 | ..... | ..... | 49 | 39 | ..... | ..... | 71 | 47 | ..... | ..... |
| Range | 37° | | 35° | | 43° | | 50° | | 37° | | 42° | | 51° | | 50° | | 59° | | 41° | | 48° | | 53° | |
| Monthly means | 72°.3 | | 70°.9 | | 64°.2 | | 51°.9 | | 40°.3 | | 36°.5 | | 26°.0 | | 28°.6 | | 40°.4 | | 52°.7 | | 56°.2 | | 65°.4 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, ROCKLIFFE, CANADA.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 78.4 | 60.0 | 89.7 | 48.0 | 64.0 | 48.9 | 74.9 | 47.4 | 46.2 | 30.0 | 26.9 | 11.2 | 22.9 | — 1.6 | 31.3 | 10.6 | 21.2 | —12.4 | 61.6 | 25 2 | 68.8 | 45.2 | 83.7 | 43.2 |
| 2 | 76.8 | 54.5 | 90.2 | 63.8 | 58.8 | 41.2 | 52.8 | 43.8 | 39.6 | 32.9 | 31.2 | 1.9 | 19.4 | —10.8 | 25.1 | — 4.8 | 30.9 | 10.2 | 59 8 | 29.0 | 58.8 | 35.8 | 83.9 | 45.2 |
| 3 | 72.3 | 51.1 | 74.3 | 55.4 | 54.0 | 41.5 | 52.8 | 43.4 | 35.6 | 30.0 | 34.9 | 27.7 | 18.1 | —13.4 | 29.7 | — 9.6 | 37.1 | 22.3 | 59.1 | 29.0 | 65.8 | 48.8 | 85.2 | 58.2 |
| 4 | 85.5 | 50.5 | 76.7 | 48.7 | 72.2 | 50.0 | 64.5 | 39.3 | 34.9 | 25.0 | 35.9 | 30.3 | 18.1 | 6.5 | 38.8 | 9.0 | 25.2 | 5.2 | 59.8 | 28.9 | 60.4 | 45.4 | 78.4 | 48.1 |
| 5 | 75.2 | 52.5 | 79.4 | 48.7 | 63.2 | 41.3 | 49.8 | 39.4 | 31.6 | 21.3 | 39.4 | 31.4 | 20.9 | —17.8 | 38.8 | 2.0 | 39.8 | 6.2 | 60.8 | 26.0 | 60.0 | 32.3 | 55.5 | 37.0 |
| 6 | 77.4 | 47.0 | 77.7 | 49.4 | 65.8 | 37.0 | 53.8 | 29.0 | 36.2 | 15.4 | 37.0 | 9.1 | —3.1 | —21.8 | 38.0 | 22.8 | 53.8 | 31.2 | 46.3 | 35.4 | 61.8 | 38.5 | 61.6 | 29.9 |
| 7 | 83.6 | 43.3 | 80.7 | 59.7 | 68.6 | 37.3 | 58.5 | 33.6 | 47.8 | 18.1 | 26.9 | 7.1 | —5.9 | —26.2 | 46.4 | 13.1 | 43.1 | 32.6 | 45.1 | 32.7 | 54.8 | 37.3 | 60.6 | 34.0 |
| 8 | 81.0 | 58.8 | 83.3 | 59.3 | 70.7 | 40.1 | 51.0 | 46.2 | 37.0 | 30.7 | 37.0 | 16.6 | 5.9 | —23.4 | 39.8 | 16.5 | 53.1 | 26.0 | 57.8 | 33.0 | 69.8 | 44.4 | 67.5 | 32.4 |
| 9 | 82.8 | 58.3 | 74.0 | 59.5 | 72.6 | 38.9 | 56.8 | 46.3 | 38.1 | 13.7 | 23.5 | 8 2 | 30.9 | 3.2 | 20.6 | 3.0 | 50.1 | 21.1 | 56.3 | 32.5 | 64.8 | 41.5 | 71.5 | 34.3 |
| 10 | 71.1 | 53.8 | 75.7 | 56.2 | 69.9 | 45.2 | 50 6 | 43 5 | 29.6 | 5.2 | 30.1 | 18.8 | 35.1 | 25.5 | 20.6 | 2.2 | 47.6 | 29.8 | 52.8 | 44.7 | 57.7 | 32.0 | 72.1 | 38.2 |
| 11 | 73.3 | 54.1 | 75.7 | 57.7 | 78.1 | 50.0 | 54.7 | 45.0 | 36.5 | 10.6 | 38.0 | 25.3 | 42.2 | 31.5 | 18.9 | — 7.6 | 37.5 | 32.0 | 64.6 | 40.2 | 44.5 | 32.0 | 66.2 | 48.4 |
| 12 | 72.3 | 48.4 | 75.0 | 53.1 | 79.7 | 54.0 | 51.5 | 41.8 | 40.0 | 25.4 | 36.4 | 27.6 | 36.5 | 29 2 | 26.2 | — 3.8 | 35.8 | 31.0 | 61.2 | 32.2 | 46.0 | 32.3 | 72.7 | 43.1 |
| 13 | 73.7 | 42.1 | 80.5 | 51.1 | 77.5 | 55.9 | 51.5 | 37.4 | 35.1 | 13.4 | 37.4 | 12.2 | 33 9 | 28.8 | 27.6 | 5.1 | 40.7 | 30.8 | 54.4 | 38.5 | 43.8 | 29.0 | 79.0 | 45.4 |
| 14 | 82.7 | 47.4 | 75.0 | 52.5 | 84.1 | 53.5 | 57.0 | 45.8 | 38.8 | 19.7 | 39.5 | 5 0 | 33.2 | 25.4 | 23.5 | —13.6 | 43.3 | 32.9 | 50.6 | 32.4 | 40.8 | 29.1 | 84.0 | 44.2 |
| 15 | 86.1 | 61.2 | 76.2 | 60.5 | 83.5 | 54.3 | 52.0 | 49 0 | 42.8 | 33.7 | 41.2 | 28.3 | 28.9 | 0.4 | 29 9 | — 9.6 | 47.8 | 19.3 | 58.2 | 33.7 | 56.8 | 26.8 | 84.7 | 43.2 |
| 16 | 88.7 | 56.8 | 75.5 | 60.6 | 78.4 | 55.8 | 54 0 | 35.4 | 43.1 | 32.6 | 40.8 | 24.2 | 2.2 | —10.9 | 33.2 | — 4.6 | 58.0 | 24.4 | 60.8 | 32.0 | 65.5 | 31.0 | 78.5 | 54.4 |
| 17 | 77.9 | 59.0 | 78.2 | 57.8 | 67.8 | 51.0 | 51.8 | 33.2 | 49.0 | 31.0 | 41.6 | 11.9 | 11.1 | — 9.8 | 30.7 | 1.2 | 45 7 | 31.0 | 63.6 | 29.4 | 66.6 | 37.8 | 63.0 | 52.1 |
| 18 | 82.2 | 57.4 | 83.9 | 50.1 | 59.8 | 39.9 | 51.0 | 37.4 | 43.2 | 22.7 | 23.5 | 4.0 | 24.7 | 0.1 | 21.3 | —10.1 | 50.0 | 24.2 | 72.7 | 29.9 | 64.7 | 39.5 | 75.2 | 42.2 |
| 19 | 76.1 | 53.8 | 80.0 | 54.4 | 61.6 | 35.7 | 48.1 | 34.8 | 30.9 | 19.4 | 34.1 | 19.1 | 38.0 | 14.1 | 33.8 | — 4.0 | 43.6 | 30.4 | 65.8 | 36.1 | 65.5 | 33.6 | 81.5 | 41.5 |
| 20 | 73.4 | 49.3 | 80.1 | 47.1 | 58.8 | 42.0 | 43.3 | 26.0 | 28.1 | 14.3 | 36.6 | 26.0 | 38.8 | 32.0 | 26.2 | 14.9 | 32.7 | 16.4 | 65.1 | 34.2 | 58.8 | 49.1 | 78.0 | 57.2 |
| 21 | 75.5 | 51.4 | 84 7 | 49.1 | 60.2 | 34.5 | 43.1 | 22.4 | 33.6 | 13.3 | 30.1 | 24 1 | 37.0 | 32.3 | 34.3 | 22.5 | 31.4 | 10.4 | 58.6 | 34.4 | 54.8 | 35.4 | 66.4 | 59.8 |
| 22 | 79.2 | 49.1 | 83.7 | 55.6 | 69.7 | 34 0 | 45.8 | 21.6 | 34.4 | 25.1 | 33.6 | 25.4 | 33.5 | 2.4 | 34.3 | 29.0 | 46.2 | 15.5 | 51.3 | 23.6 | 64.6 | 30.7 | 67.7 | 60.5 |
| 23 | 81.6 | 51.5 | 82.7 | 59.4 | 73.5 | 41.2 | 46.8 | 27.5 | 39.8 | 33.3 | 34.3 | 26.3 | 3.1 | —17.8 | 33.7 | 28.0 | 52.8 | 16.9 | 55.8 | 28.1 | 72.7 | 33.3 | 70.5 | 58.0 |
| 24 | 86.2 | 51.9 | 78.7 | 64.2 | 78.7 | 50.5 | 41.1 | 26.0 | 44.0 | 36.5 | 29.9 | 19.4 | 16.9 | —17.8 | 31.9 | 19.1 | 20.6 | — 0.4 | 71.7 | 47.4 | 68.1 | 44.6 | 71.3 | 51.4 |
| 25 | 89.7 | 58.9 | 80.6 | 62.1 | 75.7 | 56.3 | 41.8 | 29.2 | 41.1 | 37.2 | 31.9 | 19.4 | 22.9 | 7.7 | 23.2 | 7.7 | 27.1 | 3.2 | 69.6 | 46.1 | 74.7 | 42.5 | 71.4 | 46.9 |
| 26 | 92.5 | 67.0 | 75.0 | 63.2 | 66.8 | 43.2 | 39.9 | 19.9 | 44.8 | 37.6 | 36.1 | 27.2 | 24.7 | 15.8 | 34.9 | 11.9 | 44.6 | 21.1 | 71.7 | 35.3 | 70.5 | 44.5 | 73.4 | 37.0 |
| 27 | 84.3 | 65.0 | 84.5 | 62.6 | 59.8 | 35.0 | 42.8 | 14.5 | 47.1 | 38.8 | 36.2 | 31.0 | 31.7 | 8.0 | 44.4 | 25.5 | 41.7 | 31.4 | 66.8 | 43.8 | 66.5 | 46.9 | 70.7 | 59.0 |
| 28 | 82.0 | 64.8 | 79.1 | 61.1 | 68.0 | 41.1 | 49.8 | 28.6 | 41.8 | 32.7 | 35.5 | 25.3 | 13.7 | —13.9 | 36.6 | 5.2 | 39.4 | 25.8 | 67.8 | 49.1 | 64.8 | 44.9 | 90.3 | 55.9 |
| 29 | 88.3 | 67.0 | 77.3 | 55.8 | 63.0 | 38.5 | 49.8 | 37.4 | 35.3 | 26.0 | 31.9 | 22.4 | 13.1 | —14.6 | ..... | ..... | 48.2 | 21.4 | 65.8 | 54.4 | 58.5 | 45.2 | 90.5 | 51.9 |
| 30 | 84.7 | 58.9 | 74.5 | 50.6 | 84.1 | 50.2 | 45.3 | 34.7 | 33.2 | 22.4 | 27.2 | 15.1 | 12.6 | —17.6 | ..... | ..... | 52.8 | 19.4 | 63.5 | 51.4 | 70.2 | 46.2 | 93.6 | 56.4 |
| 31 | 86.7 | 48.8 | 71.0 | 48.8 | ..... | ..... | 46.3 | 37.2 | ..... | ..... | 22.9 | 2.6 | 18.2 | —18.8 | ..... | ..... | 56.5 | 26.8 | ..... | ..... | 80.7 | 40.9 | ..... | ..... |
| Range | 50°.04 | | 43°.1 | | 50°.1 | | 60°.4 | | 43°.8 | | 39°.7 | | 68°.4 | | 60°.0 | | 70°.4 | | 49°.1 | | 51°.7 | | 55°.3 | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION,* ROSEBURG, OR&G.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | ..... | ..... | 84 | 52 | 90 | 47 | 56 | 45 | 56 | 28 | 51 | 42 | 37 | (†) | 51 | 38 | 55.5 | 43 | 74 | 38 | 59 | 40 | 65 | 50 |
| 2 | ..... | ..... | 71 | 59.5 | 87 | 51 | 61 | 42 | 59 | 43 | 49 | 36 | 34 | ..... | 56 | 48 | 62 | 41.5 | 68 | 44 | 68.5 | 38 | 74.5 | 46 |
| 3 | ..... | ..... | 71 | 50.5 | 84 | 50 | 62 | 37 | 55 | 47 | 47 | 36 | 40 | ..... | 60 | 51.5 | 55 | 40.5 | 71 | 47 | 69 | 43.5 | 77.5 | 45.5 |
| 4 | ..... | ..... | 76 | 50 | 76 | 50 | 66 | 54 | 56 | 46 | 42 | 29 | 30 | ..... | 65 | 44 | 54 | 40 | 76 | 48 | 76 | 43.5 | 80 | 47.5 |
| 5 | ..... | ..... | 84 | 48 | 75 | 51 | 70 | 55 | 58 | 46 | 48 | 27.5 | 30 | ..... | 49 | 37 | 56 | 42 | 76.5 | 47.5 | 62 | 47 | 90 | 51.5 |
| 6 | ..... | ..... | 87 | 50.5 | 72.5 | 52.5 | 74 | 50 | 56 | 42 | 49 | 31 | 37 | ..... | 51 | 42 | 50 | 40 | 66.5 | 43.5 | 69.5 | 35.5 | 96.5 | 56 |
| 7 | ..... | ..... | 88 | 54 | 79 | 41 | 73 | 48 | 63 | 47 | 46 | 34 | 54 | ..... | 51 | 39 | 50 | 38 | 66.5 | 46.5 | 81 | 42 | 78 | 56 |
| 8 | ..... | ..... | 83 | 54.5 | 78 | 46 | 70 | 54 | 53 | 38 | 60 | 38 | 52 | ..... | 49 | 38.5 | 57.5 | 33.5 | 56.5 | 43.5 | 77 | 47 | 78 | 57 |
| 9 | ..... | ..... | 78 | 54 | 86 | 52 | 74 | 49 | 60 | 45 | 63 | 48 | 64 | ..... | 45.5 | 36 | 62 | 37 | 60.0 | 35.5 | 76 | 51 | 72 | 51 |
| 10 | ..... | ..... | 89 | 51 | 68 | 51 | 61 | 48 | 60 | 45 | 60 | 45 | 53 | ..... | 56 | 43 | 55.5 | 43.5 | 66 | 35 | 72 | 49 | 70 | 47 |
| 11 | ..... | ..... | 90 | 54 | 64 | 46 | 60 | 46 | 57 | 43 | 61 | 39.5 | 45 | ..... | 56 | 42.5 | 57 | 39 | 59 | 44 | 66 | 55 | 67 | 50 |
| 12 | ..... | ..... | 90 | 57 | 67 | 47 | 55 | 35 | 53 | 36 | 55 | 36 | 48 | 28 | 51 | 40 | 55.5 | 45.5 | 51.5 | 36 | 69 | 45 | 76 | 46.5 |
| 13 | ..... | ..... | 83 | 54 | 67 | 51 | 61 | 42 | 53 | 43 | 55 | 31 | 43 | 32.5 | 51 | 41.5 | 64 | 48 | 47 | 35 | 65 | 51 | 81 | 47 |
| 14 | ..... | ..... | 84 | 54 | 64.5 | 52 | 59 | 39 | 61 | 45 | 55 | 33 | 63 | 40 | 47 | 39 | 55 | 48 | 55 | 29 | 62 | 49.5 | 82 | 51 |
| 15 | 95.5 | 74 | 88 | 58 | 71 | 57 | 61 | 38 | 58 | 44 | 48 | 34 | 60 | 47 | 51 | 34.5 | 64 | 52.5 | 57.5 | 31.5 | 58 | 47.5 | 72 | 51 |
| 16 | 88 | 64 | 88 | 58 | 69 | 43 | 68 | 39 | 65 | 45 | 56 | 41 | 59.5 | 44.5 | 54 | 42 | 55 | 48 | 52 | 40 | 58 | 44 | 69 | 51 |
| 17 | 80 | 62 | 84 | 58 | 78.5 | 41.5 | 76 | 38 | 54 | 44 | 52 | 45 | 54 | 39 | 56 | 48 | 61.5 | 47 | 60 | 34 | 63 | 37 | 73 | 45 |
| 18 | 84 | 57 | 85 | 54 | 79 | 42 | 71 | 43 | 62 | 51 | 48 | 41 | 56 | 45 | 54.5 | 46 | 62 | 45 | 58 | 47 | 59 | 43.5 | 84 | 48.5 |
| 19 | 87 | 51.5 | 82 | 55 | 81 | 47 | 71 | 40 | 56 | 40 | 48 | 38 | 52 | 39 | 52.5 | 40.5 | 66.5 | 46.5 | 62.5 | 44.5 | 60.5 | 47 | 83 | 55 |
| 20 | 79 | 57 | 78 | 60 | 71 | 45 | 71 | 42 | 47 | 34 | 56 | 44 | 59.5 | 41 | 52 | 43 | 65 | 50 | 52 | 43 | 65 | 47 | 73 | 56 |
| 21 | 71 | 59 | 70 | 56 | 64 | 42 | 69 | 51 | 55 | 40 | 50.5 | 36 | 65 | 36 | 55 | 37 | 65.5 | 49.5 | 58 | 48 | 78 | 46.5 | 76 | 56 |
| 22 | 78 | 47.5 | 75 | 57 | 68 | 35 | 61 | 49 | 56.5 | 48 | 45.5 | 29.5 | 59 | 37.5 | 61.5 | 42 | 68 | 43.5 | 58.5 | 43.5 | 68 | 47 | 81 | 47 |
| 23 | 79 | 51 | 74 | 57 | 69 | 44 | 60 | 46 | 51 | 42 | 41.5 | 37 | 55 | 44 | 58.5 | 45.5 | 71 | 46 | 65 | 36 | 77 | 44 | 69 | 47 |
| 24 | 79 | 49 | 69 | 55 | 71 | 53 | 65 | 51 | 56 | 37.5 | 42 | 39 | 57 | 40 | 48 | 41.5 | 65 | 52 | 58 | 46 | 80.5 | 48.5 | 73 | 43 |
| 25 | 77.5 | 52 | 67 | 53 | 71 | 54 | 60 | 47 | 57 | 44 | 48 | 35 | 53 | 39.5 | 54 | 35 | 56.5 | 47.5 | 58 | 37 | 84.5 | 47 | 78.5 | 44.5 |
| 26 | 78 | 53 | 73.5 | 43 | 66 | 46 | 55 | 40 | 51 | 40 | 48 | 30.5 | 52 | 38 | 57 | 43 | 60.5 | 45.5 | 63 | 44 | 65 | 52 | 81 | 49.5 |
| 27 | 85 | 50 | 76 | 45 | 71 | 55 | 51 | 42 | 50.5 | 38.5 | 46 | 28 | 55 | 47.5 | 56.5 | 33.5 | 60 | 49 | 65 | 50 | 58.5 | 42.5 | 67 | 53 |
| 28 | 82 | 53 | 87 | 47 | 66 | 53 | 50 | 34 | 45 | 33 | 43 | (†) | 57 | 43 | 55 | 39 | 56 | 48 | 61 | 50 | 52 | 43 | 67 | 48 |
| 29 | 71 | 56 | 70 | 40 | 62 | 47 | 49 | 0 | 51 | 34 | 36 | ..... | 65 | 47 | ..... | ..... | 56 | 41.5 | 60 | 40 | 58.5 | 46.5 | 75 | 43 |
| 30 | 76 | 56 | 71 | 56 | 61 | 86 | 46 | 29 | 53 | 40 | 36 | ..... | 51 | 45 | ..... | ..... | 53 | 44 | 60.5 | 37 | 68 | 44 | 83 | 46 |
| 31 | 84 | 50 | 83 | 46 | ..... | ..... | 57 | 28 | ..... | ..... | 35 | ..... | 50 | 42 | ..... | ..... | 64 | 37.5 | ..... | ..... | 68 | 50.5 | ..... | ..... |
| Range | ..... | | 47° | | 55° | | 48° | | 37° | | ..... | | ..... | | 31°.5 | | 37°.5 | | 47°.5 | | 49° | | 53°.5 | |
| Monthly means | ..... | | 67°.4 | | 59°.5 | | 51°.3 | | 48°.2 | | 41°.9 | | 43°.4 | | 47°.1 | | 50°.5 | | 59°.8 | | 56°.7 | | 63°.9 | |

* Observations commenced July 16, 1877.

† Minimum broken.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, SACRAMENTO, CAL.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 93 | 56 | 92 | 57 | 92 | 57 | 77 | 51 | 64 | 37 | 59 | 43 | 51 | 29 | 55 | 44 | 61 | 43 | 72 | 48 | 72 | 56 | 75 | 49 |
| 2 | 86 | 59 | 91 | 59 | 92 | 54 | 74 | 48 | 57 | 43 | 60 | 35 | 50 | 31 | 56 | 45 | 63 | 45 | 70 | 52 | 77 | 58 | 83 | 53 |
| 3 | 77 | 58 | 88 | 55 | 97 | 57 | 79 | 49 | 62 | 45 | 53 | 38 | 46 | 27 | 58 | 46 | 57 | 47 | 67 | 51 | 81 | 54 | 90 | 56 |
| 4 | 78 | 56 | 94 | 58 | 97 | 63 | 81 | 50 | 60 | 43 | 54 | 36 | 46 | 28 | 56 | 50 | 54 | 40 | 70 | 52 | 84 | 60 | 91 | 58 |
| 5 | 80 | 54 | 93 | 58 | 88 | 59 | 83 | 54 | 62 | 52 | 58 | 33 | 50 | 29 | 53 | 44 | 62 | 48 | 78 | 56 | 86 | 57 | 95 | 67 |
| 6 | 84 | 52 | 94 | 59 | 86 | 56 | 88 | 56 | 66 | 52 | 55 | 33 | 48 | 33 | 55 | 43 | 58 | 52 | 77 | 56 | 77 | 58 | 88 | 65 |
| 7 | 96 | 57 | 92 | 56 | 94 | 58 | 88 | 59 | 64 | 43 | 55 | 37 | 57 | 41 | 55 | 44 | 57 | 43 | 77 | 60 | 71 | 53 | 84 | 56 |
| 8 | 98 | 60 | 94 | 55 | 96 | 62 | 88 | 56 | 68 | 44 | 58 | 33 | 61 | 49 | 56 | 46 | 58 | 44 | 74 | 63 | 76 | 47 | 85 | 56 |
| 9 | 90 | 57 | 94 | 57 | 95 | 63 | 87 | 55 | 70 | 48 | 58 | 35 | 58 | 38 | 53 | 43 | 62 | 41 | 71 | 58 | 78 | 50 | 90 | 60 |
| 10 | 94 | 58 | 86 | 56 | 86 | 61 | 77 | 56 | 62 | 45 | 59 | 34 | 57 | 45 | 57 | 44 | 62 | 48 | 76 | 51 | 74 | 50 | 85 | 62 |
| 11 | 97 | 60 | 91 | 54 | 77 | 53 | 72 | 56 | 58 | 50 | 53 | 38 | 54 | 36 | 53 | 48 | 64 | 47 | 70 | 52 | 82 | 56 | 77 | 56 |
| 12 | 103 | 68 | 95 | 56 | 78 | 58 | 67 | 49 | 59 | 45 | 56 | 38 | 52 | 34 | 56 | 40 | 67 | 47 | 65 | 50 | 80 | 54 | 84 | 54 |
| 13 | 102 | 70 | 95 | 57 | 82 | 55 | 70 | 50 | 59 | 41 | 61 | 34 | 55 | 34 | 59 | 46 | 60 | 52 | 61 | 49 | 76 | 53 | 88 | 58 |
| 14 | 100 | 70 | 93 | 56 | 90 | 56 | 77 | 48 | 59 | 46 | 65 | 44 | 61 | 46 | 52 | 46 | 72 | 55 | 61 | 44 | 77 | 50 | 82 | 56 |
| 15 | 94 | 68 | 91 | 55 | 93 | 63 | 78 | 49 | 61 | 49 | 67 | 46 | 59 | 51 | 54 | 41 | 71 | 56 | 57 | 41 | 81 | 54 | 76 | 54 |
| 16 | 82 | 67 | 90 | 57 | 96 | 65 | 79 | 51 | 64 | 50 | 67 | 46 | 60 | 51 | 59 | 48 | 72 | 55 | 59 | 42 | 72 | 60 | 74 | 54 |
| 17 | 88 | 59 | 88 | 59 | 96 | 59 | 77 | 49 | 62 | 41 | 58 | 52 | 58 | 41 | 59 | 52 | 70 | 57 | 63 | 43 | 75 | 57 | 79 | 52 |
| 18 | 92 | 58 | 87 | 56 | 97 | 63 | 76 | 48 | 65 | 43 | 59 | 45 | 54 | 44 | 59 | 52 | 69 | 54 | 62 | 46 | 75 | 52 | 87 | 57 |
| 19 | 95 | 61 | 87 | 56 | 98 | 63 | 76 | 46 | 64 | 43 | 56 | 45 | 55 | 46 | 60 | 50 | 70 | 54 | 62 | 50 | 73 | 53 | 87 | 59 |
| 20 | 89 | 61 | 87 | 54 | 76 | 57 | 73 | 50 | 58 | 41 | 56 | 44 | 54 | 48 | 56 | 45 | 68 | 55 | 63 | 42 | 64 | 53 | 84 | 57 |
| 21 | 95 | 68 | 91 | 56 | 80 | 54 | 69 | 55 | 62 | 43 | 55 | 46 | 57 | 45 | 56 | 45 | 65 | 52 | 62 | 47 | 66 | 49 | 93 | 59 |
| 22 | 94 | 59 | 91 | 56 | 77 | 52 | 63 | 52 | 63 | 43 | 58 | 49 | 56 | 50 | 60 | 46 | 69 | 52 | 69 | 47 | 71 | 55 | 77 | 60 |
| 23 | 91 | 59 | 85 | 56 | 79 | 50 | 66 | 52 | 64 | 51 | 56 | 46 | 61 | 48 | 61 | 50 | 67 | 54 | 71 | 49 | 81 | 51 | 87 | 55 |
| 24 | 93 | 58 | 85 | 56 | 82 | 50 | 72 | 54 | 61 | 41 | 53 | 41 | 54 | 48 | 57 | 46 | 63 | 52 | 69 | 50 | 88 | 59 | 90 | 60 |
| 25 | 90 | 59 | 84 | 57 | 83 | 54 | 72 | 54 | 65 | 39 | 52 | 46 | 56 | 41 | 59 | 43 | 65 | 48 | 64 | 48 | 91 | 67 | 94 | 63 |
| 26 | 95 | 58 | 88 | 54 | 86 | 55 | 69 | 50 | 63 | 43 | 53 | 35 | 53 | 42 | 55 | 46 | 64 | 48 | 65 | 43 | 86 | 60 | 99 | 66 |
| 27 | 93 | 60 | 90 | 58 | 89 | 58 | 66 | 44 | 65 | 44 | 51 | 33 | 53 | 47 | 55 | 43 | 58 | 50 | 72 | 45 | 82 | 62 | 88 | 63 |
| 28 | 93 | 58 | 86 | 55 | 85 | 56 | 62 | 43 | 64 | 44 | 49 | 36 | 58 | 48 | 52 | 42 | 54 | 47 | 73 | 51 | 72 | 54 | 82 | 60 |
| 29 | 84 | 56 | 80 | 57 | 84 | 59 | 62 | 43 | 64 | 40 | 52 | 33 | 62 | 48 | ..... | ..... | 60 | 48 | 72 | 52 | 71 | 48 | 89 | 67 |
| 30 | 91 | 58 | 87 | 54 | 76 | 49 | 65 | 42 | 62 | 42 | 51 | 32 | 61 | 51 | ..... | ..... | 61 | 49 | 72 | 55 | 69 | 48 | 96 | 60 |
| 31 | 95 | 59 | 91 | 59 | ..... | ..... | 62 | 38 | ..... | ..... | 48 | 34 | 60 | 49 | ..... | ..... | 67 | 51 | ..... | ..... | 71 | 52 | ..... | ..... |
| Range | 51° | | 41° | | 49° | | 50° | | 33° | | 35° | | 35° | | 21° | | 32° | | 37° | | 44° | | 50° | |
| Monthly means | 75°.7 | | 73°.0 | | 72°.8 | | 62°.7 | | 53°.9 | | 47°.8 | | 49°.0 | | 51°.0 | | 56°.5 | | 59°.8 | | 66°.4 | | 73° | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, SALT LAKE CITY, UTAH.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 71 | 55 | 92 | 57 | 74 | 62 | 74 | 49 | 50 | 35 | 42 | 20 | 25 | 10 | 42 | 33 | 45 | 28 | 56 | 39 | 63 | 39 | 61 | 48 |
| 2 | 86 | 51 | 94 | 64 | 78 | 56 | 63 | 49 | 55 | 32 | 40 | 27 | 25 | 6 | 42 | 25 | 48 | 32 | 63 | 38 | 54 | 38 | 66 | 45 |
| 3 | 90 | 59 | 90 | 67 | 77 | 55 | 56 | 37 | 50 | 37 | 38 | 24 | 26 | 9 | 50 | 33 | 56 | 31 | 67 | 40 | 63 | 37 | 70 | 46 |
| 4 | 92 | 68 | 87 | 67 | 78 | 54 | 65 | 42 | 49 | 34 | 30 | 20 | 27 | 7 | 50 | 34 | 49 | 37 | 70 | 43 | 74 | 44 | 75 | 48 |
| 5 | 87 | 68 | 85 | 60 | 90 | 55 | 63 | 53 | 55 | 38 | 30 | 12 | 26 | 6 | 49 | 32 | 54 | 32 | 71 | 44 | 83 | 50 | 78 | 54 |
| 6 | 91 | 67 | 86 | 63 | 85 | 62 | 61 | 49 | 49 | 39 | 33 | 13 | 25 | 6 | 41 | 25 | 58 | 35 | 73 | 46 | 50 | 38 | 76 | 60 |
| 7 | 93 | 62 | 90 | 58 | 71 | 54 | 68 | 42 | 50 | 35 | 38 | 18 | 25 | 5 | 40 | 30 | 52 | 27 | 63 | 45 | 60 | 35 | 78 | 60 |
| 8 | 95 | 70 | 94 | 63 | 72 | 43 | 70 | 45 | 50 | 37 | 41 | 20 | 40 | 14 | 38 | 25 | 37 | 25 | 53 | 37 | 70 | 42 | 81 | 54 |
| 9 | 96 | 74 | 96 | 64 | 83 | 45 | 75 | 45 | 55 | 34 | 43 | 22 | 43 | 27 | 35 | 20 | 40 | 27 | 44 | 34 | 73 | 48 | 84 | 57 |
| 10 | 97 | 72 | 95 | 74 | 90 | 58 | 80 | 49 | 57 | 35 | 45 | 23 | 45 | 30 | 40 | 20 | 45 | 27 | 57 | 30 | 81 | 54 | 85 | 58 |
| 11 | 95 | 73 | 93 | 67 | 88 | 66 | 70 | 54 | 60 | 41 | 49 | 25 | 37 | 25 | 48 | 32 | 43 | 30 | 68 | 41 | 83 | 58 | 80 | 61 |
| 12 | 91 | 68 | 92 | 72 | 75 | 56 | 59 | 49 | 60 | 45 | 45 | 26 | 34 | 17 | 45 | 33 | 50 | 35 | 66 | 48 | 71 | 50 | 77 | 58 |
| 13 | 90 | 66 | 95 | 69 | 60 | 47 | 56 | 43 | 52 | 36 | 48 | 25 | 27 | 13 | 38 | 24 | 57 | 32 | 56 | 36 | 73 | 47 | 73 | 54 |
| 14 | 93 | 65 | 90 | 66 | 61 | 49 | 57 | 41 | 52 | 31 | 47 | 29 | 32 | 11 | 43 | 28 | 58 | 38 | 43 | 31 | 70 | 55 | 76 | 53 |
| 15 | 85 | 65 | 92 | 65 | 72 | 50 | 58 | 42 | 55 | 40 | 47 | 33 | 36 | 13 | 45 | 32 | 67 | 40 | 48 | 34 | 70 | 46 | 80 | 50 |
| 16 | 88 | 67 | 92 | 70 | 65 | 49 | 58 | 44 | 60 | 36 | 46 | 35 | 45 | 24 | 44 | 32 | 70 | 42 | 46 | 34 | 60 | 35 | 89 | 55 |
| 17 | 90 | 65 | 90 | 65 | 70 | 42 | 60 | 38 | 53 | 35 | 51 | 37 | 45 | 36 | 56 | 38 | 73 | 47 | 43 | 32 | 50 | 34 | 88 | 67 |
| 18 | 94 | 70 | 90 | 66 | 76 | 48 | 60 | 40 | 45 | 30 | 50 | 34 | 40 | 30 | 55 | 40 | 67 | 47 | 53 | 35 | 57 | 35 | 85 | 66 |
| 19 | 96 | 69 | 85 | 65 | 80 | 50 | 65 | 48 | 50 | 30 | 45 | 28 | 42 | 30 | 50 | 32 | 61 | 45 | 63 | 34 | 70 | 42 | 83 | 59 |
| 20 | 98 | 77 | 85 | 63 | 87 | 54 | 61 | 45 | 45 | 28 | 43 | 30 | 38 | 24 | 42 | 29 | 67 | 40 | 58 | 43 | 67 | 48 | 90 | 56 |
| 21 | 97 | 77 | 84 | 61 | 75 | 60 | 68 | 40 | 41 | 24 | 46 | 28 | 40 | 22 | 40 | 30 | 70 | 47 | 50 | 34 | 65 | 45 | 93 | 63 |
| 22 | 92 | 72 | 86 | 58 | 80 | 52 | 62 | 47 | 47 | 26 | 41 | 28 | 46 | 27 | 40 | 25 | 65 | 48 | 52 | 38 | 60 | 40 | 93 | 64 |
| 23 | 93 | 71 | 90 | 59 | 70 | 50 | 62 | 41 | 52 | 35 | 47 | 25 | 52 | 37 | 41 | 22 | 70 | 42 | 60 | 41 | 70 | 48 | 84 | 62 |
| 24 | 85 | 68 | 85 | 60 | 70 | 45 | 52 | 41 | 42 | 32 | 48 | 30 | 48 | 29 | 50 | 26 | 72 | 45 | 68 | 41 | 69 | 49 | 84 | 57 |
| 25 | 89 | 63 | 77 | 63 | 75 | 45 | 60 | 42 | 52 | 31 | 46 | 29 | 46 | 32 | 53 | 31 | 65 | 45 | 69 | 46 | 71 | 52 | 76 | 62 |
| 26 | 77 | 62 | 75 | 57 | 72 | 56 | 60 | 41 | 47 | 34 | 33 | 29 | 45 | 30 | 60 | 35 | 51 | 38 | 72 | 47 | 82 | 49 | 84 | 54 |
| 27 | 78 | 56 | 80 | 53 | 77 | 47 | 55 | 35 | 39 | 23 | 33 | 18 | 47 | 30 | 53 | 39 | 60 | 37 | 59 | 43 | 75 | 57 | 93 | 58 |
| 28 | 90 | 55 | 81 | 55 | 85 | 55 | 41 | 32 | 30 | 15 | 30 | 12 | 51 | 37 | 46 | 33 | 60 | 40 | 67 | 40 | 77 | 51 | 92 | 64 |
| 29 | 95 | 65 | 92 | 60 | 83 | 60 | 42 | 25 | 35 | 15 | 28 | 9 | 45 | 30 | ..... | ..... | 50 | 37 | 65 | 49 | 57 | 38 | 87 | 50 |
| 30 | 80 | 57 | 87 | 63 | 77 | 47 | 47 | 34 | 40 | 16 | 26 | 8 | 48 | 32 | ..... | ..... | 54 | 37 | 57 | 46 | 66 | 43 | 76 | 49 |
| 31 | 80 | 50 | 87 | 58 | ..... | ..... | 45 | 35 | ..... | ..... | 28 | 17 | 45 | 32 | ..... | ..... | 56 | 38 | ..... | ..... | 70 | 49 | ..... | ..... |
| Range | 48° | | 43° | | 48° | | 55° | | 45° | | 43° | | 47° | | 40° | | 46° | | 43° | | 49° | | 48° | |
| Monthly means | 78°.2 | | 76°.3 | | *65°.0 | | 51°.0 | | 40°.1 | | 31°.7 | | 30°.0 | | 37°.3 | | 46°.6 | | 49°.8 | | 56°.2 | | 69°.4 | |

*29 days only

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, SAN ANTONIO, TEX.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 94 | 78 | 103 | 73 | 96 | 70 | 93 | 66 | 76 | 64 | 52 | 28 | 50 | 30 | 61 | 43 | 75 | 57 | 75 | 52 | 85 | 66 | 93 | 74 |
| 2 | 94 | 77 | 99 | 71 | 100 | 75 | 95 | 65 | 69 | 52 | 55 | 42 | 56 | 30 | 55 | 38 | 73 | 48 | 72 | 56 | 81 | 69 | 93 | 74 |
| 3 | 99 | 74 | 104 | 75 | 96 | 72 | 90 | 68 | 66 | 50 | 68 | 46 | 50 | 37 | 57 | 29 | 73 | 45 | 78 | 48 | 79 | 68 | 93 | 71 |
| 4 | 95 | 73 | 98 | 76 | 92 | 76 | 80 | 61 | 65 | 55 | 75 | 42 | 48 | 30 | 65 | 32 | 71 | 42 | 76 | 46 | 83 | 55 | 92 | 71 |
| 5 | 92 | 74 | 108 | 78 | 95 | 77 | 78 | 62 | 66 | 51 | 56 | 37 | 47 | 23 | 67 | 32 | 74 | 49 | 84 | 44 | 84 | 49 | 89 | 72 |
| 6 | 94 | 72 | 101 | 76 | 85 | 69 | 85 | 64 | 60 | 38 | 54 | 29 | 46 | 35 | 69 | 55 | 72 | 62 | 84 | 52 | 85 | 58 | 93 | 73 |
| 7 | 97 | 72 | 100 | 77 | 89 | 70 | 84 | 68 | 71 | 45 | 58 | 27 | 44 | 30 | 72 | 45 | 77 | 62 | 69 | 65 | 90 | 70 | 88 | 72 |
| 8 | 90 | 73 | 90 | 78 | 92 | 75 | 84 | 56 | 66 | 48 | 66 | 32 | 47 | 33 | 73 | 45 | 78 | 63 | 80 | 61 | 81 | 70 | 80 | 69 |
| 9 | 102 | 71 | 97 | 74 | 95 | 73 | 87 | 60 | 59 | 39 | 61 | 44 | 57 | 42 | 62 | 40 | 70 | 48 | 83 | 56 | 80 | 65 | 85 | 64 |
| 10 | 97 | 74 | 95 | 72 | 96 | 76 | 86 | 60 | 56 | 32 | 64 | 47 | 54 | 45 | 58 | 44 | 73 | 41 | 79 | 53 | 80 | 64 | 94 | 76 |
| 11 | 88 | 72 | 90 | 71 | 96 | 74 | 86 | 59 | 60 | 31 | 64 | 40 | 62 | 45 | 62 | 30 | 74 | 47 | 80 | 50 | 73 | 61 | 80 | 71 |
| 12 | 97 | 73 | 91 | 70 | 94 | 72 | 86 | 66 | 71 | 40 | 60 | 45 | 63 | 47 | 64 | 47 | 80 | 49 | 78 | 61 | 80 | 62 | 90 | 72 |
| 13 | 93 | 73 | 98 | 72 | 96 | 76 | 89 | 60 | 75 | 58 | 67 | 51 | 57 | 38 | 74 | 48 | 76 | 51 | 77 | 67 | 87 | 67 | 92 | 77 |
| 14 | 93 | 73 | 97 | 72 | 95 | 75 | 90 | 74 | 75 | 58 | 69 | 55 | 57 | 33 | 78 | 43 | 76 | 58 | 87 | 69 | 80 | 61 | 96 | 76 |
| 15 | 94 | 77 | 97 | 70 | 95 | 76 | 91 | 72 | 75 | 47 | 67 | 58 | 58 | 33 | 68 | 41 | 68 | 61 | 87 | 66 | 79 | 65 | 95 | 79 |
| 16 | 90 | 76 | 95 | 71 | 92 | 72 | 89 | 75 | 76 | 47 | 72 | 57 | 60 | 39 | 69 | 38 | 80 | 59 | 86 | 60 | 90 | 66 | 94 | 77 |
| 17 | 96 | 76 | 95 | 72 | 90 | 72 | 77 | 62 | 73 | 45 | 73 | 64 | 64 | 41 | 80 | 58 | 83 | 56 | 88 | 69 | 88 | 73 | 96 | 80 |
| 18 | 102 | 76 | 96 | 71 | 91 | 65 | 72 | 58 | 74 | 55 | 73 | 63 | 66 | 54 | 75 | 51 | 77 | 54 | 85 | 66 | 88 | 73 | 95 | 78 |
| 19 | 92 | 72 | 97 | 71 | 89 | 57 | 67 | 51 | 74 | 46 | 73 | 63 | 68 | 45 | 75 | 56 | 70 | 58 | 85 | 70 | 93 | 61 | 97 | 76 |
| 20 | 90 | 68 | 92 | 70 | 87 | 54 | 65 | 45 | 67 | 46 | 67 | 52 | 71 | 40 | 76 | 62 | 70 | 56 | 83 | 71 | 90 | 74 | 96 | 74 |
| 21 | 90 | 68 | 90 | 72 | 88 | 55 | 68 | 42 | 69 | 46 | 67 | 54 | 62 | 38 | 74 | 50 | 77 | 52 | 83 | 71 | 90 | 72 | 96 | 74 |
| 22 | 84 | 60 | 96 | 60 | 88 | 56 | 69 | 41 | 65 | 42 | 72 | 42 | 68 | 36 | 70 | 47 | 80 | 49 | 85 | 72 | 90 | 75 | 89 | 70 |
| 23 | 90 | 78 | 97 | 70 | 91 | 60 | 72 | 45 | 71 | 43 | 69 | 53 | 65 | 34 | 64 | 45 | 77 | 50 | 84 | 57 | 90 | 74 | 93 | 69 |
| 24 | 93 | 65 | 102 | 77 | 88 | 58 | 70 | 58 | 78 | 57 | 68 | 48 | 70 | 37 | 68 | 40 | 80 | 59 | 81 | 49 | 92 | 70 | 94 | 74 |
| 25 | 94 | 72 | 101 | 76 | 88 | 64 | 76 | 63 | 76 | 44 | 70 | 47 | 65 | 50 | 61 | 45 | 80 | 52 | 86 | 54 | 91 | 64 | 93 | 74 |
| 26 | 100 | 77 | 98 | 75 | 92 | 68 | 80 | 54 | 73 | 40 | 69 | 46 | 75 | 57 | 51 | 48 | 73 | 60 | 86 | 54 | 79 | 65 | 95 | 73 |
| 27 | 98 | 82 | 100 | 73 | 94 | 68 | 82 | 53 | 72 | 40 | 60 | 46 | 69 | 47 | 64 | 46 | 84 | 65 | 86 | 63 | 90 | 65 | 85 | 75 |
| 28 | 97 | 81 | 98 | 68 | 93 | 68 | 83 | 64 | 66 | 35 | 56 | 43 | 68 | 41 | 65 | 40 | 82 | 48 | 77 | 64 | 89 | 67 | 90 | 74 |
| 29 | 98 | 75 | 95 | 69 | 93 | 67 | 87 | 73 | 52 | 25 | 57 | 36 | 70 | 52 | | | 81 | 59 | 82 | 58 | 90 | 74 | 84 | 75 |
| 30 | 98 | 84 | 93 | 69 | 93 | 66 | 83 | 65 | 45 | 22 | 47 | 31 | 62 | 47 | | | 81 | 54 | 85 | 68 | 85 | 75 | 94 | 74 |
| 31 | 103 | 80 | 94 | 70 | | | 67 | 59 | | | 50 | 30 | 67 | 35 | | | 79 | 52 | | | 94 | 74 | | |
| Range | 43° | | 40° | | 46° | | 58° | | 56° | | 48° | | 52° | | 51° | | 43° | | 44° | | 45° | | 33° | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, SAN DIEGO, CAL.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 73 | 63 | 72 | 61 | 91 | 68 | 73 | 63 | 69 | 49 | 64 | 49 | 58 | 36 | 68 | 48 | 60 | 47 | 77 | 50 | 71 | 58 | 68 | 54 |
| 2 | 69 | 64 | 72 | 63 | 78 | 67 | 72 | 58 | 70 | 50 | 61 | 51 | 55 | 38 | 66 | 48 | 67 | 47 | 71 | 53 | 67 | 59 | 69 | 51 |
| 3 | 70 | 62 | 72 | 64 | 73 | 64 | 71 | 52 | 67 | 52 | 63 | 44 | 58 | 36 | 60 | 47 | 64 | 48 | 65 | 53 | 73 | 55 | 71 | 54 |
| 4 | 72 | 59 | 71 | 63 | 72 | 64 | 69 | 60 | 67 | 51 | 66 | 44 | 61 | 39 | 65 | 50 | 62 | 51 | 69 | 51 | 73 | 55 | 67 | 59 |
| 5 | 74 | 59 | 73 | 63 | 73 | 64 | 71 | 61 | 70 | 52 | 67 | 46 | 67 | 47 | 61 | 50 | 62 | 47 | 65 | 51 | 69 | 56 | 72 | 59 |
| 6 | 74 | 61 | 73 | 63 | 73 | 63 | 70 | 62 | 68 | 53 | 75 | 49 | 64 | 47 | 61 | 44 | 63 | 48 | 64 | 56 | 69 | 59 | 71 | 59 |
| 7 | 76 | 60 | 73 | 62 | 73 | 64 | 72 | 58 | 73 | 53 | 66 | 50 | 64 | 47 | 59 | 47 | 61 | 53 | 65 | 56 | 65 | 58 | 68 | 57 |
| 8 | 73 | 62 | 70 | 64 | 73 | 63 | 71 | 63 | 78 | 55 | 65 | 55 | 63 | 48 | 59 | 49 | 63 | 46 | 68 | 58 | 67 | 57 | 69 | 59 |
| 9 | 71 | 62 | 72 | 62 | 74 | 63 | 72 | 64 | 76 | 60 | 69 | 46 | 63 | 48 | 61 | 49 | 67 | 42 | 65 | 57 | 66 | 57 | 72 | 59 |
| 10 | 73 | 62 | 76 | 63 | 77 | 62 | 72 | 63 | 74 | 58 | 69 | 53 | 63 | 52 | 63 | 46 | 63 | 44 | 68 | 58 | 68 | 58 | 71 | 59 |
| 11 | 74 | 63 | 80 | 64 | 77 | 66 | 70 | 64 | 64 | 50 | 68 | 52 | 61 | 53 | 61 | 46 | 63 | 53 | 65 | 60 | 67 | 58 | 72 | 59 |
| 12 | 78 | 64 | 75 | 66 | 73 | 63 | 68 | 61 | 63 | 57 | 78 | 52 | 64 | 47 | 61 | 53 | 62 | 55 | 65 | 56 | 69 | 58 | 73 | 59 |
| 13 | 80 | 63 | 74 | 64 | 71 | 58 | 72 | 61 | 65 | 48 | 68 | 56 | 62 | 45 | 62 | 49 | 62 | 55 | 62 | 54 | 70 | 60 | 67 | 59 |
| 14 | 76 | 62 | 74 | 66 | 77 | 59 | 68 | 57 | 70 | 51 | 69 | 58 | 62 | 52 | 60 | 46 | 65 | 50 | 60 | 53 | 71 | 58 | 67 | 59 |
| 15 | 75 | 64 | 73 | 64 | 82 | 62 | 68 | 58 | 70 | 49 | 66 | 57 | 64 | 55 | 63 | 51 | 63 | 54 | 61 | 51 | 71 | 60 | 68 | 60 |
| 16 | 72 | 62 | 73 | 65 | 77 | 62 | 69 | 55 | 67 | 51 | 64 | 51 | 64 | 52 | 64 | 56 | 68 | 52 | 57 | 45 | 69 | 59 | 70 | 59 |
| 17 | 74 | 65 | 72 | 63 | 74 | 62 | 70 | 57 | 67 | 55 | 67 | 52 | 62 | 52 | 61 | 51 | 63 | 54 | 61 | 47 | 71 | 59 | 72 | 60 |
| 18 | 74 | 63 | 72 | 64 | 73 | 64 | 70 | 56 | 73 | 51 | 61 | 51 | 62 | 45 | 63 | 53 | 62 | 55 | 61 | 44 | 72 | 52 | 72 | 62 |
| 19 | 79 | 63 | 72 | 64 | 72 | 65 | 70 | 58 | 68 | 51 | 63 | 47 | 64 | 47 | 63 | 54 | 63 | 50 | 65 | 49 | 69 | 56 | 71 | 62 |
| 20 | 82 | 68 | 76 | 60 | 72 | 64 | 70 | 56 | 65 | 46 | 63 | 51 | 64 | 48 | 62 | 45 | 64 | 51 | 61 | 52 | 63 | 55 | 71 | 62 |
| 21 | 86 | 69 | 76 | 58 | 72 | 62 | 69 | 57 | 64 | 54 | 62 | 49 | 68 | 51 | 60 | 52 | 65 | 52 | 58 | 46 | 67 | 50 | 73 | 60 |
| 22 | 84 | 70 | 74 | 63 | 72 | 63 | 69 | 58 | 64 | 50 | 63 | 46 | 63 | 50 | 62 | 45 | 63 | 53 | 63 | 44 | 66 | 48 | 73 | 61 |
| 23 | 83 | 70 | 74 | 64 | 71 | 61 | 69 | 57 | 65 | 51 | 62 | 50 | 64 | 52 | 63 | 48 | 64 | 50 | 63 | 47 | 70 | 50 | 72 | 62 |
| 24 | 76 | 68 | 74 | 60 | 71 | 58 | 69 | 55 | 67 | 49 | 55 | 44 | 64 | 51 | 60 | 53 | 66 | 55 | 64 | 51 | 69 | 56 | 76 | 60 |
| 25 | 75 | 67 | 81 | 62 | 73 | 58 | 71 | 55 | 78 | 55 | 59 | 44 | 61 | 53 | 66 | 46 | 62 | 51 | 65 | 55 | 69 | 59 | 74 | 61 |
| 26 | 73 | 65 | 82 | 66 | 75 | 60 | 69 | 58 | 77 | 54 | 59 | 47 | 61 | 43 | 64 | 51 | 64 | 49 | 64 | 53 | 70 | 59 | 74 | 61 |
| 27 | 73 | 62 | 76 | 63 | 76 | 59 | 69 | 60 | 76 | 57 | 62 | 44 | 63 | 47 | 59 | 50 | 62 | 52 | 65 | 50 | 69 | 59 | 75 | 62 |
| 28 | 73 | 63 | 77 | 62 | 78 | 62 | 68 | 54 | 73 | 54 | 61 | 44 | 63 | 47 | 58 | 46 | 60 | 47 | 70 | 50 | 68 | 56 | 73 | 62 |
| 29 | 72 | 64 | 80 | 64 | 77 | 63 | 66 | 56 | 69 | 48 | 56 | 48 | 63 | 49 | ..... | ..... | 62 | 48 | 71 | 55 | 71 | 58 | 76 | 63 |
| 30 | 72 | 63 | 76 | 62 | 74 | 61 | 65 | 47 | 68 | 49 | 58 | 41 | 64 | 52 | ..... | ..... | 62 | 52 | 68 | 58 | 66 | 50 | 74 | 59 |
| 31 | 70 | 61 | 79 | 63 | ..... | ..... | 64 | 51 | ..... | ..... | 58 | 40 | 62 | 49 | ..... | ..... | 68 | 51 | ..... | ..... | 69 | 55 | ..... | ..... |
| Range | 27° | | 24° | | 38° | | 20° | | 32° | | 38° | | 30° | | 25° | | 26° | | 33° | | 25° | | 25° | |
| Monthly means | 69°.9 | | 69°.5 | | 67°.9 | | 63°.6 | | 60°.1 | | 56°.2 | | 55°.0 | | 55°.5 | | 56°.3 | | 58°.2 | | 61°.6 | | 64°.2 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, SANDUSKY, OHIO.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | | | | | 68 | 59 | 80 | 67 | 50 | 36 | 32 | 25 | 40 | 25 | 33 | 26 | 41 | 34 | 47 | 40 | 66 | 56 | 69 | 53 |
| 2 | | | 87 | 77 | 65 | 53 | 76 | 68 | 55 | 40 | 36 | 22 | 36 | 18 | 32 | 25 | 57 | 36 | 54 | 41 | 79 | 55 | 81 | 58 |
| 3 | | | 79 | 70 | 70 | 48 | 79 | 68 | 43 | 35 | 46 | 28 | 33 | 11 | 35 | 13 | 51 | 35 | 52 | 45 | 64 | 54 | 87 | 66 |
| 4 | | | 75 | 66 | 76 | 54 | 73 | 52 | 57 | 34 | 52 | 36 | 35 | 23 | 30 | 11 | 36 | 29 | 51 | 40 | 61 | 49 | 73 | 59 |
| 5 | | | 81 | 60 | 72 | 58 | 58 | 42 | 55 | 30 | 54 | 36 | 23 | 13 | 38 | 16 | 53 | 33 | 55 | 40 | 62 | 46 | 61 | 52 |
| 6 | | | 86 | 68 | 68 | 64 | 59 | 43 | 40 | 29 | 36 | 30 | 20 | 10 | 47 | 31 | 58 | 46 | 47 | 39 | 62 | 44 | 63 | 49 |
| 7 | | | 84 | 71 | 67 | 62 | 65 | 44 | 50 | 29 | 42 | 25 | 20 | 3 | 54 | 35 | 58 | 50 | 54 | 38 | 76 | 58 | 72 | 49 |
| 8 | | | 86 | 71 | 68 | 62 | 59 | 52 | 55 | 41 | 37 | 30 | 30 | 8 | 42 | 34 | 57 | 45 | 58 | 46 | 70 | 57 | 64 | 52 |
| 9 | | | 83 | 71 | 73 | 59 | 66 | 47 | 51 | 33 | 36 | 25 | 41 | 29 | 34 | 28 | 67 | 47 | 71 | 52 | 61 | 50 | 61 | 54 |
| 10 | | | 78 | 67 | 73 | 63 | 58 | 48 | 40 | 31 | 48 | 32 | 44 | 38 | 28 | 21 | 70 | 50 | 60 | 53 | 53 | 43 | 66 | 56 |
| 11 | | | 77 | 65 | 75 | 63 | 50 | 45 | 46 | 27 | 49 | 39 | 40 | 34 | 28 | 11 | 59 | 40 | 61 | 47 | 52 | 42 | 64 | 51 |
| 12 | | | 82 | 70 | 74 | 69 | 53 | 44 | 52 | 32 | 59 | 36 | 39 | 33 | 36 | 17 | 42 | 36 | 62 | 47 | 50 | 42 | 67 | 50 |
| 13 | | | 81 | 66 | 74 | 67 | 72 | 47 | 57 | 37 | 55 | 36 | 40 | 33 | 37 | 32 | 46 | 40 | 59 | 48 | 54 | 44 | 71 | 51 |
| 14 | | | 77 | 67 | 75 | 68 | 74 | 55 | 60 | 41 | 44 | 29 | 38 | 33 | 35 | 29 | 45 | 40 | 53 | 46 | 55 | 42 | 70 | 54 |
| 15 | | | 75 | 67 | 84 | 69 | 76 | 56 | 59 | 53 | 55 | 37 | 37 | 31 | 37 | 27 | 48 | 40 | 47 | 44 | 57 | 44 | 81 | 57 |
| 16 | | | 74 | 66 | 81 | 68 | 64 | 59 | 55 | 45 | 55 | 43 | 38 | 28 | 42 | 29 | 56 | 43 | 54 | 43 | 59 | 44 | 78 | 67 |
| 17 | | | 78 | 65 | 73 | 56 | 66 | 51 | 62 | 41 | 57 | 39 | 47 | 32 | 43 | 29 | 47 | 39 | 54 | 49 | 62 | 51 | 67 | 62 |
| 18 | | | 83 | 66 | 65 | 46 | 67 | 61 | 41 | 35 | 57 | 39 | 50 | 39 | 29 | 22 | 47 | 35 | 70 | 50 | 60 | 49 | 71 | 60 |
| 19 | | | 81 | 68 | 72 | 46 | 68 | 53 | 41 | 30 | 61 | 55 | 54 | 39 | 40 | 17 | 50 | 37 | 72 | 59 | 77 | 56 | 73 | 54 |
| 20 | | | 81 | 67 | 71 | 51 | 54 | 49 | 48 | 35 | 60 | 44 | 47 | 38 | 50 | 38 | 46 | 37 | 74 | 61 | 80 | 60 | 79 | 59 |
| 21 | | | 84 | 73 | 65 | 54 | 50 | 43 | 57 | 41 | 48 | 42 | 42 | 35 | 50 | 39 | 42 | 39 | 66 | 54 | 63 | 54 | 67 | 56 |
| 22 | | | 86 | 73 | 68 | 49 | 52 | 43 | 52 | 43 | 48 | 44 | 37 | 22 | 57 | 41 | 44 | 34 | 78 | 54 | 60 | 51 | 56 | 52 |
| 23 | | | 80 | 70 | 72 | 54 | 65 | 46 | 49 | 46 | 48 | 41 | 25 | 11 | 41 | 37 | 60 | 39 | 80 | 57 | 65 | 51 | 64 | 54 |
| 24 | | | 76 | 67 | 82 | 59 | 66 | 52 | 53 | 47 | 47 | 40 | 43 | 20 | 40 | 33 | 55 | 20 | 75 | 53 | 76 | 65 | 79 | 58 |
| 25 | | | 80 | 67 | 78 | 67 | 64 | 55 | 58 | 49 | 45 | 40 | 50 | 40 | 39 | 27 | 33 | 20 | 63 | 51 | 78 | 64 | 79 | 62 |
| 26 | | | 80 | 69 | 76 | 69 | 59 | 52 | 55 | 45 | 44 | 38 | 43 | 35 | 36 | 25 | 42 | 29 | 59 | 49 | 72 | 58 | 86 | 65 |
| 27 | | | 87 | 70 | 79 | 69 | 60 | 51 | 45 | 38 | 43 | 39 | 36 | 31 | 43 | 32 | 67 | 42 | 59 | 52 | 65 | 53 | 81 | 71 |
| 28 | | | 87 | 72 | 74 | 68 | 70 | 54 | 39 | 29 | 43 | 38 | 32 | 20 | 48 | 37 | 43 | 34 | 54 | 52 | 66 | 55 | 82 | 69 |
| 29 | | | 83 | 73 | 75 | 65 | 63 | 51 | 31 | 19 | 43 | 37 | 28 | 12 | ..... | ..... | 44 | 33 | 55 | 52 | 58 | 51 | 82 | 71 |
| 30 | | | 78 | 71 | 86 | 68 | 52 | 44 | 26 | 11 | 37 | 30 | 33 | 26 | ..... | ..... | 50 | 37 | 68 | 53 | 61 | 50 | 86 | 73 |
| 31 | | | 81 | 65 | ..... | ..... | 52 | 44 | ..... | ..... | 34 | 26 | 33 | 29 | ..... | ..... | 43 | 40 | ..... | ..... | 64 | 55 | ..... | ..... |
| Range | | | | | 40° | | 38° | | 51° | | 39° | | 51° | | 46° | | 50° | | 42° | | 38° | | 38° | |
| Monthly means | | | *74°.7 | | 66°.8 | | 56°.7 | | 42°.5 | | 41°.6 | | 32°.1 | | 33°.9 | | 43°.7 | | 54°.5 | | 58°.4 | | 65°.8 | |

* Thirty days only, station opened August 2, 1877.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, SANDY HOOK, N. J.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 88 | 68 | 74 | 68 | 84 | 60 | 73 | 50 | 54 | 44 | 37 | 26 | 35 | 20 | 35 | 26 | 44 | 32 | 57 | 42 | 59 | 48 | 59 | 53 |
| 2 | 77 | 68 | 76 | 66 | 75 | 64 | 75 | 60 | 63 | 49 | 34 | 24 | 40 | 24 | 28 | 21 | 49 | 32 | 60 | 43 | 70 | 51 | 59 | 55 |
| 3 | 74 | 63 | 83 | 66 | 71 | 59 | 72 | 63 | 51 | 41 | 41 | 29 | 25 | 12 | 28 | 15 | 59 | 41 | 60 | 44 | 84 | 62 | 60 | 54 |
| 4 | 78 | 66 | 83 | 66 | 78 | 59 | 72 | 58 | 50 | 38 | 45 | 33 | 45 | 19 | 34 | 20 | 46 | 31 | 50 | 42 | 79 | 64 | 69 | 54 |
| 5 | 82 | 66 | 80 | 66 | 79 | 63 | 60 | 52 | 59 | 44 | 58 | 42 | 38 | 21 | 36 | 25 | 46 | 31 | 54 | 43 | 66 | 53 | 73 | 53 |
| 6 | 77 | 65 | 83 | 66 | 72 | 63 | 60 | 49 | 56 | 37 | 58 | 39 | 25 | 18 | 38 | 26 | 55 | 38 | 63 | 42 | 68 | 50 | 68 | 50 |
| 7 | 79 | 65 | 85 | 71 | 66 | 56 | 61 | 49 | 48 | 36 | 40 | 35 | 21 | 14 | 44 | 31 | 63 | 45 | 53 | 44 | 22 | 54 | 63 | 54 |
| 8 | 81 | 66 | 91 | 71 | 65 | 56 | 66 | 54 | 62 | 42 | 45 | 35 | 30 | 13 | 44 | 35 | 61 | 42 | 62 | 44 | 63 | 54 | 66 | 55 |
| 9 | 85 | 68 | 81 | 70 | 73 | 60 | 68 | 59 | 64 | 54 | 40 | 32 | 40 | 26 | 44 | 36 | 54 | 41 | 50 | 42 | 58 | 53 | 70 | 58 |
| 10 | 84 | 70 | 85 | 69 | 75 | 60 | 66 | 55 | 54 | 38 | 44 | 31 | 44 | 36 | 39 | 36 | 61 | 39 | 49 | 42 | 67 | 51 | 63 | 53 |
| 11 | 79 | 67 | 84 | 68 | 74 | 62 | 62 | 52 | 43 | 37 | 52 | 36 | 43 | 36 | 39 | 22 | 54 | 36 | 55 | 46 | 57 | 47 | 59 | 50 |
| 12 | 86 | 67 | 86 | 70 | 77 | 65 | 61 | 50 | 52 | 36 | 47 | 39 | 47 | 37 | 37 | 20 | 39 | 35 | 64 | 49 | 57 | 43 | 72 | 53 |
| 13 | 83 | 66 | 82 | 69 | 79 | 67 | 63 | 50 | 48 | 41 | 52 | 40 | 41 | 31 | 39 | 31 | 54 | 38 | 60 | 47 | 56 | 44 | 74 | 55 |
| 14 | 77 | 62 | 80 | 70 | 83 | 67 | 68 | 50 | 57 | 42 | 45 | 33 | 47 | 40 | 37 | 31 | 53 | 43 | 63 | 46 | 55 | 44 | 73 | 59 |
| 15 | 84 | 64 | 75 | 69 | 78 | 67 | 74 | 56 | 63 | 47 | 52 | 36 | 44 | 36 | 36 | 26 | 52 | 39 | 61 | 45 | 51 | 44 | 78 | 58 |
| 16 | 88 | 70 | 77 | 64 | 79 | 68 | 72 | 59 | 60 | 52 | 52 | 42 | 37 | 21 | 44 | 32 | 48 | 38 | 49 | 45 | 63 | 46 | 81 | 61 |
| 17 | 85 | 69 | 83 | 68 | 79 | 68 | 61 | 48 | 55 | 48 | 53 | 39 | 35 | 20 | 47 | 35 | 43 | 38 | 49 | 39 | 61 | 51 | 78 | 64 |
| 18 | 84 | 71 | 82 | 68 | 72 | 60 | 63 | 53 | 53 | 38 | 49 | 32 | 36 | 28 | 39 | 21 | 46 | 38 | 58 | 44 | 71 | 51 | 71 | 59 |
| 19 | 81 | 68 | 85 | 68 | 71 | 59 | 67 | 61 | 43 | 34 | 52 | 37 | 45 | 30 | 31 | 16 | 53 | 40 | 69 | 46 | 71 | 53 | 76 | 59 |
| 20 | 80 | 68 | 85 | 69 | 69 | 58 | 67 | 51 | 39 | 31 | 57 | 39 | 49 | 37 | 43 | 28 | 48 | 39 | 60 | 50 | 56 | 52 | 80 | 62 |
| 21 | 79 | 70 | 81 | 70 | 69 | 56 | 53 | 50 | 42 | 31 | 41 | 35 | 49 | 41 | 43 | 37 | 43 | 34 | 71 | 52 | 74 | 51 | 77 | 62 |
| 22 | 82 | 69 | 81 | 68 | 68 | 52 | 53 | 42 | 50 | 39 | 47 | 35 | 45 | 39 | 49 | 37 | 48 | 35 | 65 | 49 | 64 | 54 | 71 | 63 |
| 23 | 81 | 70 | 85 | 68 | 73 | 56 | 61 | 44 | 52 | 47 | 44 | 34 | 45 | 14 | 46 | 38 | 58 | 39 | 54 | 46 | 74 | 50 | 74 | 61 |
| 24 | 86 | 72 | 82 | 70 | 74 | 57 | 65 | 53 | 59 | 47 | 43 | 31 | 33 | 14 | 43 | 37 | 57 | 26 | 65 | 46 | 64 | 54 | 79 | 61 |
| 25 | 89 | 72 | 81 | 72 | 77 | 57 | 69 | 56 | 56 | 47 | 42 | 34 | 43 | 32 | 42 | 34 | 33 | 15 | 62 | 54 | 74 | 57 | 78 | 63 |
| 26 | 93 | 71 | 84 | 71 | 77 | 58 | 62 | 45 | 57 | 48 | 44 | 34 | 47 | 39 | 41 | 29 | 45 | 27 | 57 | 51 | 82 | 63 | 85 | 65 |
| 27 | 81 | 67 | 89 | 68 | 76 | 64 | 49 | 42 | 56 | 49 | 45 | 38 | 44 | 35 | 48 | 34 | 60 | 37 | 56 | 48 | 75 | 60 | 87 | 67 |
| 28 | 80 | 67 | 88 | 72 | 72 | 65 | 57 | 48 | 57 | 46 | 47 | 38 | 43 | 17 | 51 | 37 | 62 | 38 | 57 | 51 | 78 | 59 | 92 | 67 |
| 29 | 81 | 71 | 89 | 74 | 72 | 63 | 68 | 48 | 48 | 36 | 45 | 37 | 29 | 16 | ..... | ..... | 57 | 41 | 56 | 48 | 75 | 57 | 82 | 68 |
| 30 | 80 | 72 | 82 | 72 | 69 | 59 | 60 | 50 | 36 | 28 | 41 | 33 | 27 | 22 | ..... | ..... | 53 | 38 | 55 | 47 | 65 | 54 | 82 | 66 |
| 31 | 81 | 70 | 84 | 69 | ..... | ..... | 58 | 47 | ..... | ..... | 37 | 23 | 35 | 25 | ..... | ..... | 54 | 41 | ..... | ..... | 56 | 53 | ..... | ..... |
| Range | 31° | | 27° | | 32° | | 33° | | 36° | | 35° | | 37° | | 36° | | 48° | | 32° | | 41° | | 42° | |
| Monthly means | 73°.9 | | 75°.4 | | 67°.3 | | 58°.1 | | 47°.3 | | 40°.8 | | 33°.5 | | 35°.1 | | 44°.4 | | 51°.8 | | 59°.4 | | 65°.7 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, SAN FRANCISCO, CAL.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 69 | 53 | 63 | 54 | 63 | 54 | 64 | 53 | 61 | 49 | 56 | 49 | 52 | 43 | 57 | 47 | 59 | 48 | 67 | 52 | 64 | 51 | 61 | 51 |
| 2 | 63 | 54 | 67 | 55 | 62 | 54 | 64 | 52 | 57 | 52 | 56 | 47 | 50 | 40 | 60 | 50 | 63 | 50 | 61 | 52 | 66 | 53 | 65 | 52 |
| 3 | 63 | 53 | 69 | 54 | 64 | 54 | 65 | 52 | 59 | 50 | 56 | 47 | 49 | 41 | 59 | 51 | 58 | 50 | 63 | 52 | 64 | 50 | 62 | 52 |
| 4 | 64 | 54 | 65 | 53 | 60 | 53 | 67 | 54 | 59 | 51 | 57 | 47 | 51 | 39 | 59 | 52 | 55 | 46 | 64 | 54 | 73 | 53 | 66 | 52 |
| 5 | 63 | 54 | 66 | 53 | 67 | 53 | 68 | 54 | 64 | 55 | 57 | 46 | 53 | 42 | 55 | 47 | 61 | 51 | 68 | 54 | 67 | 51 | 67 | 51.5 |
| 6 | 67 | 53 | 62 | 52 | 64 | 54 | 75 | 56 | 62 | 54 | 57 | 47 | 55 | 47 | 56 | 48 | 59 | 51 | 63 | 53 | 65 | 53 | 64 | 52 |
| 7 | 66 | 54 | 61 | 53 | 68 | 52 | 81 | 58 | 65 | 52 | 55 | 49 | 58 | 47 | 57 | 47 | 55 | 47 | 70 | 54 | 63.5 | 53.5 | 60 | 53 |
| 8 | 63 | 53 | 62 | 52 | 75 | 53 | 65 | 53 | 67 | 53 | 58 | 48 | 61 | 54 | 57 | 49 | 58 | 48 | 69 | 56 | 61 | 53 | 65 | 53 |
| 9 | 63 | 53 | 65 | 53 | 68 | 53 | 60 | 52 | 67 | 57 | 58 | 48 | 58 | 47 | 55 | 48 | 59 | 48 | 69 | 54 | 60 | 51 | 66 | 54 |
| 10 | 66 | 53 | 64 | 55 | 68 | 59 | 63 | 53 | 62 | 50 | 59 | 48 | 67 | 50 | 57 | 49 | 60 | 52 | 64 | 53 | 60 | 51 | 65 | 53 |
| 11 | 73 | 53 | 65 | 55 | 67 | 53 | 63 | 54 | 60 | 55 | 60 | 49 | 53 | 45 | 61 | 51 | 59 | 50 | 58 | 51 | 64 | 54 | 63 | 53 |
| 12 | 76 | 57 | 62 | 53 | 67 | 54 | 61 | 52 | 59 | 51 | 60 | 49 | 53 | 45 | 57 | 46 | 60 | 49 | 58 | 52 | 62 | 51 | 63 | 53 |
| 13 | 75 | 59 | 62 | 53 | 73 | 54 | 62 | 55 | 58 | 49 | 63 | 50 | 55 | 46 | 57 | 50 | 61 | 54 | 55 | 46 | 59 | 50 | 61.5 | 53 |
| 14 | 68 | 59 | 62 | 53 | 78 | 57 | 67 | 53 | 60 | 50 | 64 | 53 | 58 | 51 | 55 | 50 | 64 | 57 | 56 | 44 | 62 | 52 | 61 | 53 |
| 15 | 68 | 57 | 62 | 53 | 86 | 60 | 75 | 54 | 60 | 55 | 64 | 53 | 60 | 54 | 56 | 46 | 66 | 54 | 55 | 44 | 68 | 52 | 60 | 53 |
| 16 | 71 | 62 | 65 | 54 | 90 | 63 | 72 | 54 | 61 | 56 | 61 | 54 | 60 | 52 | 65 | 52 | 66 | 56 | 56 | 47 | 67 | 54 | 59 | 51 |
| 17 | 68 | 58 | 64 | 55 | 92 | 65 | 61 | 50 | 62 | 52 | 60 | 54 | 58 | 50 | 62 | 57 | 62 | 52 | 55 | 46 | 67 | 56 | 63 | 51 |
| 18 | 69 | 56 | 63 | 54 | 83 | 61 | 61 | 49 | 65 | 52 | 57 | 51 | 57 | 50 | 60 | 55 | 65 | 53 | 61 | 49 | 62 | 50 | 65 | 53 |
| 19 | 64 | 55 | 67 | 57 | 62 | 52 | 66 | 52 | 61 | 51 | 57 | 54 | 57 | 51 | 57 | 50 | 66 | 56 | 58 | 51 | 61 | 50 | 62 | 53 |
| 20 | 68 | 54 | 67 | 55 | 62 | 55 | 64 | 51 | 59 | 51 | 56 | 48 | 57 | 52 | 59 | 50 | 65 | 55 | 55 | 48 | 64 | 52 | 64 | 52 |
| 21 | 65 | 56 | 67 | 55 | 63 | 54 | 62 | 56 | 58 | 51 | 58 | 52 | 61 | 52 | 58 | 48 | 61 | 46 | 60 | 50 | 62 | 52 | 65 | 53 |
| 22 | 68 | 54 | 67 | 54 | 64 | 52 | 63 | 56 | 63 | 52 | 57 | 51 | 61 | 53 | 58 | 49 | 61 | 52 | 61 | 51 | 62 | 54 | 62 | 52 |
| 23 | 65 | 54 | 67 | 54 | 68 | 53 | 64 | 56 | 61 | 55 | 56 | 49 | 62 | 52 | 59 | 51 | 60 | 54 | 59 | 50 | 64 | 52 | 66 | 54 |
| 24 | 66 | 53 | 70 | 56 | 66 | 53 | 65 | 58 | 59 | 51 | 52 | 46 | 57 | 52 | 56 | 46 | 57 | 53 | 59 | 50 | 78 | 51.5 | 67 | 52 |
| 25 | 65 | 55 | 71 | 56 | 70 | 54 | 65 | 57 | 64 | 51 | 54 | 47 | 57 | 48 | 57 | 49 | 60 | 51 | 55 | 47 | 68 | 55 | 71 | 54 |
| 26 | 64 | 54 | 75 | 56 | 71 | 57 | 63 | 54 | 67 | 53 | 52 | 47 | 55 | 48 | 53 | 49 | 62 | 51 | 60 | 48 | 65 | 53 | 68 | 57 |
| 27 | 65 | 54 | 63 | 53 | 75 | 57 | 61 | 53 | 69 | 56 | 52 | 45 | 57 | 53 | 50 | 47 | 58 | 51 | 64 | 53 | 67 | 54 | 61 | 53 |
| 28 | 64 | 55 | 63 | 54 | 71 | 54 | 61 | 51 | 66 | 55 | 52 | 48 | 58 | 53 | 55 | 45 | 58 | 49 | 64 | 55 | 57 | 50 | 72 | 52 |
| 29 | 63 | 55 | 66 | 57 | 65 | 55 | 62 | 52 | 63 | 52 | 53 | 46 | 62 | 51 | ..... | ..... | 62 | 50 | 67 | 52 | 59 | 48 | 70 | 55.5 |
| 30 | 69 | 54 | 71 | 54 | 65 | 51 | 62 | 54 | 61 | 51 | 53 | 44 | 61 | 53 | ..... | ..... | 59 | 50 | 66 | 52 | 62 | 50 | 73 | 55 |
| 31 | 64 | 54 | 64 | 54 | ..... | ..... | 61 | 49 | ..... | ..... | 52 | 42 | 60 | 53 | ..... | ..... | 62 | 50 | ..... | ..... | 61 | 52 | ..... | ..... |
| Range | 23° | | 23° | | 41° | | 32° | | 20° | | 22° | | 23° | | 20° | | 20° | | 26° | | 30° | | 22° | |
| Monthly means | 59°.9 | | 58°.6 | | 61°.2 | | 58°.2 | | 56°.5 | | 52°.6 | | 53°.0 | | 53°.2 | | 55°.6 | | 55°.2 | | 57°.2 | | 58°.2 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, SANTA FÉ, N. MEX.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 83 | 52.5 | 82.5 | 59.5 | 85.5 | 62 | 73.5 | 47.5 | 42.5 | 27.5 | 41 | 10 | 24 | 8 | 36 | 19 | 39 | 27 | 41 | 25 | 70 | 44 | 78 | 45 |
| 2 | 85 | 52 | 66 | 54.5 | 73 | 55 | 72.5 | 48 | 49 | 21.5 | 52 | 23 | 21 | 8 | 37 | 19 | 41 | 21 | 56 | 26 | 67 | 41 | 79 | 42 |
| 3 | 88 | 54.5 | 74 | 58.5 | 70 | 50.5 | 69.5 | 44 | 56 | 23 | 39 | 22 | 21.5 | 2 | 35 | 12 | 49 | 19 | 57 | 30 | 55 | 30 | 73 | 44 |
| 4 | 89 | 60.5 | 80 | 57.5 | 69 | 50.5 | 61.5 | 38 | 51 | 26 | 29.5 | 11 | 20 | — 2 | 39 | 17 | 56 | 29 | 66 | 33 | 77 | 30 | 63 | 46 |
| 5 | 89.5 | 65 | 78 | 57 | 69 | 45 | 68 | 39 | 49 | 25 | 19 | 2 | 25 | 0 | 45 | 24 | 54 | 29.5 | 69 | 36 | 78 | 38 | 62 | 46 |
| 6 | 81 | 61 | 81.5 | 54.5 | 75 | 51 | 68.5 | 41 | 56 | 28 | 32.5 | 6 | 26 | 4 | 40 | 24 | 55 | 33 | 72 | 43 | 75 | 41 | 76 | 40 |
| 7 | 83.5 | 56 | 81 | 53 | 75 | 51 | 63 | 34 | 44 | 29.5 | 43 | 16.5 | 27 | 7 | 39.5 | 21 | 54 | 28 | 60 | 37 | 77 | 40 | 62 | 43 |
| 8 | 87 | 61 | 80 | 60.5 | 76 | 47 | 67 | 39 | 38 | 16.5 | 44 | 21 | 31 | 9 | 20.5 | 18 | 32.5 | 18 | 67 | 33 | 67 | 33 | 72 | 38 |
| 9 | 81 | 57 | 82 | 61.5 | 74 | 42 | 69 | 40 | 46.5 | 17 | 48 | 26 | 38 | 17.5 | 33 | 10 | 39 | 18 | 53 | 35 | 65 | 41 | 81 | 44 |
| 10 | 73 | 56.5 | 86 | 53.5 | 78 | 47.5 | 71 | 41.5 | 53.5 | 24 | 50.5 | 25.5 | 41 | 16 | 29 | 10 | 42 | 20.5 | 55 | 25 | 63 | 44 | 77 | 50 |
| 11 | 78 | 54 | 87.5 | 58 | 81 | 49 | 72 | 35 | 55.5 | 26.5 | 49.5 | 19 | 36 | 18 | 37 | 11 | 41 | 18 | 72 | 38 | 75 | 41 | 78 | 52 |
| 12 | 79.5 | 59.5 | 86 | 56.5 | 79 | 53 | 68.5 | 43 | 62.5 | 31.5 | 42 | 18.5 | 28 | 16 | 41 | 18 | 44 | 20.5 | 68 | 37 | 75 | 47 | 75 | 45 |
| 13 | 81 | 57 | 82.5 | 55 | 74 | 51.5 | 60 | 40 | 43 | 29.5 | 46.5 | 22 | 22 | 3 | 39.5 | 23 | 54 | 27 | 64 | 33 | 75 | 38 | 82 | 46 |
| 14 | 84 | 51.5 | 76 | 51 | 69 | 40 | 48 | 36 | 47.5 | 27 | 47.5 | 32 | 28 | 2 | 34.5 | 21 | 56 | 29.5 | 62 | 36 | 77 | 40 | 88 | 54 |
| 15 | 88 | 58.5 | 74.5 | 52 | 70 | 42 | 46.5 | 33 | 49 | 27 | 49 | 28 | 28 | 4 | 40 | 16 | 61.5 | 30 | 52 | 35 | 76 | 45 | 77 | 48 |
| 16 | 90.5 | 57 | 74.5 | 54.5 | 73.5 | 45 | 52 | 32 | 54.5 | 30 | 46 | 34 | 30 | 3 | 46 | 27 | 67 | 38 | 63 | 36 | 76 | 43 | 65 | 44 |
| 17 | 82.5 | 61 | 80 | 50.5 | 67 | 43 | 45 | 36 | 62.5 | 34 | 42 | 29 | 35 | 12 | 46 | 29 | 67 | 41 | 45 | 20 | 71 | 35 | 81 | 44 |
| 18 | 81 | 58 | 66.5 | 56 | 76 | 45 | 50 | 28.5 | 48.5 | 30 | 49.5 | 27 | 33 | 20 | 53 | 28 | 60 | 40 | 52 | 21 | 58 | 27 | 84 | 51 |
| 19 | 77.5 | 55 | 77 | 52.5 | 74 | 44 | 43.5 | 20 | 46.5 | 27.5 | 41 | 28 | 32 | 13 | 41 | 32 | 49 | 35 | 63 | 30 | 70 | 39 | 76 | 55 |
| 20 | 79.5 | 54 | 81 | 53 | 81 | 50 | 50.5 | 27 | 48.5 | 25.5 | 44 | 26.5 | 32 | 9 | 40 | 28 | 61 | 33 | 68 | 38 | 70 | 45 | 77 | 52 |
| 21 | 76 | 54 | 80 | 49 | 78.5 | 53.5 | 52.5 | 30 | 48 | 19.5 | 39 | 25 | 31 | 12 | 41 | 23 | 62.5 | 34 | 54 | 35 | 76 | 50 | 81 | 51 |
| 22 | 82 | 51 | 84 | 49 | 75 | 48.5 | 54 | 32 | 45 | 24 | 35.5 | 18 | 37 | 10 | 41 | 25 | 59.5 | 42 | 53 | 27 | 73 | 45 | 90 | 55 |
| 23 | 73 | 55 | 86.5 | 49 | 73 | 52 | 57 | 32.5 | 55 | 29 | 35.5 | 15 | 40 | 16 | 36 | 19 | 60 | 38 | 57 | 25 | 70 | 40 | 83 | 55 |
| 24 | 61.0 | 52 | 86.5 | 52 | 73.5 | 48 | 49 | 33 | 42 | 27 | 43 | 18 | 41 | 23 | 41.5 | 14 | 61.5 | 35 | 66 | 30 | 70 | 50 | 87 | 51 |
| 25 | 73 | 55 | 86.5 | 53 | 69 | 43 | 53 | 31 | 46 | 24 | 45 | 17 | 46 | 22 | 43 | 28 | 64.5 | 42 | 70 | 39 | 53 | 39 | 81 | 53 |
| 26 | 74 | 50 | 86.5 | 53 | 69 | 38.5 | 58 | 32.5 | 49 | 24 | 28 | 7 | 35 | 19 | 47.5 | 27.5 | 56 | 35 | 69 | 38 | 70 | 35 | 72 | 51 |
| 27 | 78 | 52 | 88.5 | 57 | 74 | 45.5 | 64 | 35.5 | 31 | 15 | 29.5 | 8 | 37 | 17 | 46 | 31 | 53.5 | 32 | 67 | 42 | 77 | 45 | 78 | 50 |
| 28 | 78.5 | 53.5 | 88 | 57 | 77 | 51 | 58.5 | 32.5 | 24.5 | 4 | 28 | 12 | 41 | 19 | 43 | 30 | 46 | 28 | 72 | 40 | 77 | 47 | 87 | 55 |
| 29 | 80 | 53 | 89 | 57 | 76 | 50 | 54 | 36 | 28 | 5.5 | 25 | 3 | 33 | 18 | ..... | ..... | 42 | 17 | 75 | 40 | 76 | 44 | 87 | 56 |
| 30 | 80 | 53 | 85.5 | 57 | 73.5 | 48 | 52 | 35 | 32.5 | 8 | 25 | 4 | 37 | 13 | ..... | ..... | 53 | 27 | 77 | 39 | 74 | 43 | 88 | 60 |
| 31 | 83.5 | 54.5 | 83 | 57 | ..... | ..... | 51.5 | 35 | ..... | ..... | 26 | 6 | 35 | 10 | ..... | ..... | 43 | 32 | ..... | ..... | 79 | 42 | ..... | ..... |
| Range | 40°.5 | | 40° | | 47° | | 53°.5 | | 58°.5 | | 50° | | 48° | | 43° | | 50° | | 57° | | 52° | | 52° | |
| Monthly means | 68°.6 | | 68°.4 | | 61°.4 | | 47°.3 | | 33°.4 | | 27°.8 | | 21°.4 | | 36°.0 | | 40°.7 | | 47°.4 | | 55°.8 | | 62°.9 | |

*Maximum, minimum, and mean temperatures—Continued.*

STATION, SAUGEEN, CANADA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 74 | 52.8 | 82.5 | 55.3 | 65 | 53.5 | 75 | 56.1 | 46 | 38.6 | 28.8 | 6.6 | 33 | 15.1 | 30.5 | 22.6 | 35 | 19.1 | 45 | 27.1 | 60.8 | 44 | 75 | 46.2 |
| 2 | 68.2 | 48.9 | 79 | 65.8 | 57.0 | 49.2 | 68 | 54.8 | 46 | 34.1 | 31 | 6.9 | 29 | 6.1 | 30.0 | 9.6 | 42 | 29.0 | 45 | 28.6 | 68 | 48.2 | 79 | 53.8 |
| 3 | 65 | 53.1 | 68 | 61.8 | 63.5 | 46.7 | 74 | 56.8 | 43.5 | 34.1 | 35 | 28.6 | 24 | 8.1 | 32 | 10.1 | 39 | 26.1 | 59 | 24.6 | 61 | 45.4 | 80 | 62.8 |
| 4 | 68.5 | 43.1 | 71 | 45.4 | 72.0 | 51.3 | 69 | 43.6 | 39 | 33.1 | 38 | 25.1 | 29.5 | 15.5 | 37 | 17.1 | 28 | 19.1 | 49 | 27.1 | 59 | 40.1 | 67.2 | 45.2 |
| 5 | 69 | 55.6 | 75 | 44.8 | 67.0 | 45.3 | 59.5 | 38.6 | 35 | 24.6 | 47 | 35.1 | 19.5 | 3.6 | 36 | 27.6 | 46 | 23.1 | 46 | 28.6 | 50.5 | 34.6 | 51 | 36.1 |
| 6 | 68 | 46.1 | 77 | 59.3 | 65.0 | 45.2 | 55 | 36.6 | 37 | 22.6 | 48 | 23.6 | 11 | −1.1 | 44 | 29.1 | 56 | 41.1 | 42 | 32.1 | 64.5 | 36.7 | 57 | 34.9 |
| 7 | 76 | 43.6 | 76.5 | 63.8 | 68.0 | 43.1 | 55 | 34.9 | 41 | 21.6 | 36 | 23.5 | 12.2 | 0.1 | 48.5 | 32.1 | 48 | 32.1 | 41 | 30.1 | 65 | 35.9 | 51 | 42.6 |
| 8 | 83 | 59.1 | 86.5 | 56.3 | 67.5 | 47.2 | 55 | 47.1 | 40 | 33.1 | 37 | 23.6 | 28 | 10.6 | 42.5 | 28.1 | 61 | 29.1 | 58 | 27.1 | 56 | 36.1 | 63 | 38.1 |
| 9 | 80 | 56.1 | 73 | 55.8 | 72 | 46.2 | 56 | 44.2 | 40 | 23.6 | 29 | 19.1 | 37 | 22.1 | 29 | 16.1 | 69.5 | 41.5 | 54 | 45.7 | 55.8 | 40.4 | 61 | 36.1 |
| 10 | 64.5 | 51.8 | 71 | 62.8 | 67.2 | 57.3 | 58.5 | 45.6 | 33.5 | 15.3 | 38.5 | 24.6 | 39 | 34.0 | 20 | 13.1 | 67 | 45.2 | 62 | 45.2 | 46 | 34.6 | 61 | 37.1 |
| 11 | 71 | 50.7 | 73 | 54.8 | 77 | 61.8 | 50 | 42.6 | 39 | 24.6 | 41 | 33.9 | 37 | 32.1 | 23 | 1.2 | 52.1 | 40.1 | 60 | 42.9 | 43 | 36.9 | 56 | 41.1 |
| 12 | 71 | 50.1 | 76 | 54.3 | 72 | 61.3 | 46 | 33.6 | 44 | 29.6 | 42.5 | 27.3 | 36 | 30.1 | 32 | 19.6 | 47 | 37.0 | 49 | 38.2 | 43 | 37.2 | 61 | 37.6 |
| 13 | 76 | 46.1 | 78 | 55.8 | 73.5 | 59.3 | 57 | 32.1 | 46 | 27.1 | 47 | 28.1 | 33 | 27.1 | 32 | 13.6 | 38 | 34.0 | 47 | 38.1 | 44 | 28.9 | 65 | 45.2 |
| 14 | 79 | 48.4 | 72.1 | 56.8 | 77 | 56.3 | 68 | 51.8 | 55 | 36.1 | 38.5 | 22.1 | 34 | 28.6 | 35 | 9.6 | 39 | 32.6 | 49 | 29.6 | 46 | 27.1 | 66 | 41.9 |
| 15 | 88 | 60.8 | 72 | 54.3 | 83 | 61.8 | 67 | 50.8 | 54 | 44.1 | 47 | 37.1 | 34 | 17.1 | 33 | 16.1 | 45 | 27.1 | 48 | 35.1 | 51 | 28.5 | 76.1 | 50.3 |
| 16 | 89.5 | 62.1 | 75 | 57.8 | 76 | 61.7 | 62 | 47.7 | 47 | 39.1 | 46 | 33.9 | 18 | 3.6 | 37 | 16.1 | 46 | 34.6 | 59.6 | 31.9 | 59.5 | 31.1 | 67 | 54.8 |
| 17 | 80 | 61.1 | 73.1 | 55.3 | 64 | 55.8 | 51.5 | 45.2 | 49 | 34.0 | 42 | 26.1 | 29 | 14.1 | 32 | 18.1 | 43 | 33.1 | 64 | 32.6 | 56 | 37.1 | 59 | 45.1 |
| 18 | 75.5 | 61.1 | 79.5 | 54.8 | 60 | 53.5 | 57 | 45.7 | 38 | 28.1 | 35.5 | 21.6 | 35 | 26.1 | 23 | 3.9 | 41 | 27.1 | 72.6 | 43.1 | 60.8 | 34.6 | 65.5 | 42.3 |
| 19 | 67 | 54.1 | 75 | 58.3 | 67 | 43.3 | 52 | 43.1 | 30 | 20.1 | 51 | 34.6 | 43 | 25.1 | 31 | 10.2 | 41 | 33.1 | 64.5 | 50.7 | 59.6 | 50 | 75 | 44.2 |
| 20 | 64.5 | 54.1 | 80 | 55.8 | 62 | 42.1 | 47 | 27.6 | 41 | 18.6 | 47 | 39.1 | 45 | 33.1 | 43 | 26.6 | 37 | 29.6 | 66 | 44.2 | 74 | 47.1 | 78 | 55.7 |
| 21 | 71 | 45.1 | 84.5 | 57.3 | 60 | 40.1 | 48 | 26.1 | 44 | 27.1 | 47 | 37.6 | 36 | 33.0 | 39 | 32.1 | 36 | 29.3 | 48 | 39.6 | 49 | 40.2 | 74.5 | 55.3 |
| 22 | 74 | 50.1 | 87.2 | 64.8 | 66.5 | 37.1 | 49.5 | 24.1 | 44 | 27.6 | 49 | 37.1 | 34 | 7.9 | 43 | 37.1 | 42 | 24.6 | 49.2 | 41.6 | 56 | 37.1 | 62 | 54.7 |
| 23 | 75 | 51.8 | 74 | 64.8 | 71 | 44.2 | 56 | 43.1 | 48 | 37.1 | 46.6 | 36.6 | 18 | −0.9 | 37.5 | 28.6 | 52 | 26.6 | 69 | 44.7 | 72 | 34.6 | 59.5 | 54.8 |
| 24 | 79 | 51.8 | 79 | 64.3 | 75 | 55.2 | 58 | 50.3 | 50.1 | 43.6 | 52 | 32.1 | 33 | 9.1 | 30 | 23.9 | 28 | 5.1 | 72.1 | 57.3 | 72.6 | 52.3 | 65 | 51 |
| 25 | 92 | 58.3 | 73.5 | 63.8 | 77 | 61.5 | 50.3 | 35.5 | 52.5 | 44.1 | 42 | 32.1 | 36.5 | 29.1 | 25 | 20.1 | 33.5 | 11.1 | 60 | 45.7 | 71 | 51.3 | 70 | 49.2 |
| 26 | 83 | 65.1 | 74 | 55.3 | 67 | 54.6 | 47 | 34.1 | 52.5 | 41.9 | 43 | 29.6 | 36 | 30.1 | 37 | 23.6 | 40 | 31.6 | 62 | 47.2 | 61 | 47.2 | 84 | 58.1 |
| 27 | 84 | 68.1 | 81 | 61.3 | 72 | 54.3 | 46 | 28.6 | 43.1 | 37.0 | 42 | 28.6 | 33.0 | 19.1 | 39.5 | 28.6 | 43 | 33.1 | 63 | 43.9 | 55 | 44.2 | 75 | 57.8 |
| 28 | 83 | 67.1 | 73 | 58.3 | 66 | 44.2 | 58.1 | 41.3 | 40 | 30.6 | 40 | 26.3 | 20.0 | 5.1 | 39 | 23.1 | 38.5 | 33.1 | 64 | 48.1 | 52 | 41.1 | 79.5 | 57.9 |
| 29 | 75 | 67.1 | 72 | 65.7 | 76 | 40.6 | 64 | 44.2 | 31.8 | 27.1 | 35 | 25.1 | 27.5 | 5.1 | ..... | ..... | 40 | 23.1 | 61 | 51.3 | 52.8 | 40.6 | 84.5 | 60.3 |
| 30 | 84 | 65.1 | 72 | 57.3 | 80.5 | 60.3 | 46 | 34.9 | 32 | 26.6 | 34.5 | 27.6 | 26.0 | 7.6 | ..... | ..... | 49 | 22.8 | 67 | 52.8 | 62.6 | 42.6 | 87.7 | 62.3 |
| 31 | 88 | 60.1 | 73 | 57.3 | ..... | ..... | 46 | 37.1 | ..... | ..... | 32 | 15.1 | 26.5 | 10.1 | ..... | ..... | 53.5 | 35.6 | ..... | ..... | 72 | 41.7 | ..... | ..... |
| Range | 48°.9 | | 42°.4 | | 45°.9 | | 50°.9 | | 39°.7 | | 45°.4 | | 46°.1 | | 47°.3 | | 64°.4 | | 48° | | 45°.5 | | 45°.1 | |
| Monthly means | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, SAVANNAH, GA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 93 | 74 | 89 | 74 | 96 | 71 | 76 | 67 | 75 | 60 | 51 | 30 | 56 | 35 | 59 | 44 | 66 | 43 | 75 | 61 | 83 | 61 | 85 | 65 |
| 2 | 96 | 76 | 87 | 71 | 90 | 72 | 78 | 72 | 81 | 63 | 53 | 29 | 59 | 39 | 59 | 48 | 72 | 52 | 69 | 55 | 85 | 65 | 86 | 66 |
| 3 | 95 | 78 | 86 | 72 | 81 | 65 | 80 | 72 | 64 | 49 | 58 | 32 | 56 | 38 | 56 | 44 | 72 | 56 | 68 | 57 | 87 | 67 | 92 | 73 |
| 4 | 98 | 78 | 90 | 74 | 82 | 67 | 83 | 70 | 66 | 46 | 64 | 46 | 62 | 43 | 55 | 38 | 59 | 48 | 63 | 53 | 84 | 69 | 93 | 73 |
| 5 | 95 | 77 | 92 | 76 | 86 | 71 | 72 | 60 | 67 | 54 | 67 | 60 | 47 | 32 | 53 | 30 | 61 | 38 | 71 | 47 | 77 | 57 | 91 | 71 |
| 6 | 94 | 75 | 91 | 75 | 89 | 72 | 68 | 52 | 66 | 52 | 68 | 42 | 46 | 26 | 59 | 40 | 73 | 43 | 78 | 57 | 81 | 59 | 83 | 72 |
| 7 | 86 | 71 | 95 | 78 | 91 | 71 | 71 | 53 | 64 | 46 | 53 | 32 | 46 | 30 | 64 | 50 | 75 | 55 | 76 | 56 | 86 | 66 | 80 | 68 |
| 8 | 86 | 69 | 96 | 78 | 87 | 73 | 82 | 62 | 77 | 63 | 60 | 34 | 48 | 30 | 69 | 58 | 73 | 51 | 79 | 61 | 87 | 67 | 91 | 71 |
| 9 | 91 | 72 | 93 | 78 | 82 | 70 | 75 | 61 | 72 | 51 | 55 | 36 | 53 | 39 | 68 | 53 | 72 | 56 | 71 | 63 | 86 | 70 | 91 | 72 |
| 10 | 96 | 71 | 91 | 74 | 88 | 72 | 75 | 58 | 60 | 42 | 63 | 36 | 57 | 42 | 64 | 49 | 71 | 61 | 77 | 63 | 84 | 65 | 90 | 73 |
| 11 | 89 | 76 | 91 | 73 | 91 | 71 | 77 | 58 | 56 | 40 | 67 | 43 | 59 | 42 | 54 | 38 | 80 | 60 | 86 | 65 | 76 | 59 | 83 | 66 |
| 12 | 87 | 76 | 91 | 74 | 93 | 75 | 71 | 51 | 61 | 37 | 71 | 46 | 59 | 35 | 53 | 31 | 78 | 61 | 76 | 57 | 82 | 60 | 88 | 67 |
| 13 | 88 | 72 | 94 | 63 | 86 | 70 | 71 | 55 | 67 | 40 | 71 | 47 | 68 | 48 | 59 | 41 | 79 | 63 | 82 | 58 | 82 | 68 | 82 | 69 |
| 14 | 91 | 73 | 86 | 71 | 89 | 71 | 74 | 57 | 71 | 45 | 63 | 46 | 65 | 47 | 57 | 44 | 79 | 58 | 86 | 63 | 83 | 69 | 73 | 66 |
| 15 | 93 | 74 | 88 | 68 | 88 | 71 | 77 | 62 | 78 | 58 | 67 | 46 | 62 | 38 | 58 | 46 | 71 | 56 | 79 | 66 | 71 | 61 | 77 | 66 |
| 16 | 94 | 72 | 85 | 73 | 88 | 72 | 79 | 63 | 76 | 57 | 70 | 49 | 54 | 35 | 57 | 44 | 73 | 50 | 75 | 64 | 71 | 56 | 86 | 70 |
| 17 | 90 | 72 | 88 | 72 | 88 | 72 | 79 | 61 | 76 | 53 | 70 | 45 | 59 | 37 | 66 | 39 | 77 | 55 | 70 | 59 | 79 | 67 | 88 | 70 |
| 18 | 93 | 76 | 80 | 71 | 87 | 72 | 80 | 60 | 72 | 52 | 70 | 47 | 61 | 38 | 64 | 50 | 64 | 47 | 70 | 60 | 84 | 66 | 89 | 76 |
| 19 | 93 | 72 | 81 | 70 | 77 | 62 | 81 | 63 | 67 | 48 | 64 | 53 | 66 | 49 | 56 | 38 | 65 | 45 | 74 | 57 | 80 | 70 | 88 | 74 |
| 20 | 89 | 76 | 85 | 67 | 78 | 63 | 83 | 68 | 67 | 54 | 63 | 49 | 70 | 56 | 70 | 46 | 72 | 51 | 83 | 63 | 86 | 73 | 81 | 72 |
| 21 | 82 | 74 | 86 | 71 | 74 | 67 | 76 | 61 | 68 | 61 | 66 | 55 | 64 | 52 | 68 | 61 | 70 | 53 | 88 | 68 | 89 | 73 | 88 | 68 |
| 22 | 88 | 73 | 87 | 70 | 73 | 64 | 70 | 53 | 68 | 59 | 63 | 56 | 62 | 46 | 75 | 56 | 71 | 58 | 87 | 70 | 90 | 71 | 88 | 73 |
| 23 | 90 | 75 | 85 | 72 | 78 | 66 | 70 | 50 | 66 | 58 | 67 | 58 | 60 | 47 | 68 | 53 | 74 | 51 | 85 | 70 | 88 | 73 | 88 | 67 |
| 24 | 91 | 77 | 91 | 73 | 79 | 67 | 72 | 53 | 66 | 53 | 63 | 58 | 58 | 40 | 71 | 48 | 84 | 60 | 84 | 70 | 94 | 74 | 90 | 69 |
| 25 | 92 | 74 | 86 | 76 | 79 | 66 | 79 | 60 | 64 | 47 | 69 | 59 | 60 | 45 | 61 | 44 | 72 | 55 | 81 | 63 | 98 | 76 | 91 | 73 |
| 26 | 94 | 76 | 85 | 72 | 82 | 69 | 76 | 67 | 64 | 52 | 62 | 55 | 70 | 43 | 58 | 39 | 72 | 48 | 84 | 63 | 97 | 81 | 89 | 74 |
| 27 | 94 | 77 | 86 | 75 | 82 | 70 | 72 | 63 | 69 | 49 | 62 | 52 | 74 | 49 | 56 | 43 | 79 | 52 | 83 | 62 | 93 | 77 | 93 | 73 |
| 28 | 97 | 78 | 88 | 74 | 83 | 69 | 74 | 60 | 60 | 47 | 61 | 47 | 66 | 51 | 66 | 45 | 79 | 63 | 79 | 58 | 87 | 71 | 90 | 75 |
| 29 | 100 | 79 | 89 | 72 | 82 | 65 | 79 | 61 | 57 | 37 | 67 | 52 | 56 | 42 | ..... | ..... | 80 | 61 | 75 | 56 | 85 | 70 | 88 | 74 |
| 30 | 99 | 74 | 93 | 72 | 74 | 64 | 78 | 63 | 44 | 28 | 59 | 47 | 65 | 47 | ..... | ..... | 81 | 59 | 81 | 60 | 89 | 68 | 87 | 73 |
| 31 | 91 | 76 | 93 | 75 | ..... | ..... | 78 | 68 | ..... | ..... | 54 | 43 | 64 | 51 | ..... | ..... | 83 | 65 | ..... | ..... | 89 | 71 | ..... | ..... |
| Range | 31° | | 29° | | 34° | | 33° | | 53° | | 42° | | 48° | | 44° | | 46° | | 41° | | 42° | | 28° | |
| Monthly means | 83°.8 | | 81°.6 | | 76°.7 | | 68°.7 | | 59°.4 | | 55°.1 | | 51°.2 | | 53°.9 | | 63°.9 | | 69°.4 | | 76°.9 | | 78°.9 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, SHREVEPORT, LA.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 96 | 76 | 97 | 80 | 98 | 78 | 86 | 67 | 70 | 59 | 44 | 22 | 52 | 33 | 53 | 44 | 71 | 52 | 71 | 52 | 87 | 65 | 92 | 76 |
| 2 | 94 | 74 | 99 | 78 | 86 | 73 | 86 | 67 | 60 | 51 | 51 | 25 | 55 | 35 | 45 | 35 | 67 | 56 | 71 | 50 | 81 | 68 | 92 | 74 |
| 3 | 93 | 75 | 94 | 75 | 76 | 67 | 88 | 66 | 63 | 48 | 58 | 38 | 43 | 34 | 44 | 38 | 62 | 49 | 61 | 49 | 73 | 61 | 94 | 69 |
| 4 | 96 | 75 | 96 | 76 | 74 | 66 | 74 | 57 | 61 | 45 | 70 | 55 | 40 | 35 | 53 | 32 | 64 | 45 | 66 | 46 | 77 | 54 | 88 | 69 |
| 5 | 95 | 76 | 96 | 79 | 86 | 69 | 69 | 49 | 59 | 45 | 49 | 40 | 41 | 25 | 65 | 39 | 73 | 46 | 80 | 44 | 84 | 55 | 80 | 69 |
| 6 | 99 | 76 | 96 | 80 | 77 | 71 | 75 | 51 | 52 | 39 | 50 | 34 | 41 | 28 | 56 | 46 | 72 | 58 | 84 | 57 | 84 | 61 | 85 | 70 |
| 7 | 98 | 76 | 96 | 80 | 76 | 69 | 70 | 62 | 51 | 37 | 57 | 31 | 45 | 31 | 51 | 47 | 75 | 61 | 67 | 60 | 80 | 69 | 81 | 69 |
| 8 | 99 | 77 | 90 | 75 | 83 | 70 | 74 | 53 | 55 | 45 | 58 | 32 | 49 | 35 | 61 | 40 | 78 | 54 | 70 | 60 | 74 | 63 | 81 | 70 |
| 9 | 97 | 79 | 94 | 72 | 90 | 75 | 77 | 55 | 45 | 41 | 58 | 35 | 57 | 35 | 49 | 39 | 57 | 49 | 85 | 63 | 78 | 59 | 91 | 69 |
| 10 | 88 | 76 | 96 | 72 | 88 | 68 | 79 | 55 | 52 | 38 | 61 | 33 | 59 | 42 | 39 | 34 | 70 | 46 | 69 | 56 | 77 | 59 | 78 | 67 |
| 11 | 92 | 75 | 96 | 72 | 89 | 68 | 80 | 61 | 55 | 35 | 64 | 34 | 62 | 34 | 49 | 28 | 75 | 50 | 73 | 50 | 77 | 59 | 80 | 66 |
| 12 | 92 | 72 | 95 | 75 | 88 | 71 | 81 | 63 | 62 | 37 | 67 | 39 | 60 | 46 | 49 | 35 | 79 | 54 | 83 | 55 | 79 | 63 | 82 | 71 |
| 13 | 92 | 68 | 94 | 74 | 89 | 72 | 81 | 61 | 71 | 43 | 70 | 51 | 48 | 40 | 59 | 47 | 77 | 52 | 77 | 62 | 80 | 63 | 89 | 73 |
| 14 | 94 | 72 | 89 | 72 | 91 | 75 | 83 | 66 | 70 | 57 | 69 | 46 | 49 | 39 | 66 | 43 | 80 | 58 | 88 | 70 | 69 | 61 | 91 | 76 |
| 15 | 92 | 76 | 87 | 67 | 89 | 76 | 80 | 68 | 70 | 51 | 72 | 45 | 53 | 34 | 60 | 48 | 76 | 57 | 80 | 65 | 75 | 53 | 92 | 75 |
| 16 | 91 | 74 | 90 | 65 | 89 | 75 | 75 | 67 | 70 | 46 | 73 | 61 | 56 | 34 | 67 | 44 | 80 | 56 | 83 | 64 | 82 | 63 | 89 | 74 |
| 17 | 93 | 73 | 86 | 69 | 78 | 65 | 75 | 67 | 72 | 48 | 74 | 57 | 62 | 36 | 70 | 49 | 75 | 58 | 78 | 66 | 87 | 71 | 89 | 76 |
| 18 | 92 | 74 | 88 | 69 | 72 | 58 | 71 | 62 | 72 | 49 | 63 | 53 | 61 | 39 | 70 | 48 | 71 | 54 | 83 | 71 | 88 | 65 | 91 | 70 |
| 19 | 87 | 70 | 89 | 68 | 74 | 51 | 62 | 53 | 68 | 55 | 71 | 52 | 57 | 47 | 70 | 50 | 71 | 52 | 77 | 72 | 88 | 65 | 90 | 74 |
| 20 | 83 | 70 | 92 | 69 | 81 | 55 | 57 | 48 | 67 | 57 | 63 | 58 | 56 | 45 | 71 | 55 | 75 | 53 | 84 | 72 | 88 | 68 | 88 | 73 |
| 21 | 80 | 64 | 83 | 73 | 84 | 60 | 55 | 49 | 65 | 52 | 61 | 55 | 55 | 41 | 58 | 53 | 80 | 55 | 83 | 70 | 84 | 68 | 87 | 74 |
| 22 | 85 | 64 | 84 | 65 | 83 | 58 | 59 | 49 | 59 | 43 | 69 | 54 | 59 | 35 | 62 | 45 | 82 | 55 | 83 | 72 | 88 | 72 | 87 | 70 |
| 23 | 87 | 66 | 88 | 65 | 83 | 63 | 58 | 43 | 61 | 43 | 61 | 54 | 60 | 39 | 62 | 47 | 83 | 56 | 78 | 64 | 87 | 72 | 89 | 69 |
| 24 | 83 | 69 | 93 | 66 | 78 | 66 | 67 | 45 | 70 | 46 | 63 | 55 | 67 | 43 | 60 | 40 | 87 | 60 | 79 | 56 | 87 | 70 | 88 | 71 |
| 25 | 84 | 68 | 95 | 72 | 83 | 63 | 73 | 57 | 59 | 47 | 64 | 48 | 66 | 49 | 66 | 46 | 76 | 56 | 84 | 58 | 88 | 71 | 90 | 72 |
| 26 | 88 | 69 | 95 | 75 | 88 | 67 | 74 | 61 | 68 | 39 | 56 | 43 | 64 | 55 | 60 | 46 | 80 | 56 | 84 | 60 | 80 | 67 | 92 | 75 |
| 27 | 91 | 77 | 96 | 73 | 91 | 67 | 79 | 55 | 58 | 43 | 58 | 46 | 61 | 45 | 60 | 39 | 77 | 59 | 85 | 61 | 82 | 66 | 88 | 74 |
| 28 | 94 | 75 | 92 | 73 | 86 | 68 | 76 | 59 | 46 | 36 | 53 | 50 | 65 | 38 | 66 | 40 | 76 | 58 | 83 | 63 | 87 | 68 | 89 | 73 |
| 29 | 92 | 75 | 94 | 74 | 89 | 68 | 78 | 63 | 40 | 28 | 50 | 40 | 53 | 46 | ..... | ..... | 80 | 56 | 80 | 61 | 90 | 71 | 90 | 74 |
| 30 | 93 | 77 | 95 | 75 | 89 | 70 | 65 | 61 | 33 | 19 | 41 | 37 | 49 | 43 | ..... | ..... | 79 | 60 | 86 | 61 | 89 | 72 | 88 | 75 |
| 31 | 96 | 79 | 96 | 75 | ..... | ..... | 66 | 58 | ..... | ..... | 45 | 37 | 54 | 42 | ..... | ..... | 68 | 50 | ..... | ..... | 91 | 74 | ..... | ..... |
| Range | 35° | | 34° | | 47° | | 45° | | 53° | | 52° | | 42° | | 43° | | 42° | | 44° | | 38° | | 28° | |
| Monthly means | 81°.8 | | 82°.2 | | 75°.6 | | 65°.4 | | 51°.7 | | 51°.2 | | 46°.6 | | 50°.4 | | 64°.5 | | 69°.0 | | 73°.9 | | 79° | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, SILVER CITY, N. MEX.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | | | | | | | | | | | | | | | | | | | | | | | 75 | 52 |
| 2 | | | | | | | | | | | | | | | | | | | | | | | 78 | 47 |
| 3 | | | | | | | | | | | | | | | | | | | | | | | 79 | 54 |
| 4 | | | | | | | | | | | | | | | | | | | | | | | 84 | 49 |
| 5 | | | | | | | | | | | | | | | | | | | | | | | 84 | 61 |
| 6 | | | | | | | | | | | | | | | | | | | | | | | 76 | 54 |
| 7 | | | | | | | | | | | | | | | | | | | | | | | 76 | 50 |
| 8 | | | | | | | | | | | | | | | | | | | | | | | 81 | 55 |
| 9 | | | | | | | | | | | | | | | | | | | | | | | 84 | 57 |
| 10 | | | | | | | | | | | | | | | | | | | | | | | 86 | 55 |
| 11 | | | | | | | | | | | | | | | | | | | | | | | 86 | 65 |
| 12 | | | | | | | | | | | | | | | | | | | | | | | 82 | 55 |
| 13 | | | | | | | | | | | | | | | | | | | | | | | 86 | 57 |
| 14 | | | | | | | | | | | | | | | | | | | | | | | 86 | 59 |
| 15 | | | | | | | | | | | | | | | | | | | | | | | 76 | 62 |
| 16 | | | | | | | | | | | | | | | | | | | | | *76 | 47 | 78 | 50 |
| 17 | | | | | | | | | | | | | | | | | | | | | 71 | 52 | 88 | 56 |
| 18 | | | | | | | | | | | | | | | | | | | | | 67 | 42 | 93 | 52 |
| 19 | | | | | | | | | | | | | | | | | | | | | 71 | 45 | 80 | 65 |
| 20 | | | | | | | | | | | | | | | | | | | | | 76 | 48 | 82 | 62 |
| 21 | | | | | | | | | | | | | | | | | | | | | 75 | 51 | 88 | 61 |
| 22 | | | | | | | | | | | | | | | | | | | | | 73 | 44 | 92 | 66 |
| 23 | | | | | | | | | | | | | | | | | | | | | 74 | 50 | 86 | 65 |
| 24 | | | | | | | | | | | | | | | | | | | | | 79 | 43 | 87 | 68 |
| 25 | | | | | | | | | | | | | | | | | | | | | 73 | 45 | 90 | 73 |
| 26 | | | | | | | | | | | | | | | | | | | | | 76 | 47 | 85 | 66 |
| 27 | | | | | | | | | | | | | | | | | | | | | 82 | 51 | 88 | 53 |
| 28 | | | | | | | | | | | | | | | | | | | | | 76 | 51 | 90 | 66 |
| 29 | | | | | | | | | | | | | | | | | | | | | 78 | 49 | 88 | 60 |
| 30 | | | | | | | | | | | | | | | | | | | | | 77 | 46 | 91 | 61 |
| 31 | | | | | | | | | | | | | | | | | | | | | 80 | 49 | | |
| Range | | | | | | | | | | | | | | | | | | | | | | | 46° | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

*Observations commenced May 16, 1878.

No maximum and minimum thermometers on station. The readings given are the highest and lowest observed readings of the exposed thermometer.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, SMITHVILLE, N. C.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 88 | 76 | 84 | 73 | 87 | 73 | 77 | 64 | 71 | 59 | 47 | 24 | 50 | 31 | 52 | 44 | 62 | 40 | 66 | 50 | 80 | 57 | 78 | 53 |
| 2 | 90 | 77 | 92 | 71 | 86 | 68 | 77 | 65 | 78 | 65 | 45 | 25 | 53 | 39 | 51 | 40 | 62 | 52 | 67 | 44 | 80 | 63 | 76 | 55 |
| 3 | 89 | 78 | 87 | 72 | 83 | 64 | 78 | 71 | 67 | 47 | 50 | 30 | 53 | 34 | 48 | 38 | 63 | 54 | 61 | 54 | 79 | 69 | 81 | 57 |
| 4 | 91 | 76 | 87 | 71 | 82 | 63 | 77 | 71 | 64 | 43 | 62 | 39 | 62 | 43 | 51 | 34 | 57 | 44 | 60 | 45 | 78 | 70 | 88 | 72 |
| 5 | 87 | 75 | 87 | 72 | 87 | 64 | 73 | 35 | 71 | 48 | 65 | 59 | 45 | 29 | 52 | 34 | 58 | 34 | 68 | 43 | 73 | 53 | 86 | 68 |
| 6 | 84 | 71 | 87 | 74 | 88 | 73 | 67 | 51 | 65 | 43 | 65 | 39 | 42 | 22 | 55 | 34 | 63 | 45 | 70 | 50 | 78 | 51 | 74 | 65 |
| 7 | 85 | 68 | 87 | 78 | 83 | 73 | 68 | 53 | 64 | 37 | 51 | 31 | 32 | 24 | 61 | 46 | 67 | 55 | 67 | 45 | 79 | 66 | 73 | 59 |
| 8 | 87 | 64 | 89 | 80 | 83 | 66 | 74 | 59 | 72 | 60 | 55 | 37 | 44 | 23 | 60 | 53 | 71 | 54 | 67 | 49 | 79 | 68 | 81 | 61 |
| 9 | 88 | 66 | 88 | 75 | 78 | 60 | 74 | 60 | 73 | 57 | 47 | 35 | 58 | 39 | 60 | 50 | 67 | 56 | 68 | 58 | 87 | 68 | 84 | 67 |
| 10 | 88 | 76 | 92 | 72 | 82 | 60 | 77 | 56 | 59 | 46 | 56 | 32 | 57 | 47 | 57 | 50 | 72 | 58 | 77 | 61 | 80 | 58 | 82 | 69 |
| 11 | 84 | 70 | 93 | 69 | 88 | 72 | 74 | 56 | 56 | 42 | 60 | 44 | 54 | 40 | 51 | 40 | 67 | 60 | 71 | 59 | 74 | 55 | 80 | 57 |
| 12 | 86 | 69 | 91 | 72 | 87 | 69 | 68 | 48 | 60 | 36 | 60 | 43 | 51 | 32 | 51 | 32 | 70 | 60 | 71 | 52 | 77 | 54 | 84 | 65 |
| 13 | 87 | 68 | 88 | 74 | 84 | 71 | 72 | 50 | 66 | 41 | 63 | 48 | 62 | 36 | 54 | 35 | 67 | 58 | 71 | 61 | 70 | 55 | 75 | 65 |
| 14 | 90 | 66 | 87 | 68 | 84 | 68 | 73 | 53 | 66 | 44 | 60 | 42 | 60 | 45 | 52 | 43 | 71 | 55 | 74 | 62 | 72 | 54 | 77 | 67 |
| 15 | 87 | 71 | 84 | 72 | 89 | 67 | 76 | 56 | 73 | 57 | 63 | 38 | 52 | 36 | 48 | 42 | 64 | 49 | 78 | 65 | 59 | 49 | 83 | 59 |
| 16 | 88 | 77 | 89 | 72 | 87 | 68 | 80 | 62 | 73 | 59 | 66 | 52 | 49 | 32 | 57 | 41 | 66 | 45 | 67 | 54 | 70 | 41 | 85 | 62 |
| 17 | 88 | 77 | 93 | 74 | 91 | 69 | 76 | 59 | 71 | 50 | 66 | 51 | 50 | 35 | 59 | 42 | 68 | 54 | 69 | 52 | 79 | 60 | 83 | 73 |
| 18 | 88 | 76 | 86 | 70 | 81 | 67 | 79 | 60 | 71 | 49 | 64 | 52 | 53 | 35 | 57 | 40 | 63 | 42 | 65 | 45 | 76 | 63 | 77 | 73 |
| 19 | 86 | 75 | 82 | 69 | 72 | 65 | 82 | 61 | 58 | 41 | 58 | 46 | 55 | 37 | 50 | 33 | 63 | 41 | 72 | 47 | 79 | 53 | 77 | 69 |
| 20 | 89 | 77 | 88 | 67 | 78 | 64 | 79 | 70 | 61 | 44 | 58 | 49 | 63 | 53 | 61 | 37 | 67 | 49 | 72 | 60 | 77 | 69 | 82 | 65 |
| 21 | 85 | 75 | 86 | 68 | 76 | 66 | 78 | 63 | 67 | 51 | 62 | 53 | 61 | 51 | 65 | 56 | 70 | 52 | 81 | 64 | 82 | 69 | 86 | 63 |
| 22 | 82 | 73 | 88 | 68 | 73 | 61 | 73 | 53 | 67 | 62 | 58 | 51 | 55 | 42 | 61 | 56 | 67 | 52 | 81 | 65 | 79 | 69 | 86 | 72 |
| 23 | 91 | 78 | 83 | 77 | 75 | 64 | 68 | 46 | 71 | 62 | 59 | 53 | 56 | 39 | 59 | 52 | 64 | 45 | 79 | 68 | 73 | 64 | 85 | 63 |
| 24 | 93 | 78 | 88 | 76 | 78 | 64 | 73 | 48 | 65 | 53 | 56 | 50 | 52 | 37 | 61 | 43 | 67 | 59 | 75 | 68 | 85 | 69 | 87 | 64 |
| 25 | 90 | 75 | 87 | 76 | 79 | 67 | 76 | 53 | 66 | 53 | 59 | 50 | 50 | 46 | 60 | 42 | 64 | 44 | 77 | 66 | 87 | 72 | 89 | 68 |
| 26 | 93 | 78 | 89 | 73 | 81 | 69 | 73 | 63 | 67 | 49 | 60 | 51 | 58 | 43 | 52 | 34 | 61 | 44 | 78 | 65 | 87 | 70 | 90 | 76 |
| 27 | 89 | 78 | 89 | 72 | 78 | 70 | 68 | 57 | 67 | 45 | 56 | 50 | 60 | 43 | 52 | 35 | 71 | 54 | 81 | 63 | 83 | 66 | 89 | 73 |
| 28 | 96 | 81 | 88 | 72 | 75 | 64 | 72 | 54 | 63 | 51 | 56 | 44 | 62 | 47 | 65 | 40 | 67 | 60 | 75 | 59 | 86 | 67 | 92 | 77 |
| 29 | 98 | 79 | 88 | 72 | 77 | 64 | 71 | 61 | 59 | 44 | 62 | 48 | 48 | 38 | ..... | ..... | 73 | 56 | 76 | 54 | 87 | 61 | 87 | 72 |
| 30 | 97 | 73 | 88 | 73 | 78 | 64 | 77 | 63 | 46 | 28 | 57 | 40 | 54 | 39 | ..... | ..... | 65 | 56 | 78 | 60 | 86 | 67 | 89 | 70 |
| 31 | 91 | 74 | 91 | 78 | ..... | ..... | 75 | 63 | ..... | ..... | 49 | 38 | 59 | 49 | ..... | ..... | 71 | 63 | ..... | ..... | 77 | 60 | ..... | ..... |
| Range | 34° | | 26° | | 31° | | 36° | | 50° | | 42° | | 41° | | 33° | | 39° | | 38° | | 46° | | 39° | |
| Monthly means | 80°.9 | | 79°.9 | | 74°.3 | | 66°.2 | | 57°.7 | | 50°.5 | | 46°.3 | | 48°.5 | | 58°.5 | | 63°.6 | | 69°.8 | | 74°.3 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, SPRINGFIELD, MASS.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 80.5 | 65 | 77 | 65 | 76 | 67 | 76 | 50 | 53 | 35 | 36 | 24 | 33 | 17 | 28 | 22 | 44 | 25 | 52 | 41 | 66 | 48 | 70 | 52 |
| 2 | 76 | 63 | 78 | 61.5 | 75 | 60 | 77 | 55 | 62 | 40 | 30 | 14 | 37 | 24 | 35 | 12 | 46 | 27 | 54 | 42 | 76 | 53 | 74 | 50 |
| 3 | 78.5 | 59 | 83.5 | 63 | 68 | 56 | 74 | 55 | 53 | 44 | 39 | 16 | 25 | 8 | 28 | 2 | 54 | 40 | 59 | 39 | 81 | 57 | 80 | 62 |
| 4 | 79 | 63.5 | 78 | 62.5 | 75 | 52 | 71 | 58 | 49 | 37 | 41 | 24 | 33 | 3 | 34 | 2 | 45 | 28 | 55 | 41 | 78 | 60 | 79 | 61 |
| 5 | 84 | 57 | 79 | 56 | 78 | 58 | 58 | 46 | 56 | 33 | 36 | 36 | 34 | 17 | 38 | 8 | 45 | 24 | 47 | 38 | 68 | 52 | 72 | 53 |
| 6 | 77 | 61 | 81.5 | 59 | 70 | 59 | 57 | 38 | 56 | 34 | 57 | 39 | 25 | 4 | 43 | 11 | 52 | 33 | 51 | 41 | 67 | 45 | 66 | 49 |
| 7 | 79.5 | 60.5 | 81 | 64 | 61 | 54 | 60 | 37 | 50 | 30 | 42 | 29 | 16 | −7 | 48 | 21 | 62 | 39 | 52 | 41 | 70 | 45 | 70 | 44 |
| 8 | 82 | 62 | 86 | 62 | 68 | 51 | 59 | 39 | 58 | 32 | 46 | 32 | 18 | −8 | 45 | 25 | 62 | 43 | 59 | 41 | 76 | 50 | 67 | 51 |
| 9 | 80 | 67 | 74 | 67 | 74 | 50 | 62 | 43 | 68 | 52 | 37 | 29 | 36 | 12 | 46 | 36 | 60 | 35 | 61 | 42 | 63 | 54 | 67 | 56 |
| 10 | 84.5 | 68 | 83 | 64 | 77 | 50 | 66 | 48 | 52 | 37 | 39 | 22 | 40 | 28 | 36 | 27 | 69 | 37 | 52 | 42 | 66 | 50 | 56 | 50 |
| 11 | 79 | 62.5 | 82 | 60 | 78 | 55 | 62 | 50 | 44 | 35 | 47 | 32 | 42 | 35 | 32 | 21 | 50 | 34 | 58 | 47 | 57 | 45 | 60 | 48 |
| 12 | 81 | 62 | 85 | 59 | 80 | 58 | 61 | 48 | 48 | 28 | 47 | 34 | 45 | 37 | 32 | 14 | 38 | 32 | 62 | 49 | 54 | 42 | 67 | 47 |
| 13 | 80.5 | 59 | 79 | 69 | 85 | 60 | 60 | 45 | 44 | 31 | 52 | 31 | 43 | 30 | 39 | 22 | 42 | 33 | 56 | 45 | 55 | 37 | 69 | 46 |
| 14 | 75.5 | 58 | 82 | 68 | 86 | 63 | 61 | 38 | 54 | 27 | 43 | 26 | 43 | 34 | 34 | 18 | 49 | 38 | 58 | 46 | 56 | 43 | 75 | 50 |
| 15 | 83 | 56 | 74 | 69 | 82 | 64 | 72 | 44 | 62 | 44 | 53 | 28 | 42 | 30 | 33 | 8 | 50 | 35 | 65 | 58 | 53 | 43 | 80 | 54 |
| 16 | 84 | 67 | 82.5 | 67 | 82 | 70 | 72 | 49 | 65 | 48 | 53 | 37 | 30 | 15 | 41 | 25 | 53 | 31 | 61 | 47 | 62 | 41 | 80 | 57 |
| 17 | 82.5 | 69 | 83 | 65 | 82 | 68 | 64 | 40 | 54 | 37 | 56 | 31 | 28 | 11 | 39 | 24 | 43 | 34 | 55 | 38 | 66 | 41 | 76 | 60 |
| 18 | 85.5 | 64 | 78 | 64 | 72 | 54 | 64 | 47 | 48 | 37 | 42 | 24 | 35 | 15 | 35 | 16 | 45 | 36 | 64 | 41 | 71 | 45 | 68 | 60 |
| 19 | 77.5 | 71 | 83 | 59.5 | 69 | 48 | 67 | 51 | 38 | 28 | 44 | 25 | 45 | 24 | 30 | 6 | 51 | 38 | 73 | 42 | 75 | 46 | 78 | 52 |
| 20 | 81 | 69 | 84 | 61 | 70 | 44 | 51 | 45 | 37 | 24 | 51 | 33 | 48 | 35 | 37 | 12 | 43 | 31 | 69 | 48 | 57 | 50 | 82 | 54 |
| 21 | 81 | 69 | 84.5 | 63 | 62 | 46 | 47 | 41 | 36 | 22 | 39 | 24 | 47 | 39 | 40 | 35 | 38 | 24 | 67 | 50 | 67 | 47 | 79 | 58 |
| 22 | 85 | 69 | 86 | 61 | 63 | 43 | 45 | 39 | 46 | 29 | 45 | 34 | 49 | 38 | 38 | 34 | 44 | 27 | 70 | 45 | 62 | 50 | 70 | 57 |
| 23 | 83 | 67 | 88 | 64 | 75 | 40 | 59 | 34 | 52 | 35 | 44 | 29 | 38 | 5 | 45 | 35 | 62 | 38 | 53 | 48 | 69 | 48 | 78 | 63 |
| 24 | 83.5 | 63 | 83 | 67 | 76 | 46 | 67 | 47 | 49 | 39 | 45 | 23 | 28 | 6 | 42 | 33 | 51 | 20 | 61 | 47 | 71 | 53 | 76 | 59 |
| 25 | 88.5 | 64 | 81 | 69 | 80 | 54 | 63 | 44 | 48 | 42 | 44 | 23 | 43 | 25 | 37 | 31 | 30 | 12 | 68 | 60 | 78 | 54 | 75 | 62 |
| 26 | 90 | 68 | 85 | 69 | 81 | 60 | 44 | 37 | 60 | 45 | 43 | 24 | 42 | 33 | 40 | 27 | 48 | 30 | 65 | 58 | 78 | 60 | 79 | 57 |
| 27 | 76 | 65 | 86 | 68 | 78 | 62 | 48 | 37 | 58 | 50 | 45 | 24 | 45 | 35 | 51 | 34 | 53 | 34 | 65 | 51 | 72 | 55 | 87 | 59 |
| 28 | 74 | 65 | 89 | 64 | 69 | 62 | 52 | 32 | 53 | 45 | 46 | 25 | 38 | 17 | 53 | 35 | 57 | 43 | 60 | 52 | 74 | 52 | 82 | 63 |
| 29 | 82 | 69 | 88 | 68 | 71 | 56 | 66 | 48 | 45 | 37 | 45 | 25 | 25 | 9 | ..... | ..... | 52 | 41 | 68 | 50 | 72 | 56 | 88 | 65 |
| 30 | 79 | 69 | 80.5 | 65 | 72 | 49 | 58 | 45 | 37 | 30 | 38 | 27 | 26 | 8 | ..... | ..... | 55 | 35 | 59 | 52 | 60 | 54 | 92 | 67 |
| 31 | 79 | 68 | 82 | 57 | ..... | ..... | 46 | 33 | ..... | ..... | 33 | 22 | 26 | 12 | ..... | ..... | 59 | 39 | ..... | ..... | 58 | 53 | ..... | ..... |
| Range | 34° | | 33° | | 46° | | 45° | | 46° | | 43° | | 57° | | 51° | | 57° | | 35° | | 44° | | 48° | |
| Monthly means | 73°.7 | | 73°.3 | | 65°.1 | | 53°.0 | | 43°.9 | | 34°.2 | | 28°.6 | | 31°.0 | | 42°.2 | | 53°.1 | | 59°.2 | | 66°.3 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, STAYNOR, CANADA.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | .... | .... | 92.7 | 55.2 | 62.7 | 54.2 | 86.7 | 54.2 | 47.7 | 34.5 | 29.0 | 10.5 | 32.0 | 10.5 | 31.0 | 16.5 | 27.0 | 12.5 | 52.7 | 25.5 | 62.7 | 51.2 | 79.7 | 45.3 |
| 2 | 80.7 | 53.2 | 85.7 | 61.2 | .... | .... | 61.7 | 43.3 | 50.7 | 36.3 | .... | .... | 12.9 | 7.5 | 33.0 | −5.5 | 39.7 | 22.5 | 55.7 | 30.5 | 65.7 | 50.2 | .... | .... |
| 3 | 64.7 | 51.2 | .... | .... | 60.7 | 46.2 | 65.7 | 54.0 | 39.7 | 26.5 | 34.0 | −0.5 | 22.9 | 11.5 | .... | .... | .... | .... | 54.7 | 27.5 | 63.7 | 44.3 | 84.7 | 50.2 |
| 4 | 75.8 | 50.2 | .... | .... | 73.8 | 55.2 | 66.7 | 45.2 | .... | .... | 34.1 | 19.5 | 32.0 | 12.5 | 39.7 | −3.5 | 27.0 | 18.5 | 52.7 | 26.5 | 57.7 | 41.3 | 70.8 | 49.2 |
| 5 | 75.8 | 54.2 | .... | .... | 64.7 | 50.2 | 51.7 | 34.5 | 34.0 | 23.5 | 44.7 | 34.5 | 7.9 | 2.5 | 35.0 | 19.5 | 46.7 | 20.5 | 53.7 | 30.5 | .... | .... | 52.0 | 40.3 |
| 6 | 71.8 | 50.2 | 84.7 | 51.2 | 65.7 | 45.2 | 52.7 | 38.3 | 36.0 | 23.5 | 36.0 | 20.5 | .... | .... | 46.7 | 23.5 | 56.7 | 38.3 | 46.7 | 27.5 | 60.7 | 37.3 | 55.7 | 32.5 |
| 7 | 84.7 | 43.3 | 77.7 | 62.2 | 61.7 | 45.3 | .... | .... | 39.7 | 20.5 | 31.0 | 16.5 | 3.8 | −15.7 | 47.7 | 28.5 | 53.7 | 32.5 | .... | .... | 66.7 | 44.3 | 51.7 | 43.3 |
| 8 | .... | .... | 83.7 | 58.2 | 67.8 | 47.3 | 53.0 | 28.5 | 37.7 | 30.5 | 34.0 | 24.5 | 24.0 | 2.5 | 40.7 | 27.5 | 59.7 | 28.5 | 62.7 | 27.5 | 69.8 | 38.3 | 59.7 | 36.3 |
| 9 | 82.7 | 60.2 | 73.8 | 59.2 | .... | .... | 55.7 | 40.3 | 38.7 | 20.5 | .... | .... | 34.0 | 15.5 | 31.0 | 15.5 | 64.7 | 31.5 | 51.7 | 36.3 | 60.7 | 44.3 | .... | .... |
| 10 | 69.8 | 51.2 | 73.0 | 59.2 | 72.8 | 43.3 | 55.7 | 42.3 | 29.0 | 12.5 | 37.7 | 18.5 | 37.7 | 30.5 | .... | .... | .... | .... | 55.7 | 45.3 | 46.7 | 36.3 | 66.7 | 39.3 |
| 11 | 73.0 | 48.2 | 75.8 | 56.2 | 77.7 | 59.2 | 52.7 | 44.3 | .... | .... | 43.7 | 33.5 | 37.0 | 33.5 | 21.9 | −4.5 | 66.7 | 35.3 | 60.7 | 45.3 | 42.7 | 36.3 | 62.7 | 41.3 |
| 12 | 75.8 | 53.2 | .... | .... | 81.7 | 58.2 | 51.7 | 41.3 | 41.7 | 16.5 | 40.7 | 27.5 | 36.0 | 31.5 | 33.0 | 16.5 | 40.7 | 32.5 | 57.7 | 40.3 | .... | .... | 64.7 | 40.3 |
| 13 | 74.8 | 49.2 | 77.7 | 50.2 | 74.8 | 55.2 | 55.7 | 36.3 | 37.7 | 29.5 | 44.7 | 27.5 | .... | .... | 30.0 | 15.5 | 37.0 | 33.5 | 52.7 | 33.5 | 46.7 | 29.5 | 64.7 | 44.3 |
| 14 | 90.7 | 45.3 | 75.8 | 59.2 | 80.7 | 57.2 | .... | .... | 58.7 | 32.5 | 38.7 | 24.5 | 33.0 | 27.5 | 30.0 | 3.5 | 37.7 | 31.5 | .... | .... | 49.7 | 28.5 | 75.8 | 45.3 |
| 15 | .... | .... | 74.8 | 52.2 | 85.7 | 57.2 | 70.8 | 49.2 | 55.7 | 47.2 | 43.7 | 36.4 | 27.1 | 14.5 | 31.0 | 5.5 | 49.7 | 29.5 | 47.7 | 34.5 | 54.7 | 28.5 | 81.7 | 45.3 |
| 16 | 95.7 | 67.2 | 72.8 | 59.2 | .... | .... | 64.7 | 44.3 | 51.7 | 40.3 | .... | .... | 12.9 | 0.5 | 37.0 | 5.5 | 49.7 | 29.5 | 59.7 | 34.5 | 60.7 | 30.5 | .... | .... |
| 17 | 83.7 | 64.8 | 81.1 | 60.2 | 80.7 | 51.2 | 64.7 | 41.3 | 53.7 | 37.3 | 40.7 | 28.5 | 23.1 | 5.5 | .... | .... | .... | .... | 59.7 | 34.5 | 63.7 | 39.3 | 64.7 | 47.2 |
| 18 | 77.8 | 64.2 | 79.7 | 60.2 | 58.7 | 45.3 | 48.7 | 44.3 | .... | .... | 31.0 | 18.5 | 29.0 | 11.5 | 34.0 | −0.5 | 40.7 | 29.5 | 72.8 | 34.5 | 58.7 | 37.3 | 70.8 | 41.3 |
| 19 | 74.8 | 57.5 | .... | .... | 70.8 | 40.3 | 49.7 | 41.3 | 34.0 | 25.5 | 53.7 | 28.5 | 41.7 | 22.5 | 34.0 | −1.5 | 49.7 | 36.3 | 67.8 | 49.2 | .... | .... | 79.7 | 39.3 |
| 20 | 64.7 | 51.2 | 83.7 | 52.2 | 63.7 | 47.2 | 43.7 | 28.5 | 36.0 | 12.5 | 43.7 | 35.5 | .... | .... | 39.7 | 21.5 | 37.7 | 28.5 | 72.8 | 40.3 | 74.8 | 48.2 | 79.7 | 51.2 |
| 21 | 74.8 | 49.3 | 86.7 | 58.2 | 56.7 | 43.3 | .... | .... | 39.7 | 23.5 | 39.7 | 31.5 | 39.7 | 29.5 | 35.0 | 29.5 | 37.7 | 26.5 | .... | .... | 55.7 | 44.3 | 79.7 | 58.2 |
| 22 | .... | .... | 88.7 | 60.2 | 69.8 | 35.5 | 50.7 | 25.5 | 46.7 | 34.5 | 44.7 | 36.3 | 35.0 | 6.5 | 38.7 | 34.5 | 47.7 | 28.5 | 44.7 | 41.3 | 58.7 | 35.3 | 72.8 | 50.2 |
| 23 | 77.7 | 54.2 | 82.7 | 62.2 | .... | .... | 55.7 | 41.3 | 42.7 | 38.3 | .... | .... | 16.9 | −1.5 | 38.7 | 25.5 | 59.7 | 30.5 | 57.7 | 43.3 | 71.8 | 34.5 | .... | .... |
| 24 | 81.7 | 51.2 | 81.7 | 65.2 | 81.7 | 44.3 | 63.7 | 46.2 | 55.7 | 41.3 | 40.7 | 28.5 | 32.0 | 10.5 | .... | .... | .... | .... | 66.7 | 54.2 | 73.8 | 49.2 | 70.8 | 55.2 |
| 25 | 83.7 | 55.2 | 78.7 | 58.2 | 82.7 | 61.2 | 52.7 | 35.5 | .... | .... | 34.7 | 27.5 | 33.0 | 26.5 | 26.0 | 20.5 | 29.0 | 6.5 | 62.7 | 43.3 | 71.8 | 50.2 | 71.8 | 53.2 |
| 26 | 87.7 | 61.2 | .... | .... | 67.8 | 51.2 | 42.7 | 30.1 | 54.7 | 41.3 | 38.7 | 29.5 | 34.0 | 25.5 | 40.7 | 21.5 | 41.7 | 26.5 | 68.8 | 42.3 | .... | .... | 80.7 | 52.2 |
| 27 | 87.7 | 69.2 | 84.7 | 57.2 | 68.8 | 49.2 | 49.7 | 25.5 | 44.7 | 38.3 | 39.7 | 27.5 | .... | .... | 45.7 | 29.5 | 45.7 | 31.5 | 67.8 | 43.3 | 61.7 | 47.2 | 77.7 | 57.2 |
| 28 | 86.7 | 67.2 | 84.7 | 62.2 | 68.8 | 46.2 | .... | .... | 39.7 | 31.5 | 39.7 | 26.5 | 14.9 | 3.5 | 41.7 | 19.5 | 37.7 | 30.5 | .... | .... | 57.7 | 33.5 | 81.7 | 58.2 |
| 29 | .... | .... | 76.8 | 60.2 | 77.7 | 37.3 | 53.7 | 38.3 | 32.0 | 25.5 | 31.0 | 26.5 | 25.0 | 0.5 | .... | .... | 39.7 | 24.5 | 61.7 | 45.3 | 56.7 | 36.3 | 89.7 | 56.2 |
| 30 | 86.7 | 61.2 | 72.8 | 56.2 | .... | .... | 49.7 | 32.5 | 30.0 | 25.5 | .... | .... | 16.9 | −1.5 | .... | .... | 49.7 | 27.5 | 62.0 | 49.2 | 63.7 | 45.3 | .... | .... |
| 31 | 85.7 | 51.2 | 72.8 | 54.2 | .... | .... | 46.7 | 35.3 | .... | .... | 30.0 | 13.5 | 24.0 | 5.5 | .... | .... | .... | .... | .... | .... | 73.8 | 42.3 | .... | .... |
| Range | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Monthly means | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, ST. JOHN'S, NEWFOUNDLAND.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 70 | 46 | 70 | 50 | 74 | 55 | 62 | 34 | 50 | 27 | 42 | 28 | 36.5 | 32 | 23 | 9.5 | 36 | 6 | 40.5 | 34 | 48 | 22 | 53 | 38 |
| 2 | 60 | 45 | 69 | 45 | 69 | 53.5 | 62 | 42 | 46 | 30 | 29.5 | 15 | 32.5 | 30 | 22 | 9 | 8 | — 2 | 39 | 31.5 | 42 | 27.5 | 72 | 38 |
| 3 | 63 | 51 | 75 | 47.5 | 77 | 62.5 | 50 | 36 | 54 | 30 | 33 | 12 | 32 | 28 | 22 | 9.5 | 30 | 3 | 37.5 | 34.5 | 45 | 34 | 56 | 41 |
| 4 | 69 | 52 | 62 | 56 | 72 | 64 | 53 | 27.5 | 45 | 38 | 36 | 18 | 29 | 21 | 30 | 7.5 | 48 | 29 | 38 | 35 | 46.5 | 32 | 44 | 38 |
| 5 | 69 | 48 | 66 | 47.5 | 74 | 51.5 | 63 | 43.5 | 41 | 31 | 28 | 22 | 35 | 22.5 | 30 | 25 | 47 | 30 | 36.5 | 30 | 35 | 30 | 46 | 38 |
| 6 | 69 | 47 | 59.5 | 55 | 74 | 54.5 | 57 | 54 | 58 | 30 | 53 | 16 | 36 | 22 | 30 | 25 | 34 | 24 | 35 | 29.5 | 69 | 33 | 55 | 39 |
| 7 | 77 | 52 | 61.5 | 54 | 66 | 46 | 57 | 41 | 43 | 29 | 54 | 22 | 32.5 | 16 | 30 | 23 | 34 | 24 | 37 | 32 | 70 | 47 | 64 | 42 |
| 8 | 63 | 49 | 70 | 54 | 63 | 44 | 44 | 38 | 40 | 29 | 31 | 22 | 25 | 6 | 32 | 24.5 | 40 | 30 | 39 | 30 | 56 | 37.5 | 62 | 44 |
| 9 | 75 | 48 | 59 | 54 | 69 | 36.5 | 46 | 38 | 55 | 35 | 33 | 20 | 15 | 4.5 | 34.5 | 25 | 40 | 30 | 40 | 30 | 44 | 37.5 | 70 | 43 |
| 10 | 68 | 53 | 63 | 53 | 63 | 44 | 48 | 40 | 57 | 26.5 | 34 | 24 | 31.5 | 10 | 34 | 25 | 32 | 25 | 38 | 28 | 47 | 35.5 | 66 | 40.5 |
| 11 | 82.5 | 60 | 57 | 52 | 61 | 52.5 | 51 | 42 | 32 | 23 | 31 | 17 | 35 | 28.5 | 38 | 25 | 30 | 22 | 35 | 29 | 43 | 38 | 59 | 43 |
| 12 | 83 | 67 | 62 | 53 | 73 | 48 | 44 | 40 | 32.5 | 29 | 32 | 10 | 42 | 33 | 32 | 21 | 26 | 15 | 38 | 30 | 42 | 36 | 60 | 42 |
| 13 | 70 | 64 | 63 | 52.5 | 78 | 60 | 45 | 40.5 | 32 | 28 | 35.5 | 28 | 37.5 | 32 | 22 | 10 | 27 | 10 | 45 | 31.5 | 45.5 | 35 | 50 | 42.5 |
| 14 | 72.5 | 65 | 73 | 57 | 64 | 49 | 46 | 43 | 31.5 | 23 | 38 | 28 | 32 | 26 | 28 | 12 | 30 | 15 | 41.5 | 33 | 48 | 36 | 54 | 35 |
| 15 | 74 | 57.5 | 60 | 52 | 55 | 43 | 45 | 37.5 | 41 | 24 | 36 | 21 | 42 | 24 | 20 | 5.5 | 38 | 25 | 39 | 30 | 47 | 34.5 | 70 | 37 |
| 16 | 68 | 56 | 57 | 52 | 53 | 41.5 | 42 | 37 | 45 | 35 | 38 | 17 | 42 | 31.5 | 29.5 | 9 | 35 | 27 | 35 | 28.5 | 57 | 30 | 75 | 44 |
| 17 | 74 | 55 | 59 | 53.5 | 62 | 46 | 44 | 37 | 57 | 40.5 | 35 | 16.5 | 33 | 9 | 30 | 15 | 35 | 24 | 36 | 27 | 43 | 31.5 | 62 | 39 |
| 18 | 84 | 59 | 59 | 53 | 74 | 53.5 | 45 | 40 | 55 | 47 | 39 | 27 | 18 | 6.5 | 30 | 5 | 32 | 26 | 46 | 27 | 50 | 35 | 70 | 39 |
| 19 | 78 | 61.5 | 72 | 56.5 | 72 | 61 | 49 | 40 | 55 | 39 | 30 | 18 | 23 | 12 | 35 | 5 | 36 | 25 | 35 | 24 | 49 | 36 | 75 | 47.5 |
| 20 | 87 | 57 | 75 | 57.5 | 67 | 47.5 | 49 | 37 | 40 | 34 | 35 | 24 | 31 | 20 | 18 | — 0.5 | 42 | 32.5 | 42.5 | 27 | 48 | 36 | 65 | 55.5 |
| 21 | 83 | 68 | 67 | 56 | 67 | 44 | 41 | 31.5 | 35 | 30 | 34 | 29 | 31 | 14 | 23 | 3 | 34 | 30 | 40 | 26 | 57 | 35.5 | 79 | 51 |
| 22 | 80 | 65 | 76 | 55 | 60 | 50 | 42 | 29 | 39 | 25 | 37.5 | 29 | 48 | 15 | 23 | 16 | 32 | 15 | 52 | 35 | 55 | 37 | 54 | 42 |
| 23 | 73 | 63 | 72 | 55 | 55 | 48 | 47 | 37 | 35 | 29 | 35 | 26.5 | 49.5 | 33 | 36 | 19 | 30 | 15 | 43 | 27 | 53 | 36.5 | 54.5 | 42.5 |
| 24 | 75 | 58 | 85 | 60 | 61 | 41 | 45 | 34 | 36 | 31 | 34 | 26 | 45 | 27 | 36 | 8 | 41 | 21.5 | 45 | 25 | 52 | 39 | 63 | 37 |
| 25 | 57 | 52 | 60 | 52.5 | 62 | 37 | 41.5 | 30 | 37 | 29 | 36 | 29.5 | 30 | 22.5 | 38 | 30 | 52 | 38 | 54 | 30 | 47 | 39 | 52 | 37 |
| 26 | 52.5 | 49 | 58 | 47 | 53 | 35.5 | 34.5 | 30 | 50 | 28 | 42 | 33 | 29 | 14 | 37 | 29 | 40 | 29 | 45 | 29 | 46 | 41.5 | 67 | 46 |
| 27 | 62 | 46 | 70 | 45 | 61.5 | 51.5 | 34 | 29 | 55 | 29 | 35 | 31.5 | 38 | 13.5 | 36 | 25 | 35 | 25 | 54 | 33.5 | 57 | 40 | 65 | 48 |
| 28 | 73 | 43 | 71 | 52 | 50 | 41 | 38 | 28 | 51 | 34 | 32 | 25.5 | 35 | 26.5 | 40 | 26 | 34 | 22.5 | 64.5 | 29 | 57.5 | 40 | 61 | 47.5 |
| 29 | 75 | 50 | 70 | 52.5 | 54 | 34 | 36 | 32.5 | 50 | 40 | 36 | 21 | 45 | 31.5 | ..... | ..... | 44 | 29.5 | 57 | 33 | 57 | 41 | 62 | 49 |
| 30 | 71 | 50 | 62 | 55 | 47 | 35 | 47 | 29 | 57 | 38.5 | 32 | 26 | 33 | 20 | ..... | ..... | 52.5 | 33 | 42 | 25.5 | 47 | 39 | 75 | 52 |
| 31 | 77 | 59 | 72 | 59 | ..... | ..... | 46 | 34 | ..... | ..... | 35 | 25 | 24 | 15 | ..... | ..... | 39 | 30.5 | ..... | ..... | 53 | 40 | ..... | ..... |
| Range | 44° | | 40° | | 44° | | 35° | | 35° | | 42° | | 45°.0 | | 40°.5 | | 54°.5 | | 40°.5 | | 48° | | 41° | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, SAINT LOUIS, MO.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 85 | 69 | 85 | 70 | 75 | 67 | 85 | 68 | 49 | 41 | 32 | 23 | 44 | 30 | 36 | 31 | 03 | 41 | 61 | 43 | 82 | 61 | 86 | 66 |
| 2 | 90 | 71 | 90 | 74 | 73 | 58 | 84 | 65 | 48 | 41 | 41 | 21 | 38 | 31 | 36 | 31 | 55 | 43 | 60 | 46 | 78 | 57 | 90 | 71 |
| 3 | 91 | 73 | 84 | 67 | 73 | 56 | 84 | 57 | 60 | 37 | 49 | 30 | 38 | 27 | 33 | 30 | 44 | 36 | 54 | 48 | 63 | 53 | 83 | 74 |
| 4 | 94 | 77 | 84 | 66 | 74 | 57 | 59 | 44 | 63 | 46 | 59 | 39 | 34 | 16 | 42 | 26 | 48 | 34 | 61 | 45 | 63 | 47 | 78 | 66 |
| 5 | 95 | 78 | 86 | 64 | 71 | 63 | 63 | 44 | 57 | 31 | 38 | 31 | 33 | 15 | 50 | 32 | 68 | 39 | 63 | 48 | 70 | 48 | 77 | 62 |
| 6 | 91 | 78 | 78 | 65 | 74 | 61 | 68 | 51 | 41 | 26 | 35 | 28 | 21 | 12 | 53 | 38 | 70 | 53 | 61 | 48 | 82 | 55 | 78 | 63 |
| 7 | 91 | 75 | 86 | 68 | 76 | 61 | 61 | 53 | 47 | 32 | 50 | 35 | 24 | 8 | 49 | 39 | 70 | 52 | 65 | 47 | 80 | 63 | 78 | 63 |
| 8 | 97 | 77 | 87 | 67 | 77 | 62 | 67 | 51 | 50 | 37 | 41 | 31 | 38 | 21 | 45 | 34 | 71 | 61 | 63 | 54 | 71 | 61 | 67 | 60 |
| 9 | 86 | 71 | 82 | 64 | 70 | 63 | 72 | 52 | 38 | 34 | 46 | 29 | 48 | 31 | 36 | 30 | 66 | 59 | 75 | 52 | 65 | 51 | 63 | 56 |
| 10 | 86 | 71 | 85 | 67 | 67 | 64 | 62 | 45 | 42 | 27 | 58 | 43 | 41 | 35 | 31 | 24 | 65 | 55 | 65 | 46 | 62 | 46 | 71 | 53 |
| 11 | 78 | 63 | 85 | 70 | 76 | 60 | 60 | 45 | 51 | 31 | 67 | 50 | 42 | 34 | 37 | 21 | 67 | 49 | 68 | 47 | 60 | 45 | 76 | 56 |
| 12 | 82 | 63 | 81 | 71 | 82 | 64 | 73 | 49 | 60 | 35 | 69 | 51 | 49 | 34 | 60 | 33 | 68 | 49 | 80 | 58 | 54 | 41 | 77 | 60 |
| 13 | 84 | 68 | 82 | 67 | 85 | 68 | 79 | 61 | 65 | 38 | 57 | 44 | 40 | 34 | 47 | 40 | 58 | 45 | 66 | 53 | 50 | 43 | 74 | 62 |
| 14 | 87 | 69 | 75 | 62 | 88 | 71 | 77 | 57 | 61 | 48 | 54 | 36 | 36 | 32 | 50 | 39 | 55 | 42 | 78 | 54 | 60 | 44 | 78 | 65 |
| 15 | 96 | 70 | 81 | 63 | 83 | 70 | 79 | 63 | 58 | 52 | 67 | 46 | 41 | 31 | 51 | 38 | 65 | 45 | 76 | 59 | 65 | 47 | 85 | 69 |
| 16 | 84 | 71 | 83 | 65 | 84 | 66 | 80 | 61 | 62 | 43 | 62 | 56 | 50 | 30 | 59 | 43 | 57 | 49 | 79 | 58 | 71 | 51 | 81 | 69 |
| 17 | 86 | 66 | 85 | 67 | 71 | 56 | 72 | 63 | 56 | 45 | 68 | 60 | 57 | 36 | 50 | 38 | 49 | 40 | 81 | 61 | 65 | 53 | 76 | 67 |
| 18 | 84 | 70 | 84 | 67 | 67 | 53 | 64 | 56 | 49 | 35 | 69 | 59 | 57 | 39 | 47 | 35 | 54 | 41 | 82 | 62 | 78 | 57 | 79 | 62 |
| 19 | 70 | 61 | 87 | 66 | 72 | 51 | 70 | 58 | 55 | 35 | 68 | 55 | 44 | 38 | 62 | 38 | 69 | 43 | 75 | 62 | 80 | 61 | 82 | 65 |
| 20 | 70 | 62 | 88 | 69 | 81 | 55 | 61 | 52 | 53 | 44 | 66 | 53 | 45 | 39 | 61 | 52 | 67 | 49 | 76 | 61 | 76 | 60 | 83 | 69 |
| 21 | 78 | 60 | 85 | 68 | 78 | 57 | 52 | 45 | 56 | 43 | 66 | 52 | 42 | 38 | 59 | 43 | 75 | 52 | 81 | 61 | 73 | 58 | 78 | 62 |
| 22 | 81 | 62 | 69 | 65 | 79 | 58 | 60 | 41 | 45 | 39 | 63 | 56 | 45 | 30 | 43 | 39 | 67 | 47 | 72 | 64 | 69 | 56 | 77 | 59 |
| 23 | 86 | 67 | 74 | 61 | 83 | 61 | 68 | 47 | 46 | 39 | 58 | 51 | 38 | 25 | 41 | 34 | 76 | 54 | 70 | 57 | 86 | 65 | 81 | 60 |
| 24 | 85 | 72 | 78 | 60 | 79 | 65 | 71 | 49 | 49 | 40 | 61 | 57 | 56 | 34 | 40 | 34 | 68 | 44 | 64 | 52 | 79 | 68 | 84 | 67 |
| 25 | 86 | 74 | 82 | 63 | 83 | 65 | 65 | 56 | 46 | 40 | 57 | 50 | 47 | 37 | 44 | 32 | 55 | 37 | 61 | 51 | 70 | 67 | 86 | 68 |
| 26 | 85 | 73 | 88 | 67 | 79 | 65 | 65 | 57 | 43 | 38 | 48 | 45 | 42 | 32 | 44 | 31 | 76 | 46 | 55 | 47 | 75 | 61 | 88 | 72 |
| 27 | 82 | 70 | 92 | 72 | 78 | 62 | 74 | 51 | 42 | 35 | 46 | 41 | 43 | 40 | 49 | 33 | 74 | 59 | 58 | 49 | 71 | 59 | 90 | 73 |
| 28 | 86 | 75 | 93 | 73 | 83 | 63 | 75 | 55 | 32 | 21 | 49 | 44 | 40 | 32 | 59 | 37 | 59 | 40 | 65 | 50 | 81 | 64 | 88 | 71 |
| 29 | 86 | 73 | 91 | 75 | 85 | 67 | 66 | 48 | 24 | 15 | 44 | 39 | 39 | 31 | ..... | ..... | 52 | 35 | 70 | 53 | 85 | 67 | 86 | 73 |
| 30 | 86 | 69 | 94 | 73 | 87 | 66 | 57 | 42 | 28 | 14 | 40 | 36 | 34 | 31 | ..... | ..... | 58 | 45 | 77 | 56 | 69 | 60 | 86 | 73 |
| 31 | 90 | 75 | 92 | 74 | ..... | ..... | 53 | 44 | ..... | ..... | 42 | 33 | 34 | 29 | ..... | ..... | 53 | 42 | ..... | ..... | 73 | 62 | ..... | ..... |
| Range | 37° | | 34° | | 37° | | 44° | | 51° | | 48° | | 49° | | 41° | | 42° | | 39° | | 45° | | 37° | |
| Monthly means | 78°.4 | | 76°.0 | | 69°.8 | | 59°.6 | | 42°.3 | | 48°.0 | | 35°.8 | | 41°.1 | | 54°.2 | | 61°.6 | | 63°.5 | | 73°.2 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, SAINT MARK'S, FLA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 92 | 73 | 91 | 75 | 91 | 73 | 73 | 69 | 77 | 60 | 49 | 24 | 52 | 36 | 57 | 37 | 72 | 43 | 73 | 63 | 84 | 55 | 91 | 69 |
| 2 | 93 | 71 | 94 | 72 | 91 | 70 | 77 | 71 | 81 | 59 | 51 | 25 | 57 | 32 | 62 | 52 | 67 | 58 | 72 | 64 | 82 | 56 | 89 | 70 |
| 3 | 93 | 72 | 93 | 73 | 85 | 69 | 77 | 70 | 65 | 50 | 65 | 33 | 56 | 34 | 61 | 46 | 67 | 54 | 71 | 60 | 80 | 61 | 89 | 68 |
| 4 | 94 | 72 | 92 | 73 | 87 | 65 | 83 | 69 | 74 | 50 | 63 | 55 | 60 | 42 | 50 | 32 | 61 | 45 | 61 | 51 | 73 | 61 | 89 | 69 |
| 5 | 96 | 68 | 91 | 74 | 88 | 71 | 73 | 55 | 78 | 60 | 65 | 53 | 44 | 33 | 50 | 33 | 61 | 34 | 71 | 47 | 77 | 53 | 94 | 71 |
| 6 | 97 | 72 | 87 | 73 | 90 | 70 | 74 | 55 | 70 | 59 | 53 | 41 | 45 | 29 | 62 | 35 | 68 | 37 | 79 | 55 | 80 | 54 | 94 | 70 |
| 7 | 92 | 71 | 88 | 72 | 91 | 72 | 81 | 57 | 67 | 57 | 52 | 31 | 46 | 33 | 63 | 52 | 71 | 46 | 76 | 59 | 80 | 55 | 91 | 67 |
| 8 | 89 | 71 | 85 | 75 | 92 | 73 | 78 | 66 | 78 | 57 | 58 | 34 | 47 | 39 | 69 | 54 | 73 | 48 | 76 | 61 | 80 | 57 | 89 | 73 |
| 9 | 91 | 72 | 90 | 75 | 91 | 69 | 79 | 61 | 59 | 47 | 58 | 30 | 46 | 43 | 69 | 52 | 78 | 60 | 70 | 65 | 85 | 68 | 83 | 73 |
| 10 | 90 | 72 | 92 | 73 | 89 | 71 | 81 | 62 | 52 | 43 | 67 | 37 | 55 | 41 | 60 | 45 | 68 | 59 | 79 | 63 | 85 | 63 | 84 | 69 |
| 11 | 88 | 75 | 94 | 67 | 86 | 70 | 80 | 55 | 57 | 37 | 67 | 40 | 58 | 38 | 50 | 36 | 68 | 58 | 82 | 64 | 82 | 61 | 87 | 67 |
| 12 | 95 | 74 | 92 | 69 | 91 | 72 | 79 | 54 | 61 | 36 | 68 | 37 | 60 | 35 | 49 | 29 | 70 | 62 | 80 | 53 | 81 | 56 | 89 | 67 |
| 13 | 93 | 73 | 89 | 69 | 91 | 70 | 78 | 60 | 71 | 40 | 69 | 36 | 67 | 51 | 56 | 37 | 72 | 58 | 79 | 51 | 82 | 63 | 84 | 74 |
| 14 | 91 | 74 | 88 | 69 | 90 | 70 | 81 | 60 | 75 | 54 | 64 | 42 | 54 | 41 | 70 | 50 | 80 | 48 | 77 | 58 | 86 | 65 | 81 | 72 |
| 15 | 88 | 73 | 89 | 68 | 90 | 69 | 84 | 67 | 77 | 55 | 70 | 50 | 50 | 32 | 62 | 45 | 79 | 55 | 76 | 65 | 81 | 60 | 83 | 70 |
| 16 | 91 | 69 | 89 | 68 | 91 | 71 | 83 | 66 | 78 | 55 | 72 | 46 | 54 | 30 | 65 | 42 | 72 | 56 | 84 | 66 | 77 | 56 | 87 | 71 |
| 17 | 88 | 68 | 87 | 72 | 89 | 74 | 84 | 63 | 77 | 52 | 73 | 45 | 57 | 30 | 63 | 39 | 75 | 53 | 78 | 65 | 88 | 69 | 82 | 72 |
| 18 | 91 | 68 | 84 | 70 | 90 | 72 | 82 | 64 | 73 | 45 | 74 | 47 | 62 | 31 | 69 | 46 | 68 | 49 | 80 | 60 | 90 | 68 | 89 | 76 |
| 19 | 87 | 77 | 87 | 70 | 84 | 73 | 81 | 64 | 72 | 48 | 69 | 55 | 66 | 40 | 63 | 43 | 72 | 43 | 78 | 65 | 82 | 64 | 87 | 76 |
| 20 | 85 | 74 | 86 | 67 | 83 | 71 | 79 | 67 | 72 | 63 | 65 | 52 | 68 | 54 | 65 | 47 | 72 | 46 | 81 | 63 | 86 | 62 | 89 | 74 |
| 21 | 92 | 72 | 85 | 71 | 80 | 67 | 73 | 57 | 69 | 60 | 73 | 59 | 62 | 45 | 70 | 60 | 71 | 56 | 82 | 65 | 86 | 68 | 87 | 74 |
| 22 | 87 | 73 | 78 | 69 | 78 | 69 | 68 | 51 | 60 | 55 | 72 | 65 | 62 | 39 | 68 | 51 | 73 | 60 | 81 | 64 | 89 | 67 | 88 | 70 |
| 23 | 86 | 73 | 84 | 70 | 81 | 70 | 67 | 46 | 65 | 51 | 66 | 63 | 61 | 39 | 71 | 55 | 79 | 55 | 80 | 71 | 91 | 70 | 91 | 63 |
| 24 | 90 | 75 | 86 | 69 | 83 | 68 | 73 | 47 | 62 | 43 | 70 | 61 | 61 | 35 | 69 | 50 | 82 | 60 | 82 | 66 | 94 | 72 | 87 | 65 |
| 25 | 90 | 75 | 87 | 72 | 82 | 68 | 75 | 58 | 70 | 40 | 69 | 56 | 65 | 35 | 62 | 40 | 74 | 52 | 80 | 59 | 93 | 74 | 85 | 64 |
| 26 | 90 | 76 | 88 | 71 | 84 | 71 | 77 | 62 | 65 | 43 | 66 | 55 | 66 | 37 | 57 | 38 | 74 | 43 | 80 | 58 | 88 | 73 | 90 | 67 |
| 27 | 93 | 73 | 92 | 72 | 85 | 70 | 75 | 60 | 73 | 45 | 64 | 48 | 68 | 40 | 59 | 45 | 74 | 49 | 83 | 54 | 86 | 70 | 88 | 74 |
| 28 | 95 | 75 | 90 | 70 | 84 | 70 | 78 | 58 | 69 | 48 | 59 | 48 | 61 | 45 | 70 | 42 | 81 | 64 | 82 | 60 | 92 | 66 | 89 | 73 |
| 29 | 99 | 76 | 93 | 70 | 84 | 69 | 79 | 60 | 49 | 35 | 63 | 51 | 60 | 35 | ..... | ..... | 77 | 57 | 76 | 57 | 89 | 67 | 87 | 72 |
| 30 | 98 | 73 | 90 | 72 | 77 | 66 | 78 | 65 | 42 | 27 | 58 | 46 | 63 | 49 | ..... | ..... | 77 | 55 | 82 | 52 | 89 | 68 | 83 | 72 |
| 31 | 98 | 75 | 90 | 73 | ..... | ..... | 80 | 66 | ..... | ..... | 49 | 39 | 55 | 43 | ..... | ..... | 80 | 68 | ..... | ..... | 90 | 69 | ..... | ..... |
| Range | 31° | | 27° | | 27° | | 38° | | 54° | | 50° | | 39° | | 42° | | 48° | | 37° | | 41° | | 31° | |
| Monthly means | 81°.4 | | 78°.6 | | 77°.3 | | 68°.7 | | 57°.8 | | 53°.7 | | 47°.0 | | 52°.6 | | 61°.9 | | 68°.2 | | 73°.8 | | 78°.9 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, SAINT MICHAEL'S, ALASKA.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | ..... | 43 | 58 | 47 | 60 | 47 | 43 | 29 | 41 | 31 | 20 | 18 | 20 | 6 | —30 | —46 | 0 | —12 | 25 | 8 | 35 | 17 | 57 | 35 |
| 2 | ..... | 44 | 55 | 47 | 60 | 47 | 43 | 30 | 39 | 33 | 26 | 7 | 29 | 15 | —11 | —45 | 1 | —20 | 22 | 13 | 33 | 21 | 60 | 37 |
| 3 | ..... | 48 | 56 | 46 | 61 | 49 | 45 | 28 | 37 | 26 | 9 | —13 | 30 | 16 | — 6 | —25 | 1 | —15 | 37 | 11 | 33 | 14 | 52 | 84 |
| 4 | ..... | 46 | 57 | 46 | 61 | 51 | 44 | 29 | 28 | 24 | 13 | — 2 | 21 | 16 | — 4 | —15 | 7 | — 9 | 39 | 14 | 33 | 26 | 53 | 36 |
| 5 | ..... | 47 | 59 | 44 | 57 | 48 | 43 | 31 | 26 | 21 | 16 | 7 | 18 | 8 | —10 | —47 | 10 | — 7 | 39 | 9 | 29 | 9 | 53 | 39 |
| 6 | ..... | 44 | 57 | 51 | 51 | 44 | 45 | 29 | 17 | 15 | 22 | 6 | 10 | — 8 | —29 | —52 | 19 | 4 | 32 | 21 | 28 | 5 | 52 | 37 |
| 7 | ..... | 46 | 60 | 51 | 49 | 41 | 42 | 33 | 15 | 9 | 29 | 16 | 8 | — 3 | —24 | —46 | 14 | 0 | 28 | 6 | 29 | 7 | 50 | 36 |
| 8 | ..... | 43 | 65 | 50 | 52 | 46 | 35 | 33 | 15 | 7 | 20 | 8 | 5 | — 5 | 7 | —35 | 9 | — 7 | 21 | 9 | 42 | 10 | 52 | 35 |
| 9 | ..... | 48 | 64 | 51 | 50 | 37 | 37 | 27 | 22 | 12 | 9 | — 7 | 0 | —25 | 17 | 7 | 9 | — 2 | 23 | 5 | 47 | 15 | 50 | 37 |
| 10 | ..... | 48 | 64 | 52 | 44 | 34 | 36 | 23 | 22 | 16 | 2 | —15 | —15 | —28 | 25 | 7 | 3 | —14 | 13 | —15 | 42 | 23 | 47 | 36 |
| 11 | ..... | 51 | 66 | 51 | 46 | 38 | 34 | 26 | 24 | 16 | 3 | —14 | — 5 | —23 | 28 | 12 | —10 | —35 | 15 | —17 | 47 | 21 | 50 | 34 |
| 12 | ..... | 42 | 67 | 56 | 44 | 35 | 29 | 23 | 27 | 7 | 1 | —12 | 5 | —12 | 19 | 1 | — 5 | —39 | 34 | 5 | 46 | 26 | 60 | 35 |
| 13 | ..... | 45 | 64 | 55 | 40 | 31 | 25 | 20 | 17 | 7 | 0 | —12 | 2 | —10 | 12 | 0 | —10 | —34 | 29 | 17 | 44 | 21 | 64 | 40 |
| 14 | (*) | 46 | 63 | 51 | 43 | 30 | 33 | 20 | 21 | 6 | — 2 | —21 | — 1 | —13 | 5 | — 7 | — 8 | —34 | 26 | 3 | 41 | 25 | 61 | 48 |
| 15 | 61 | 49 | 60 | 50 | 44 | 34 | 32 | 25 | 17 | 6 | — 9 | —24 | — 5 | —15 | 7 | — 6 | — 6 | —34 | 26 | — 9 | 41 | 25 | 56 | 40 |
| 16 | 61 | 47 | 59 | 47 | 48 | 36 | 32 | 22 | 19 | 3 | — 5 | —15 | 15 | —15 | 0 | —20 | 8 | —24 | 31 | 17 | 45 | 27 | 55 | 42 |
| 17 | 59 | 46 | 54 | 47 | 44 | 36 | 35 | 28 | 20 | 8 | — 4 | —16 | 24 | 5 | — 5 | —25 | 12 | — 3 | 39 | 22 | 50 | 33 | 54 | 42 |
| 18 | 62 | 41 | 62 | 47 | 41 | 32 | 38 | 26 | 19 | 7 | —13 | —28 | 22 | 10 | — 5 | —32 | 8 | —13 | 42 | 31 | 53 | 34 | 62 | 43 |
| 19 | 75 | 52 | 55 | 48 | 40 | 30 | 30 | 22 | 17 | 6 | — 9 | —29 | 22 | 5 | 3 | —20 | 5 | —17 | 36 | 16 | 50 | 33 | 58 | 42 |
| 20 | 69 | 52 | 57 | 46 | 41 | 32 | 26 | 17 | 14 | — 1 | 1 | —27 | 24 | 12 | 4 | —16 | 5 | —15 | 24 | 11 | 45 | 33 | 61 | 43 |
| 21 | 62 | 52 | 55 | 44 | 40 | 28 | 21 | 16 | 7 | — 3 | 6 | —11 | 25 | 10 | 5 | —20 | 3 | —13 | 22 | 7 | 46 | 32 | 55 | 37 |
| 22 | 73 | 54 | 58 | 44 | 41 | 34 | 20 | 10 | 5 | —14 | 11 | —15 | 24 | 5 | 12 | — 5 | 11 | —12 | 23 | 12 | 42 | 26 | 55 | 37 |
| 23 | 64 | 55 | 64 | 48 | 40 | 35 | 24 | 9 | — 4 | —18 | 1 | —16 | 21 | 7 | 9 | — 3 | 39 | — 3 | 27 | 12 | 42 | 28 | 52 | 38 |
| 24 | 62 | 51 | 62 | 48 | 40 | 32 | 21 | 13 | 8 | — 8 | —21 | —30 | 15 | 3 | 5 | — 6 | 41 | 22 | 33 | 4 | 44 | 32 | 47 | 40 |
| 25 | 64 | 48 | 57 | 48 | 40 | 31 | 21 | 12 | 12 | 2 | 2 | —30 | 10 | —10 | — 1 | — 9 | 36 | 25 | 38 | 27 | 43 | 25 | 47 | 32 |
| 26 | 64 | 49 | 56 | 46 | 40 | 32 | 19 | 4 | 17 | 4 | 4 | — 5 | 14 | 6 | — 2 | —22 | 34 | 20 | 38 | 22 | 43 | 25 | 54 | 36 |
| 27 | 64 | 49 | 55 | 46 | 40 | 24 | 25 | 9 | 17 | 6 | 2 | —12 | 12 | —24 | 10 | —15 | 36 | 20 | 33 | 22 | 47 | 25 | 51 | 40 |
| 28 | 62 | 46 | 55 | 44 | 44 | 21 | 26 | 20 | 33 | 12 | 18 | — 2 | —12 | —28 | 10 | — 5 | 34 | 15 | 30 | 14 | 55 | 35 | 54 | 42 |
| 29 | 59 | 51 | 54 | 45 | 40 | 30 | 36 | 23 | 32 | 20 | 32 | 14 | —12 | —34 | ..... | ..... | 25 | 8 | 32 | 20 | 53 | 37 | 55 | 45 |
| 30 | 57 | 47 | 51 | 46 | 38 | 31 | 36 | 29 | 23 | 13 | 27 | 16 | —20 | —45 | ..... | ..... | 19 | 5 | 35 | 22 | 53 | 34 | 55 | 44 |
| 31 | 62 | 51 | 51 | 42 | ..... | ..... | 38 | 30 | ..... | ..... | 24 | 9 | —29 | —47 | ..... | ..... | 15 | 4 | ..... | ..... | 47 | 33 | ..... | ..... |
| Range | ..... | ..... | 25° | | 40° | | 41° | | 59° | | 62° | | 77° | | 80° | | 80° | | 59° | | 50° | | 32° | |
| Monthly means | ..... | ..... | 53°.4 | | 40°.8 | | 28°.6 | | 15°.7 | | 1°.9 | | 1°.4 | | — 6°.2 | | 3°.6 | | 21°.6 | | 34°.1 | | 46°.3 | |

* Observations of maximum thermometer commenced July 15, 1877.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, STOCKTON, TEX.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | *100 | 72 | 92 | 69 | 93 | 66 | 93 | 67 | 63 | 44 | 56 | 17 | 45 | 21 | 60 | 28 | 63 | 43 | 56 | 39 | 95 | 60 | 100 | 72 |
| 2 | 98 | 71 | 94 | 66 | 44 | 69 | 95 | 67 | 64 | 40 | 62 | 29 | 40 | 25 | 45 | 30 | 65 | 36 | 58 | 45 | 89 | 70 | 104 | 66 |
| 3 | 94 | 70 | 95 | 67 | 88 | 69 | 90 | 61 | 73 | 36 | 63 | 33 | 50 | 24 | 56 | 20 | 64 | 29 | 69 | 40 | 72 | 53 | 103 | 62 |
| 4 | 91 | 69 | 96 | 71 | 78 | 64 | 68 | 46 | 82 | 46 | 59 | 31 | 43 | 18 | 65 | 26 | 76 | 31 | 75 | 39 | 85 | 43 | 82 | 70 |
| 5 | 88 | 70 | 91 | 71 | 71 | 60 | 82 | 53 | 59 | 37 | 44 | 19 | 45 | 21 | 71 | 30 | 80 | 44 | 84 | 49 | 94 | 58 | 86 | 62 |
| 6 | 90 | 69 | 100 | 71 | 78 | 64 | 88 | 56 | 64 | 34 | 55 | 13 | 39 | 22 | 64 | 40 | 76 | 45 | 88 | 46 | 92 | 65 | 86 | 60 |
| 7 | 95 | 70 | 101 | 75 | 79 | 65 | 79 | 56 | 70 | 40 | 64 | 18 | 47 | 34 | 69 | 29 | 83 | 45 | 75 | 40 | 93 | 54 | 83 | 65 |
| 8 | 98 | 68 | 91 | 71 | 88 | 64 | 89 | 54 | 55 | 27 | 44 | 24 | 60 | 25 | 60 | 42 | 59 | 40 | 78 | 50 | 73 | 59 | 88 | 60 |
| 9 | 95 | 70 | 92 | 67 | 88 | 67 | 88 | 56 | 57 | 21 | 45 | 36 | 65 | 30 | 54 | 24 | 60 | 35 | 81 | 59 | 77 | 56 | 96 | 61 |
| 10 | 92 | 66 | 92 | 63 | 92 | 62 | 83 | 55 | 65 | 35 | 50 | 39 | 57 | 35 | 50 | 20 | 70 | 35 | 75 | 52 | 68 | 58 | 101 | 65 |
| 11 | 89 | 66 | 93 | 61 | 93 | 65 | 90 | 58 | 71 | 36 | 62 | 39 | 71 | 33 | 62 | 19 | 69 | 35 | 82 | 53 | 72 | 55 | 95 | 69 |
| 12 | 89 | 64 | 95 | 63 | 92 | 64 | 85 | 67 | 77 | 36 | 65 | 46 | 55 | 35 | 68 | 31 | 74 | 34 | 92 | 57 | 85 | 53 | 95 | 66 |
| 13 | 91 | 68 | 95 | 61 | 92 | 67 | 88 | 61 | 71 | 41 | 56 | 36 | 44 | 23 | 67 | 45 | 78 | 38 | 84 | 52 | 82 | 59 | 101 | 66 |
| 14 | 95 | 68 | 93 | 69 | 83 | 66 | 87 | 51 | 60 | 36 | 60 | 49 | 58 | 20 | 66 | 40 | 75 | 41 | 83 | 46 | 82 | 55 | 102 | 73 |
| 15 | 96 | 69 | 94 | 68 | 86 | 63 | 86 | 52 | 70 | 38 | 71 | 51 | 63 | 29 | 72 | 26 | 78 | 44 | 85 | 43 | 92 | 58 | 100 | 66 |
| 16 | 91 | 71 | 91 | 70 | 89 | 63 | 59 | 47 | 73 | 32 | 75 | 52 | 58 | 27 | 75 | 38 | 78 | 47 | 90 | 63 | 96 | 60 | 88 | 62 |
| 17 | 90 | 72 | 92 | 68 | 71 | 61 | 66 | 49 | 80 | 36 | 67 | 51 | 70 | 25 | 74 | 43 | 78 | 46 | 74 | 50 | 93 | 56 | 96 | 64 |
| 18 | 95 | 72 | 91 | 63 | 77 | 55 | 63 | 46 | 71 | 45 | 67 | 55 | 62 | 38 | 80 | 41 | 60 | 51 | 81 | 40 | 87 | 57 | 97 | 71 |
| 19 | (†) | ..... | 95 | 67 | 83 | 60 | 53 | 39 | 46 | 40 | 61 | 48 | 57 | 35 | 75 | 45 | 52 | 48 | 85 | 46 | 92 | 54 | 99 | 68 |
| 20 | ..... | ..... | 102 | 69 | 83 | 53 | 60 | 36 | 67 | 42 | 55 | 46 | 51 | 25 | 65 | 46 | 62 | 41 | 93 | 60 | 93 | 65 | 96 | 69 |
| 21 | ..... | ..... | 93 | 64 | 85 | 51 | 60 | 29 | 55 | 39 | 58 | 41 | 59 | 26 | 68 | 35 | 70 | 40 | 90 | 55 | 94 | 75 | 91 | 68 |
| 22 | ..... | ..... | 100 | 70 | 88 | 51 | 72 | 33 | 64 | 37 | 57 | 35 | 56 | 35 | 57 | 39 | 73 | 40 | 80 | 53 | 99 | 70 | 95 | 66 |
| 23 | ..... | ..... | 103 | 69 | 87 | 54 | 81 | 43 | 76 | 33 | 59 | 38 | 70 | 23 | 58 | 37 | 68 | 49 | 73 | 50 | 89 | 71 | 95 | 68 |
| 24 | 90 | 50 | 99 | 70 | 90 | 58 | 72 | 51 | 71 | 41 | 65 | 37 | 64 | 40 | 65 | 32 | 72 | 41 | 83 | 45 | 88 | 65 | 98 | 70 |
| 25 | 97 | 69 | 104 | 70 | 89 | 61 | 68 | 49 | 67 | 25 | 67 | 40 | 75 | 37 | 52 | 43 | 78 | 40 | 83 | 48 | 91 | 66 | 91 | 68 |
| 26 | 102 | 69 | 105 | 71 | 85 | 54 | 79 | 44 | 65 | 41 | 62 | 45 | 65 | 35 | 51 | 40 | 81 | 51 | 87 | 49 | 85 | 60 | 88 | 66 |
| 27 | 100 | 69 | 96 | 70 | 92 | 63 | 86 | 49 | 50 | 26 | 52 | 34 | 64 | 31 | 59 | 35 | 75 | 50 | 92 | 57 | 93 | 55 | 89 | 65 |
| 28 | 94 | 69 | 92 | 68 | 89 | 60 | 81 | 48 | 37 | 21 | 40 | 32 | 72 | 32 | 70 | 35 | 76 | 44 | 75 | 55 | 96 | 67 | 98 | 65 |
| 29 | 87 | 67 | 88 | 65 | 86 | 60 | 72 | 48 | 42 | 19 | 38 | 25 | 61 | 47 | ..... | ..... | 66 | 45 | 82 | 45 | 98 | 60 | 98 | 70 |
| 30 | 87 | 68 | 91 | 64 | 91 | 60 | 52 | 46 | 43 | 14 | 36 | 22 | 57 | 34 | ..... | ..... | 75 | 40 | 95 | 54 | 99 | 60 | 96 | 70 |
| 31 | 90 | 69 | 92 | 70 | ..... | ..... | 58 | 48 | ..... | ..... | 38 | 16 | 71 | 33 | ..... | ..... | 73 | 51 | ..... | ..... | 95 | 70 | ..... | ..... |
| Range | | | 44° | | 43° | | 66° | | 68° | | 62° | | 57° | | 61° | | 54° | | 56° | | 56° | | 44° | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

* Highest observed readings of exposed thermometer. † No observations. ‡ Readings of maximum thermometer commenced July 24, 1877.

*Maximum, minimum, and mean temperatures—Continued.*

STATION, SAINT PAUL, MINN.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 81 | 58 | 87 | 67 | 68 | 45 | 62 | 46 | 47 | 37 | 25 | 15 | 30 | 14 | 38 | 14 | 56 | 38 | 57 | 32 | 69 | 49 | 67 | 60 |
| 2 | 77 | 65 | 81 | 61 | 71 | 46 | 56 | 47 | 43 | 32 | 32 | 13 | 20 | 1 | 37 | 5 | 46 | 37 | 59 | 39 | 71 | 48 | 76 | 62 |
| 3 | 79 | 59 | 86 | 58 | 77 | 51 | 56 | 41 | 37 | 23 | 37 | 17 | 26 | 9 | 32 | 3 | 40 | 25 | 57 | 30 | 53 | 39 | 66 | 56 |
| 4 | 85 | 64 | 88 | 64 | 80 | 59 | 49 | 33 | 36 | 23 | 37 | 30 | 16 | − 9 | 35 | 12 | 44 | 21 | 55 | 31 | 64 | 35 | 77 | 50 |
| 5 | 83 | 61 | 85 | 69 | 77 | 53 | 49 | 34 | 30 | 15 | 36 | 20 | 12 | − 8 | 44 | 28 | 60 | 34 | 56 | 34 | 72 | 37 | 78 | 50 |
| 6 | 89 | 68 | 87 | 70 | 73 | 60 | 54 | 32 | 35 | 17 | 34 | 17 | 6 | −13 | 48 | 33 | 50 | 33 | 59 | 31 | 68 | 51 | 66 | 52 |
| 7 | 93 | 74 | 86 | 64 | 76 | 56 | 52 | 45 | 40 | 27 | 33 | 10 | 22 | −10 | 40 | 32 | 57 | 30 | 50 | 39 | 71 | 45 | 68 | 50 |
| 8 | 87 | 72 | 79 | 64 | 77 | 61 | 56 | 39 | 39 | 27 | 30 | 16 | 33 | 12 | 33 | 22 | 61 | 47 | 53 | 40 | 63 | 46 | 69 | 48 |
| 9 | 86 | 65 | 81 | 56 | 72 | 62 | 55 | 40 | 33 | 20 | 33 | 14 | 37 | 27 | 32 | 18 | 61 | 50 | 57 | 44 | 57 | 42 | 72 | 49 |
| 10 | 76 | 56 | 87 | 61 | 77 | 58 | 54 | 41 | 38 | 18 | 41 | 27 | 36 | 27 | 30 | 11 | 59 | 45 | 51 | 36 | 52 | 36 | 79 | 51 |
| 11 | 84 | 55 | 87 | 65 | 79 | 60 | 56 | 33 | 42 | 24 | 43 | 30 | 33 | 26 | 38 | 15 | 55 | 41 | 57 | 37 | 51 | 33 | 77 | 52 |
| 12 | 83 | 62 | 79 | 61 | 86 | 58 | 51 | 43 | 49 | 32 | 44 | 33 | 35 | 28 | 36 | 20 | 60 | 43 | 57 | 35 | 63 | 40 | 77 | 51 |
| 13 | 81 | 65 | 76 | 65 | 91 | 69 | 56 | 48 | 49 | 34 | 41 | 27 | 33 | 21 | 37 | 21 | 56 | 40 | 55 | 33 | 63 | 38 | 74 | 52 |
| 14 | 85 | 69 | 82 | 54 | 81 | 64 | 65 | 49 | 51 | 37 | 44 | 23 | 28 | 16 | 37 | 27 | 62 | 35 | 53 | 38 | 65 | 41 | 69 | 57 |
| 15 | 81 | 67 | 85 | 59 | 71 | 59 | 53 | 40 | 50 | 31 | 47 | 30 | 32 | 12 | 39 | 22 | 57 | 37 | 56 | 39 | 63 | 39 | 77 | 62 |
| 16 | 81 | 60 | 86 | 64 | 67 | 52 | 48 | 40 | 53 | 33 | 42 | 25 | 33 | 19 | 36 | 21 | 51 | 36 | 59 | 42 | 67 | 50 | 81 | 56 |
| 17 | 82 | 62 | 88 | 62 | 60 | 41 | 52 | 39 | 41 | 26 | 47 | 27 | 34 | 21 | 37 | 24 | 45 | 29 | 59 | 50 | 65 | 44 | 79 | 55 |
| 18 | 75 | 52 | 87 | 65 | 73 | 41 | 53 | 46 | 37 | 23 | 47 | 36 | 34 | 27 | 36 | 24 | 60 | 30 | 69 | 50 | 55 | 49 | 81 | 56 |
| 19 | 63 | 54 | 88 | 69 | 69 | 44 | 54 | 36 | 39 | 30 | 46 | 36 | 37 | 27 | 45 | 32 | 59 | 39 | 70 | 48 | 70 | 50 | 86 | 63 |
| 20 | 75 | 52 | 87 | 67 | 66 | 43 | 52 | 31 | 41 | 31 | 43 | 32 | 32 | 26 | 44 | 33 | 54 | 35 | 70 | 47 | 58 | 47 | 77 | 61 |
| 21 | 82 | 55 | 78 | 58 | 76 | 52 | 59 | 33 | 43 | 36 | 56 | 38 | 31 | 21 | 43 | 32 | 59 | 42 | 67 | 46 | 66 | 47 | 78 | 53 |
| 22 | 86 | 63 | 80 | 50 | 75 | 59 | 67 | 39 | 46 | 32 | 52 | 45 | 31 | 8 | 45 | 32 | 59 | 37 | 76 | 51 | 64 | 45 | 84 | 50 |
| 23 | 86 | 64 | 83 | 56 | 71 | 56 | 62 | 41 | 43 | 31 | 52 | 38 | 24 | 3 | 37 | 29 | 64 | 42 | 61 | 50 | 79 | 56 | 83 | 58 |
| 24 | 87 | 66 | 86 | 63 | 67 | 57 | 61 | 44 | 43 | 33 | 42 | 35 | 36 | 21 | 40 | 28 | 46 | 23 | 61 | 44 | 75 | 51 | 87 | 65 |
| 25 | 88 | 67 | 85 | 68 | 67 | 57 | 56 | 44 | 39 | 34 | 38 | 34 | 33 | 25 | 41 | 27 | 53 | 27 | 57 | 45 | 69 | 52 | 76 | 65 |
| 26 | 89 | 70 | 86 | 65 | 70 | 58 | 54 | 46 | 39 | 31 | 40 | 34 | 34 | 19 | 44 | 25 | 64 | 39 | 57 | 42 | 61 | 46 | 83 | 63 |
| 27 | 89 | 70 | 82 | 61 | 67 | 54 | 59 | 46 | 35 | 21 | 39 | 32 | 32 | 16 | 51 | 30 | 52 | 32 | 69 | 38 | 62 | 45 | 87 | 58 |
| 28 | 82 | 67 | 80 | 65 | 69 | 46 | 57 | 40 | 28 | 7 | 38 | 32 | 25 | 5 | 55 | 36 | 44 | 23 | 75 | 47 | 64 | 53 | 87 | 66 |
| 29 | 88 | 65 | 79 | 59 | 84 | 64 | 44 | 32 | 19 | 4 | 36 | 32 | 29 | 15 | ..... | ..... | 52 | 30 | 74 | 48 | 66 | 51 | 80 | 69 |
| 30 | 90 | 67 | 78 | 57 | 77 | 54 | 47 | 31 | 23 | 11 | 36 | 26 | 31 | 21 | ..... | ..... | 50 | 33 | 68 | 53 | 69 | 46 | 79 | 64 |
| 31 | 84 | 67 | 75 | 66 | ..... | ..... | 46 | 31 | ..... | ..... | 36 | 22 | 34 | 13 | ..... | ..... | 57 | 30 | ..... | ..... | 68 | 52 | ..... | ..... |
| Range | 41° | | 38° | | 50° | | 36° | | 49° | | 46° | | 50° | | 52° | | 43° | | 46° | | 46° | | 39° | |
| Monthly means | 73°.6 | | 72°.2 | | 64°.0 | | 46°.7 | | 32°.4 | | 33°.9 | | 22°.5 | | 31°.6 | | 44°.4 | | 51°.1 | | 55°1. | | 66°.6 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, SYDNEY, CANADA.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 69.9 | 45.3 | 68.6 | 45.5 | 73.9 | 50.7 | 69.1 | 44.6 | 43.0 | 33.8 | 36.6 | 21.0 | 31.5 | 27.1 | 20.4 | 7.3 | 28.0 | 4.5 | 39.0 | 31.4 | 39.5 | 33.6 | 75.9 | 35.2 |
| 2 | 62.6 | 48.0 | 72.9 | 41.0 | 74.3 | 59.0 | 63.1 | 46.4 | 46.7 | 30.0 | 28.0 | 19.0 | 28.4 | 23.0 | 23.2 | 9.5 | 17.7 | 3.2 | 38.0 | 31.3 | 42.3 | 34.5 | 77.0 | 53.0 |
| 3 | 71.9 | 50.6 | 75.1 | 54.4 | 71.9 | 63.5 | 51.5 | 40.0 | 56.4 | 41.4 | 31.8 | 18.1 | 25.1 | 13.5 | 24.0 | 10.0 | 44.4 | 7.1 | 36.1 | 32.9 | 57.1 | 37.7 | 76.1 | 54.3 |
| 4 | 71.0 | 44.0 | 75.8 | 60.2 | 68.1 | 51.7 | 55.9 | 42.1 | 43.2 | 37.6 | 36.4 | 27.0 | 19.8 | 5.0 | 34.0 | 11.4 | 47.0 | 30.8 | 41.0 | 32.6 | 46.2 | 37.4 | 78.4 | 53.0 |
| 5 | 69.8 | 39.3 | 76.8 | 54.8 | 71.2 | 44.9 | 65.5 | 53 6 | 42.0 | 32.5 | 39.4 | 18.7 | 38.1 | 2.8 | 26.8 | 20.5 | 31.9 | 19.3 | 38.7 | 32.3 | 71.0 | 36.7 | 78.4 | 52.5 |
| 6 | 80.0 | 45.2 | 71.0 | 52.0 | 71.0 | 46.0 | 61.0 | 43.7 | 53.3 | 32.0 | 55.0 | 39.0 | 33 0 | 5.7 | 27.8 | 17.3 | 29?9 | 17.0 | 38.9 | 32.7 | 67.7 | 49.6 | 61.6 | 54.6 |
| 7 | 64.1 | 50.0 | 73.4 | 48.8 | 62.6 | 38.9 | 50.0 | 39.4 | 36.0 | 29.7 | 42.8 | 23.3 | 17.7 | —2.0 | 34.0 | 16.4 | 39.1 | 17.0 | 38.9 | 34.0 | 63.0 | 49.6 | 57.2 | 46.0 |
| 8 | 71.5 | 44.0 | 66.6 | 58.8 | 66.0 | 39.0 | 46.3 | 29.9 | 50.2 | 27.1 | 32.4 | 21.5 | 13.0 | 2.3 | 38.5 | 16.0 | 41.7 | 34.8 | 40.2 | 31.6 | 54.9 | 41.8 | 69.2 | 40.1 |
| 9 | 65.8 | 54.1 | 66.6 | 58.8 | 67.5 | 44.6 | 49.0 | 27.7 | 58.0 | 41.4 | 37.6 | 21.3 | 23.2 | —4.0 | 36.0 | 25.3 | 35.4 | 27.8 | 42.0 | 27.4 | 47.6 | 40.4 | 56.0 | 48.1 |
| 10 | 68.4 | 58.6 | 69.7 | 53.2 | 63.0 | 45.3 | 48.8 | 42.3 | 56.4 | 27.4 | 34.0 | 18.5 | 37.6 | 23.2 | 30.0 | 19.3 | 36.2 | 21.0 | 60.9 | 26.6 | 46.4 | 39.2 | 58.5 | 48.7 |
| 11 | 77.3 | 60.8 | 62.7 | 57.4 | 74.0 | 39.9 | 50.0 | 43.4 | 37.3 | 27.6 | 28.6 | 10.5 | 39.8 | 25.6 | 35.7 | 14.3 | 21.5 | 15.0 | 41.0 | 30.3 | 62.1 | 39.6 | 54.0 | 42.6 |
| 12 | 68.0 | 60.0 | 73.5 | 56.7 | 76.7 | 51.6 | 49.0 | 45.3 | 38.2 | 30.5 | 33.6 | 25.2 | 38.6 | 30.3 | 19.4 | 3.2 | 28.0 | 13.7 | 45.3 | 27.2 | 54.7 | 41.4 | 55.0 | 45.0 |
| 13 | 70.0 | 58.0 | 78.7 | 58.0 | 73.2 | 59.3 | 50.0 | 41.7 | 35.1 | 28.0 | 30.5 | 25.3 | 35.5 | 28.0 | 31.7 | 0.3 | 33.5 | 9.3 | 41.1 | 27.7 | 46.0 | 38.0 | 63.4 | 45.5 |
| 14 | 61.0 | 55.0 | 70.1 | 60.1 | 62.7 | 43.0 | 46.3 | 41.3 | 39.6 | 27.0 | 34.1 | 23.0 | 36.8 | 23.1 | 26.0 | — 3.0 | 35.0 | 25.4 | 39.5 | 33.4 | 46.2 | 33.0 | 66.9 | 39.7 |
| 15 | 61.0 | 54.8 | 73.5 | 61.2 | 61.8 | 37.7 | 52.6 | 38.3 | 52.2 | 38.1 | 25.0 | 18.0 | 41.7 | 33.0 | 23.3 | — 8.5 | 34.4 | 24.0 | 36.6 | 34.0 | 53.0 | 31.0 | 68.0 | 41.2 |
| 16 | 68.1 | 52.4 | 70.3 | 63.6 | 67.0 | 35.3 | 46.0 | 38.0 | 58.0 | 41.3 | 28.3 | 24.3 | 35.0 | 10.5 | 30.0 | — 7.5 | 31.7 | 14.0 | 36.4 | 25.8 | 54.0 | 31.0 | 70.1 | 45 |
| 17 | 81.0 | 51.3 | 76.8 | 62.3 | 73.7 | 58.2 | 45.5 | 37.0 | 55.5 | 43.5 | 37.0 | 19.8 | 12.6 | 5.1 | 28.9 | — 3.5 | 41.4 | 10.6 | 41.0 | 23.3 | 49.0 | 36.4 | 70.1 | 40.4 |
| 18 | 71.6 | 56.7 | 78.0 | 63.7 | 76.2 | 60.2 | 49.0 | 42.0 | 46.0 | 41.0 | 34.5 | 14.4 | 19.3 | 9.8 | 34.0 | 6.5 | 34.6 | 19.4 | 47.2 | 22.5 | 48.4 | 36.2 | 60.7 | 52 |
| 19 | 80.7 | 61.7 | 78.0 | 62.4 | 67.0 | 46.4 | 58.4 | 38.4 | 45.0 | 34.0 | 34.0 | 9.2 | 35.0 | 14.7 | 16.0 | — 7.6 | 41.3 | 33.7 | 50.6 | 27.0 | 52.2 | 33.4 | 63 | 55 |
| 20 | 80.3 | 64.5 | 77.0 | 60.6 | 66.0 | 46.0 | 49.1 | 36.0 | 39.1 | 31.8 | 37.0 | 24.0 | 37.4 | 29.0 | 22.0 | —12.5 | 37.0 | 32.1 | 52.0 | 26.0 | 51.7 | 31.5 | 76 | 51 |
| 21 | 78.5 | 65.2 | 73.5 | 52.7 | 62.9 | 44.5 | 46.9 | 29.3 | 35.3 | 29.8 | 27.5 | 20.0 | 37.5 | 26.8 | 33.0 | 2.8 | 33.0 | 17.5 | 46.9 | 31.0 | 58.0 | 29.8 | 73.3 | 47.5 |
| 22 | 76.2 | 64.2 | 79.6 | 47.7 | 56.9 | 48.8 | 44.5 | 28.3 | 40.0 | 24.3 | 28.8 | 22.2 | 46.0 | 32.0 | 25.6 | 2.4 | 21.4 | 14.8 | 47.5 | 30.5 | 57.0 | 39.4 | 76 | 53.7 |
| 23 | 76.2 | 59.6 | 76.2 | 54.0 | 56.6 | 48.6 | 46.6 | 36.4 | 44.0 | 22.5 | 32.4 | 24.7 | 38.6 | 31.7 | 32.6 | — 0.5 | 34.1 | 18.3 | 38.7 | 35.2 | 48.4 | 39.0 | 64.9 | 50.3 |
| 24 | 65.5 | 54.4 | 83.2 | 51.7 | 64.8 | 46.0 | 48.8 | 34.0 | 41.1 | 27.0 | 33.2 | 28.5 | 34.0 | 13.4 | 38.4 | 32.6 | 47.2 | 27.0 | 53.0 | 21.0 | 46.9 | 41.5 | 58.8 | 52.2 |
| 25 | 64.0 | 51.7 | 64.3 | 50.0 | 65.5 | 42.5 | 42.5 | 32.4 | 39.0 | 21.6 | 34.7 | 30.7 | 27.9 | 12.4 | 41.0 | 32.6 | 48.8 | 25.4 | 54.8 | 37.2 | 49.0 | 42.0 | 71 | 55.2 |
| 26 | 62.0 | 47.0 | 67.5 | 47.2 | 72.8 | 54.0 | 39.0 | 31.6 | 42.2 | 28.2 | 36.2 | 32.2 | 33.8 | 9.0 | 37.3 | 29.0 | 35.3 | 25.0 | 66.5 | 34.8 | 60.5 | 45.6 | 64 | 56.4 |
| 27 | 63.6 | 47.7 | 66.5 | 52.3 | 64.0 | 48.0 | 44.5 | 32.4 | 46.8 | 25.4 | 36.9 | 25.9 | 39.0 | 28.4 | 37.0 | 24.6 | 42.7 | 29.0 | 69.8 | 33.2 | 69.6 | 44.0 | 66.5 | 50.8 |
| 28 | 71.8 | 47.2 | 70.3 | 58.9 | 60.5 | 36.7 | 40.0 | 33.4 | 52.0 | 41.0 | 36.0 | 16.5 | 41.9 | 22.3 | 41.7 | 21.0 | 45.0 | 31.4 | 67.7 | 40.2 | 65.0 | 45.0 | 72.5 | 46.6 |
| 29 | 65.8 | 53.0 | 71.0 | 62.2 | 60.5 | 49.0 | 46.4 | 32.0 | 49.6 | 35.2 | 39.1 | 13.8 | 37.2 | 12.5 | ..... | ..... | 49.0 | 34.3 | 59.4 | 40.3 | 66.6 | 44.0 | 82 | 51.8 |
| 30 | 74.2 | 59.0 | 74.0 | 56.0 | 55.5 | 41.3 | 51.0 | 36.0 | 55.0 | 34.4 | 32.3 | 26.1 | 13.8 | 7.0 | ..... | ..... | 35.4 | 32.0 | 42.0 | 32.3 | 59.5 | 35.0 | 36 | 59.4 |
| 31 | 75.9 | 52.0 | 70.5 | 54.0 | ..... | ..... | 49.0 | 32.0 | ..... | ..... | 33.9 | 27.0 | 24.9 | 8.5 | ..... | ..... | 38.0 | 32.4 | ..... | ..... | 68.0 | 33.2 | ..... | ..... |
| Range | 41°.7 | | 42°.2 | | 41° 4 | | 41°.4 | | 36°.4 | | 45°.8 | | 50°.2 | | 54°.2 | | 45°.8 | | 48°.8 | | 41°.2 | | 43°.2 | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, THATCHER'S ISLAND, MASS.*

| Day of month. | 1877. July. | | 1877. August. | | 1877. September. | | 1877. October. | | 1877. November. | | 1877. December. | | 1878. January. | | 1878. February. | | 1878. March. | | 1878. April. | | 1878. May. | | 1878. June. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 65 | 56 | 71 | 61 | 78 | 66 | 68 | 54 | 50 | 39 | 34 | 27 | 32 | 22 | 33 | 23 | 41 | 24 | 41 | 36 | 57 | 42 | 61 | 50 |
| 2 | 72 | 51 | 73 | 61 | 69 | 60 | 70 | 54 | 58 | 42 | 30 | 21 | 35 | 26 | 23 | 17 | 42 | 28 | 49 | 37 | 65 | 45 | 65 | 51 |
| 3 | 71 | 52 | 71 | 63 | 66 | 55 | 61 | 54 | 52 | 42 | 39 | 17 | 32 | 13 | 31 | 14 | 44 | 41 | 53 | 37 | 66 | 44 | 67 | 55 |
| 4 | 70 | 54 | 75 | 64 | 72 | 53 | 63 | 54 | 49 | 36 | 44 | 30 | 43 | 11 | 36 | 19 | 43 | 28 | 44 | 37 | 62 | 49 | 69 | 54 |
| 5 | 76 | 57 | 80 | 58 | 72 | 60 | 57 | 49 | 55 | 41 | 54 | 42 | 45 | 17 | 38 | 24 | 38 | 24 | 40 | 34 | 58 | 48 | 77 | 55 |
| 6 | 66 | 57 | 76 | 59 | 62 | 57 | 57 | 41 | 53 | 31 | 54 | 39 | 22 | 11 | 38 | 23 | 44 | 34 | 43 | 37 | 63 | 45 | 62 | 50 |
| 7 | 73 | 55 | 76 | 64 | 60 | 55 | 62 | 42 | 51 | 30 | 41 | 27 | 18 | 6 | 44 | 32 | 50 | 38 | 44 | 36 | 65 | 50 | 66 | 47 |
| 8 | 70 | 56 | 71 | 64 | 61 | 56 | 57 | 48 | 53 | 42 | 44 | 29 | 30 | 1 | 43 | 34 | 59 | 42 | 53 | 39 | 65 | 49 | 65 | 51 |
| 9 | 65 | 56 | 68 | 64 | 61 | 55 | 58 | 52 | 60 | 50 | 37 | 29 | 37 | 22 | 42 | 35 | 52 | 37 | 54 | 39 | 55 | 49 | 62 | 52 |
| 10 | 69 | 54 | 73 | 61 | 73 | 55 | 62 | 51 | 51 | 37 | 39 | 19 | 43 | 36 | 37 | 24 | 65 | 37 | 52 | 39 | 69 | 52 | 56 | 52 |
| 11 | 70 | 57 | 79 | 64 | 71 | 57 | 60 | 50 | 41 | 36 | 43 | 29 | 43 | 34 | 28 | 18 | 45 | 34 | 53 | 38 | 57 | 46 | 55 | 49 |
| 12 | 76 | 60 | 78 | 62 | 71 | 58 | 56 | 47 | 43 | 32 | 41 | 33 | 43 | 35 | 28 | 12 | 39 | 32 | 49 | 40 | 51 | 41 | 67 | 48 |
| 13 | 76 | 58 | 72 | 65 | 76 | 60 | 60 | 45 | 43 | 33 | 47 | 33 | 43 | 33 | 39 | 25 | 41 | 34 | 55 | 41 | 58 | 39 | 68 | 51 |
| 14 | 76 | 57 | 83 | 65 | 73 | 61 | 56 | 49 | 51 | 34 | 37 | 23 | 45 | 35 | 37 | 21 | 46 | 34 | 56 | 43 | 55 | 40 | 70 | 53 |
| 15 | 77 | 58 | 72 | 66 | 72 | 61 | 61 | 52 | 57 | 45 | 47 | 26 | 41 | 28 | 35 | 19 | 48 | 34 | 58 | 41 | 52 | 41 | 66 | 54 |
| 16 | 77 | 62 | 76 | 64 | 75 | 61 | 56 | 45 | 55 | 49 | 50 | 36 | 29 | 10 | 41 | 25 | 49 | 34 | 60 | 41 | 59 | 38 | 67 | 53 |
| 17 | 72 | 62 | 79 | 64 | 75 | 62 | 57 | 41 | 52 | 44 | 59 | 34 | 27 | 8 | 39 | 26 | 45 | 35 | 52 | 39 | 62 | 43 | 64 | 55 |
| 18 | 75 | 62 | 74 | 63 | 67 | 55 | 62 | 41 | 48 | 34 | 44 | 30 | 33 | 24 | 33 | 22 | 40 | 34 | 58 | 40 | 67 | 46 | 63 | 54 |
| 19 | 69 | 60 | 78 | 62 | 66 | 50 | 58 | 48 | 37 | 30 | 48 | 34 | 41 | 28 | 26 | 15 | 48 | 31 | 66 | 41 | 60 | 48 | 72 | 52 |
| 20 | 72 | 59 | 72 | 64 | 67 | 53 | 50 | 44 | 39 | 29 | 50 | 35 | 45 | 35 | 37 | 19 | 41 | 28 | 57 | 44 | 56 | 47 | 78 | 57 |
| 21 | 68 | 58 | 70 | 63 | 66 | 53 | 47 | 44 | 39 | 31 | 37 | 28 | 44 | 37 | 38 | 32 | 34 | 21 | 65 | 46 | 59 | 47 | 72 | 57 |
| 22 | 77 | 59 | 81 | 64 | 62 | 47 | 45 | 38 | 45 | 36 | 40 | 33 | 44 | 37 | 40 | 32 | 36 | 25 | 60 | 45 | 58 | 49 | 66 | 56 |
| 23 | 79 | 61 | 83 | 64 | 69 | 47 | 58 | 37 | 48 | 37 | 42 | 34 | 40 | 2 | 48 | 34 | 52 | 30 | 54 | 46 | 54 | 47 | 69 | 58 |
| 24 | 73 | 62 | 83 | 66 | 72 | 53 | 64 | 50 | 48 | 41 | 40 | 31 | 30 | 3 | 46 | 34 | 50 | 24 | 53 | 44 | 58 | 49 | 70 | 56 |
| 25 | 84 | 62 | 75 | 66 | 72 | 55 | 52 | 38 | 49 | 43 | 39 | 34 | 44 | 29 | 38 | 29 | 30 | 12 | 58 | 48 | 63 | 50 | 74 | 55 |
| 26 | 75 | 62 | 80 | 62 | 72 | 57 | 41 | 37 | 53 | 48 | 44 | 30 | 44 | 35 | 39 | 26 | 46 | 22 | 53 | 49 | 64 | 50 | 73 | 55 |
| 27 | 65 | 61 | 78 | 62 | 67 | 57 | 43 | 36 | 53 | 49 | 42 | 32 | 44 | 35 | 49 | 34 | 43 | 35 | 52 | 48 | 72 | 50 | 78 | 56 |
| 28 | 67 | 61 | 82 | 63 | 63 | 57 | 52 | 35 | 53 | 43 | 41 | 35 | 41 | 14 | 50 | 34 | 48 | 37 | 52 | 47 | 74 | 54 | 85 | 59 |
| 29 | 73 | 62 | 78 | 66 | 66 | 54 | 59 | 46 | 45 | 38 | 42 | 30 | 22 | 9 | ..... | ..... | ..... | 36 | 52 | 45 | 68 | 54 | 79 | 63 |
| 30 | 68 | 62 | 77 | 64 | 68 | 49 | 57 | 45 | 39 | 30 | 40 | 33 | 22 | 7 | ..... | ..... | 47 | 36 | 48 | 43 | 63 | 53 | 81 | 63 |
| 31 | 67 | 62 | 78 | 61 | ..... | ..... | 54 | 42 | ..... | ..... | 35 | 27 | 32 | 6 | ..... | ..... | 52 | 37 | ..... | ..... | 56 | 50 | ..... | ..... |
| Range | 33° | | 25° | | 31° | | 35° | | 31° | | 42° | | 44° | | 38° | | 53° | | 32° | | 36° | | 38° | |
| Monthly means | 64°.5 | | 68°.4 | | 61°.7 | | 51°.6 | | 44°.1 | | 36°.9 | | 29°.2 | | 32°.1 | | 38°.1 | | 46°.6 | | 53°.6 | | 61° | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, TOLEDO, OHIO.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 80 | 67 | 85 | 72 | 66 | 54 | 83 | 63 | 49 | 35 | 33 | 25 | 40 | 29 | 30 | 21 | 45 | 53 | 53 | 41 | 67 | 54 | 72 | 51 |
| 2 | 75 | 60 | 87 | 72 | 63 | 55 | 78 | 63 | 47 | 42 | 35 | 24 | 38 | 21 | 29 | 20 | 59 | 33 | 58 | 38 | 79 | 54 | 81 | 58 |
| 3 | 82 | 66 | 78 | 60 | 68 | 50 | 79 | 60 | 45 | 35 | 43 | 27 | 31 | 14 | 29 | 7 | 52 | 36 | 55 | 43 | 66 | 53 | 85 | 68 |
| 4 | 71 | 60 | 74 | 56 | 74 | 50 | 72 | 48 | 53 | 33 | 30 | 24 | 35 | 23 | 33 | 9 | 38 | 30 | 59 | 39 | 59 | 46 | 74 | 57 |
| 5 | 87 | 66 | 82 | 56 | 73 | 60 | 59 | 37 | 49 | 28 | 51 | 37 | 23 | 15 | 41 | 15 | 54 | 32 | 57 | 38 | 63 | 46 | 65 | 49 |
| 6 | 75 | 60 | 85 | 64 | 64 | 58 | 61 | 41 | 40 | 19 | 37 | 30 | 21 | 10 | 48 | 28 | 61 | 46 | 53 | 38 | 66 | 44 | 65 | 48 |
| 7 | 79 | 61 | 84 | 66 | 66 | 51 | 58 | 45 | 45 | 27 | 41 | 24 | 21 | 8 | 49 | 27 | 60 | 49 | 57 | 36 | 76 | 58 | 72 | 53 |
| 8 | 86 | 67 | 86 | 64 | 67 | 58 | 57 | 50 | 52 | 39 | 37 | 32 | 34 | 11 | 38 | 33 | 64 | 45 | 59 | 47 | 66 | 55 | 57 | 48 |
| 9 | 86 | 70 | 80 | 65 | 71 | 53 | 65 | 45 | 50 | 32 | 36 | 26 | 44 | 27 | 34 | 22 | 61 | 42 | 69 | 48 | 63 | 49 | 60 | 43 |
| 10 | 75 | 64 | 77 | 59 | 72 | 61 | 59 | 49 | 38 | 28 | 49 | 32 | 45 | 37 | 26 | 20 | 68 | 45 | 66 | 54 | 53 | 44 | 66 | 52 |
| 11 | 73 | 56 | 81 | 58 | 72 | 64 | 51 | 44 | 45 | 27 | 49 | 38 | 42 | 34 | 29 | 10 | 59 | 42 | 62 | 48 | 54 | 37 | 67 | 49 |
| 12 | 81 | 60 | 83 | 66 | 72 | 62 | 54 | 43 | 51 | 31 | 56 | 34 | 40 | 32 | 36 | 18 | 45 | 36 | 63 | 48 | 51 | 37 | 67 | 47 |
| 13 | 84 | 63 | 78 | 63 | 75 | 59 | 71 | 45 | 55 | 34 | 56 | 39 | 34 | 29 | 35 | 27 | 50 | 40 | 61 | 45 | 55 | 37 | 70 | 49 |
| 14 | 84 | 67 | 75 | 62 | 76 | 57 | 72 | 53 | 60 | 41 | 43 | 33 | 41 | 32 | 32 | 22 | 48 | 41 | 53 | 45 | 54 | 38 | 71 | 53 |
| 15 | 87 | 67 | 72 | 56 | 82 | 65 | 75 | 55 | 58 | 53 | 54 | 35 | 37 | 32 | 34 | 24 | 55 | 38 | 50 | 45 | 59 | 38 | 81 | 56 |
| 16 | 87 | 72 | 70 | 59 | 80 | 65 | 67 | 57 | 55 | 43 | 54 | 40 | 36 | 27 | 40 | 25 | 58 | 44 | 57 | 43 | 62 | 47 | 81 | 67 |
| 17 | 82 | 64 | 77 | 58 | 65 | 55 | 65 | 52 | 60 | 41 | 58 | 38 | 48 | 31 | 41 | 31 | 48 | 39 | 59 | 47 | 62 | 47 | 70 | 57 |
| 18 | 76 | 67 | 84 | 58 | 65 | 46 | 67 | 58 | 43 | 32 | 51 | 35 | 47 | 34 | 31 | 24 | 50 | 34 | 68 | 47 | 64 | 48 | 69 | 53 |
| 19 | 74 | 61 | 81 | 63 | 69 | 45 | 60 | 49 | 39 | 29 | 59 | 51 | 53 | 37 | 41 | 17 | 52 | 37 | 73 | 58 | 77 | 55 | 74 | 54 |
| 20 | 71 | 56 | 84 | 63 | 72 | 50 | 50 | 46 | 45 | 33 | 57 | 44 | 48 | 40 | 54 | 36 | 51 | 35 | 73 | 61 | 80 | 55 | 78 | 58 |
| 21 | 74 | 56 | 85 | 66 | 63 | 47 | 46 | 40 | 57 | 40 | 46 | 38 | 52 | 38 | 50 | 38 | 44 | 39 | 73 | 54 | 64 | 54 | 64 | 58 |
| 22 | 78 | 61 | 85 | 68 | 69 | 49 | 53 | 33 | 49 | 44 | 45 | 40 | 41 | 22 | 51 | 37 | 51 | 36 | 77 | 51 | 61 | 48 | 60 | 50 |
| 23 | 80 | 61 | 76 | 64 | 76 | 53 | 64 | 45 | 47 | 41 | 47 | 40 | 25 | 13 | 43 | 35 | 62 | 38 | 79 | 54 | 72 | 50 | 66 | 54 |
| 24 | 81 | 62 | 74 | 64 | 80 | 60 | 65 | 50 | 51 | 44 | 43 | 37 | 45 | 20 | 43 | 32 | 56 | 23 | 73 | 53 | 77 | 63 | 79 | 58 |
| 25 | 85 | 71 | 79 | 57 | 80 | 63 | 63 | 52 | 53 | 47 | 42 | 38 | 51 | 41 | 40 | 29 | 38 | 20 | 61 | 51 | 77 | 58 | 83 | 60 |
| 26 | 90 | 73 | 81 | 64 | 79 | 64 | 58 | 47 | 52 | 43 | 45 | 39 | 45 | 34 | 43 | 25 | 42 | 30 | 62 | 51 | 72 | 58 | 86 | 69 |
| 27 | 82 | 74 | 84 | 64 | 73 | 63 | 57 | 44 | 43 | 39 | 43 | 38 | 37 | 32 | 50 | 30 | 68 | 38 | 61 | 51 | 69 | 55 | 85 | 72 |
| 28 | 87 | 73 | 86 | 69 | 75 | 63 | 68 | 52 | 40 | 31 | 43 | 37 | 33 | 16 | 54 | 33 | 41 | 35 | 59 | 50 | 66 | 48 | 87 | 67 |
| 29 | 86 | 73 | 83 | 69 | 80 | 63 | 62 | 49 | 31 | 18 | 41 | 35 | 28 | 12 | ..... | ..... | 45 | 29 | 61 | 51 | 61 | 53 | 87 | 71 |
| 30 | 81 | 68 | 75 | 62 | 85 | 63 | 53 | 38 | 29 | 13 | 37 | 30 | 30 | 21 | ..... | ..... | 45 | 35 | 72 | 54 | 61 | 45 | 92 | 71 |
| 31 | 82 | 64 | 80 | 65 | ..... | ..... | 54 | 44 | ..... | ..... | 35 | 28 | 30 | 24 | ..... | ..... | 46 | 40 | ..... | ..... | 66 | 45 | ..... | ..... |
| Range | 34° | | 31° | | 40° | | 50° | | 47° | | 35° | | 45° | | 47° | | 48° | | 43° | | 43° | | 49° | |
| Monthly means | 74°.4 | | 72°.9 | | 65°.7 | | 56°.3 | | 42°.4 | | 41°.2 | | 32°.7 | | 34°.0 | | 44°.9 | | 56°.5 | | 59°.9 | | 67°.3 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, TORONTO, CANADA.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 80.1 | 64.3 | 79.9 | 61.3 | 68.6 | 52.0 | 83.0 | 58.7 | 48.1 | 34.0 | 28.3 | 17.8 | 31.4 | 14.9 | 29.4 | 20.6 | 30.4 | 17.9 | 58.7 | 33.5 | 71.7 | 47.5 | 67.2 | 52.7 |
| 2 | 75.1 | 55.4 | 80.9 | 66.7 | 64.0 | 49.0 | 64.8 | 55.5 | 55.0 | 39.7 | 33.4 | 14.6 | 31.6 | 2.7 | 22.3 | 6.9 | 39.3 | 26.2 | 56.1 | 32.2 | 59.3 | 50.8 | 73.1 | 52.7 |
| 3 | 75.6 | 57.7 | 77.1 | 58.0 | 63.0 | 44.9 | 61.0 | 54.1 | 43.3 | 32.5 | 40.1 | 26.5 | 24.3 | 1.0 | 29.2 | 8.2 | 45.1 | 30.2 | 52.7 | 32.5 | 63.0 | 49.5 | 76.5 | 58.9 |
| 4 | 78.9 | 57.5 | 75.9 | 54.0 | 72.6 | 51.7 | 66.0 | 42.3 | 43.1 | 27.6 | 42.2 | 26.4 | 29.7 | 21.6 | 34.2 | 12.4 | 31.2 | 21.7 | 55.5 | 38.3 | 58.4 | 46.1 | 75.3 | 51.5 |
| 5 | 81.5 | 57.5 | 77.1 | 53.5 | 67.2 | 54.5 | 55.1 | 37.3 | 40.1 | 23.3 | 49.1 | 35.5 | 27.2 | 8.2 | 33.2 | 13.8 | 41.3 | 28.0 | 58.0 | 37.1 | 60.8 | 42.7 | 60.9 | 44.5 |
| 6 | 75.1 | 56.5 | 79.3 | 55.5 | 63.2 | 52.7 | 55.1 | 37.5 | 40.4 | 18.6 | 37.2 | 25.8 | 10.3 | —1.9 | 38.4 | 22.0 | 50.3 | 36.8 | 55.1 | 32.0 | 62.5 | 39.5 | 62.6 | 37.5 |
| 7 | 80.3 | 50.3 | 79.9 | 63.0 | 62.0 | 54.1 | 57.2 | 32.7 | 41.6 | 23.1 | 34.7 | 25.0 | 7.3 | —9.0 | 42.9 | 26.1 | 55.6 | 35.5 | 52.3 | 37.1 | 67.3 | 46.9 | 55.6 | 44.5 |
| 8 | 85.1 | 61.9 | 78.5 | 63.9 | 65.8 | 50.3 | 59.5 | 50.0 | 46.1 | 39.5 | 37.2 | 27.3 | 28.0 | 6.5 | 42.1 | 26.6 | 54.3 | 33.9 | 54.1 | 32.5 | 63.8 | 50.5 | 59.1 | 46.5 |
| 9 | 86.9 | 63.5 | 79.3 | 65.5 | 67.6 | 47.3 | 60.2 | 47.9 | 46.7 | 23.6 | 32.0 | 22.4 | 40.2 | 26.8 | 35.2 | 18.6 | 50.9 | 38.7 | 48.5 | 40.3 | 63.0 | 42.7 | 65.0 | 45.5 |
| 10 | 74.7 | 59.5 | 78.9 | 60.1 | 70.6 | 56.0 | 61.8 | 49.5 | 31.6 | 17.2 | 40.4 | 30.7 | 39.8 | 35.1 | 19.7 | 16.5 | 54.5 | 35.5 | 50.7 | 43.7 | 53.5 | 39.5 | 65.0 | 50.3 |
| 11 | 74.3 | 52.9 | 78.9 | 59.8 | 74.0 | 62.5 | 55.3 | 45.5 | 40.3 | 20.6 | 46.1 | 33.0 | 40.0 | 33.5 | 20.5 | 4.3 | 46.5 | 35.3 | 58.3 | 39.5 | 47.1 | 38.3 | 65.0 | 48.3 |
| 12 | 84.5 | 54.7 | 66.0 | 56.5 | 75.7 | 59.3 | 51.9 | 43.5 | 43.3 | 27.8 | 40.5 | 27.0 | 37.8 | 32.5 | 28.6 | 13.2 | 40.1 | 33.5 | 59.6 | 36.5 | 48.1 | 34.3 | 67.1 | 45.5 |
| 13 | 71.1 | 54.9 | 70.7 | 58.3 | 79.0 | 58.7 | 55.6 | 37.5 | 41.2 | 31.7 | 44.1 | 27.4 | 35.2 | 31.6 | 35.2 | 19.6 | 40.2 | 34.3 | 54.1 | 37.3 | 50.1 | 32.5 | 75.1 | 46.5 |
| 14 | 77.0 | 52.7 | 74.9 | 63.7 | 81.2 | 59.3 | 69.8 | 52.7 | 52.9 | 29.0 | 41.1 | 23.0 | 34.2 | 29.1 | 29.0 | 17.8 | 40.5 | 34.9 | 53.9 | 35.3 | 49.5 | 32.5 | 76.1 | 56.5 |
| 15 | 86.9 | 53.7 | 78.1 | 61.7 | 81.7 | 61.5 | 64.4 | 49.1 | 51.1 | 44.7 | 46.7 | 34.5 | 34.3 | 13.8 | 30.2 | 17.1 | 47.1 | 32.4 | 48.1 | 37.5 | 53.3 | 35.5 | 76.1 | 57.5 |
| 16 | 88.7 | 59.7 | 74.1 | 62.3 | 81.3 | 64.5 | 64.0 | 51.3 | 52.1 | 40.5 | 45.1 | 32.7 | 14.3 | 2.3 | 32.8 | 22.8 | 47.3 | 30.9 | 55.9 | 39.9 | 57.7 | 33.5 | 78.0 | 59.5 |
| 17 | 84.1 | 64.5 | 77.3 | 62.5 | 73.1 | 48.3 | 53.6 | 46.5 | 50.5 | 38.9 | 49.4 | 29.7 | 30.0 | 14.0 | 37.2 | 21.6 | 46.7 | 38.9 | 58.1 | 37.7 | 61.0 | 37.5 | 71.0 | 51.5 |
| 18 | 76.3 | 62.3 | 77.1 | 62.5 | 62.5 | 45.5 | 55.6 | 46.9 | 38.9 | 31.0 | 37.0 | 25.0 | 33.2 | 25.3 | 23.6 | 7.7 | 51.1 | 34.3 | 64.5 | 42.7 | 61.5 | 45.0 | 72.1 | 50.5 |
| 19 | 77.1 | 60.5 | 83.1 | 59.0 | 70.9 | 39.7 | 49.8 | 44.2 | 32.4 | 22.6 | 48.9 | 34.7 | 42.5 | 25.3 | 30.2 | 5.9 | 49.1 | 35.7 | 56.8 | 47.5 | 55.1 | 48.9 | 73.6 | 49.0 |
| 20 | 74.1 | 57.5 | 79.1 | 58.2 | 67.5 | 48.5 | 45.1 | 35.3 | 33.6 | 20.6 | 48.1 | 36.1 | 40.3 | 29.7 | 40.4 | 26.5 | 42.1 | 30.7 | 69.6 | 46.5 | 71.1 | 51.5 | 75.9 | 51.6 |
| 21 | 73.1 | 50.5 | 78.1 | 61.9 | 63.0 | 45.5 | 45.1 | 33.5 | 41.9 | 29.2 | 39.8 | 36.5 | 40.0 | 34.5 | 36.0 | 32.3 | 37.2 | 29.8 | 59.6 | 45.5 | 59.0 | 45.5 | 72.5 | 60.5 |
| 22 | 80.1 | 55.3 | 80.7 | 63.9 | 64.6 | 38.3 | 50.5 | 31.3 | 46.0 | 38.5 | 40.4 | 35.9 | 36.0 | 17.2 | 38.7 | 34.7 | 44.1 | 32.0 | 50.1 | 39.5 | 62.0 | 38.7 | 70.1 | 59.0 |
| 23 | 79.3 | 59.5 | 80.0 | 63.7 | 73.0 | 44.5 | 61.1 | 35.4 | 44.7 | 41.7 | 39.5 | 33.5 | 17.3 | —3.0 | 37.7 | 31.8 | 58.4 | 34.0 | 55.3 | 46.7 | 64.8 | 37.9 | 67.2 | 60.5 |
| 24 | 80.1 | 57.7 | 78.7 | 67.5 | 78.3 | 49.0 | 63.8 | 50.5 | 44.4 | 41.7 | 34.6 | 30.8 | 34.2 | 11.8 | 33.4 | 27.4 | 36.1 | 9.2 | 65.0 | 48.7 | 71.6 | 48.5 | 75.1 | 59.0 |
| 25 | 87.3 | 61.5 | 78.1 | 60.5 | 80.0 | 58.3 | 53.0 | 35.5 | 45.9 | 40.5 | 35.0 | 29.0 | 36.0 | 30.1 | 29.4 | 24.1 | 31.6 | 8.9 | 60.6 | 46.1 | 76.1 | 52.9 | 79.0 | 55.0 |
| 26 | 83.7 | 68.5 | 82.9 | 60.5 | 76.7 | 58.0 | 42.9 | 32.9 | 48.3 | 41.7 | 38.1 | 31.1 | 37.8 | 31.4 | 41.3 | 21.8 | 46.5 | 24.7 | 60.8 | 45.5 | 71.4 | 51.0 | 71.0 | 55 6 |
| 27 | 82.5 | 67.5 | 83.1 | 62.7 | 64.2 | 51.5 | 44.1 | 32.7 | 46.1 | 40.3 | 41.6 | 33.5 | 35.2 | 31.5 | 46.1 | 27.0 | 49.8 | 33.3 | 63.2 | 43.5 | 68.0 | 50.1 | 81.9 | 56.9 |
| 28 | 83.1 | 66.9 | 81.0 | 64.5 | 70.1 | 53.7 | 51.9 | 41.3 | 42.1 | 32.5 | 42.1 | 31.1 | 32.2 | 4.7 | 43.1 | 26.8 | 40.7 | 31.5 | 66.5 | 51.7 | 64.0 | 43.5 | 83.1 | 56.7 |
| 29 | 84.1 | 68.7 | 82.5 | 64.7 | 67.7 | 52.9 | 60.3 | 41.5 | 33.7 | 25.4 | 34.2 | 28.9 | 28.4 | 10.0 | ..... | ..... | 46.0 | 30.3 | 61.0 | 51.3 | 60.0 | 41.3 | 84.5 | 60.5 |
| 30 | 86.4 | 68.0 | 74.1 | 59.4 | 80.8 | 53.5 | 50.5 | 33.7 | 28.2 | 25.5 | 31.5 | 26.2 | 20.3 | 9.5 | ..... | ..... | 43.9 | 30.4 | 61.0 | 48.3 | 62.0 | 47.7 | 86.5 | 63.9 |
| 31 | 78.1 | 64.7 | 70.5 | 56.9 | ..... | ..... | 49.1 | 35.9 | ..... | ..... | 31.2 | 15.3 | 24.4 | 14.0 | ..... | ..... | 47.1 | 36.5 | ..... | ..... | 71.5 | 50.9 | ..... | ..... |
| Range | 38°.4 | | 29°.6 | | 43°.4 | | 51°.7 | | 37°.8 | | 34°.8 | | 51°.5 | | 40°.2 | | 49°.5 | | 37°.4 | | 39°.2 | | 39°.0 | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, TUCSON, ARIZ.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | *99 | *69 | *101 | *75 | *99 | *75 | *90 | *70 | *72 | *39 | *72 | *35 | *54 | *26 | 165 | 30 | 65 | 41 | 72 | 43 | 89 | 56 | 90 | 59 |
| 2 | 102 | 70 | 102 | 80 | 97 | 77 | 88 | 66 | 74 | 35 | 58 | 35 | 52 | 27 | 63 | 26 | 74 | 34 | 80 | 46 | 90 | 57 | 96 | 54 |
| 3 | 102 | 68 | 97 | 81 | 87 | 68 | 86 | 67 | 77 | 45 | 60 | 36 | 47 | 25 | 68 | 34 | 80 | 35 | 84 | 43 | 91 | 58 | 91 | 53 |
| 4 | 103 | 75 | 103 | 78 | 86 | 68 | 88 | 65 | 67 | 45 | 58 | 35 | 54 | 24 | 72 | 34 | 81 | 36 | 90 | 45 | 91 | 59 | 93 | 54 |
| 5 | 110 | 80 | 100 | 74 | 84 | 70 | 87 | 65 | 74 | 34 | 59 | 34 | 61 | 25 | 63 | 41 | 75 | 41 | 94 | 48 | 99 | 52 | 93 | 58 |
| 6 | 109 | 82 | 99 | 73 | 93 | 72 | 85 | 63 | 71 | 39 | 69 | 35 | 62 | 30 | 71 | 32 | 77 | 44 | 86 | 55 | 96 | 50 | 93 | 60 |
| 7 | 101 | 84 | 101 | 75 | 96 | 73 | 86 | 62 | 68 | 37 | 69 | 36 | 64 | 28 | 66 | 41 | 79 | 47 | 80 | 49 | 90 | 55 | 93 | 60 |
| 8 | 101 | 82 | 105 | 72 | 97 | 72 | 86 | 62 | 68 | 35 | 54 | 37 | 63 | 30 | 73 | 32 | 61 | 38 | 84 | 53 | 92 | 50 | 93 | 63 |
| 9 | 102 | 80 | 100 | 76 | 96 | 82 | 85 | 60 | 74 | 52 | 62 | 37 | 64 | 32 | 61 | 30 | 65 | 28 | 85 | 55 | 93 | 55 | 103 | 62 |
| 10 | 104 | 75 | 102 | 79 | 92 | 76 | 90 | 66 | 82 | 56 | 66 | 36 | 73 | 32 | 66 | 32 | 73 | 27 | 83 | 56 | 92 | 54 | 95 | 64 |
| 11 | 102 | 78 | 100 | 77 | 81 | 74 | 87 | 67 | 84 | 51 | 68 | 42 | 57 | 38 | 64 | 26 | 75 | 32 | 90 | 50 | 94 | 49 | 94 | 63 |
| 12 | 102 | 75 | 105 | 78 | 84 | 72 | 81 | 70 | 66 | 49 | 69 | 40 | 59 | 35 | 65 | 31 | 75 | 32 | 90 | 53 | 94 | 56 | 93 | 63 |
| 13 | 103 | 76 | 104 | 79 | 77 | 65 | 78 | 61 | 65 | 39 | 72 | 45 | 64 | 32 | 72 | 33 | 80 | 39 | 87 | 49 | 96 | 55 | 95 | 58 |
| 14 | 105 | 87 | 102 | 81 | 79 | 58 | 67 | 63 | 72 | 34 | 73 | 60 | 64 | 30 | 72 | 43 | 84 | 38 | 74 | 54 | 93 | 54 | 90 | 57 |
| 15 | 102 | 81 | 95 | 82 | 85 | 64 | 65 | 61 | 75 | 37 | 74 | 55 | 63 | 28 | 75 | 39 | 92 | 40 | 80 | 45 | 92 | 55 | 91 | 56 |
| 16 | 99 | 83 | 95 | 80 | 89 | 68 | 71 | 60 | 80 | 51 | 66 | 53 | 67 | 26 | 73 | 42 | 90 | 45 | 71 | 41 | 91 | 52 | 97 | 58 |
| 17 | 100 | 80 | 97 | 75 | 86 | 71 | 70 | 60 | 77 | 41 | 70 | 57 | 60 | 29 | 75 | 36 | 92 | 47 | 72 | 36 | 91 | 57 | 99 | 60 |
| 18 | 106 | 84 | 97 | 76 | 94 | 72 | 72 | 46 | 64 | 47 | 57 | 45 | 58 | 31 | 81 | 34 | 75 | 49 | 73 | 43 | 90 | 50 | 98 | 55 |
| 19 | 104 | 85 | 99 | 79 | 94 | 72 | 74 | 60 | 68 | 36 | 56 | 45 | 60 | 30 | 72 | 45 | 78 | 57 | 75 | 44 | 90 | 49 | 84 | 65 |
| 20 | 98 | 81 | 100 | 73 | 97 | 72 | 74 | 54 | 71 | 36 | 55 | 37 | 65 | 29 | 70 | 38 | 80 | 51 | 70 | 52 | 88 | 50 | 99 | 65 |
| 21 | 99 | 81 | 100 | 70 | 91 | 72 | 75 | 60 | 75 | 39 | 56 | 35 | 64 | 33 | 62 | 34 | 82 | 55 | 72 | 54 | 89 | 47 | 104 | 57 |
| 22 | 101 | 82 | 100 | 68 | 91 | 68 | 77 | 65 | 73 | 33 | 62 | 33 | 68 | 30 | 71 | 30 | 83 | 50 | 72 | 45 | 89 | 53 | 101 | 57 |
| 23 | 98 | 78 | 102 | 69 | 89 | 66 | 75 | 68 | 70 | 40 | 64 | 32 | 71 | 32 | 68 | 31 | 80 | 49 | 75 | 49 | 90 | 50 | 105 | 65 |
| 24 | 91 | 73 | 101 | 68 | 85 | 60 | 74 | 55 | 74 | 39 | 62 | 33 | 67 | 34 | 73 | 31 | 90 | 57 | 74 | 46 | 87 | 50 | 104 | 57 |
| 25 | 92 | 74 | 100 | 69 | 85 | 69 | 74 | 48 | 71 | 37 | 53 | 34 | 66 | 32 | 67 | 43 | 90 | 48 | 83 | 50 | 92 | 52 | 101 | 63 |
| 26 | 96 | 74 | 100 | 69 | 87 | 65 | 77 | 52 | 72 | 37 | 53 | 32 | 62 | 32 | 74 | 34 | 78 | 47 | 86 | 45 | 94 | 56 | 102 | 64 |
| 27 | 96 | 75 | 103 | 71 | 93 | 63 | 83 | 53 | 69 | 38 | 50 | 31 | 64 | 31 | 76 | 40 | 79 | 37 | 82 | 46 | 90 | 58 | 103 | 66 |
| 28 | 100 | 70 | 106 | 71 | 90 | 68 | 78 | 51 | 60 | 38 | 50 | 33 | 69 | 32 | 75 | 38 | 60 | 38 | 87 | 49 | 90 | 58 | 104 | 67 |
| 29 | 99 | 73 | 102 | 76 | 81 | 72 | 79 | 60 | 61 | 40 | 53 | 29 | 67 | 32 | ..... | ..... | 73 | 42 | 92 | 51 | 90 | 58 | 100 | 60 |
| 30 | 98 | 77 | 98 | 76 | 85 | 68 | 71 | 62 | 67 | 38 | 56 | 27 | 70 | 34 | ..... | ..... | 76 | 45 | 93 | 55 | 89 | 58 | 101 | 64 |
| 31 | 98 | 76 | 98 | 77 | ..... | ..... | 67 | 62 | ..... | ..... | 54 | 27 | 64 | 35 | ..... | ..... | 65 | 42 | ..... | ..... | 90 | 59 | ..... | ..... |
| Range | | | | | | | | | | | | | | | 55° | | 65° | | 58° | | 52° | | 52° | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

* Highest and lowest observed readings of exposed thermometer.

† Observations of maximum and minimum thermometers began February 1, 1878.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, TYBEE ISLAND, GA.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 91 | 74 | 89 | 77 | 92 | 72 | 76 | 69 | 75 | 65 | 47 | 31 | 51 | 36 | 57 | 43 | 61 | 44 | 71 | 60 | 80 | 58 | 82 | 70 |
| 2 | 95 | 76 | 85 | 75 | 90 | 71 | 78 | 73 | 80 | 63 | 47 | 34 | 57 | 34 | 55 | 45 | 67 | 54 | 65 | 58 | 86 | 65 | 81 | 68 |
| 3 | 95 | 78 | 86 | 74 | 81 | 69 | 79 | 72 | 64 | 54 | 54 | 41 | 57 | 42 | 54 | 43 | 73 | 56 | 67 | 58 | 85 | 67 | 93 | 69 |
| 4 | 94 | 77 | 89 | 75 | 84 | 70 | 82 | 69 | 66 | 56 | 61 | 52 | 61 | 43 | 53 | 39 | 57 | 46 | 63 | 52 | 82 | 67 | 94 | 72 |
| 5 | 96 | 67 | 92 | 76 | 87 | 75 | 73 | 64 | 69 | 60 | 64 | 58 | 45 | 34 | 51 | 39 | 59 | 41 | 70 | 47 | 77 | 57 | 86 | 69 |
| 6 | 94 | 71 | 92 | 77 | 88 | 73 | 69 | 59 | 64 | 58 | 61 | 42 | 44 | 28 | 54 | 44 | 66 | 46 | 78 | 50 | 82 | 52 | 82 | 71 |
| 7 | 83 | 73 | 93 | 75 | 92 | 74 | 73 | 61 | 67 | 50 | 49 | 35 | 41 | 32 | 60 | 52 | 74 | 54 | 70 | 57 | 83 | 63 | 81 | 68 |
| 8 | 84 | 77 | 95 | 77 | 87 | 75 | 84 | 66 | 73 | 66 | 58 | 36 | 45 | 34 | 69 | 52 | 68 | 52 | 75 | 59 | 86 | 69 | 90 | 70 |
| 9 | 89 | 74 | 94 | 76 | 82 | 76 | 75 | 64 | 71 | 52 | 51 | 39 | 53 | 43 | 64 | 51 | 67 | 57 | 67 | 64 | 86 | 65 | 90 | 66 |
| 10 | 94 | 75 | 92 | 75 | 88 | 72 | 77 | 61 | 60 | 43 | 57 | 43 | 55 | 42 | 62 | 46 | 66 | 58 | 75 | 64 | 81 | 64 | 91 | 72 |
| 11 | 92 | 76 | 92 | 74 | 89 | 72 | 78 | 60 | 57 | 44 | 66 | 39 | 56 | 39 | 50 | 37 | 73 | 59 | 80 | 63 | 76 | 60 | 80 | 68 |
| 12 | 85 | 75 | 91 | 76 | 90 | 73 | 71 | 61 | 58 | 46 | 69 | 43 | 53 | 38 | 45 | 32 | 76 | 60 | 75 | 58 | 81 | 56 | 85 | 67 |
| 13 | 88 | 76 | 92 | 73 | 85 | 70 | 70 | 65 | 64 | 46 | 72 | 42 | 63 | 50 | 56 | 38 | 76 | 60 | 80 | 58 | 81 | 67 | 86 | 68 |
| 14 | 89 | 72 | 87 | 72 | 88 | 71 | 73 | 65 | 67 | 54 | 57 | 50 | 55 | 43 | 54 | 45 | 78 | 55 | 78 | 64 | 84 | 67 | 75 | 67 |
| 15 | 92 | 73 | 87 | 70 | 87 | 73 | 74 | 69 | 77 | 61 | 59 | 49 | 52 | 38 | 53 | 45 | 66 | 56 | 76 | 65 | 73 | 61 | 77 | 71 |
| 16 | 93 | 74 | 87 | 74 | 88 | 74 | 77 | 68 | 73 | 58 | 66 | 48 | 49 | 34 | 54 | 44 | 67 | 55 | 72 | 66 | 71 | 61 | 87 | 73 |
| 17 | 89 | 73 | 90 | 73 | 89 | 75 | 78 | 68 | 72 | 52 | 66 | 49 | 54 | 44 | 62 | 43 | 79 | 51 | 68 | 60 | 76 | 67 | 87 | 72 |
| 18 | 92 | 76 | 82 | 73 | 87 | 73 | 77 | 68 | 69 | 52 | 65 | 48 | 54 | 45 | 63 | 46 | 64 | 52 | 68 | 63 | 77 | 66 | 91 | 73 |
| 19 | 91 | 76 | 81 | 70 | 80 | 67 | 82 | 70 | 64 | 56 | 57 | 53 | 60 | 50 | 53 | 43 | 66 | 51 | 73 | 62 | 79 | 70 | 87 | 72 |
| 20 | 86 | 75 | 83 | 72 | 79 | 66 | 80 | 71 | 67 | 58 | 58 | 52 | 69 | 52 | 64 | 48 | 74 | 47 | 84 | 61 | 83 | 71 | 79 | 73 |
| 21 | 81 | 72 | 85 | 75 | 76 | 69 | 78 | 62 | 68 | 64 | 60 | 54 | 65 | 50 | 63 | 55 | 68 | 55 | 84 | 65 | 87 | 71 | 88 | 74 |
| 22 | 85 | 73 | 84 | 75 | 77 | 68 | 70 | 54 | 68 | 60 | 58 | 55 | 59 | 41 | 68 | 53 | 66 | 60 | 83 | 67 | 88 | 68 | 88 | 69 |
| 23 | 88 | 74 | 90 | 73 | 78 | 69 | 70 | 53 | 63 | 58 | 62 | 56 | 58 | 39 | 62 | 51 | 66 | 53 | 81 | 68 | 83 | 72 | 87 | 69 |
| 24 | 88 | 79 | 92 | 73 | 77 | 69 | 72 | 62 | 62 | 49 | 61 | 58 | 52 | 44 | 67 | 47 | 84 | 57 | 78 | 69 | 92 | 73 | 89 | 69 |
| 25 | 88 | 75 | 86 | 74 | 76 | 70 | 78 | 68 | 65 | 45 | 62 | 57 | 52 | 45 | 60 | 43 | 67 | 55 | 79 | 63 | 99 | 74 | 89 | 72 |
| 26 | 94 | 74 | 82 | 73 | 79 | 72 | 76 | 65 | 62 | 48 | 60 | 54 | 63 | 38 | 51 | 44 | 69 | 49 | 81 | 58 | 95 | 76 | 89 | 73 |
| 27 | 92 | 75 | 86 | 77 | 78 | 71 | 73 | 64 | 69 | 48 | 60 | 52 | 68 | 50 | 53 | 47 | 79 | 57 | 84 | 62 | 93 | 72 | 90 | 73 |
| 28 | 94 | 77 | 87 | 78 | 82 | 71 | 73 | 64 | 60 | 50 | 58 | 50 | 60 | 48 | 62 | 45 | 73 | 63 | 79 | 60 | 87 | 70 | 90 | 76 |
| 29 | 99 | 76 | 88 | 75 | 82 | 67 | 79 | 68 | 56 | 38 | 66 | 52 | 54 | 47 | ..... | ..... | 76 | 60 | 75 | 58 | 85 | 69 | 87 | 75 |
| 30 | 98 | 77 | 89 | 74 | 76 | 68 | 80 | 67 | 43 | 27 | 52 | 47 | 62 | 49 | ..... | ..... | 75 | 60 | 76 | 59 | 86 | 68 | 86 | 74 |
| 31 | 92 | 78 | 91 | 74 | ..... | ..... | 77 | 67 | ..... | ..... | 52 | 44 | 59 | 47 | ..... | ..... | 83 | 66 | ..... | ..... | 91 | 69 | ..... | ..... |
| Range | 32° | | 25° | | 26° | | 31° | | 53° | | 41° | | 41° | | 37° | | 43° | | 37° | | 47° | | 28° | |
| Monthly means | 80°.0 | | 80°.2 | | 76°.7 | | 70°.0 | | 59°.0 | | 52°.6 | | 48°.5 | | 51°.0 | | 61°.4 | | 66°.6 | | 74°.1 | | 78°.2 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, *UMATILLA, OREG.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | ..... | ..... | 93 | 59 | 94 | 57 | 49 | 34 | 52 | 21 | 37 | 30 | 29 | 22 | 52 | 33 | 56 | 40 | 73 | 41 | 65 | 44 | 78 | 55 |
| 2 | ..... | ..... | 82 | 63 | 95 | 59 | 63 | 39 | 51 | 23 | 43 | 31 | 29 | 21 | 58 | 40 | 58 | 28 | 78 | 43 | 70 | 33 | 81 | 49 |
| 3 | ..... | ..... | 76 | 55 | 92 | 60 | 63 | 35 | 50 | 39 | 51 | 34 | 29 | 21 | 50 | 44 | 53 | 37 | 78 | 48 | 76 | 45 | 87 | 49 |
| 4 | ..... | ..... | 80 | 50 | 91 | 54 | 53 | 48 | 47 | 34 | 42 | 22 | 25 | 17 | 63 | 45 | 60 | 42 | 82 | 47 | 76 | 49 | 91 | 55 |
| 5 | ..... | ..... | 89 | 50 | 82 | 62 | 55 | 46 | 51 | 41 | 36 | 22 | 28 | 21 | 51 | 39 | 55 | 36 | 79 | 50 | 74 | 48 | 95 | 55 |
| 6 | ..... | ..... | 95 | 54 | 89 | 55 | 70 | 46 | 53 | 44 | 39 | 31 | 26 | 20 | 52 | 38 | 62 | 40 | 73 | 52 | 76 | 38 | 99 | 61 |
| 7 | ..... | ..... | 99 | 61 | 78 | 46 | 76 | 58 | 57 | 41 | 42 | 32 | 26 | 19 | 49 | 30 | 55 | 33 | 64 | 51 | 83 | 40 | 103 | 62 |
| 8 | ..... | ..... | 93 | 61 | 82 | 49 | 68 | 49 | 56 | 36 | 38 | 32 | 44 | 21 | 46 | 32 | 56 | 32 | 57 | 41 | 88 | 45 | 88 | 65 |
| 9 | ..... | ..... | 92 | 60 | 92 | 53 | 68 | 43 | 56 | 45 | 43 | 33 | 40 | 34 | 45 | 28 | 57 | 27 | 61 | 29 | 92 | 48 | 83 | 57 |
| 10 | ..... | ..... | 95 | 54 | 75 | 56 | 68 | 49 | 52 | 41 | 40 | 35 | 51 | 35 | 51 | 38 | 59 | 38 | 63 | 38 | 88 | 53 | 83 | 53 |
| 11 | ..... | ..... | 96 | 62 | 70 | 41 | 63 | 45 | 56 | 43 | 53 | 29 | 50 | 33 | 52 | 39 | 59 | 36 | 61 | 48 | 78 | 57 | 83 | 53 |
| 12 | ..... | ..... | 102 | 60 | 80 | 53 | 62 | 35 | 55 | 33 | 50 | 32 | 45 | 25 | 54 | 35 | 62 | 36 | 57 | 36 | 75 | 51 | 85 | 48 |
| 13 | ..... | ..... | 102 | 62 | 73 | 57 | 65 | 37 | 52 | 36 | 40 | 31 | 42 | 26 | 52 | 37 | 60 | 43 | 53 | 29 | 78 | 47 | 86 | 60 |
| 14 | ..... | ..... | 101 | 63 | 68 | 56 | 62 | 34 | 57 | 43 | 41 | 29 | 37 | 24 | 53 | 33 | 61 | 45 | 57 | 24 | 73 | 53 | 90 | 53 |
| 15 | 91 | 52 | 101 | 60 | 73 | 59 | 62 | 35 | 59 | 43 | 44 | 30 | 40 | 27 | 51 | 33 | 61 | 46 | 63 | 29 | 61 | 50 | 88 | 56 |
| 16 | 95 | 55 | 103 | 69 | 72 | 36 | 68 | 36 | 54 | 48 | 46 | 30 | 45 | 30 | 47 | 37 | 66 | 49 | 64 | 29 | 65 | 45 | 84 | 61 |
| 17 | 101 | 55 | 94 | 67 | 76 | 37 | 70 | 39 | 55 | 44 | 47 | 35 | 50 | 35 | 51 | 41 | 64 | 44 | 67 | 30 | 79 | 48 | 79 | 57 |
| 18 | 99 | 69 | 100 | 70 | 80 | 43 | 69 | 39 | 64 | 46 | 45 | 33 | 43 | 29 | 51 | 37 | 65 | 46 | 71 | 33 | 72 | 52 | 92 | 56 |
| 19 | 102 | 72 | 96 | 74 | 86 | 48 | 72 | 39 | 56 | 42 | 39 | 27 | 51 | 34 | 53 | 39 | 67 | 40 | 73 | 46 | 72 | 50 | 100 | 56 |
| 20 | 104 | 70 | 89 | 64 | 78 | 57 | 73 | 39 | 48 | 32 | 37 | 32 | 46 | 31 | 51 | 38 | 69 | 45 | 73 | 53 | 79 | 45 | 84 | 72 |
| 21 | 91 | 71 | 90 | 63 | 68 | 43 | 69 | 39 | 48 | 33 | 47 | 32 | 43 | 25 | 52 | 29 | 69 | 43 | 74 | 51 | 85 | 52 | 87 | 57 |
| 22 | 85 | 64 | 87 | 55 | 72 | 35 | 69 | 41 | 54 | 41 | 39 | 27 | 43 | 33 | 58 | 36 | 76 | 42 | 67 | 46 | 84 | 55 | 95 | 50 |
| 23 | 86 | 55 | 82 | 59 | 71 | 38 | 72 | 41 | 53 | 40 | 40 | 34 | 48 | 32 | 57 | 40 | 77 | 43 | 69 | 40 | 83 | 59 | 81 | 65 |
| 24 | 89 | 63 | 81 | 53 | 73 | 54 | 65 | 46 | 56 | 38 | 40 | 34 | 49 | 31 | 55 | 39 | 71 | 48 | 64 | 38 | 86 | 50 | 77 | 48 |
| 25 | 86 | 65 | 80 | 59 | 72 | 53 | 60 | 41 | 57 | 42 | 39 | 33 | 53 | 36 | 56 | 42 | 68 | 52 | 63 | 39 | 91 | 49 | 87 | 59 |
| 26 | 88 | 59 | 83 | 47 | 63 | 44 | 58 | 41 | 47 | 29 | 39 | 32 | 45 | 30 | 58 | 39 | 60 | 46 | 66 | 42 | 74 | 58 | 91 | 56 |
| 27 | 92 | 57 | 85 | 47 | 63 | 49 | 55 | 34 | 41 | 21 | 36 | 31 | 45 | 33 | 58 | 46 | 61 | 39 | 66 | 42 | 65 | 47 | 76 | 56 |
| 28 | 91 | 67 | 89 | 46 | 68 | 53 | 52 | 32 | 39 | 19 | 35 | 31 | 55 | 38 | 56 | 27 | 66 | 38 | 67 | 50 | 71 | 37 | 78 | 54 |
| 29 | 80 | 59 | 87 | 49 | 64 | 47 | 52 | 21 | 38 | 22 | 33 | 29 | 56 | 34 | ..... | ..... | 60 | 48 | 64 | 42 | 72 | 49 | 80 | 52 |
| 30 | 85 | 59 | 87 | 65 | 63 | 34 | 53 | 20 | 40 | 29 | 31 | 24 | 48 | 41 | ..... | ..... | 59 | 34 | 63 | 33 | 75 | 52 | 87 | 49 |
| 31 | 88 | 57 | 91 | 54 | ..... | ..... | 52 | 19 | ..... | ..... | 28 | 23 | 53 | 34 | ..... | ..... | 64 | 35 | ..... | ..... | 74 | 54 | ..... | ..... |
| Range | ..... | ..... | 57° | | 61° | | 57° | | 45° | | 31° | | 39° | | 36° | | 50° | | 58° | | 59° | | 55° | |
| Monthly means | ..... | ..... | 75°.0 | | 61°.5 | | 49°.7 | | 43°.6 | | 35°.2 | | 35°.2 | | 44°.4 | | 51°.6 | | 54°.9 | | 63° | | 72°.1 | |

* Observations commenced July 15, 1877.

*Maximum, minimum, and mean temperature—Continued.*

*STATION, UVALDE, TEX.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | ..... | ..... | 103 | 65 | 101 | 71 | 92 | 62 | 70 | 52 | 55 | 37 | 53 | 29 | 67 | 47 | 76 | 42 | 72 | 53 | 84 | 63 | 91 | 77 |
| 2 | ..... | ..... | 103 | 58 | 106 | 72 | 103 | 71 | 62 | 44 | 55 | 43 | 56 | 35 | 66 | 25 | 74 | 36 | 74 | 42 | 82 | 44 | 95 | 71 |
| 3 | ..... | ..... | 107 | 55 | 102 | 70 | 105 | 56 | 68 | 50 | 68 | 34 | 57 | 26 | 61 | 26 | 75 | 33 | 79 | 41 | (†) | ..... | 96 | 70 |
| 4 | ..... | ..... | 107 | 54 | 104 | 70 | 83 | 58 | 63 | 51 | 78 | 34 | 54 | 25 | 67 | 30 | 76 | 45 | 81 | 42 | ..... | ..... | 88 | 70 |
| 5 | ..... | ..... | 107 | 67 | 101 | 71 | 79 | 56 | 68 | 33 | 57 | 17 | 49 | 32 | 70 | 46 | 75 | 57 | 83 | 51 | ..... | ..... | 88 | 69 |
| 6 | ..... | ..... | 106 | 52 | 92 | 69 | 91 | 66 | 62 | 36 | 59 | 18 | 47 | 30 | 74 | 39 | 71 | 53 | 81 | 58 | 83 | 64 | 89 | 68 |
| 7 | ..... | ..... | 106 | 59 | 92 | 72 | 91 | 52 | 75 | 43 | 62 | 27 | 47 | 32 | 79 | 40 | 76 | 59 | 74 | 53 | 85 | 70 | 87 | 63 |
| 8 | ..... | ..... | 104 | 72 | 97 | 71 | 90 | 66 | 71 | 32 | 62 | 40 | 54 | 39 | 73 | 34 | 77 | 58 | 81 | 50 | 81 | 57 | 81 | 59 |
| 9 | ..... | ..... | 101 | 66 | 101 | 70 | 93 | 67 | 68 | 26 | 63 | 40 | 60 | 39 | 69 | 27 | 71 | 32 | 86 | 50 | 81 | 61 | 89 | 70 |
| 10 | ..... | ..... | 101 | 65 | 101 | 73 | 89 | 53 | 63 | 26 | 63 | 38 | 54 | 42 | 62 | 26 | 77 | 46 | 81 | 50 | 71 | 59 | 96 | 68 |
| 11 | ..... | ..... | 101 | 66 | 92 | 63 | 93 | 62 | 64 | 34 | 68 | 45 | 54 | 42 | 65 | 42 | 78 | 37 | 82 | 57 | 71 | 60 | 86 | 69 |
| 12 | ..... | ..... | 101 | 70 | 96 | 74 | 90 | 62 | 74 | 50 | 69 | 50 | 60 | 31 | 65 | 41 | 82 | 46 | 81 | 62 | 82 | 69 | 86 | 72 |
| 13 | ..... | ..... | 103 | 72 | 98 | 73 | 91 | 71 | 79 | 50 | 65 | 52 | 58 | 27 | 75 | 33 | 82 | 57 | 76 | 63 | 85 | 62 | (†) | ..... |
| 14 | ..... | ..... | 102 | 74 | 101 | 72 | 92 | 69 | 79 | 39 | 67 | 53 | 58 | 26 | 81 | 35 | 76 | 54 | 77 | 57 | 83 | 66 | 95 | 75 |
| 15 | ..... | ..... | 107 | 76 | 102 | 70 | 95 | 61 | 78 | 44 | 67 | 59 | 61 | 37 | 67 | 34 | 71 | 49 | 82 | 59 | 75 | 59 | 97 | 71 |
| 16 | ..... | ..... | 104 | 71 | 95 | 68 | 75 | 58 | 80 | 42 | 74 | 61 | 66 | 42 | 72 | 50 | 81 | 74 | 86 | 64 | 87 | 71 | 95 | 72 |
| 17 | ..... | ..... | 101 | 70 | 95 | 61 | 75 | 55 | 78 | 50 | 75 | 61 | 65 | 48 | 83 | 45 | 83 | 50 | 91 | 66 | 86 | 71 | 100 | 74 |
| 18 | ..... | ..... | 103 | 72 | 91 | 52 | 74 | 46 | 76 | 54 | 74 | 59 | 71 | 33 | 80 | 53 | 74 | 50 | 87 | 69 | 88 | 61 | 99 | 72 |
| 19 | ..... | ..... | 104 | 74 | 93 | 51 | 78 | 33 | 70 | 46 | 77 | 57 | 68 | 31 | 76 | 56 | 65 | 49 | 83 | 70 | 94 | 70 | 99 | 70 |
| 20 | ..... | ..... | 105 | 69 | 92 | 49 | 70 | 35 | 71 | 39 | 71 | 57 | 71 | 32 | 77 | 45 | 69 | 45 | 87 | 69 | 88 | 74 | (†) | ..... |
| 21 | ..... | ..... | 100 | 70 | 95 | 65 | 74 | 37 | 74 | 39 | 74 | 41 | 69 | 28 | 77 | 46 | 76 | 42 | 83 | 71 | 88 | 74 | ..... | ..... |
| 22 | *90 | 54 | 101 | 71 | 93 | 56 | 75 | 41 | 70 | 36 | 70 | 49 | 66 | 26 | 75 | 41 | (†) | ..... | 87 | 56 | 88 | 72 | 97 | 69 |
| 23 | 91 | 42 | 101 | 75 | 91 | 57 | 79 | 58 | 76 | 47 | 69 | 43 | 67 | 26 | 69 | 34 | 76 | 46 | 83 | 42 | 90 | 68 | 96 | 71 |
| 24 | 99 | 47 | 101 | 75 | 92 | 60 | 71 | 59 | 82 | 37 | 68 | 42 | 70 | 36 | 68 | 46 | 80 | 48 | 84 | 46 | 87 | 68 | 97 | 71 |
| 25 | 98 | 63 | 104 | 75 | 94 | 69 | 85 | 46 | 72 | 28 | 69 | 45 | 67 | 48 | 65 | 46 | 68 | 50 | 86 | 53 | 84 | 75 | 95 | 71 |
| 26 | 105 | 60 | 101 | 72 | 92 | 68 | 88 | 46 | 77 | 30 | 68 | 50 | 75 | 37 | 57 | 41 | 77 | 46 | 86 | 59 | 81 | 56 | (†) | ..... |
| 27 | 103 | 56 | 100 | 66 | 96 | 65 | 91 | 60 | 76 | 31 | 60 | 46 | 72 | 35 | 61 | 36 | 87 | 46 | 85 | 53 | 85 | 65 | 97 | 69 |
| 28 | 92 | 53 | 96 | 66 | 93 | 58 | 89 | 60 | 54 | 20 | 55 | 33 | 72 | 43 | 66 | 50 | 82 | 52 | 77 | 54 | 89 | 70 | (†) | ..... |
| 29 | 101 | 52 | 100 | 64 | 98 | 64 | 87 | 62 | 52 | 17 | 48 | 28 | 68 | 33 | ..... | ..... | 83 | 41 | 80 | 53 | 89 | 78 | ..... | ..... |
| 30 | 101 | 64 | 99 | 72 | 95 | 65 | 74 | 54 | 49 | 16 | 59 | 24 | 70 | 29 | ..... | ..... | 80 | 45 | 83 | 61 | 84 | 73 | 94 | 74 |
| 31 | 101 | 52 | 102 | 72 | ..... | ..... | 69 | 61 | ..... | ..... | 50 | 26 | 71 | 34 | ..... | ..... | (†) | ..... | ..... | ..... | 91 | 72 | ..... | ..... |
| Range | ..... | | 55° | | 57° | | 72° | | 68° | | 61° | | 49° | | 56° | | ..... | | 50° | | ..... | | ..... | |
| Monthly means | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | |

* Observation of maximum and minimum thermometers commenced July 22, 1877; only one observation taken daily.

† No observations taken.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, VICKSBURG, MISS.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 93 | 76 | 99 | 77 | 96 | 75 | 84 | 67 | 74 | 57 | 42 | 23 | 53 | 37 | 49 | 39 | 70 | 50 | 71 | 52 | 87 | 62 | 95 | 75 |
| 2 | 93 | 74 | 93 | 74 | 86 | 70 | 82 | 66 | 67 | 52 | 47 | 26 | 55 | 39 | 50 | 33 | 75 | 61 | 72 | 53 | 84 | 65 | 92 | 70 |
| 3 | 96 | 76 | 93 | 74 | 75 | 68 | 86 | 66 | 62 | 47 | 59 | 32 | 46 | 38 | 44 | 38 | 62 | 51 | 68 | 50 | 87 | 64 | 92 | 74 |
| 4 | 96 | 75 | 96 | 75 | 78 | 69 | 75 | 57 | 67 | 43 | 68 | 54 | 47 | 31 | 48 | 37 | 63 | 44 | 66 | 49 | 77 | 60 | 88 | 68 |
| 5 | 99 | 80 | 96 | 76 | 87 | 68 | 70 | 47 | 63 | 48 | 61 | 42 | 41 | 24 | 60 | 32 | 71 | 43 | 74 | 49 | 82 | 56 | 88 | 73 |
| 6 | 98 | 77 | 97 | 75 | 83 | 71 | 75 | 50 | 50 | 42 | 49 | 35 | 43 | 29 | 62 | 36 | 70 | 54 | 83 | 58 | 83 | 59 | 80 | 69 |
| 7 | 95 | 80 | 95 | 73 | 80 | 69 | 71 | 57 | 64 | 37 | 55 | 30 | 39 | 26 | 55 | 47 | 75 | 58 | 70 | 55 | 82 | 63 | 84 | 69 |
| 8 | 98 | 76 | 87 | 74 | 87 | 68 | 72 | 57 | 62 | 49 | 58 | 36 | 44 | 31 | 64 | 43 | 71 | 62 | 68 | 62 | 75 | 62 | 83 | 69 |
| 9 | 96 | 74 | 91 | 73 | 90 | 71 | 77 | 52 | 49 | 43 | 57 | 40 | 57 | 39 | 60 | 45 | 71 | 58 | 86 | 64 | 80 | 62 | 89 | 69 |
| 10 | 93 | 76 | 92 | 70 | 89 | 70 | 80 | 53 | 47 | 39 | 62 | 38 | 57 | 40 | 45 | 37 | 70 | 51 | 76 | 63 | 77 | 58 | 80 | 68 |
| 11 | 93 | 74 | 93 | 71 | 88 | 67 | 78 | 57 | 54 | 32 | 65 | 39 | 61 | 37 | 49 | 33 | 75 | 51 | 74 | 55 | 78 | 58 | 83 | 62 |
| 12 | 91 | 70 | 95 | 73 | 91 | 69 | 81 | 56 | 60 | 34 | 68 | 47 | 62 | 41 | 53 | 32 | 80 | 58 | 81 | 50 | 82 | 63 | 87 | 67 |
| 13 | 93 | 70 | 94 | 73 | 92 | 70 | 77 | 56 | 70 | 42 | 69 | 53 | 55 | 45 | 61 | 44 | 77 | 56 | 79 | 58 | 84 | 61 | 84 | 71 |
| 14 | 95 | 71 | 89 | 71 | 93 | 70 | 85 | 60 | 74 | 58 | 69 | 48 | 49 | 40 | 59 | 48 | 82 | 59 | 73 | 62 | 69 | 57 | 90 | 73 |
| 15 | 93 | 76 | 87 | 68 | 93 | 71 | 86 | 63 | 73 | 60 | 69 | 51 | 52 | 35 | 60 | 46 | 75 | 57 | 85 | 65 | 73 | 49 | 87 | 71 |
| 16 | 91 | 71 | 88 | 67 | 85 | 72 | 80 | 68 | 72 | 50 | 72 | 55 | 55 | 36 | 66 | 43 | 79 | 58 | 83 | 61 | 85 | 61 | 88 | 72 |
| 17 | 92 | 72 | 90 | 68 | 77 | 64 | 81 | 68 | 72 | 49 | 73 | 56 | 58 | 35 | 68 | 50 | 74 | 58 | 84 | 65 | 90 | 69 | 92 | 74 |
| 18 | 92 | 74 | 86 | 70 | 64 | 55 | 73 | 67 | 73 | 51 | 73 | 54 | 62 | 39 | 71 | 50 | 69 | 49 | 80 | 69 | 86 | 67 | 90 | 73 |
| 19 | 89 | 75 | 87 | 68 | 60 | 54 | 67 | 58 | 72 | 55 | 73 | 55 | 65 | 52 | 71 | 50 | 72 | 49 | 85 | 71 | 83 | 66 | 88 | 73 |
| 20 | 84 | 66 | 89 | 69 | 73 | 57 | 67 | 51 | 67 | 58 | 63 | 55 | 55 | 48 | 68 | 58 | 75 | 53 | 83 | 71 | 83 | 68 | 91 | 70 |
| 21 | 82 | 64 | 92 | 69 | 78 | 55 | 58 | 51 | 62 | 54 | 64 | 59 | 59 | 45 | 60 | 56 | 77 | 58 | 82 | 68 | 90 | 68 | 91 | 73 |
| 22 | 85 | 64 | 85 | 70 | 83 | 56 | 57 | 50 | 61 | 48 | 71 | 56 | 58 | 40 | 66 | 48 | 81 | 55 | 85 | 67 | 88 | 71 | 89 | 68 |
| 23 | 86 | 67 | 86 | 66 | 77 | 65 | 65 | 45 | 59 | 47 | 65 | 60 | 58 | 39 | 66 | 49 | 82 | 58 | 76 | 68 | 88 | 71 | 90 | 67 |
| 24 | 87 | 69 | 90 | 67 | 82 | 67 | 69 | 43 | 65 | 40 | 64 | 57 | 63 | 39 | 61 | 41 | 85 | 60 | 78 | 59 | 89 | 73 | 91 | 67 |
| 25 | 78 | 71 | 92 | 66 | 83 | 65 | 68 | 58 | 60 | 47 | 61 | 54 | 68 | 52 | 66 | 41 | 74 | 55 | 82 | 59 | 88 | 72 | 92 | 70 |
| 26 | 88 | 67 | 94 | 71 | 87 | 68 | 73 | 62 | 63 | 41 | 59 | 50 | 71 | 51 | 56 | 45 | 81 | 52 | 82 | 57 | 90 | 70 | 93 | 74 |
| 27 | 91 | 72 | 94 | 70 | 87 | 67 | 78 | 57 | 61 | 45 | 62 | 52 | 64 | 48 | 61 | 37 | 70 | 63 | 84 | 61 | 87 | 68 | 94 | 72 |
| 28 | 93 | 73 | 92 | 72 | 86 | 65 | 78 | 58 | 50 | 37 | 56 | 53 | 61 | 41 | 65 | 42 | 76 | 60 | 81 | 58 | 85 | 65 | 90 | 73 |
| 29 | 95 | 75 | 94 | 72 | 87 | 66 | 77 | 65 | 42 | 27 | 52 | 43 | 61 | 43 | ..... | ..... | 72 | 53 | 78 | 58 | 92 | 68 | 90 | 73 |
| 30 | 97 | 78 | 97 | 74 | 88 | 58 | 68 | 61 | 38 | 23 | 45 | 42 | 50 | 44 | ..... | ..... | 80 | 65 | 83 | 59 | 91 | 71 | 93 | 72 |
| 31 | 99 | 77 | 97 | 75 | ..... | ..... | 69 | 58 | ..... | ..... | 50 | 40 | 51 | 41 | ..... | ..... | 71 | 54 | ..... | ..... | 93 | 71 | ..... | ..... |
| Range | 35° | | 33° | | 42° | | 43° | | 51° | | 50° | | 47° | | 39° | | 42° | | 37° | | 44° | | 33° | |
| Monthly means | 82°.4 | | 81°.1 | | 74°.0 | | 66°.0 | | 53°.3 | | 54°.1 | | 47°.7 | | 51°.3 | | 65°.1 | | 68°.9 | | 73°.9 | | 78°.4 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, VIRGINIA CITY, MONT.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 61 | 38 | 79 | 44 | 77 | 50 | 52 | 32 | 36 | 19 | 30 | 12 | 18 | 8 | 34 | 21 | 36 | 23 | 56 | 32 | 49 | 29 | 53 | 37 |
| 2 | 65 | 43 | 86 | 52 | 64 | 50 | 50 | 28 | 43 | 20 | 29 | 10 | 25 | 7 | 37 | 13 | 37 | 16 | 61 | 36 | 43 | 25 | 60 | 38 |
| 3 | 75 | 44 | 80 | 50 | 66 | 45 | 44 | 25 | 36 | 29 | 30 | 14 | 17 | 2 | 38 | 21 | 43 | 20 | 65 | 38 | 57 | 28 | 67 | 39 |
| 4 | 82 | 50 | 71 | 45 | 70 | 42 | 40 | 32 | 33 | 25 | 22 | 6 | 21 | −4 | 45 | 28 | 40 | 30 | 65 | 40 | 60 | 41 | 68 | 44 |
| 5 | 86 | 49 | 77 | 41 | 73 | 46 | 42 | 30 | 39 | 22 | 23 | 0 | 21 | 1 | 40 | 20 | 39 | 24 | 65 | 45 | 59 | 35 | 64 | 49 |
| 6 | 84 | 55 | 78 | 49 | 67 | 43 | 53 | 38 | 36 | 26 | 38 | 11 | 28 | 9 | 32 | 11 | 45 | 22 | 54 | 42 | 47 | 31 | 66 | 44 |
| 7 | 80 | 47 | 79 | 50 | 57 | 33 | 58 | 38 | 34 | 23 | 32 | 20 | 27 | 10 | 29 | 19 | 36 | 22 | 58 | 30 | 58 | 40 | 74 | 47 |
| 8 | 80 | 56 | 88 | 50 | 69 | 33 | 55 | 43 | 40 | 20 | 40 | 25 | 39 | 19 | 25 | 11 | 34 | 11 | 52 | 26 | 57 | 38 | 77 | 50 |
| 9 | 86 | 58 | 84 | 57 | 79 | 44 | 57 | 34 | 45 | 25 | 45 | 26 | 38 | 19 | 23 | 10 | 35 | 14 | 38 | 21 | 61 | 38 | 79 | 54 |
| 10 | 89 | 59 | 83 | 55 | 82 | 50 | 67 | 37 | 48 | 29 | 51 | 28 | 41 | 26 | 33 | 11 | 36 | 23 | 49 | 19 | 70 | 38 | 75 | 50 |
| 11 | 85 | 57 | 82 | 56 | 71 | 46 | 58 | 39 | 51 | 33 | 42 | 27 | 31 | 17 | 40 | 29 | 36 | 25 | 46 | 38 | 60 | 42 | 75 | 51 |
| 12 | 78 | 51 | 80 | 58 | 52 | 40 | 49 | 37 | 45 | 33 | 39 | 22 | 26 | 7 | 38 | 19 | 41 | 27 | 44 | 29 | 60 | 40 | 64 | 44 |
| 13 | 80 | 48 | 83 | 54 | 55 | 40 | 43 | 38 | 39 | 26 | 44 | 25 | 25 | 4 | 32 | 11 | 43 | 27 | 45 | 25 | 59 | 32 | 47 | 35 |
| 14 | 73 | 60 | 80 | 55 | 48 | 34 | 41 | 33 | 40 | 25 | 42 | 24 | 31 | 12 | 36 | 13 | 48 | 29 | 40 | 26 | 54 | 41 | 62 | 40 |
| 15 | 72 | 43 | 82 | 52 | 45 | 40 | 49 | 25 | 48 | 28 | 42 | 24 | 38 | 16 | 32 | 20 | 54 | 38 | 41 | 24 | 52 | 38 | 69 | 42 |
| 16 | 80 | 46 | 84 | 54 | 50 | 35 | 52 | 30 | 49 | 29 | 43 | 29 | 40 | 19 | 36 | 10 | 56 | 37 | 29 | 21 | 43 | 30 | 74 | 50 |
| 17 | 79 | 61 | 83 | 63 | 62 | 28 | 57 | 33 | 51 | 29 | 40 | 29 | 38 | 29 | 45 | 20 | 59 | 39 | 35 | 20 | 44 | 28 | 67 | 50 |
| 18 | 81 | 57 | 80 | 56 | 67 | 38 | 57 | 37 | 41 | 24 | 39 | 30 | 35 | 14 | 43 | 34 | 60 | 39 | 39 | 22 | 50 | 31 | 64 | 46 |
| 19 | 83 | 62 | 72 | 52 | 75 | 41 | 56 | 34 | 40 | 29 | 41 | 22 | 30 | 21 | 40 | 30 | 55 | 39 | 48 | 27 | 53 | 32 | 70 | 46 |
| 20 | 88 | 56 | 70 | 47 | 79 | 45 | 57 | 32 | 32 | 10 | 33 | 23 | 25 | 11 | 38 | 20 | 58 | 37 | 42 | 32 | 53 | 39 | 80 | 50 |
| 21 | 94 | 63 | 71 | 45 | 60 | 50 | 56 | 32 | 27 | 12 | 37 | 13 | 29 | 11 | 34 | 18 | 61 | 38 | 47 | 33 | 55 | 42 | 82 | 50 |
| 22 | 88 | 67 | 78 | 43 | 56 | 35 | 53 | 34 | 37 | 14 | 27 | 5 | 41 | 19 | 32 | 11 | 60 | 39 | 53 | 35 | 56 | 37 | 80 | 53 |
| 23 | 83 | 54 | 80 | 45 | 57 | 38 | 53 | 32 | 35 | 25 | 30 | 12 | 35 | 25 | 35 | 11 | 62 | 39 | 54 | 33 | 58 | 36 | 75 | 56 |
| 24 | 76 | 57 | 78 | 44 | 60 | 34 | 53 | 37 | 35 | 11 | 30 | 17 | 40 | 20 | 41 | 16 | 64 | 42 | 62 | 33 | 61 | 40 | 72 | 46 |
| 25 | 74 | 48 | 64 | 44 | 64 | 35 | 47 | 33 | 38 | 19 | 23 | 12 | 34 | 20 | 47 | 26 | 58 | 40 | 57 | 42 | 68 | 40 | 73 | 52 |
| 26 | 58 | 43 | 62 | 37 | 59 | 38 | 36 | 29 | 28 | 13 | 23 | 11 | 35 | 23 | 48 | 26 | 59 | 36 | 58 | 37 | 70 | 45 | 81 | 49 |
| 27 | 69 | 44 | 69 | 39 | 56 | 32 | 36 | 22 | 16 | 4 | 19 | 9 | 37 | 20 | 49 | 36 | 50 | 35 | 51 | 35 | 58 | 39 | 85 | 52 |
| 28 | 80 | 48 | 78 | 41 | 65 | 44 | 28 | 21 | 10 | −6 | 27 | 15 | 37 | 30 | 42 | 29 | 42 | 29 | 58 | 38 | 55 | 41 | 68 | 46 |
| 29 | 79 | 49 | 82 | 44 | 53 | 36 | 26 | 13 | 20 | −2 | 20 | 8 | 39 | 23 | ..... | ..... | 47 | 28 | 51 | 35 | 52 | 37 | 57 | 38 |
| 30 | 57 | 38 | 75 | 51 | 48 | 27 | 32 | 15 | 32 | 8 | 17 | 4 | 43 | 20 | ..... | ..... | 47 | 34 | 44 | 25 | 55 | 30 | 66 | 42 |
| 31 | 69 | 39 | 77 | 48 | ..... | ..... | 34 | 17 | ..... | ..... | 16 | 0 | 39 | 27 | ..... | ..... | 50 | 29 | ..... | ..... | 57 | 35 | ..... | ..... |
| Range | 56° | | 51° | | 55° | | 54° | | 57° | | 51° | | 47° | | 39° | | 53° | | 46° | | 45° | | 50° | |
| Monthly means | 65°.2 | | 65°.2 | | 51°.7 | | 39°.1 | | 28°.1 | | 24°.0 | | 23°.1 | | 27°.9 | | 37°.8 | | 39°.8 | | 45°.5 | | 58°.6 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, VISALIA, CAL.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 93 | 58 | 99 | 56 | 88 | 63 | 80 | 47 | 66 | 35 | 57 | 38 | 49 | 29 | 58 | 38 | 57 | 36 | 73 | 45 | 77 | 51 | 78 | 47 |
| 2 | 97 | 57 | 98 | 62 | 94 | 55 | 74 | 53 | 67 | 35 | 53 | 42 | 49 | 27 | 58 | 37 | 62 | 39 | 76 | 49 | 81 | 48 | 85 | 49 |
| 3 | 91 | 61 | 93 | 57 | 95 | 58 | 76 | 42 | 59 | 46 | 54 | 34 | 48 | 27 | 63 | 39 | 67 | 43 | 69 | 49 | 88 | 53 | 91 | 54 |
| 4 | 90 | 57 | 95 | 52 | 99 | 62 | 79 | 46 | 61 | 35 | 54 | 33 | 49 | 24 | 60 | 45 | 57 | 41 | 66 | 45 | 91 | 55 | 95 | 58 |
| 5 | 90 | 56 | 95 | 53 | 101 | 61 | 80 | 48 | 66 | 44 | 58 | 35 | 54 | 30 | 53 | 43 | 59 | 38 | 73 | 45 | 90 | 57 | 97 | 61 |
| 6 | 91 | 55 | 97 | 58 | 93 | 57 | 84 | 55 | 69 | 50 | 60 | 31 | 57 | 36 | 56 | 37 | 62 | 43 | 78 | 52 | 82 | 55 | 97 | 66 |
| 7 | 97 | 55 | 99 | 56 | 92 | 54 | 88 | 57 | 66 | 41 | 58 | 37 | 62 | 45 | 54 | 37 | 57 | 42 | 78 | 54 | 78 | 53 | 89 | 61 |
| 8 | 102 | 57 | 99 | 57 | 96 | 59 | 90 | 55 | 72 | 41 | 57 | 35 | 65 | 42 | 57 | 42 | 56 | 37 | 81 | 56 | 79 | 51 | 93 | 62 |
| 9 | 101 | 62 | 99 | 58 | 101 | 59 | 90 | 56 | 70 | 44 | 60 | 34 | 63 | 41 | 56 | 36 | 60 | 38 | 74 | 52 | 85 | 54 | 94 | 63 |
| 10 | 99 | 63 | 97 | 58 | 95 | 57 | 87 | 59 | 78 | 46 | 64 | 33 | 54 | 43 | 57 | 36 | 62 | 40 | 79 | 51 | 88 | 55 | 100 | 63 |
| 11 | 102 | 61 | 99 | 58 | 82 | 59 | 75 | 50 | 73 | 46 | 68 | 38 | 52 | 36 | 62 | 38 | 64 | 43 | 79 | 52 | 83 | 55 | 92 | 59 |
| 12 | 106 | 66 | 100 | 58 | 77 | 48 | 68 | 48 | 57 | 49 | 61 | 34 | 56 | 32 | 56 | 41 | 66 | 44 | 70 | 50 | 82 | 54 | 89 | 59 |
| 13 | 105 | 70 | 103 | 59 | 81 | 46 | 71 | 44 | 59 | 38 | 66 | 33 | 57 | 32 | 57 | 46 | 66 | 45 | 60 | 44 | 84 | 54 | 95 | 62 |
| 14 | 106.5 | 69 | 103 | 59 | 86 | 52 | 69 | 45 | 61 | 39 | 58 | 48 | 61 | 44 | 53 | 40 | 70 | 51 | 58 | 41 | 79 | 50 | 96 | 64 |
| 15 | 103 | 68 | 102 | 62 | 92 | 55 | 73 | 46 | 63 | 40 | 66 | 47 | 59 | 48 | 56 | 45 | 73 | 50 | 60 | 43 | 86 | 54 | 93 | 61 |
| 16 | 97 | 72 | 100 | 63 | 95 | 58 | 77 | 45 | 67 | 42 | 65 | 46 | 69 | 47 | 66 | 44 | 72 | 51 | 56 | 42 | 76 | 54 | 86 | 56 |
| 17 | 95 | 63 | 97 | 62 | 98 | 59 | 78 | 47 | 60 | 44 | 63 | 42 | 56 | 43 | 66 | 52 | 71 | 52 | 63 | 43 | 78 | 46 | 84 | 53 |
| 18 | 98 | 65 | 96 | 62 | 98 | 59 | 79 | 44 | 63 | 39 | 56 | 46 | 57 | 38 | 59 | 51 | 66 | 53 | 68 | 39 | 83 | 45 | 92 | 58 |
| 19 | 102 | 63 | 91 | 58 | 96 | 60 | 78 | 43 | 63 | 38 | 58 | 46 | 58 | 37 | 58 | 49 | 69 | 45 | 58 | 49 | 78 | 57 | 97 | 59 |
| 20 | 89 | 62 | 92 | 58 | 89 | 60 | 80 | 46 | 60 | 40 | 56 | 48 | 59 | 37 | 56 | 41 | 74 | 49 | 59 | 44 | 71 | 51 | 96 | 61 |
| 21 | 105 | 69 | 94 | 55 | 84 | 53 | 72 | 42 | 60 | 36 | 58 | 44 | 62 | 37 | 58 | 46 | 66 | 50 | 60 | 49 | 71 | 49 | 96 | 64 |
| 22 | 101 | 67 | 95 | 53 | 81 | 51 | 68 | 42 | 61 | 37 | 58 | 41 | 64 | 46 | 60 | 45 | 65 | 47 | 67 | 46 | 73 | 48 | 95 | 66 |
| 23 | 102 | 68 | 92 | 61 | 77 | 46 | 70 | 49 | 63 | 40 | 51 | 37 | 60 | 45 | 65 | 45 | 73 | 46 | 74 | 51 | 82 | 49 | 91 | 60 |
| 24 | 99 | 63 | 91 | 59 | 79 | 46 | 71 | 46 | 62 | 37 | 50 | 37 | 61 | 47 | 58 | 50 | 63 | 53 | 76 | 52 | 92 | 56 | 96 | 61 |
| 25 | 97 | 61 | 90 | 63 | 84 | 50 | 74 | 48 | 60 | 36 | 51 | 39 | 55 | 44 | 57 | 44 | 63 | 44 | 72 | 50 | 97 | 62 | 97 | 63 |
| 26 | 96 | 59 | 92 | 58 | 85 | 49 | 72 | 56 | 62 | 38 | 51 | 32 | 57 | 37 | 61 | 46 | 63 | 41 | 65 | 45 | 97 | 63 | 101 | 64 |
| 27 | 100 | 65 | 94 | 53 | 87 | 53 | 65 | 45 | 64 | 37 | 49 | 36 | 56 | 39 | 59 | 38 | 57 | 49 | 71 | 43 | 90 | 60 | 101 | 67 |
| 28 | 100 | 62 | 94 | 54 | 90 | 55 | 61 | 37 | 66 | 38 | 53 | 35 | 57 | 47 | 56 | 39 | 59 | 49 | 77 | 49 | 78 | 53 | 91 | 59 |
| 29 | 98 | 61 | 88 | 55 | 87 | 51 | 58 | 32 | 65 | 38 | 54 | 36 | 64 | 44 | ..... | ..... | 61 | 45 | 80 | 51 | 75 | 45 | 90 | 60 |
| 30 | 94 | 62 | 89 | 56 | 83 | 53 | 60 | 33 | 62 | 38 | 53 | 37 | 63 | 45 | ..... | ..... | 61 | 48 | 80 | 52 | 73 | 46 | 98 | 58 |
| 31 | 98 | 58 | 94 | 56 | ..... | ..... | 62 | 34 | ..... | ..... | 52 | 31 | 61 | 41 | ..... | ..... | 66 | 43 | ..... | ..... | 71 | 51 | ..... | ..... |
| Range | 51°.5 | | 51° | | 55° | | 58° | | 43° | | 37° | | 45°. | | 30° | | 38° | | 42° | | 5 ° | | 54° | |
| Monthly means | 81°.6 | | 78°.7 | | 72°.1 | | 59°.7 | | 51°.1 | | 46°.8 | | 48°.3 | | 50°.3 | | 54°.6 | | 58°.8 | | 68°.5 | | 78°.2 | |

*Maximum, minimum, and mean temperatures—Continued.*

STATION, WASHINGTON, D. C.

| Day of month. | 1877. July. | | August. | | September. | | October. | | November. | | December. | | 1878. January. | | February. | | March. | | April. | | May. | | June. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 94 | 74 | 78 | 69 | 87 | 71 | 78 | 52 | 58 | 39 | 37 | 21 | 39 | 22 | 36 | 31 | 54 | 37 | 60 | 44 | 80 | 50 | 65 | 55 |
| 2 | 84 | 73 | 76 | 67 | 77 | 62 | 77 | 56 | 68 | 47 | 36.5 | 25 | 43 | 26 | 37 | 30 | 59 | 37 | 62 | 43 | 87 | 58.5 | 66 | 60 |
| 3 | 85 | 67.5 | 86 | 69 | 71 | 56.5 | 77 | 58.5 | 55 | 41 | 43.5 | 22 | 30 | 17 | 35 | 24 | 61 | 50 | 64 | 43 | 84.5 | 64.5 | 80 | 60 |
| 4 | 82 | 68.5 | 81 | 67 | 79 | 55 | 71 | 56.5 | 55 | 32.5 | 46 | 29 | 36 | 22 | 38 | 20 | 50 | 33.5 | 53 | 46 | 80 | 58 | 87 | 65 |
| 5 | 86 | 63 | 81 | 61 | 77 | 60 | 61 | 48 | 53 | 42.5 | 59 | 40.5 | 33 | 15 | 41 | 26.5 | 52 | 29.5 | 65 | 43.5 | 65.5 | 51.5 | 75 | 57 |
| 6 | 80.5 | 65.5 | 89 | 63 | 69 | 63 | 63 | 44 | 51 | 33.5 | 48 | 37 | 28 | 5 | 49 | 23.5 | 64 | 38 | 59.5 | 47.5 | 71 | 47 | 70.5 | 48.5 |
| 7 | 85 | 64 | 87.5 | 70 | 65 | 60 | 61 | 40.5 | 50 | 28 | 43.5 | 33 | 18 | 6.5 | 54 | 26 | 73 | 51 | 60.5 | 43 | 80 | 50 | 75 | 49 |
| 8 | 88 | 66 | 88 | 69 | 63 | 57.5 | 66 | 52 | 65 | 34.5 | 50 | 31 | 28 | 0.0 | 54 | 39.5 | 71.5 | 43.5 | 67 | 42.5 | 83.5 | 61 | 69 | 61 |
| 9 | 93 | 70 | 80.5 | 72 | 75 | 52 | 67 | 51 | 66.5 | 50.5 | 39 | 27 | 32.5 | 21.5 | 58 | 42.5 | 68 | 40.5 | 59 | 48.5 | 75 | 60 | 75.5 | 60 |
| 10 | 88.5 | 73.5 | 88 | 68 | 76 | 54 | 69 | 44.5 | 51 | 34.5 | 49 | 24 | 44 | 32.5 | 57 | 41 | 67.5 | 43.5 | 60.5 | 49 | 69 | 51 | 73 | 57 |
| 11 | 84 | 67.5 | 86 | 63 | 71 | 65 | 62 | 49.5 | 43 | 35 | 60 | 32.5 | 44.5 | 37 | (*) | 29 | 72 | 46 | 72 | 56 | 58 | 45.5 | 70 | 52 |
| 12 | 83 | 64.5 | 88.5 | 66 | 76 | 68 | 59 | 47 | 55 | 31.5 | 58 | 36 | 48 | 35 | 41 | 24.5 | 46 | 40 | 71 | 48 | 54.5 | 42 | 73 | 52 |
| 13 | 84.5 | 62 | 81 | 71 | 73 | 68 | 64 | 42.5 | 60 | 31 | 63 | 40 | 42.5 | 29 | 52.5 | 32.5 | 67 | 38 | 71.5 | 53 | 61 | 39 | 76 | 52 |
| 14 | 83.5 | 62.5 | 85.5 | 70 | 81 | 67 | 73 | 45.5 | 60 | 32 | 49 | 35 | 45 | 38 | 41 | 34 | 59 | 46.5 | 65.5 | 49 | 49.5 | 45 | 78.5 | 57 |
| 15 | 91.5 | 68.5 | 85 | 69 | 84 | 69 | 77 | 49 | 65 | 46 | 55 | 28.5 | 43.5 | 36 | 39.5 | 30.5 | 51 | 40 | 55 | 47.5 | 54.5 | 42 | 82 | 55 |
| 16 | 94.5 | 71.5 | 85 | 64 | 85 | 69 | 80 | 54 | 66 | 48 | 64.5 | 44 | 39 | 29.5 | 50.5 | 34 | 56 | 37 | 54 | 47.5 | 67 | 43.5 | 83 | 61 |
| 17 | 88 | 73.5 | 82 | 64 | 84 | 67.5 | 69.5 | 54 | 64.5 | 42.5 | 61 | 37.5 | 41.5 | 26 | 50 | 35 | 55 | 44 | 62 | 42.5 | 58 | 52 | 85 | 67 |
| 18 | 88 | 71.5 | 85.5 | 65 | 70 | 58 | 74 | 51.5 | 53 | 38 | 55.5 | 38.5 | 47 | 27 | 46 | 29 | 57.5 | 40.5 | 65 | 43 | 70 | 48.5 | 69 | 60 |
| 19 | 80 | 73 | 89.5 | 62 | 68.5 | 55 | 77 | 57 | 46 | 32 | 51.5 | 36 | 51.5 | 27 | 38.5 | 20.5 | 64 | 41.5 | 72 | 46 | 71 | 48 | 77 | 56.5 |
| 20 | 77 | 71 | 86.5 | 65.5 | 66.5 | 54.5 | 77 | 64.5 | 43 | 31 | 66.5 | 38 | 47 | 39.5 | 55.0 | 31.5 | 57 | 46 | 79 | 55 | 69 | 57 | 81 | 56 |
| 21 | 82.5 | 70 | 90 | 64 | 71.5 | 52.5 | 66.5 | 53.5 | 42 | 31 | 53 | 41.5 | 46 | 41.5 | 66 | 43 | 58 | 36.5 | 81 | 63 | 80 | 63 | 75 | 64 |
| 22 | 83 | 71 | 86.5 | 66 | 70 | 47 | 57 | 44.5 | 51.5 | 37.5 | 49 | 42 | 52.5 | 38.0 | 67 | 54 | 57 | 41.5 | 77 | 55 | 70 | 54 | 77 | 62 |
| 23 | 83.5 | 72 | 81.5 | 67 | 73.5 | 44.5 | 68 | 39.5 | 58 | 49.5 | 50 | 43 | 45 | 21 | 54.5 | 43 | 67.5 | 40 | 84 | 57 | 75 | 46.5 | 74 | 59 |
| 24 | 85 | 74.5 | 87 | 73 | 78 | 50 | 72 | 42.5 | 61 | 55.5 | 46 | 41.5 | 38.5 | 17 | 47.5 | 38 | 62 | 26 | 77.5 | 62 | 68 | 54 | 79 | 58 |
| 25 | 90.5 | 74.5 | 87 | 68 | 80 | 56 | 71 | 45.5 | 59 | 50.5 | 47 | 43 | 52 | 28 | 46 | 33 | 34 | 21.5 | 70 | 59 | 79 | 60.5 | 85 | 63 |
| 26 | 96 | 72 | 87.5 | 66.5 | 82.5 | 57.5 | 62 | 49.5 | 60.5 | 49.5 | 44 | 40.5 | 59.5 | 40 | 44 | 29.5 | 50 | 25 | 76.5 | 54.5 | 78.5 | 63.5 | 87 | 66 |
| 27 | 98 | 75 | 91 | 66 | 80.5 | 61 | 52.5 | 46.5 | 52.5 | 44 | 49 | 41 | 45 | 36 | 56 | 34 | 72.5 | 42 | 79 | 55.5 | 78 | 61 | 95 | 67 |
| 28 | 95 | 71.5 | 92 | 68 | 76 | 67 | 60 | 52 | 53 | 38 | 53 | 37 | 43 | 29 | 61 | 32 | 67.5 | 56 | 65 | 52 | 78 | 58 | 87 | 72 |
| 29 | 89 | 70 | 94 | 70 | 78.5 | 64.5 | 74.5 | 53 | 46 | 29.5 | 48 | 32.5 | 31 | 19 | ..... | ..... | 60 | 46 | 66.5 | 53 | 75 | 58 | 87 | 70.5 |
| 30 | 90 | 74 | 89.5 | 73 | 75 | 58 | 64 | 52 | 29.5 | 22 | 41 | 35 | 32 | 21 | ..... | ..... | 54 | 35 | 70 | 49 | 87 | 57 | 84 | 70 |
| 31 | 85.5 | 72.5 | 91.5 | 73.5 | ..... | ..... | 58.5 | 43.5 | ..... | ..... | 39 | 30 | 39 | 26 | ..... | ..... | 49 | 42 | ..... | ..... | 66 | 53.5 | ..... | ..... |
| Range | 36° | | 33° | | 42°.5 | | 40°.5 | | 46° | | 45°.5 | | 50°.5 | | 47° | | 71°.5 | | 41°.5 | | 48° | | 46.°5 | |
| Monthly means | 78°.0 | | 76°.1 | | 67°.0 | | 58°.6 | | 46°.7 | | 42°.7 | | 33°.7 | | 39°.8 | | 49°.6 | | 58°.4 | | 62°.8 | | 68°.9 | |

* Maximum thermometer not set.

*Maximum, minimum, and mean temperatures*—Continued.

STATION, WICKENBURG, ARIZ.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | ..... | ..... | 109 | 37 | 107 | 66 | 94 | 53 | 66 | 27 | 67 | 21 | 50 | 22 | 66 | 26 | 59 | 42 | 74 | 54 | 84 | 58 | 84 | 58 |
| 2 | ..... | ..... | 107 | 43 | 106 | 68 | 93 | 51 | 76 | 28 | 56 | 21 | 46 | 20 | 65 | 28 | 66 | 45 | 77 | 62 | 86 | 46 | 88 | 47 |
| 3 | ..... | ..... | 108 | 44 | 101 | 67 | 92 | 50 | 72 | 30 | 60 | 20 | 49 | 15 | 67 | 25 | 69 | 49 | 80 | 54 | 87 | 48 | 93 | 47 |
| 4 | ..... | ..... | (†) | ..... | 100 | 64 | 92 | 49 | 70 | 30 | 57 | 19 | 52 | 16 | 69 | 28 | 68 | 46 | 83 | 57 | 91 | 48 | 95 | 51 |
| 5 | ..... | ..... | ..... | ..... | 103 | 60 | 94 | 47 | 76 | 27 | 58 | 30 | 55 | 24 | 62 | 27 | 69 | 46 | 90 | 59 | 93 | 48 | 96 | 53 |
| 6 | ..... | ..... | ..... | ..... | 103 | 62 | 92 | 46 | 73 | 30 | 67 | 18 | 60 | 22 | 65 | 24 | 68 | 51 | 82 | 58 | 87 | 50 | 96 | 53 |
| 7 | ..... | ..... | ..... | ..... | 103 | 62 | 94 | 47 | 72 | 33 | 72 | 19 | 60 | 25 | 60 | 30 | 66 | 43 | 86 | 66 | 87 | 49 | 89 | 50 |
| 8 | ..... | ..... | ..... | ..... | 105 | 62 | 94 | 49 | 73 | 37 | 63 | 37 | 63 | 26 | 62 | 21 | 61 | 49 | 79 | 65 | 90 | 52 | 98 | 59 |
| 9 | ..... | ..... | ..... | ..... | 104 | 59 | 96 | 48 | 76 | 27 | 70 | 30 | 65 | 27 | 61 | 20 | 64 | 45 | 78 | 57 | 95 | 53 | (†) | ..... |
| 10 | ..... | ..... | ..... | ..... | 101 | 78 | 95 | 48 | 79 | 28 | 72 | 22 | 66 | 29 | 62 | 21 | 65 | 40 | 78 | 55 | 93 | 58 | ..... | ..... |
| 11 | ..... | ..... | ..... | ..... | 92 | 67 | 90 | 43 | 78 | 29 | 69 | 26 | 60 | 29 | 65 | 19 | 69 | 43 | 83 | 61 | 93 | 55 | ..... | ..... |
| 12 | ..... | ..... | ..... | ..... | 82 | 64 | 89 | 41 | 67 | 38 | 70 | 30 | 60 | 24 | 63 | 26 | 71 | 45 | 81 | 70 | 93 | 55 | 94 | 50 |
| 13 | ..... | ..... | 112 | 46 | 83 | 57 | 69 | 37 | 68 | 30 | 74 | 28 | 62 | 23 | 55 | 23 | 74 | 51 | 75 | 65 | 91 | 50 | 94 | 50 |
| 14 | ..... | ..... | 113 | 50 | 89 | 46 | 55 | 38 | 73 | 28 | 73 | 30 | 60 | 25 | 64 | 25 | 75 | 53 | 67 | 53 | 91 | 51 | 98 | 53 |
| 15 | ..... | ..... | 101 | 74 | 95 | 51 | 63 | 39 | 78 | 34 | 62 | 30 | 62 | 19 | 67 | 30 | 83 | 54 | 67 | 59 | 91 | 51 | 85 | 56 |
| 16 | ..... | ..... | 104 | 76 | 99 | 52 | 72 | 39 | 80 | 34 | 65 | 37 | 65 | 29 | 69 | 38 | 85 | 65 | 61 | 34 | 89 | 50 | 95 | 53 |
| 17 | ..... | ..... | 105 | 70 | 101 | 55 | 77 | 40 | 75 | 33 | 67 | 34 | 65 | 28 | 73 | 33 | 85 | 64 | 61 | 47 | 79 | 54 | 97 | 54 |
| 18 | ..... | ..... | 104 | 67 | 100 | 58 | 80 | 38 | 69 | 35 | (†) | ..... | 62 | 29 | 72 | 34 | 71 | 54 | 68 | 50 | 83 | 40 | 99 | 52 |
| 19 | ..... | ..... | 105 | 62 | 101 | 56 | 80 | 41 | 73 | 30 | ..... | ..... | 66 | 30 | 69 | 46 | 77 | 52 | 75 | 62 | 85 | 44 | 101 | 52 |
| 20 | ..... | ..... | 105 | 60 | 100 | 57 | 79 | 36 | 71 | 27 | 60 | 31 | 68 | 30 | (†) | ..... | 80 | 55 | 62 | 51 | 78 | 58 | 104 | 53 |
| 21 | ..... | ..... | 107 | 53 | 96 | 59 | 80 | 37 | 70 | 27 | 60 | 30 | 66 | 27 | ..... | ..... | 79 | 65 | 58 | 42 | 73 | 49 | 104 | 59 |
| 22 | (*) | ..... | (†) | ..... | 95 | 47 | 79 | 35 | 71 | 26 | 61 | 30 | 67 | 30 | 63 | 38 | 73 | 52 | 65 | 48 | 77 | 40 | 101 | 49 |
| 23 | 109 | 50 | ..... | ..... | 90 | 42 | 79 | 46 | 72 | 27 | 60 | 27 | 68 | 30 | 63 | 27 | 80 | 55 | 74 | 57 | 86 | 45 | 99 | 54 |
| 24 | 103 | 48 | 106 | 52 | 87 | 41 | 77 | 40 | 75 | 30 | 38 | 30 | 65 | 29 | 68 | 33 | 81 | 68 | 78 | 55 | 70 | 47 | 101 | 52 |
| 25 | 104 | 59 | 106 | 55 | 92 | 43 | 78 | 37 | 75 | 45 | 42 | 30 | 61 | 32 | 70 | 38 | 75 | 57 | 80 | 51 | 92 | 52 | 102 | 56 |
| 26 | 105 | 49 | 107 | 53 | 94 | 45 | 79 | 36 | 78 | 29 | 51 | 31 | 64 | 25 | 67 | 32 | 68 | 47 | 80 | 60 | 96 | 52 | 104 | 60 |
| 27 | 106 | 42 | 107 | 56 | 96 | 44 | 77 | 37 | 69 | 40 | 49 | 25 | 65 | 26 | 64 | 34 | 70 | 56 | 81 | 59 | 93 | 56 | 104 | 61 |
| 28 | 110 | 40 | 108 | 56 | 98 | 50 | 73 | 33 | 60 | 28 | 50 | 25 | 69 | 30 | 51 | 33 | 59 | 46 | 82 | 58 | 89 | 52 | 103 | 54 |
| 29 | 106 | 44 | 106 | 59 | 98 | 58 | 72 | 30 | 64 | 18 | 52 | 23 | 68 | 30 | ..... | ..... | 61 | 45 | 89 | 62 | 85 | 51 | 100 | 55 |
| 30 | 106 | 43 | 106 | 60 | 98 | 53 | 62 | 31 | 66 | 21 | 53 | 24 | 67 | 26 | ..... | ..... | 62 | 50 | 89 | 68 | 86 | 46 | 101 | 57 |
| 31 | 106 | 30 | 111 | 61 | ..... | ..... | 63 | 23 | ..... | ..... | 53 | 24 | 66 | 28 | ..... | ..... | 67 | 57 | ..... | ..... | 85 | 46 | ..... | ..... |
| Range | ..... | ..... | ..... | ..... | 66° | | 73° | | 62° | | ..... | ..... | 53° | | ..... | ..... | 45° | | 56° | | 50° | | ..... | ..... |
| Monthly means | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |

* Observations of maximum and minimum thermometer commenced July 23, 1877.

† No observations taken.

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, WILMINGTON, N. C.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 89 | 72 | 85 | 73 | 88 | 72 | 81 | 64 | 70 | 57 | 46 | 27 | 50 | 32 | 52 | 42 | 68 | 35 | 65 | 49 | 78 | 57 | 76 | 55 |
| 2 | 96 | 75 | 89 | 73 | 86 | 69 | 81 | 65 | 83 | 59 | 43 | 25 | 56 | 36 | 50 | 39 | 66 | 49 | 70 | 44 | 83 | 62 | 74 | 56 |
| 3 | 97 | 74 | 84 | 74 | 80 | 64 | 79 | 69 | 65 | 43 | 50 | 28 | 44 | 33 | 44 | 36 | 71 | 54 | 62 | 53 | 81 | 66 | 84 | 59 |
| 4 | 97 | 71 | 87 | 71 | 82 | 62 | 77 | 69 | 66 | 42 | 64 | 44 | 65 | 39 | 49 | 34 | 54 | 44 | 56 | 45 | 77 | 69 | 90 | 70 |
| 5 | 88 | 73 | 86 | 71 | 84 | 64 | 72 | 55 | 71 | 47 | 68 | 39 | 42 | 30 | 50 | 33 | 55 | 34 | 66 | 42 | 73 | 52 | 86 | 69 |
| 6 | 84 | 72 | 86 | 71 | 90 | 72 | 67 | 49 | 64 | 41 | 71 | 39 | 42 | 24 | 55 | 33 | 66 | 40 | 66 | 40 | 76 | 51 | 74 | 59 |
| 7 | 85 | 67 | 86 | 76 | 84 | 71 | 73 | 51 | 68 | 35 | 50 | 32 | 31 | 24 | 66 | 38 | 72 | 52 | 69 | 46 | 81 | 62 | 70 | 52 |
| 8 | 86 | 64 | 90 | 75 | 81 | 63 | 75 | 55 | 75 | 51 | 60 | 34 | 45 | 21 | 67 | 50 | 73 | 52 | 71 | 45 | 89 | 63 | 84 | 61 |
| 9 | 91 | 68 | 90 | 74 | 78 | 58 | 74 | 61 | 75 | 58 | 46 | 35 | 60 | 36 | 63 | 47 | 72 | 53 | 69 | 61 | 83 | 67 | 88 | 67 |
| 10 | 94 | 73 | 91 | 72 | 81 | 61 | 75 | 55 | 58 | 45 | 60 | 29 | 57 | 46 | 66 | 48 | 75 | 55 | 74 | 62 | 81 | 59 | 85 | 66 |
| 11 | 90 | 73 | 92 | 70 | 84 | 62 | 72 | 57 | 54 | 41 | 67 | 38 | 53 | 38 | 52 | 39 | 64 | 59 | 84 | 57 | 74 | 55 | 81 | 58 |
| 12 | 86 | 70 | 90 | 72 | 87 | 72 | 68 | 48 | 59 | 37 | 65 | 44 | 52 | 31 | 51 | 31 | 75 | 60 | 80 | 53 | 78 | 53 | 85 | 63 |
| 13 | 86 | 68 | 91 | 73 | 84 | 71 | 72 | 50 | 67 | 40 | 73 | 43 | 65 | 36 | 59 | 36 | 80 | 60 | 85 | 57 | 65 | 54 | 72 | 66 |
| 14 | 92 | 69 | 85 | 70 | 84 | 68 | 72 | 52 | 71 | 41 | 56 | 40 | 65 | 44 | 51 | 41 | 77 | 55 | 87 | 61 | 69 | 53 | 79 | 62 |
| 15 | 90 | 73 | 85 | 70 | 85 | 67 | 80 | 53 | 75 | 53 | 64 | 33 | 51 | 36 | 46 | 40 | 66 | 49 | 75 | 63 | 57 | 49 | 81 | 59 |
| 16 | 91 | 74 | 89 | 70 | 90 | 68 | 82 | 56 | 73 | 56 | 70 | 50 | 49 | 32 | 49 | 40 | 65 | 45 | 66 | 54 | 65 | 43 | 85 | 59 |
| 17 | 89 | 74 | 91 | 71 | 86 | 71 | 82 | 58 | 75 | 50 | 72 | 49 | 55 | 33 | 62 | 40 | 75 | 56 | 70 | 50 | 73 | 57 | 82 | 68 |
| 18 | 90 | 73 | 87 | 69 | 79 | 66 | 80 | 58 | 70 | 49 | 65 | 48 | 59 | 35 | 55 | 41 | 62 | 42 | 65 | 45 | 73 | 60 | 80 | 71 |
| 19 | 86 | 73 | 82 | 70 | 69 | 63 | 80 | 58 | 60 | 41 | 59 | 45 | 62 | 35 | 47 | 31 | 71 | 41 | 74 | 46 | 77 | 53 | 75 | 69 |
| 20 | 86 | 74 | 88 | 67 | 72 | 62 | 81 | 67 | 66 | 40 | 57 | 47 | 65 | 54 | 66 | 36 | 74 | 47 | 75 | 57 | 75 | 68 | 79 | 63 |
| 21 | 84 | 72 | 85 | 69 | 75 | 62 | 81 | 60 | 67 | 45 | 70 | 51 | 67 | 51 | 70 | 55 | 73 | 49 | 86 | 65 | 80 | 67 | 81 | 61 |
| 22 | 78 | 72 | 86 | 66 | 73 | 59 | 72 | 51 | 66 | 60 | 60 | 50 | 60 | 41 | 71 | 54 | 68 | 48 | 85 | 63 | 83 | 65 | 88 | 69 |
| 23 | 88 | 75 | 83 | 76 | 76 | 56 | 70 | 45 | 70 | 62 | 65 | 52 | 55 | 38 | 62 | 51 | 70 | 43 | 86 | 63 | 72 | 63 | 84 | 63 |
| 24 | 91 | 76 | 90 | 74 | 81 | 62 | 73 | 46 | 66 | 53 | 55 | 48 | 49 | 30 | 61 | 41 | 84 | 57 | 77 | 67 | 84 | 64 | 85 | 66 |
| 25 | 95 | 74 | 86 | 72 | 83 | 68 | 80 | 52 | 69 | 51 | 56 | 45 | 63 | 42 | 58 | 41 | 68 | 45 | 82 | 63 | 85 | 70 | 90 | 69 |
| 26 | 95 | 77 | 86 | 72 | 84 | 67 | 72 | 63 | 63 | 49 | 61 | 52 | 65 | 49 | 52 | 34 | 60 | 40 | 80 | 59 | 95 | 73 | 89 | 71 |
| 27 | 95 | 77 | 88 | 72 | 75 | 70 | 67 | 58 | 68 | 44 | 56 | 48 | 63 | 43 | 55 | 33 | 77 | 47 | 78 | 63 | 83 | 68 | 90 | 72 |
| 28 | 97 | 79 | 89 | 71 | 74 | 65 | 72 | 51 | 60 | 51 | 56 | 42 | 61 | 46 | 64 | 40 | 69 | 60 | 74 | 58 | 84 | 67 | 91 | 73 |
| 29 | 96 | 79 | 92 | 73 | 75 | 62 | 72 | 57 | 55 | 43 | 59 | 48 | 50 | 37 | ..... | ..... | 74 | 55 | 77 | 53 | 84 | 62 | 87 | 72 |
| 30 | 94 | 78 | 95 | 72 | 81 | 66 | 78 | 62 | 43 | 28 | 55 | 41 | 54 | 34 | ..... | ..... | 67 | 51 | 76 | 58 | 84 | 66 | 88 | 71 |
| 31 | 93 | 75 | 92 | 75 | ..... | ..... | 74 | 64 | ..... | ..... | 48 | 39 | 58 | 47 | ..... | ..... | 81 | 64 | ..... | ..... | 75 | 61 | ..... | ..... |
| Range | 33° | | 29° | | 34° | | 37° | | 55° | | 48° | | 46° | | 40° | | 50° | | 47°. | | 52°. | | 39° | |
| Monthly means | 80°. 0 | | 78°. 5 | | 72°. 4 | | 65°. 4 | | 57°. 5 | | 50°. 4 | | 46°. 1 | | 51°. 2 | | 59°. 3 | | 63°. 6 | | 68°. 9 | | 72°. 8 | |

*Maximum, minimum, and mean temperature*—Continued.

STATION, WINNEMUCCA, NEV.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 74 | 37 | 94 | 46 | 85 | 52 | 71 | 39 | 59 | 17 | 45 | 16 | 32 | — 2 | 44 | 21 | 49 | 30 | 60 | 30 | 56 | 41 | 59 | 42 |
| 2 | 81 | 51 | 90 | 62 | 86 | 40 | 55 | 41 | 54 | 20 | 44 | 23 | 35 | — 3 | 47 | 26 | 55 | 25 | 70 | 35 | 60 | 30 | 67 | 41 |
| 3 | 79 | 56 | 80 | 49 | 86 | 53 | 60 | 25 | 45 | 37 | 40 | 26 | 34 | — 2 | 54 | 31 | 60 | 36 | 71 | 45 | 73 | 33 | 72 | 40 |
| 4 | 82 | 49 | 80 | 51 | 89 | 54 | 67 | 27 | 45 | 30 | 36 | 4 | 33 | — 3 | 55 | 38 | 47 | 29 | 73 | 42 | 79 | 37 | 76 | 43 |
| 5 | 84 | 54 | 84 | 47 | 83 | 56 | 70 | 41 | 55 | 37 | 41 | 8 | 37 | — 3 | 42 | 31 | 50 | 29 | 74 | 34 | 75 | 37 | 80 | 51 |
| 6 | 82 | 50 | 90 | 54 | 79 | 52 | 69 | 38 | 53 | 33 | 45 | 10 | 38 | — 5 | 47 | 25 | 56 | 36 | 69 | 39 | 61 | 28 | 83 | 52 |
| 7 | 91 | 47 | 93 | 47 | 72 | 37 | 73 | 29 | 53 | 31 | 49 | 21 | 42 | 7 | 41 | 25 | 41 | 22 | 66 | 39 | 69 | 37 | 84 | 54 |
| 8 | 95 | 58 | 93 | 45 | 83 | 38 | 76 | 33 | 54 | 28 | 46 | 10 | 53 | 27 | 38 | 20 | 45 | 14 | 57 | 44 | 77 | 41 | 87 | 58 |
| 9 | 97 | 49 | 91 | 52 | 89 | 39 | 79 | 32 | 56 | 33 | 54 | 15 | 56 | 35 | 39 | 14 | 49 | 20 | 51 | 26 | 78 | 42 | 87 | 56 |
| 10 | 92 | 61 | 94 | 56 | 88 | 52 | 77 | 36 | 57 | 25 | 50 | 12 | 43 | 29 | 44 | 26 | 47 | 27 | 66 | 25 | 83 | 49 | 84 | 56 |
| 11 | 90 | 52 | 94 | 52 | 72 | 45 | 65 | 47 | 57 | 27 | 57 | 17 | 38 | 13 | 53 | 34 | 49 | 21 | 70 | 37 | 77 | 50 | 80 | 57 |
| 12 | 93 | 58 | 95 | 47 | 59 | 43 | 61 | 38 | 47 | 34 | 52 | 19 | 42 | 13 | 46 | 30 | 54 | 24 | 57 | 33 | 72 | 40 | 79 | 55 |
| 13 | 94 | 52 | 98 | 59 | 67 | 43 | 57 | 27 | 49 | 23 | 52 | 17 | 44 | 17 | 44 | 29 | 50 | 39 | 40 | 30 | 77 | 43 | 77 | 44 |
| 14 | 94 | 53 | 95 | 50 | 69 | 47 | 58 | 25 | 45 | 34 | 47 | 17 | 46 | 17 | 45 | 27 | 60 | 38 | 44 | 24 | 68 | 51 | 82 | 46 |
| 15 | 90 | 59 | 94 | 51 | 75 | 42 | 62 | 24 | 53 | 34 | 55 | 24 | 45 | 21 | 38 | 23 | 66 | 37 | 48 | 24 | 72 | 38 | 89 | 48 |
| 16 | 92 | 59 | 95 | 55 | 72 | 44 | 65 | 20 | 62 | 36 | 52 | 19 | 57 | 26 | 46 | 24 | 62 | 37 | 48 | 27 | 60 | 37 | 82 | 58 |
| 17 | 91 | 54 | 93 | 62 | 76 | 39 | 68 | 30 | 50 | 33 | 48 | 22 | 53 | 27 | 61 | 33 | 68 | 32 | 49 | 30 | 62 | 32 | 83 | 55 |
| 18 | 101 | 57 | 84 | 63 | 84 | 36 | 70 | 29 | 51 | 27 | 51 | 26 | 41 | 13 | 50 | 33 | 61 | 42 | 57 | 27 | 71 | 33 | 81 | 59 |
| 19 | 100 | 67 | 86 | 55 | 86 | 37 | 72 | 37 | 58 | 28 | 49 | 16 | 46 | 25 | 42 | 31 | 63 | 27 | 61 | 42 | 61 | 41 | 88 | 53 |
| 20 | 104 | 55 | 87 | 52 | 84 | 42 | 70 | 39 | 44 | 17 | 48 | 21 | 44 | 15 | 39 | 24 | 66 | 42 | 50 | 35 | 60 | 44 | 91 | 61 |
| 21 | 101 | 67 | 86 | 42 | 75 | 53 | 66 | 36 | 46 | 21 | 50 | 25 | 50 | 24 | 38 | 14 | 64 | 43 | 47 | 32 | 59 | 43 | 90 | 57 |
| 22 | 91 | 60 | 86 | 44 | 70 | 42 | 60 | 37 | 56 | 30 | 46 | 17 | 52 | 30 | 39 | 13 | 60 | 41 | 58 | 40 | 64 | 43 | 91 | 59 |
| 23 | 94 | 61 | 87 | 45 | 69 | 33 | 56 | 36 | 54 | 34 | 47 | 22 | 48 | 31 | 40 | 18 | 69 | 34 | 65 | 29 | 71 | 44 | 84 | 62 |
| 24 | 86 | 53 | 83 | 49 | 71 | 32 | 60 | 42 | 51 | 19 | 46 | 25 | 43 | 23 | 40 | 33 | 67 | 42 | 70 | 31 | 72 | 43 | 86 | 53 |
| 25 | 93 | 59 | 75 | 49 | 75 | 34 | 68 | 47 | 55 | 29 | 42 | 19 | 45 | 33 | 46 | 31 | 52 | 35 | 65 | 43 | 76 | 45 | 84 | 54 |
| 26 | 79 | 52 | 74 | 41 | 78 | 46 | 57 | 32 | 47 | 25 | 41 | 18 | 40 | 18 | 56 | 33 | 58 | 36 | 59 | 38 | 82 | 47 | 90 | 53 |
| 27 | 85 | 50 | 82 | 36 | 78 | 44 | 47 | 14 | 39 | 17 | 38 | 10 | 51 | 33 | 46 | 30 | 50 | 33 | 62 | 32 | 67 | 42 | 94 | 60 |
| 28 | 98 | 44 | 90 | 47 | 81 | 47 | 43 | 28 | 40 | 13 | 39 | 6 | 47 | 35 | 45 | 24 | 48 | 37 | 69 | 41 | 53 | 40 | 77 | 52 |
| 29 | 90 | 64 | 83 | 54 | 74 | 51 | 44 | 18 | 46 | 12 | 31 | 13 | 50 | 30 | ..... | ..... | 50 | 38 | 62 | 43 | 58 | 85 | 69 | 36 |
| 30 | 73 | 44 | 79 | 42 | 72 | 37 | 51 | 21 | 49 | 15 | 36 | 0 | 52 | 32 | ..... | ..... | 50 | 34 | 64 | 39 | 63 | 31 | 81 | 45 |
| 31 | 83 | 45 | 83 | 39 | ..... | ..... | 56 | 32 | ..... | ..... | 32 | — 1 | 45 | 32 | ..... | ..... | 53 | 32 | ..... | ..... | 60 | 42 | ..... | ..... |
| Range | 67° | | 62° | | 47° | | 65° | | 50° | | 58° | | 62° | | 48° | | 55° | | 50° | | 55° | | 58° | |
| Monthly means | 74°.9 | | 72°.0 | | 61°.8 | | 47°.4 | | 38°.2 | | 30°.3 | | 31°.5 | | 35°.3 | | 43°.5 | | 48°.4 | | 55°.4 | | 69°.0 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, WOOD'S HOLL, MASS.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 68 | 57 | 73 | 63 | 79 | 68 | 70 | 57 | 55 | 42.5 | 38 | 25 | 32 | 21 | 36 | 30 | 39 | 24 | 45 | 37 | 58 | 45 | 61 | 51 |
| 2 | 76 | 63 | 70 | 60.5 | 70 | 62 | 75 | 60.5 | 63 | 46 | 38 | 24 | 40 | 26 | 31 | 20 | 46 | 26 | 48 | 38 | 67 | 48 | 64 | 51 |
| 3 | 72 | 62 | 77 | 64.5 | 72 | 59.5 | 67 | 59 | 58 | 46 | 43 | 25 | 22 | 12 | 34 | 16 | 49 | 40 | 54 | 38 | 62 | 53 | 65 | 53 |
| 4 | 69 | 62 | 81 | 66 | 72 | 61.5 | 72 | 58 | 51 | 40 | 50 | 35 | 45 | 12 | 41 | 23 | 46 | 31 | 49 | 38 | 62 | 54 | 66 | 55 |
| 5 | 75 | 59 | 76 | 62 | 75 | 65 | 69 | 49 | 57 | 40 | 57 | 48 | 44 | 19 | 39 | 21 | 41 | 26 | 45 | 37 | 63 | 54 | 68 | 55 |
| 6 | 69 | 60 | 78 | 65 | 73 | 62 | 62 | 45.5 | 57 | 35 | 57 | 40 | 31 | 16 | 42 | 26 | 44 | 34 | 48 | 39 | 70 | 51 | 67 | 49 |
| 7 | 74 | 60 | 74 | 67 | 63 | 59 | 63 | 41.5 | 50 | 34.3 | 42 | 33 | 24 | 11 | 43 | 34 | 48 | 41 | 46 | 39 | 70 | 50 | 63 | 46 |
| 8 | 71 | 61 | 79 | 67 | 67 | 57.5 | 61 | 46.5 | 60 | 44 | 50 | 37 | 32 | 8 | 47 | 35 | 50 | 39 | 54 | 40 | 72 | 51 | 63 | 51 |
| 9 | 70 | 64 | 75 | 67 | 68 | 57 | 63 | 52.5 | 63 | 54 | 42 | 30 | 43 | 29 | 44 | 36 | 55 | 38 | 52 | 36 | 61 | 51 | 65 | 56 |
| 10 | 72 | 64 | 76 | 67.5 | 73 | 56.5 | 66 | 56 | 56 | 42.8 | 43 | 26 | 46 | 33 | 44 | 27 | 57 | 36 | 50 | 39 | 70 | 52 | 58 | 53 |
| 11 | 73 | 64 | 77 | 65.5 | 73 | 61 | 63 | 55 | 44 | 35 | 48 | 33 | 45 | 36 | 33 | 21 | 48 | 33 | 56 | 43 | 61 | 48 | 59 | 49 |
| 12 | 76 | 64 | 79 | 65.5 | 73 | 63 | 63 | 51 | 46 | 32.5 | 48 | 36 | 45 | 36 | 33 | 16 | 39 | 33 | 54 | 43 | 60 | 44 | 70 | 52 |
| 13 | 80 | 62 | 78 | 68.5 | 76 | 64 | 62 | 48 | 46 | 34.2 | 53 | 34 | 45 | 33 | 40 | 30 | 50 | 38 | 56 | 45 | 61 | 43 | 70 | 55 |
| 14 | 72 | 58 | 76 | 67 | 84 | 64 | 62 | 45 | 53 | 38 | 39 | 32 | 48 | 37 | 36 | 23 | 54 | 39 | 58 | 44 | 61 | 43 | 70 | 52 |
| 15 | 77 | 60 | 75 | 68 | 76 | 65 | 68 | 53 | 61 | 50.4 | 50 | 32 | 43 | 36 | 39 | 22 | 50 | 34 | 62 | 42 | 52 | 39 | 61 | 49 |
| 16 | 73 | 65 | 75 | 67.7 | 76 | 65 | 70 | 46 | 58 | 52 | 54 | 43 | 36 | 18 | 43 | 28 | 46 | 32 | 60 | 41 | 53 | 41 | 65 | 55 |
| 17 | 72 | 67 | 77 | 69 | 77 | 68.5 | 61 | 43.5 | 58 | 45.5 | 54 | 39 | 32 | 13 | 41 | 29 | 44 | 36 | 48 | 40 | 63 | 43 | 66 | 57 |
| 18 | 79 | 63.5 | 77 | 68 | 72 | 58 | 61 | 43 | 57 | 36 | 47 | 30 | 39 | 28 | 41 | 20 | 43 | 36 | 60 | 41 | 67 | 48 | 63 | 57 |
| 19 | 74 | 68 | 79 | 65.5 | 64 | 56 | 65 | 53 | 41 | 33 | 50 | 38 | 45 | 32 | 28 | 13 | 53 | 34 | 56 | 41 | 74 | 49 | 75 | 56 |
| 20 | 72 | 67 | 76 | 66.5 | 68 | 55.5 | 63 | 47 | 40 | 28.5 | 54 | 39 | 51 | 38 | 37 | 25 | 47 | 33 | 55 | 45 | 55 | 45 | 79 | 56 |
| 21 | 71 | 66 | 79 | 65.8 | 70 | 52 | 51 | 45.8 | 41 | 33 | 43 | 31 | 50 | 39 | 41 | 36 | 40 | 25 | 66 | 47 | 60 | 47 | 71 | 58 |
| 22 | 77 | 67.5 | 76 | 65 | 65 | 48.5 | 53 | 41 | 46 | 32.8 | 44 | 35 | 45 | 38 | 46 | 35 | 43 | 28 | 65 | 46 | 67 | 51 | 68 | 58 |
| 23 | 75 | 67 | 82 | 66.8 | 70 | 53 | 57 | 40.5 | 50 | 39.5 | 45 | 34 | 41 | 7 | 46 | 37 | 53 | 36 | 55 | 46 | 58 | 49 | 75 | 58 |
| 24 | 77 | 67 | 79 | 69.5 | 74 | 61.5 | 64 | 55.5 | 50 | 39 | 45 | 30 | 36 | 9 | 46 | 35 | 52 | 25 | 57 | 44 | 66 | 48 | 70 | 59 |
| 25 | 83 | 66 | 76 | 68.5 | 72 | 61.5 | 64 | 49 | 53 | 45 | 43 | 30 | 50 | 35 | 41 | 32 | 32 | 18 | 60 | 52 | 61 | 50 | 74 | 61 |
| 26 | 83 | 65 | 76 | 67 | 77 | 62.5 | 51 | 40 | 58 | 50 | 48 | 34 | 46 | 39 | 39 | 28 | 47 | 26 | 57 | 53 | 64 | 54 | 76 | 59 |
| 27 | 71 | 64 | 79 | 69 | 77 | 62 | 53 | 37.5 | 58 | 49.5 | 48 | 34 | 47 | 37 | 48 | 32 | 46 | 38 | 57 | 52 | 74 | 56 | 73 | 59 |
| 28 | 70 | 64 | 80 | 68 | 68 | 61.5 | 54 | 37 | 55 | 47.5 | 46 | 33 | 43 | 17 | 46 | 35 | 53 | 41 | 55 | 50 | 72 | 55 | 81 | 63 |
| 29 | 73 | 66 | 79 | 70.5 | 68 | 52.5 | 63 | 47.5 | 52 | 38 | 45 | 32 | 27 | 11 | ..... | ..... | 48 | 40 | 58 | 48 | 70 | 55 | 78 | 64 |
| 30 | 75 | 66 | 81 | 69 | 71 | 50.5 | 61 | 47 | 40 | 31 | 42 | 35 | 26 | 10 | ..... | ..... | 54 | 37 | 62 | 46 | 68 | 53 | 76 | 64 |
| 31 | 72 | 66 | 77 | 64 | ..... | ..... | 59 | 40 | ..... | ..... | 40 | 24 | 35 | 20 | ..... | ..... | 48 | 37 | ..... | ..... | 57 | 51 | ..... | ..... |
| Range | 26° | | 21°.5 | | 35°.2 | | 38° | | 34°.5 | | 33° | | 44° | | 35° | | 39° | | 30° | | 35° | | 35° | |
| Monthly means | 68°.2 | | 70°.9 | | 64°.6 | | 54°.7 | | 46°.5 | | 39°.8 | | 33°.0 | | 34°.5 | | 40°.5 | | 48°.7 | | 55°.8 | | 62°.2 | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, YANKTON, DAK.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 77 | 52 | 86 | 58 | 73 | 48 | 68 | 36 | 47 | 36 | 34 | — 1 | 26 | 13 | 35 | 15 | 52 | 42 | 60 | 30 | 64 | 50 | 83 | 62 |
| 2 | 78 | 55 | 83 | 56 | 74 | 41 | 67 | 51 | 38 | 30 | 44 | 14 | 15 | — 2 | 35 | 11 | 42 | 31 | 56 | 32 | 67 | 46 | 76 | 61 |
| 3 | 85 | 58 | 81 | 64 | 80 | 41 | 63 | 37 | 34 | 24 | 37 | 15 | 28 | 6 | 43 | 3 | 33 | 24 | 60 | 29 | 54 | 36 | 71 | 54 |
| 4 | 89 | 71 | 81 | 63 | 83 | 56 | 60 | 30 | 31 | 21 | 33 | 26 | 11 | — 5 | 51 | 21 | 54 | 21 | 68 | 27 | 63 | 36 | 76 | 47 |
| 5 | 93 | 71 | 86 | 68 | 78 | 54 | 53 | 30 | 28 | 10 | 26 | 22 | 20 | 2 | 55 | 24 | 60 | 38 | 58 | 33 | 77 | 38 | 75 | 51 |
| 6 | 92 | 75 | 82 | 64 | 83 | 52 | 51 | 36 | 39 | 15 | 27 | 10 | 2 | —10 | 49 | 28 | 58 | 35 | 65 | 30 | 78 | 55 | 76 | 58 |
| 7 | 96 | 74 | 88 | 58 | 83 | 58 | 61 | 40 | 35 | 32 | 34 | 24 | 31 | — 5 | 45 | 25 | 63 | 29 | 62 | 43 | 68 | 43 | 66 | 53 |
| 8 | 85 | 68 | 83 | 58 | 75 | 64 | 61 | 34 | 33 | 21 | 26 | 7 | 38 | 8 | 31 | 23 | 62 | 46 | 67 | 36 | 69 | 41 | 62 | 51 |
| 9 | 85 | 59 | 79 | 53 | 73 | 60 | 53 | 39 | 28 | 8 | 38 | 18 | 43 | 24 | 26 | 19 | 52 | 41 | 57 | 33 | 58 | 38 | 71 | 52 |
| 10 | 79 | 58 | 91 | 64 | 80 | 57 | 61 | 32 | 51 | 21 | 47 | 22 | 36 | 20 | 31 | 13 | 46 | 38 | 47 | 33 | 63 | 36 | 77 | 54 |
| 11 | 78 | 59 | 86 | 64 | 84 | 58 | 64 | 38 | 52 | 26 | 44 | 19 | 36 | 20 | 48 | 16 | 43 | 31 | 64 | 37 | 44 | 31 | 81 | 56 |
| 12 | 86 | 63 | 80 | 59 | 89 | 63 | 68 | 47 | 56 | 29 | 45 | 24 | 37 | 29 | 38 | 27 | 48 | 31 | 57 | 42 | 53 | 28 | 65 | 57 |
| 13 | 89 | 72 | 76 | 54 | 89 | 70 | 54 | 44 | 55 | 33 | 44 | 25 | 29 | 16 | 37 | 27 | 45 | 36 | 42 | 32 | 58 | 39 | 62 | 56 |
| 14 | 90 | 68 | 80 | 51 | 79 | 60 | 53 | 39 | 50 | 30 | 50 | 33 | 33 | 9 | 36 | 30 | 57 | 32 | 40 | 32 | 57 | 44 | 74 | 58 |
| 15 | 81 | 58 | 79 | 50 | 75 | 50 | 52 | 36 | 57 | 28 | 52 | 27 | 45 | 10 | 42 | 31 | 64 | 41 | 47 | 40 | 55 | 45 | 70 | 57 |
| 16 | 83 | 54 | 79 | 58 | 64 | 46 | 57 | 43 | 53 | 37 | 57 | 23 | 46 | 21 | 36 | 27 | 52 | 34 | 65 | 43 | 62 | 44 | 75 | 52 |
| 17 | 85 | 64 | 84 | 55 | 64 | 38 | 56 | 35 | 39 | 23 | 43 | 30 | 44 | 14 | 35 | 26 | 58 | 27 | 71 | 50 | 51 | 45 | 80 | 54 |
| 18 | 71 | 53 | 85 | 56 | 75 | 39 | 45 | 40 | 34 | 31 | 42 | 36 | 44 | 16 | 45 | 29 | 67 | 39 | 65 | 42 | 68 | 50 | 82 | 58 |
| 19 | 67 | 50 | 85 | 64 | 81 | 42 | 49 | 37 | 41 | 33 | 39 | 27 | 39 | 22 | 53 | 35 | 65 | 42 | 62 | 42 | 61 | 44 | 85 | 64 |
| 20 | 75 | 51 | 80 | 60 | 77 | 42 | 52 | 28 | 48 | 38 | 37 | 31 | 40 | 18 | 49 | 28 | 71 | 36 | 67 | 42 | 60 | 49 | 76 | 58 |
| 21 | 80 | 44 | 72 | 49 | 85 | 53 | 61 | 29 | 45 | 28 | 52 | 36 | 45 | 21 | 50 | 28 | 55 | 41 | 72 | 50 | 66 | 43 | 78 | 54 |
| 22 | 82 | 49 | 77 | 46 | 79 | 58 | 68 | 40 | 46 | 21 | 50 | 40 | 34 | 12 | 34 | 28 | 69 | 31 | 66 | 47 | 67 | 55 | 83 | 53 |
| 23 | 81 | 56 | 81 | 50 | 73 | 43 | 69 | 40 | 48 | 34 | 44 | 33 | 39 | 9 | 35 | 28 | 71 | 44 | 59 | 42 | 72 | 56 | 89 | 65 |
| 24 | 83 | 57 | 84 | 54 | 78 | 63 | 69 | 40 | 46 | 34 | 44 | 28 | 38 | 19 | 32 | 27 | 52 | 29 | 63 | 40 | 75 | 52 | 78 | 65 |
| 25 | 86 | 61 | 86 | 63 | 64 | 58 | 73 | 33 | 35 | 25 | 34 | 27 | 27 | 16 | 42 | 18 | 65 | 32 | 67 | 43 | 71 | 48 | 73 | 59 |
| 26 | 88 | 66 | 80 | 65 | 68 | 55 | 61 | 46 | 34 | 30 | 36 | 27 | 31 | 14 | 49 | 26 | 77 | 36 | 67 | 36 | 69 | 48 | 75 | 53 |
| 27 | 81 | 64 | 83 | 51 | 67 | 49 | 58 | 39 | 30 | 17 | 34 | 31 | 30 | 18 | 62 | 36 | 58 | 32 | 70 | 35 | 67 | 41 | 85 | 63 |
| 28 | 85 | 58 | 85 | 66 | 84 | 42 | 52 | 34 | 17 | 5 | 31 | 28 | 26 | 13 | 59 | 27 | 43 | 23 | 74 | 44 | 67 | 52 | 83 | 67 |
| 29 | 90 | 60 | 82 | 56 | 89 | 65 | 46 | 28 | 13 | — 5 | 28 | 21 | 28 | 22 | ..... | ..... | 48 | 30 | 80 | 49 | 63 | 53 | 84 | 68 |
| 30 | 86 | 65 | 93 | 71 | 77 | 48 | 54 | 29 | 16 | 5 | 26 | 18 | 29 | 17 | ..... | ..... | 41 | 32 | 70 | 51 | 61 | 51 | 71 | 56 |
| 31 | 82 | 67 | 83 | 60 | ..... | ..... | 54 | 25 | ..... | ..... | 27 | 13 | 35 | 17 | ..... | ..... | 57 | 27 | ..... | ..... | 76 | 54 | ..... | ..... |
| Range | 52° | | 47° | | 51° | | 48° | | 62° | | 53° | | 56° | | 59° | | 56° | | 53° | | 50° | | 42° | |
| Monthly means | 73°.4 | | 71°.2 | | 64°.7 | | 46°.8 | | 31°.3 | | 34°.2 | | 21°.8 | | 33°.2 | | 43°.4 | | 50°.5 | | 54°.5 | | 66°.5 | |

*Maximum, minimum, and mean temperatures—Continued.*

*STATION, YORK FACTORY, H. B. T.*

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | 63.0 | 38.0 | 62.0 | 42.5 | 53.0 | 38.5 | 44.5 | 28.5 | 31.0 | 27.0 | 16.0 | — 6.0 | 0.0 | 17.0 | 16.5 | 14.5 | 8.5 | — 9.0 | | | | | | |
| 2 | 86.5 | 40.0 | 60.5 | 41.0 | 73.0 | 37.5 | 46.0 | 27.5 | 29.0 | 9.5 | 21.0 | 15.0 | —14.5 | —24.0 | 17.0 | 14.5 | 2.0 | —18.0 | | | | | | |
| 3 | 75.0 | 48.5 | 79.5 | 43.0 | 53.5 | 33.0 | 43.0 | 28.5 | 18.5 | 1.5 | 18.5 | 1.0 | —22.0 | —33.0 | 24.0 | 12.0 | | | | | | | | |
| 4 | 79.5 | 42.0 | 82.0 | 50.0 | 53.0 | 32.5 | 40.0 | 25.0 | 18.5 | —10.0 | 12.0 | — 2.0 | —24.0 | —32.0 | 17.0 | 13.5 | | | | | | | | |
| 5 | 91.5 | 41.0 | 74.0 | 48.0 | 65.0 | 32.0 | 35.0 | 20.0 | 18.5 | — 3.0 | 3.0 | —19.5 | —20.5 | —30.0 | 15.0 | 0.5 | | | | | | | | |
| 6 | 93.0 | 62.0 | 69.5 | 43.0 | 79.0 | 51.5 | 29.5 | 16.5 | 27.0 | 16.0 | — 1.0 | —19.5 | —21.0 | —30.5 | 12.0 | — 2.0 | | | | | | | | |
| 7 | 82.0 | 52.0 | 68.0 | 43.0 | 83.0 | 54.0 | 30.5 | 13.5 | 23.5 | — 5.0 | 16.0 | — 1.0 | —10.0 | —28.0 | 8.0 | —14.0 | | | | | | | | |
| 8 | 69.5 | 49.0 | 61.0 | 43.5 | 69.0 | 53.0 | 37.0 | 16.0 | — 2.5 | — 8.0 | 14.0 | — 4.0 | — 2.0 | —17.0 | —13.5 | —23.5 | | | | | | | | |
| 9 | 55.0 | 44.5 | 68.5 | 40.5 | 69.0 | 40.0 | 43.0 | 15.0 | 23.0 | — 4.0 | 8.0 | — 3.0 | — 7.5 | —20.0 | — 8.0 | —22.0 | | | | | | | | |
| 10 | 86.5 | 42.0 | 70.0 | 44.0 | 73.0 | 50.5 | 38.5 | 20.0 | 23.0 | 18.5 | 32.0 | 7.0 | 4.0 | —26.0 | — 6.0 | —24.0 | | | | | | | | |
| 11 | 62.5 | 44.0 | 73.0 | 50.5 | 70.0 | 46.5 | 40.0 | 18.0 | 27.5 | 18.0 | 19.0 | — 5.0 | 18.0 | — 6.0 | 4.0 | —16.5 | | | | | | | | |
| 12 | 96.0 | 44.0 | 80.0 | 41.5 | 61.0 | 46.0 | 42.0 | 28.0 | 28.0 | 20.0 | — 0.5 | — 8.0 | 14.0 | — 4.0 | 19.0 | 1.0 | | | | | | | | |
| 13 | 100.0 | 56.0 | 60.0 | 39.0 | 58.0 | 36.0 | 40.0 | 32.0 | 27.0 | 19.0 | — 3.0 | —16.0 | 23.0 | — 4.0 | 17.0 | — 4.5 | | | | | | | | |
| 14 | 98.0 | 57.0 | 59.0 | 38.5 | 49.0 | 36.0 | 39.0 | 23.0 | 28.5 | 9.5 | —13.0 | —25.5 | 15.0 | — 7.0 | — 3.0 | —25.0 | | | | | | | | |
| 15 | 69.0 | 49.0 | 55.5 | 47.5 | 47.0 | 35.0 | 47.0 | 19.0 | 12.0 | 3.0 | —14.5 | —28.5 | — 6.5 | —31.0 | 15.0 | —13.0 | | | | | | | | |
| 16 | 69.0 | 43.5 | 61.5 | 42.0 | 46.0 | 34.0 | 57.0 | 18.0 | 18.0 | 0.5 | —11.5 | —23.0 | — 2.0 | —17.0 | 15.0 | —15.5 | | | | | | | | |
| 17 | 69.5 | 41.0 | 70.0 | 42.0 | 42.0 | 34.0 | 45.0 | 33.5 | 11.0 | — 5.0 | 10.0 | —11.5 | 3.0 | — 6.0 | — 9.5 | —27.0 | | | | | | | | |
| 18 | 78.0 | 40.0 | 72.0 | 48.0 | 39.0 | 36.0 | 34.0 | 22.5 | 9.0 | —14.0 | 27.0 | 4.0 | 26.5 | — 1.0 | 0.0 | —10.0 | | | | | | | | |
| 19 | 79.0 | 41.0 | 71.0 | 40.5 | 40.0 | 33.5 | 37.0 | 10.0 | 30.5 | — 9.0 | 1.0 | —12.0 | 21.0 | 9.0 | 10.5 | —11.0 | | | | | | | | |
| 20 | 60.5 | 45.0 | 71.5 | 56.0 | 38.5 | 29.0 | 33.5 | 15.0 | 38.0 | 29.0 | 21.5 | —12.0 | 24.0 | 0.0 | 16.5 | 0.5 | | | | | | | | |
| 21 | 67.0 | 43.0 | 67.0 | 42.0 | 45.5 | 32.0 | 31.0 | 14.5 | 36.0 | 17.0 | 29.5 | 16.0 | 24.0 | —16.5 | 34.0 | 7.0 | | | | | | | | |
| 22 | 89.0 | 41.5 | 73.5 | 40.0 | 43.0 | 29.0 | 30.0 | 18.0 | 21.0 | 10.5 | 32.0 | 17.0 | —16.0 | — 2.4 | 23.5 | 9.0 | | | | | | | | |
| 23 | 98.5 | 58.0 | 60.0 | 53.5 | 46.0 | 28.5 | 29.0 | 16.5 | 34.0 | 17.0 | 30.0 | 18.0 | —17.0 | —27.0 | 10.0 | 0.5 | | | | | | | | |
| 24 | 104.0 | 68.5 | 52.0 | 34.0 | 44.0 | 26.0 | 33.0 | 18.5 | 33.5 | 15.0 | 20.0 | 9.0 | —13.5 | —31.0 | 30.0 | 3.0 | | | | | | | | |
| 25 | 97.0 | 67.5 | 63.0 | 31.5 | 40.0 | 30.5 | 34.0 | 14.5 | 19.0 | 12.0 | 21.0 | 14.5 | —10.0 | —18.0 | 40.0 | 18.0 | | | | | | | | |
| 26 | 71.0 | 53.0 | 72.0 | 39.5 | 57.0 | 24.0 | 36.0 | 15.0 | 15.0 | 11.0 | 21.5 | 3.0 | —10.0 | —19.0 | 34.0 | 5.0 | | | | | | | | |
| 27 | 57.0 | 51.0 | 68.0 | 43.0 | 46.0 | 37.5 | 39.0 | 24.0 | 25.5 | 10.0 | 4.5 | —10.0 | —12.0 | —22.0 | 5.0 | —24.0 | | | | | | | | |
| 28 | 52.0 | 46.0 | 55.0 | 34.5 | 44.5 | 39.5 | 39.5 | 29.0 | 26.0 | 20.5 | 9.0 | — 4.5 | — 1.0 | —24.0 | — 4.5 | —27.0 | | | | | | | | |
| 29 | 60.0 | 41.0 | 61.0 | 45.5 | 41.0 | 30.0 | 36.5 | 26.0 | 21.0 | — 0.5 | 18.0 | — 2.0 | 18.0 | — 1.5 | | | | | | | | | | |
| 30 | 66.0 | 42.0 | 59.5 | 41.5 | 44.0 | 30.5 | 30.0 | 26.0 | 6.0 | — 5.5 | 18.0 | 8.5 | 16.5 | 12.0 | | | | | | | | | | |
| 31 | 71.5 | 50.0 | 51.0 | 42.5 | | | 27.0 | 23.0 | | | 22.0 | — 1.0 | 18.5 | 14.0 | | | | | | | | | | |
| Range | 66° | | 50°.5 | | 59° | | 47° | | 52° | | 60°.5 | | 59°.5 | | 67° | | | | | | | | | |
| Monthly means | | | | | | | | | | | | | | | | | | | | | | | | |

*Maximum, minimum, and mean temperatures*—Continued.

STATION, YUMA, ARIZ.

| Day of month. | 1877. | | | | | | | | | | | | 1878. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | | August. | | September. | | October. | | November. | | December. | | January. | | February. | | March. | | April. | | May. | | June. | |
| | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| 1 | *103 | *70 | *103 | *73 | *105 | *75 | 98 | *61 | *70 | *50 | *69 | *44 | *52 | *41 | *69 | *50 | *67 | 45 | 88 | 57 | 98 | 68 | 88 | 57 |
| 2 | 104 | 73 | 109 | 73 | 105 | 75 | 100 | 61 | 75 | 49 | 65 | 45 | 51 | 37 | 68 | 48 | 73 | 44 | 89 | 52 | 100 | 61 | 96 | 57 |
| 3 | 103 | 72 | 110 | 82 | 101 | 76 | 101 | 60 | 76 | 49 | 68 | 39 | 54 | 33 | 70 | 50 | 79 | 44 | 91 | 55 | 97 | 65 | 98 | 62 |
| 4 | 108 | 74 | 105 | 82 | 99 | 75 | 97 | 59 | 71 | 50 | 64 | 42 | 55 | 37 | 71 | 45 | 74 | 44 | 89 | 60 | 99 | 64 | 100 | 64 |
| 5 | 107 | 82 | 107 | 83 | 102 | 76 | 95 | 58 | 75 | 50 | 59 | 47 | 54 | 45 | 68 | 45 | 76 | 44 | 90 | 56 | 102 | 59 | 99 | 65 |
| 6 | 108 | 78 | 108 | 82 | 103 | 75 | 95 | 62 | 75 | 45 | 64 | 45 | 59 | 47 | 71 | 45 | 81 | 44 | 82 | 58 | 98 | 59 | 93 | 69 |
| 7 | 110 | 85 | 109 | 80 | 103 | 75 | 93 | 65 | 75 | 46 | 67 | 43 | 61 | 48 | 65 | 52 | 76 | 55 | 91 | 55 | 92 | 60 | 99 | 67 |
| 8 | 109 | 84 | 111 | 82 | 105 | 74 | 95 | 63 | 76 | 45 | 68 | 50 | 63 | 46 | 64 | 55 | 65 | 50 | 87 | 61 | 95 | 59 | 103 | 70 |
| 9 | 110 | 85 | 112 | 83 | 104 | 75 | 97 | 63 | 76 | 47 | 70 | 48 | 64 | 51 | 66 | †49 | 68 | 45 | 88 | 61 | 99 | 62 | 105 | 69 |
| 10 | 112 | 90 | 106 | 82 | 103 | 76 | 98 | 68 | 75 | 46 | 72 | 47 | 65 | 46 | 67 | 41 | †76 | 40 | 85 | 58 | 101 | 62 | 104 | 71 |
| 11 | 109 | 84 | 95 | 83 | 100 | 76 | 96 | 68 | 77 | 45 | 72 | 48 | 65 | 52 | 69 | 44 | 81 | 43 | 89 | 57 | 100 | 63 | 98 | 66 |
| 12 | 101 | 82 | 109 | 79 | 88 | 75 | 76 | 65 | 70 | 47 | 74 | 54 | 62 | 47 | 70 | 49 | 80 | 49 | 86 | 60 | 99 | 64 | 98 | 67 |
| 13 | 109 | 83 | 108 | 82 | 86 | 66 | 80 | 61 | 70 | 45 | 74 | 52 | 62 | 50 | 73 | 47 | 83 | 49 | 88 | 58 | 98 | 65 | 100 | 66 |
| 14 | 111 | 88 | 111 | 82 | 91 | 60 | 76 | 63 | 73 | 46 | 63 | 57 | 66 | 40 | 67 | 47 | 85 | 52 | 71 | 53 | 99 | 64 | 98 | 68 |
| 15 | 110 | 89 | 103 | 87 | 95 | 61 | 77 | 55 | 76 | 45 | 65 | 57 | 69 | 44 | 69 | 45 | 90 | 54 | 75 | 45 | 100 | 63 | 98 | 68 |
| 16 | 97 | 85 | 107 | 87 | 101 | 66 | 78 | 55 | 79 | 47 | 66 | 53 | 70 | 45 | 75 | 45 | 91 | 59 | 68 | 52 | 95 | 64 | 102 | 66 |
| 17 | 103 | 89 | 104 | 86 | 101 | 65 | 80 | 60 | 77 | 46 | 68 | 51 | 66 | 52 | 77 | 49 | 90 | 56 | 72 | 45 | 84 | 62 | 99 | 72 |
| 18 | 112 | 85 | 103 | 80 | 99 | 66 | 83 | 55 | 72 | 45 | 62 | 51 | 68 | 45 | 75 | 48 | 79 | 58 | 75 | 40 | 92 | 52 | 100 | 67 |
| 19 | 113 | 85 | 106 | 78 | 100 | 67 | 85 | 52 | 75 | 47 | 63 | 49 | 69 | 51 | 72 | 58 | 85 | 52 | 83 | 49 | 92 | 59 | 101 | 65 |
| 20 | 98 | 87 | 105 | 76 | 100 | 67 | 84 | 58 | 74 | 46 | 64 | 47 | 68 | 49 | 76 | 48 | 83 | 55 | 69 | 50 | 81 | 62 | 106 | 67 |
| 21 | 90 | 82 | 105 | 74 | 94 | 72 | 84 | 58 | 72 | 48 | 65 | 45 | 67 | 50 | 69 | 48 | 87 | 59 | 63 | 45 | 76 | 53 | 109 | 71 |
| 22 | 107 | 83 | 102 | 73 | 93 | 65 | 82 | 57 | 74 | 47 | 65 | 49 | 72 | 48 | 68 | 48 | 90 | 58 | 75 | 41 | 81 | 54 | 109 | 72 |
| 23 | 108 | 85 | 104 | 75 | 98 | 66 | 81 | 57 | 75 | 45 | 65 | 46 | 71 | 46 | 68 | 49 | 84 | 54 | 84 | 49 | 91 | 53 | 102 | 68 |
| 24 | 105 | 88 | 104 | 75 | 97 | 60 | 82 | 55 | 75 | 58 | 52 | 50 | 69 | 49 | 66 | 48 | 88 | 55 | 86 | 56 | 95 | 65 | 108 | 68 |
| 25 | 105 | 89 | 106 | 75 | 100 | 60 | 81 | 61 | 75 | 59 | 58 | 46 | 65 | 47 | 70 | 54 | 75 | 58 | 86 | 55 | 97 | 63 | 108 | 73 |
| 26 | 101 | 81 | 104 | 81 | 101 | 60 | 86 | 53 | 78 | 57 | 57 | 45 | 65 | 45 | 73 | 49 | 70 | 50 | 89 | 58 | 105 | 68 | 110 | 74 |
| 27 | 100 | 80 | 101 | 80 | 85 | 59 | 77 | 58 | 72 | 62 | 57 | 44 | 67 | 47 | 61 | 53 | 78 | 51 | 87 | 58 | 102 | 68 | 107 | 74 |
| 28 | 105 | 77 | 103 | 71 | 100 | 60 | 75 | 57 | 61 | 52 | 51 | 45 | 71 | 47 | 60 | 48 | 74 | 48 | 97 | 58 | 98 | 62 | 105 | 73 |
| 29 | 108 | 80 | 103 | 75 | 98 | 62 | 72 | 56 | 64 | 49 | 53 | 43 | 67 | 47 | ..... | ..... | 72 | 44 | 101 | 60 | 88 | 54 | 105 | 71 |
| 30 | 102 | 74 | 101 | 73 | 100 | 63 | 65 | 53 | 68 | 42 | 54 | 42 | 76 | 48 | ..... | ..... | 72 | 56 | 101 | 63 | 85 | 56 | 107 | 73 |
| 31 | 103 | 74 | 101 | 75 | ..... | ..... | 66 | 43 | ..... | ..... | 53 | 33 | 70 | 48 | ..... | ..... | 78 | 52 | ..... | ..... | 84 | 52 | ..... | ..... |
| Range | 43° | | 41° | | 46° | | 58° | | 37° | | 41° | | 43° | | ..... | | ..... | | 61° | | 53° | | 52° | |
| Monthly means | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | | ..... | |

Highest and lowest observed readings of exposed thermometer. †Observations of minimum thermometer commenced February 9, 1878.
‡Observations of maximum thermometer commenced March 9, 1878.

## STATION STATISTICS.

### PAPER 18.

*Statement showing how many times the wind was observed blowing from the eight cardinal points of the compass during each month and season of the year ending June 30, 1878, compiled from the local observations taken at the several stations of observations at 7 a. m., 2 p. m., and 9 p. m. (local time).*

| Station. | Wind. | July, 1877. | August. | September. | October. | November. | December. | January, '78. | February. | March. | April. | May. | June. | Spring. | Summer. | Autumn. | Winter. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Albany, N. Y. | N. | 6 | 2 | 2 | 8 | 7 | 11 | 16 | 23 | 22 | 23 | 10 | 10 | 55 | 18 | 17 | 50 |
| | N. W. | 23 | 16 | 26 | 30 | 30 | 25 | 31 | 15 | 23 | 18 | 16 | 18 | 57 | 57 | 86 | 71 |
| | W. | 7 | 5 | 0 | 0 | 5 | 0 | 5 | 9 | 0 | 4 | 20 | 12 | 33 | 24 | 5 | 23 |
| | S. W. | 1 | 6 | 3 | 2 | 1 | 0 | 4 | 0 | 3 | 1 | 2 | 1 | 6 | 8 | 6 | 4 |
| | S. | 20 | 11 | 26 | 24 | 19 | 14 | 18 | 20 | 25 | 27 | 30 | 34 | 82 | 65 | 69 | 52 |
| | S. E. | 9 | 8 | 3 | 4 | 10 | 11 | 5 | 2 | 3 | 10 | 1 | 3 | 14 | 20 | 17 | 18 |
| | E. | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 4 | 2 | 6 | 2 | 0 |
| | N. E. | 2 | 2 | 2 | 0 | 2 | 4 | 3 | 6 | 4 | 2 | 4 | 3 | 10 | 7 | 4 | 13 |
| | Calm. | 24 | 42 | 28 | 23 | 16 | 19 | 11 | 9 | 4 | 4 | 9 | 5 | 17 | 71 | 67 | 39 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Alpena, Mich. | N. | 2 | 7 | 3 | 6 | 6 | 5 | 1 | 10 | 8 | 8 | 2 | 8 | 18 | 17 | 15 | 16 |
| | N. W. | 17 | 28 | 16 | 11 | 15 | 16 | 27 | 19 | 26 | 25 | 32 | 24 | 83 | 69 | 42 | 62 |
| | W. | 16 | 12 | 14 | 12 | 15 | 5 | 13 | 10 | 9 | 3 | 18 | 10 | 30 | 38 | 41 | 28 |
| | S. W. | 16 | 6 | 8 | 12 | 16 | 21 | 15 | 12 | 8 | 9 | 9 | 2 | 26 | 24 | 36 | 48 |
| | S. | 4 | 3 | 9 | 3 | 9 | 2 | 7 | 3 | 5 | 3 | 2 | 2 | 10 | 9 | 21 | 12 |
| | S. E. | 20 | 18 | 14 | 13 | 15 | 17 | 5 | 9 | 18 | 17 | 12 | 26 | 47 | 64 | 42 | 81 |
| | E. | 6 | 5 | 9 | 12 | 8 | 2 | 5 | 3 | 10 | 10 | 8 | 8 | 28 | 19 | 29 | 10 |
| | N. E. | 5 | 7 | 3 | 21 | 1 | 9 | 9 | 15 | 7 | 9 | 6 | 3 | 22 | 15 | 25 | 33 |
| | Calm. | 7 | 7 | 14 | 3 | 5 | 16 | 11 | 3 | 2 | 6 | 4 | 7 | 12 | 21 | 22 | 30 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Atlantic City, N. J. | N. | 4 | 3 | 7 | 6 | 8 | 7 | 4 | 16 | 5 | 1 | 9 | 4 | 15 | 11 | 21 | 27 |
| | N. W. | 5 | 5 | 10 | 14 | 13 | 14 | 19 | 19 | 13 | 9 | 8 | 7 | 30 | 17 | 37 | 62 |
| | W. | 8 | 7 | 5 | 16 | 16 | 19 | 26 | 9 | 22 | 21 | 13 | 10 | 56 | 25 | 37 | 54 |
| | S. W. | 31 | 20 | 7 | 19 | 16 | 12 | 4 | 16 | 12 | 1 | 6 | 9 | 19 | 60 | 42 | 32 |
| | S. | 11 | 29 | 19 | 4 | 14 | 10 | 15 | 7 | 19 | 12 | 33 | 31 | 64 | 71 | 37 | 32 |
| | S. E. | 3 | 0 | 7 | 12 | 4 | 0 | 1 | 4 | 8 | 12 | 13 | 8 | 33 | 11 | 23 | 5 |
| | E. | 6 | 6 | 13 | 9 | 11 | 4 | 4 | 2 | 9 | 20 | 2 | 5 | 31 | 17 | 33 | 10 |
| | N. E. | 13 | 6 | 12 | 10 | 6 | 17 | 9 | 7 | 5 | 14 | 7 | 16 | 26 | 35 | 28 | 33 |
| | Calm. | 12 | 17 | 10 | 3 | 2 | 10 | 11 | 4 | 0 | 0 | 2 | 0 | 2 | 29 | 15 | 25 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Augusta, Ga. | N. | 0 | 7 | 9 | 12 | 6 | 3 | 4 | 7 | 3 | 3 | 8 | 3 | 14 | 10 | 27 | 14 |
| | N. W. | 13 | 14 | 7 | 20 | 31 | 14 | 24 | 18 | 18 | 13 | 18 | 14 | 49 | 41 | 58 | 56 |
| | W. | 2 | 2 | 3 | 4 | 6 | 9 | 6 | 4 | 4 | 8 | 11 | 1 | 23 | 5 | 13 | 19 |
| | S. W. | 10 | 1 | 2 | 2 | 5 | 3 | 6 | 8 | 10 | 4 | 9 | 8 | 23 | 19 | 9 | 17 |
| | S. | 21 | 13 | 2 | 3 | 3 | 1 | 2 | 2 | 8 | 5 | 11 | 10 | 24 | 44 | 8 | 5 |
| | S. E. | 17 | 15 | 22 | 17 | 7 | 2 | 4 | 12 | 15 | 17 | 15 | 21 | 47 | 53 | 46 | 18 |
| | E. | 4 | 6 | 8 | 8 | 6 | 10 | 9 | 2 | 6 | 8 | 2 | 11 | 16 | 21 | 22 | 21 |
| | N. E. | 8 | 10 | 34 | 9 | 12 | 21 | 11 | 6 | 2 | 5 | 7 | 10 | 14 | 28 | 55 | 38 |
| | Calm. | 18 | 25 | 3 | 18 | 14 | 30 | 27 | 25 | 27 | 27 | 12 | 12 | 66 | 55 | 35 | 82 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Baltimore, Md. | N. | 4 | 6 | 11 | 8 | 3 | 6 | 7 | 14 | 8 | 10 | 11 | 8 | 29 | 18 | 22 | 27 |
| | N. W. | 15 | 16 | 16 | 21 | 25 | 16 | 23 | 13 | 23 | 20 | 26 | 6 | 69 | 37 | 62 | 52 |
| | W. | 6 | 12 | 2 | 8 | 11 | 14 | 18 | 24 | 10 | 10 | 7 | 21 | 27 | 39 | 21 | 56 |
| | S. W. | 21 | 17 | 8 | 16 | 8 | 17 | 10 | 3 | 9 | 3 | 10 | 9 | 22 | 47 | 32 | 30 |
| | S. | 7 | 5 | 3 | 6 | 15 | 4 | 4 | 7 | 15 | 9 | 10 | 15 | 34 | 27 | 14 | 15 |
| | S. E. | 21 | 21 | 29 | 16 | 17 | 5 | 9 | 3 | 9 | 15 | 11 | 11 | 35 | 53 | 62 | 17 |
| | E. | 2 | 1 | 8 | 5 | 5 | 15 | 12 | 13 | 15 | 12 | 4 | 8 | 31 | 11 | 18 | 40 |
| | N. E. | 12 | 11 | 11 | 10 | 12 | 13 | 10 | 6 | 4 | 10 | 9 | 11 | 23 | 34 | 33 | 29 |
| | Calm. | 5 | 4 | 2 | 3 | 4 | 3 | 0 | 1 | 0 | 1 | 5 | 1 | 6 | 10 | 9 | 4 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Barnegat, N. J. | N. | 3 | 6 | 5 | 8 | 7 | 14 | 10 | 14 | 12 | 4 | 6 | 5 | 22 | 14 | 20 | 38 |
| | N. W. | 9 | 14 | 12 | 24 | 21 | 19 | 29 | 24 | 16 | 15 | 18 | 12 | 49 | 35 | 57 | 72 |
| | W. | 6 | 8 | 6 | 8 | 11 | 19 | 18 | 3 | 9 | 8 | 11 | 8 | 28 | 22 | 25 | 40 |
| | S. W. | 13 | 18 | 10 | 13 | 8 | 13 | 7 | 5 | 11 | 4 | 11 | 4 | 26 | 39 | 31 | 25 |
| | S. | 33 | 24 | 13 | 11 | 14 | 4 | 10 | 12 | 23 | 13 | 20 | 24 | 56 | 81 | 38 | 26 |
| | S. E. | 10 | 10 | 15 | 14 | 10 | 3 | 5 | 5 | 7 | 10 | 12 | 11 | 35 | 31 | 30 | 13 |
| | E. | 8 | 7 | 18 | 10 | 14 | 4 | 8 | 8 | 6 | 17 | 8 | 9 | 31 | 24 | 42 | 20 |
| | N. E. | 11 | 6 | 7 | 4 | 5 | 17 | 5 | 13 | 9 | 13 | 7 | 12 | 29 | 29 | 16 | 35 |
| | Calm. | 0 | 0 | 4 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 5 | 1 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Statement showing how many times the wind was observed blowing, &c.*—Continued.

| Station. | Wind. | July, 1877. | August. | September. | October. | November. | December. | January, '78. | February. | March. | April. | May. | June. | Spring. | Summer. | Autumn. | Winter. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bismarck, Dak. | N. | 16 | 16 | 15 | 15 | 7 | 4 | 7 | 8 | 20 | 8 | 14 | 7 | 42 | 39 | 37 | 19 |
| | N. W. | 12 | 15 | 9 | 13 | 30 | 27 | 25 | 13 | 18 | 21 | 20 | 11 | 59 | 38 | 52 | 65 |
| | W. | 16 | 12 | 21 | 26 | 5 | 24 | 8 | 0 | 4 | 11 | 10 | 10 | 25 | 38 | 52 | 32 |
| | S. W. | 5 | 2 | 5 | 4 | 4 | 7 | 5 | 4 | 2 | 5 | 4 | 3 | 11 | 10 | 13 | 16 |
| | S. | 14 | 12 | 9 | 4 | 14 | 5 | 7 | 10 | 14 | 5 | 2 | 8 | 21 | 34 | 27 | 22 |
| | S. E. | 9 | 4 | 4 | 4 | 8 | 10 | 18 | 20 | 20 | 9 | 11 | 17 | 40 | 30 | 10 | 48 |
| | E. | 14 | 13 | 17 | 14 | 10 | 9 | 8 | 15 | 5 | 20 | 22 | 21 | 47 | 48 | 41 | 32 |
| | N. E. | 5 | 8 | 6 | 4 | 6 | 3 | 6 | 11 | 7 | 11 | 8 | 10 | 26 | 23 | 16 | 20 |
| | Calm. | 2 | 11 | 4 | 9 | 6 | 4 | 9 | 3 | 3 | 0 | 2 | 3 | 5 | 16 | 19 | 16 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Boise City, Idaho | N. | 7 | 10 | 12 | 10 | 9 | 12 | 9 | 5 | 5 | 9 | 19 | 21 | 33 | 38 | 31 | 26 |
| | N. W. | 2 | 10 | 14 | 5 | 6 | 7 | 3 | 5 | 3 | 11 | 22 | 27 | 36 | 39 | 25 | 15 |
| | W. | 4 | 7 | 8 | 10 | 8 | 18 | 12 | 7 | 15 | 16 | 8 | 5 | 39 | 16 | 26 | 37 |
| | S. W. | 7 | 6 | 5 | 8 | 5 | 11 | 8 | 3 | 4 | 9 | 5 | 1 | 18 | 14 | 18 | 22 |
| | S. | 4 | 17 | 16 | 30 | 27 | 8 | 26 | 17 | 21 | 9 | 7 | 8 | 37 | 29 | 73 | 51 |
| | S. E. | 1 | 6 | 2 | 3 | 6 | 0 | 2 | 5 | 5 | 9 | 8 | 6 | 22 | 13 | 11 | 7 |
| | E. | 4 | 9 | 7 | 1 | 5 | 6 | 8 | 17 | 11 | 5 | 8 | 9 | 24 | 22 | 13 | 31 |
| | N. E. | 13 | 20 | 10 | 7 | 10 | 3 | 8 | 18 | 12 | 6 | 10 | 8 | 28 | 41 | 27 | 29 |
| | Calm. | 4 | 8 | 16 | 19 | 14 | 28 | 17 | 7 | 17 | 16 | 6 | 5 | 39 | 17 | 49 | 52 |
| | Blank. | 47 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 47 | 0 | 0 |
| Boston, Mass | N. | 4 | 2 | 3 | 9 | 7 | 4 | 6 | 5 | 10 | 5 | 4 | 6 | 19 | 12 | 19 | 15 |
| | N. W. | 6 | 13 | 8 | 8 | 19 | 28 | 29 | 25 | 17 | 16 | 19 | 12 | 52 | 31 | 35 | 82 |
| | W. | 19 | 16 | 12 | 25 | 17 | 21 | 20 | 25 | 21 | 8 | 16 | 14 | 45 | 49 | 54 | 72 |
| | S. W. | 18 | 19 | 35 | 13 | 20 | 15 | 14 | 8 | 13 | 4 | 10 | 23 | 27 | 60 | 68 | 37 |
| | S. | 17 | 8 | 7 | 8 | 8 | 7 | 5 | 2 | 13 | 12 | 10 | 9 | 35 | 34 | 23 | 14 |
| | S. E. | 10 | 16 | 9 | 9 | 8 | 7 | 3 | 3 | 5 | 12 | 15 | 9 | 32 | 35 | 26 | 13 |
| | E. | 10 | 11 | 3 | 10 | 5 | 3 | 3 | 7 | 4 | 22 | 11 | 12 | 37 | 33 | 18 | 18 |
| | N. E. | 8 | 4 | 10 | 8 | 6 | 7 | 7 | 9 | 9 | 10 | 7 | 4 | 26 | 16 | 24 | 23 |
| | Calm. | 1 | 4 | 3 | 3 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 3 | 6 | 6 | 1 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brackettville, Tex.* | N. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 5 | 2 | 1 | .... | .... | .... | .... |
| | N. W. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 4 | 0 | 1 | .... | .... | .... | .... |
| | W. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 11 | 0 | 2 | .... | .... | .... | .... |
| | S. W. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 3 | 9 | 5 | .... | .... | .... | .... |
| | S. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 12 | 17 | 21 | .... | .... | .... | .... |
| | S. E. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 12 | 29 | 30 | .... | .... | .... | .... |
| | E. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 13 | 15 | 25 | .... | .... | .... | .... |
| | N. E. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 3 | 2 | 2 | .... | .... | .... | .... |
| | Calm. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 27 | 19 | 3 | .... | .... | .... | .... |
| | Blank. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | 0 | .... | .... | .... | .... |
| Breckinridge, Minn. | N. | 16 | 22 | 23 | 20 | 21 | 22 | 29 | 23 | 30 | 27 | 28 | 22 | 85 | 60 | 70 | 74 |
| | N. W. | 11 | 18 | 3 | 14 | 18 | 5 | 7 | 11 | 6 | 14 | 10 | 9 | 30 | 38 | 35 | 23 |
| | W. | 15 | 10 | 12 | 20 | 9 | 18 | 8 | 6 | 6 | 8 | 9 | 5 | 23 | 30 | 41 | 32 |
| | S. W. | 4 | 2 | 4 | 3 | 1 | 4 | 7 | 1 | 1 | 2 | 3 | 2 | 6 | 8 | 8 | 12 |
| | S. | 14 | 11 | 16 | 3 | 17 | 21 | 17 | 18 | 12 | 9 | 9 | 20 | 30 | 45 | 36 | 56 |
| | S. E. | 28 | 18 | 22 | 13 | 21 | 18 | 22 | 15 | 23 | 11 | 11 | 21 | 43 | 67 | 56 | 55 |
| | E. | 3 | 9 | 5 | 4 | 1 | 3 | 1 | 2 | 13 | 14 | 15 | 3 | 42 | 15 | 10 | 6 |
| | N. E. | 2 | 2 | 2 | 8 | 2 | 2 | 2 | 8 | 2 | 5 | 7 | 6 | 14 | 10 | 12 | 12 |
| | Calm. | 0 | 1 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 3 | 5 | 0 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Buffalo, N. Y. | N. | 1 | 2 | 6 | 3 | 3 | 7 | 6 | 10 | 6 | 2 | 3 | 3 | 11 | 6 | 12 | 23 |
| | N. W. | 5 | 7 | 8 | 4 | 1 | 4 | 6 | 4 | 11 | 2 | 6 | 2 | 19 | 14 | 13 | 14 |
| | W. | 27 | 25 | 11 | 17 | 25 | 12 | 25 | 7 | 5 | 2 | 15 | 7 | 22 | 59 | 62 | 44 |
| | S. W. | 40 | 35 | 25 | 20 | 17 | 22 | 10 | 22 | 36 | 37 | 43 | 50 | 110 | 125 | 41 | 54 |
| | S. | 2 | 3 | 15 | 12 | 14 | 14 | 10 | 11 | 6 | 10 | 6 | 10 | 22 | 15 | 13 | 35 |
| | S. E. | 1 | 4 | 3 | 5 | 5 | 2 | 5 | 2 | 3 | 7 | 3 | 0 | 13 | 5 | 15 | 9 |
| | E. | 6 | 16 | 7 | 2 | 6 | 0 | 5 | 5 | 1 | 6 | 2 | 5 | 9 | 21 | 55 | 10 |
| | N. E. | 7 | 4 | 12 | 27 | 16 | 31 | 17 | 18 | 22 | 24 | 13 | 11 | 59 | 22 | 9 | 66 |
| | Calm. | 4 | 3 | 3 | 3 | 3 | 1 | 9 | 5 | 3 | 0 | 2 | 2 | 5 | 9 | 9 | 15 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Burlington, Vt. | N. | 19 | 14 | 16 | 42 | 13 | 33 | 27 | 28 | 36 | 34 | 20 | 13 | 90 | 46 | 71 | 88 |
| | N. W. | 2 | 3 | 5 | 6 | 11 | 9 | 7 | 5 | 6 | 3 | 8 | 9 | 17 | 14 | 22 | 21 |
| | W. | 6 | 11 | 4 | 2 | 11 | 7 | 2 | 2 | 9 | 7 | 13 | 7 | 29 | 24 | 17 | 11 |
| | S. W. | 5 | 6 | 7 | 1 | 3 | 3 | 1 | 4 | 2 | 2 | 3 | 10 | 7 | 18 | 11 | 8 |
| | S. | 35 | 35 | 39 | 23 | 42 | 28 | 31 | 32 | 29 | 25 | 26 | 27 | 80 | 97 | 104 | 91 |
| | S. E. | 2 | 4 | 0 | 0 | 3 | 0 | 4 | 2 | 3 | 6 | 3 | 4 | 12 | 10 | 9 | 6 |
| | E. | 2 | 3 | 4 | 3 | 2 | 5 | 7 | 5 | 1 | 5 | 3 | 1 | 9 | 6 | 6 | 17 |
| | N. E. | 1 | 1 | 3 | 2 | 1 | 4 | 4 | 4 | 2 | 1 | 2 | 2 | 5 | 4 | 30 | 12 |
| | Calm. | 21 | 16 | 12 | 14 | 4 | 4 | 10 | 2 | 5 | 7 | 15 | 17 | 27 | 54 | 0 | 16 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Local observations commenced April 1, 1878.

*Statement showing how many times the wind was observed blowing, &c.*—Continued.

| Station. | Wind. | July, 1877. | August. | September. | October. | November. | December. | January, '78. | February. | March. | April. | May. | June. | Spring. | Summer. | Autumn. | Winter. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cairo, Ill. | N. | 19 | 18 | 23 | 12 | 9 | 8 | 5 | 15 | 14 | 9 | 12 | 6 | 35 | 43 | 44 | 28 |
| | N. W. | 11 | 11 | 7 | 12 | 19 | 14 | 19 | 18 | 12 | 12 | 11 | 15 | 35 | 37 | 38 | 51 |
| | W. | 4 | 18 | 2 | 6 | 11 | 5 | 8 | 6 | 11 | 6 | 7 | 3 | 24 | 25 | 19 | 19 |
| | S. W. | 14 | 9 | 7 | 4 | 8 | 4 | 11 | 4 | 7 | 12 | 7 | 4 | 26 | 27 | 19 | 19 |
| | S. | 23 | 14 | 10 | 27 | 14 | 29 | 16 | 13 | 20 | 22 | 24 | 21 | 66 | 58 | 51 | 58 |
| | S. E. | 8 | 11 | 11 | 21 | 9 | 13 | 10 | 14 | 14 | 11 | 9 | 17 | 34 | 36 | 41 | 37 |
| | E. | 4 | 1 | 5 | 4 | 11 | 12 | 14 | 5 | 4 | 5 | 3 | 7 | 12 | 12 | 20 | 31 |
| | N. E. | 6 | 8 | 13 | 3 | 6 | 5 | 5 | 3 | 5 | 4 | 10 | 9 | 19 | 23 | 22 | 13 |
| | Calm. | 4 | 3 | 12 | 4 | 3 | 3 | 5 | 6 | 6 | 9 | 10 | 8 | 25 | 15 | 19 | 14 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cape Hatteras, N. C. | N. | 0 | 2 | 2 | 0 | 8 | 12 | 0 | 7 | 2 | 5 | 8 | 0 | 15 | 2 | 16 | 25 |
| | N. W. | 3 | 0 | 4 | 6 | 9 | 9 | 12 | 5 | 2 | 8 | 6 | 5 | 16 | 8 | 19 | 26 |
| | W. | 5 | 2 | 3 | 6 | 4 | 10 | 15 | 5 | 8 | 8 | 7 | 4 | 23 | 11 | 13 | 30 |
| | S. W. | 34 | 32 | 5 | 7 | 8 | 12 | 7 | 9 | 19 | 17 | 17 | 29 | 53 | 95 | 20 | 28 |
| | S. | 14 | 8 | 2 | 2 | 1 | 4 | 1 | 5 | 10 | 11 | 12 | 7 | 33 | 20 | 5 | 10 |
| | S. E. | 9 | 9 | 15 | 12 | 13 | 3 | 15 | 7 | 8 | 16 | 8 | 8 | 32 | 26 | 40 | 25 |
| | E. | 5 | 5 | 14 | 4 | 7 | 1 | 4 | 2 | 4 | 3 | 4 | 5 | 11 | 15 | 25 | 7 |
| | N. E. | 21 | 29 | 42 | 40 | 34 | 37 | 30 | 39 | 36 | 19 | 27 | 29 | 82 | 79 | 116 | 106 |
| | Calm. | 2 | 6 | 3 | 10 | 6 | 5 | 3 | 5 | 4 | 3 | 4 | 3 | 11 | 11 | 10 | 13 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cape Henry, Va | N. | 5 | 10 | 16 | 9 | 11 | 10 | 12 | 20 | 8 | 3 | 6 | 9 | 17 | 24 | 36 | 42 |
| | N. W. | 7 | 8 | 6 | 19 | 20 | 15 | 22 | 14 | 19 | 9 | 12 | 10 | 40 | 25 | 45 | 51 |
| | W. | 8 | 4 | 3 | 8 | 8 | 8 | 17 | 9 | 9 | 11 | 10 | 8 | 30 | 20 | 19 | 34 |
| | S. W. | 16 | 20 | 4 | 11 | 10 | 19 | 9 | 10 | 9 | 10 | 12 | 13 | 31 | 49 | 25 | 38 |
| | S. | 12 | 11 | 2 | 7 | 5 | 4 | 3 | 5 | 14 | 10 | 16 | 11 | 40 | 34 | 14 | 12 |
| | S. E. | 25 | 19 | 21 | 18 | 19 | 4 | 9 | 16 | 18 | 21 | 18 | 25 | 57 | 69 | 58 | 29 |
| | E. | 4 | 2 | 15 | 3 | 5 | 3 | 11 | 2 | 11 | 7 | 2 | 2 | 20 | 8 | 23 | 16 |
| | N. E. | 11 | 15 | 19 | 14 | 10 | 30 | 6 | 8 | 4 | 19 | 15 | 9 | 38 | 35 | 43 | 44 |
| | Calm. | 5 | 4 | 4 | 4 | 2 | 0 | 4 | 0 | 1 | 0 | 2 | 3 | 3 | 12 | 10 | 4 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cape Lookout, N. C. | N. | 3 | 2 | 10 | 10 | 12 | 15 | 9 | 21 | 6 | 5 | 8 | 4 | 19 | 9 | 32 | 45 |
| | N. W. | 4 | 7 | 3 | 9 | 11 | 12 | 13 | 9 | 5 | 11 | 11 | 7 | 27 | 18 | 23 | 34 |
| | W. | 9 | 5 | 2 | 5 | 9 | 17 | 19 | 7 | 8 | 9 | 6 | 9 | 23 | 23 | 16 | 43 |
| | S. W. | 42 | 32 | 13 | 14 | 8 | 9 | 9 | 9 | 27 | 27 | 34 | 33 | 88 | 107 | 35 | 27 |
| | S. | 10 | 8 | 2 | 3 | 5 | 1 | 6 | 7 | 15 | 11 | 10 | 2 | 36 | 20 | 10 | 14 |
| | S. E. | 5 | 3 | 8 | 8 | 14 | 3 | 7 | 7 | 4 | 10 | 5 | 5 | 10 | 13 | 30 | 17 |
| | E. | 3 | 12 | 11 | 7 | 4 | 3 | 4 | 4 | 3 | 5 | 6 | 6 | 14 | 21 | 22 | 11 |
| | N. E. | 15 | 22 | 37 | 34 | 24 | 30 | 26 | 20 | 25 | 12 | 13 | 24 | 50 | 61 | 95 | 76 |
| | Calm. | 2 | 2 | 4 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 10 | 3 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cape May, N. J | N. | 4 | 7 | 13 | 6 | 10 | 10 | 10 | 18 | 9 | 1 | 13 | 9 | 23 | 20 | 29 | 38 |
| | N. W. | 3 | 5 | 8 | 16 | 19 | 17 | 19 | 22 | 22 | 19 | 17 | 13 | 58 | 21 | 43 | 58 |
| | W. | 14 | 9 | 5 | 13 | 12 | 14 | 23 | 5 | 5 | 12 | 9 | 12 | 26 | 35 | 30 | 42 |
| | S. W. | 6 | 14 | 2 | 10 | 3 | 13 | 3 | 9 | 8 | 1 | 9 | 5 | 18 | 25 | 15 | 25 |
| | S. | 34 | 33 | 10 | 10 | 14 | 12 | 9 | 16 | 29 | 15 | 22 | 24 | 66 | 91 | 43 | 37 |
| | S. E. | 15 | 17 | 20 | 8 | 16 | 2 | 10 | 5 | 9 | 20 | 12 | 13 | 41 | 45 | 44 | 17 |
| | E. | 12 | 3 | 19 | 12 | 15 | 4 | 11 | 7 | 5 | 15 | 6 | 4 | 26 | 19 | 46 | 22 |
| | N. E. | 5 | 4 | 10 | 9 | 1 | 21 | 6 | 1 | 6 | 7 | 5 | 9 | 18 | 18 | 20 | 28 |
| | Calm. | 0 | 1 | 3 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 3 | 3 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Charleston, S. C. | N. | 5 | 14 | 13 | 21 | 22 | 11 | 4 | 11 | 9 | 7 | 8 | 3 | 24 | 22 | 56 | 26 |
| | N. W. | 1 | 3 | 6 | 3 | 4 | 7 | 10 | 9 | 5 | 4 | 6 | 3 | 15 | 7 | 13 | 26 |
| | W. | 13 | 7 | 3 | 10 | 13 | 16 | 25 | 9 | 11 | 17 | 9 | 6 | 37 | 26 | 26 | 50 |
| | S. W. | 21 | 14 | 5 | 4 | 14 | 8 | 13 | 11 | 24 | 27 | 34 | 28 | 85 | 63 | 23 | 32 |
| | S. | 31 | 27 | 9 | 7 | 7 | 9 | 1 | 8 | 12 | 10 | 10 | 9 | 32 | 67 | 23 | 18 |
| | S. E. | 7 | 4 | 10 | 4 | 2 | 4 | 5 | 7 | 16 | 12 | 12 | 16 | 40 | 27 | 16 | 16 |
| | E. | 9 | 18 | 17 | 2 | 13 | 17 | 14 | 7 | 11 | 5 | 12 | 7 | 28 | 34 | 50 | 38 |
| | N. E. | 6 | 6 | 27 | 24 | 15 | 20 | 21 | 21 | 5 | 8 | 2 | 18 | 15 | 30 | 66 | 62 |
| | Calm. | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cheyenne, Wyo. | N. | 9 | 9 | 10 | 17 | 16 | 10 | 7 | 7 | 12 | 21 | 13 | 17 | 46 | 35 | 43 | 24 |
| | N. W. | 17 | 16 | 15 | 19 | 24 | 25 | 50 | 39 | 39 | 35 | 24 | 20 | 98 | 53 | 58 | 114 |
| | W. | 13 | 13 | 25 | 20 | 32 | 38 | 21 | 17 | 11 | 9 | 3 | 5 | 23 | 31 | 77 | 76 |
| | S. W. | 12 | 14 | 11 | 8 | 15 | 8 | 12 | 8 | 5 | 4 | 9 | 6 | 18 | 32 | 34 | 28 |
| | S. | 23 | 16 | 17 | 13 | 3 | 6 | 3 | 6 | 5 | 7 | 5 | 15 | 17 | 54 | 33 | 15 |
| | S. E. | 11 | 11 | 8 | 4 | 0 | 2 | 0 | 2 | 5 | 8 | 7 | 4 | 20 | 26 | 12 | 4 |
| | E. | 2 | 11 | 2 | 7 | 0 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 4 | 14 | 9 | 2 |
| | N. E. | 3 | 3 | 2 | 5 | 0 | 1 | 0 | 0 | 6 | 0 | 5 | 5 | 10 | 11 | 7 | 1 |
| | Calm. | 3 | 0 | 0 | 0 | 0 | 1 | 0 | 5 | 8 | 5 | 26 | 17 | 39 | 20 | 0 | 6 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |

*Statement showing how many times the wind was observed blowing, &c.*—Continued.

| Station. | Wind. | July, 1877. | August. | September. | October. | November. | December. | January, '78. | February. | March. | April. | May. | June. | Spring. | Summer. | Autumn. | Winter. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chicago, Ill | N. | 1 | 12 | 9 | 9 | 7 | 8 | 8 | 10 | 10 | 10 | 3 | 7 | 23 | 20 | 25 | 26 |
| | N. W. | 10 | 5 | 1 | 16 | 9 | 6 | 11 | 7 | 11 | 4 | 5 | 1 | 20 | 10 | 26 | 24 |
| | W. | 8 | 12 | 7 | 11 | 18 | 12 | 15 | 2 | 4 | 11 | 18 | 9 | 33 | 29 | 36 | 29 |
| | S. W. | 26 | 14 | 26 | 18 | 24 | 21 | 10 | 11 | 17 | 13 | 11 | 20 | 41 | 60 | 68 | 42 |
| | S. | 2 | 10 | 8 | 7 | 6 | 19 | 25 | 15 | 10 | 9 | 11 | 7 | 30 | 19 | 21 | 59 |
| | S. E. | 16 | 6 | 9 | 8 | 7 | 9 | 5 | 8 | 15 | 11 | 17 | 17 | 43 | 39 | 24 | 22 |
| | E. | 6 | 13 | 10 | 1 | 9 | 6 | 4 | 6 | 11 | 8 | 15 | 12 | 34 | 31 | 20 | 16 |
| | N. E. | 21 | 14 | 15 | 22 | 9 | 12 | 15 | 24 | 15 | 24 | 12 | 17 | 51 | 52 | 46 | 51 |
| | Calm. | 3 | 7 | 5 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 10 | 7 | 1 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cincinnati, Ohio | N. | 9 | 8 | 14 | 9 | 10 | 9 | 2 | 13 | 10 | 10 | 10 | 4 | 30 | 21 | 33 | 24 |
| | N. W. | 8 | 13 | 8 | 12 | 6 | 5 | 16 | 9 | 13 | 16 | 13 | 7 | 42 | 28 | 26 | 30 |
| | W. | 14 | 22 | 7 | 10 | 17 | 12 | 16 | 8 | 13 | 12 | 18 | 13 | 43 | 49 | 34 | 36 |
| | S. W. | 14 | 9 | 7 | 7 | 10 | 13 | 11 | 12 | 9 | 10 | 9 | 12 | 28 | 35 | 24 | 36 |
| | S. | 9 | 8 | 13 | 20 | 14 | 15 | 15 | 9 | 10 | 14 | 12 | 11 | 36 | 28 | 47 | 39 |
| | S. E. | 10 | 11 | 19 | 25 | 20 | 17 | 15 | 12 | 21 | 12 | 14 | 16 | 47 | 37 | 64 | 44 |
| | E. | 11 | 10 | 10 | 3 | 8 | 7 | 14 | 7 | 7 | 4 | 6 | 14 | 17 | 35 | 21 | 28 |
| | N. E. | 14 | 5 | 10 | 4 | 5 | 9 | 4 | 13 | 10 | 12 | 11 | 12 | 33 | 31 | 19 | 26 |
| | Calm. | 4 | 7 | 2 | 3 | 0 | 6 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 12 | 5 | 7 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cleveland, Ohio | N. | 18 | 12 | 14 | 12 | 7 | 6 | 9 | 10 | 9 | 5 | 9 | 19 | 23 | 49 | 33 | 25 |
| | N. W. | 6 | 4 | 7 | 3 | 3 | 4 | 5 | 5 | 7 | 9 | 13 | 3 | 29 | 13 | 13 | 14 |
| | W. | 10 | 19 | 5 | 13 | 2 | 10 | 11 | 9 | 15 | 15 | 16 | 8 | 46 | 37 | 20 | 30 |
| | S. W. | 8 | 6 | 6 | 6 | 20 | 12 | 13 | 3 | 11 | 12 | 10 | 10 | 33 | 24 | 32 | 28 |
| | S. | 19 | 17 | 4 | 22 | 18 | 18 | 18 | 10 | 14 | 6 | 14 | 11 | 34 | 47 | 44 | 46 |
| | S. E. | 4 | 10 | 25 | 18 | 26 | 18 | 24 | 24 | 22 | 23 | 10 | 16 | 55 | 30 | 60 | 66 |
| | E. | 2 | 11 | 19 | 10 | 9 | 8 | 3 | 3 | 4 | 4 | 2 | 8 | 10 | 21 | 38 | 14 |
| | N. E. | 10 | 5 | 8 | 8 | 5 | 17 | 10 | 10 | 10 | 16 | 18 | 14 | 44 | 29 | 21 | 46 |
| | Calm. | 16 | 9 | 2 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 2 | 26 | 3 | 1 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Concho, Tex.* | N. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | 2 | .... | .... | .... | .... | .... |
| | N. W. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 17 | 5 | .... | .... | .... | .... | .... |
| | W. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 10 | 5 | .... | .... | .... | .... | .... |
| | S. W. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 18 | 13 | .... | .... | .... | .... | .... |
| | S. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 19 | 22 | .... | .... | .... | .... | .... |
| | S. E. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 9 | 19 | .... | .... | .... | .... | .... |
| | E. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 4 | 14 | .... | .... | .... | .... | .... |
| | N. E. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 5 | 9 | .... | .... | .... | .... | .... |
| | Calm. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 7 | 4 | .... | .... | .... | .... | .... |
| | Blank. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | .... | .... | .... | .... | .... |
| Corsicana, Tex | N. | 6 | 14 | 21 | 18 | 26 | 14 | 22 | 16 | 6 | 12 | 14 | 12 | 32 | 32 | 65 | 52 |
| | N. W. | 0 | 1 | 1 | 6 | 17 | 16 | 16 | 17 | 11 | 8 | 4 | 1 | 23 | 2 | 24 | 49 |
| | W. | 5 | 0 | 0 | 4 | 3 | 5 | 9 | 6 | 6 | 5 | 1 | 3 | 12 | 8 | 7 | 20 |
| | S. W. | 3 | 2 | 3 | 2 | 4 | 8 | 3 | 4 | 7 | 10 | 3 | 7 | 20 | 12 | 9 | 15 |
| | S. | 32 | 20 | 12 | 20 | 18 | 18 | 15 | 17 | 20 | 35 | 45 | 28 | 100 | 80 | 50 | 50 |
| | S. E. | 23 | 24 | 17 | 17 | 7 | 20 | 16 | 8 | 8 | 12 | 17 | 18 | 37 | 65 | 41 | 44 |
| | E. | 12 | 19 | 15 | 9 | 5 | 7 | 1 | 6 | 5 | 4 | 5 | 9 | 14 | 40 | 29 | 14 |
| | N. E. | 11 | 9 | 18 | 6 | 0 | 2 | 4 | 3 | 13 | 2 | 4 | 7 | 19 | 27 | 24 | 9 |
| | Calm. | 1 | 4 | 3 | 11 | 10 | 3 | 7 | 7 | 17 | 2 | 0 | 5 | 19 | 10 | 24 | 17 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Davenport, Iowa | N. | 7 | 13 | 4 | 7 | 10 | 5 | 9 | 10 | 4 | 11 | 2 | 4 | 17 | 24 | 21 | 24 |
| | N. W. | 17 | 16 | 10 | 17 | 13 | 7 | 15 | 8 | 18 | 16 | 23 | 14 | 57 | 47 | 40 | 30 |
| | W. | 3 | 5 | 6 | 8 | 16 | 10 | 12 | 3 | 6 | 11 | 12 | 7 | 29 | 15 | 30 | 25 |
| | S. W. | 10 | 11 | 19 | 15 | 4 | 22 | 11 | 14 | 10 | 9 | 7 | 14 | 26 | 44 | 38 | 47 |
| | S. | 10 | 7 | 11 | 5 | 6 | 7 | 11 | 10 | 6 | 5 | 3 | 7 | 14 | 24 | 22 | 28 |
| | S. E. | 13 | 7 | 12 | 5 | 5 | 8 | 3 | 5 | 17 | 9 | 6 | 3 | 32 | 23 | 22 | 16 |
| | E. | 12 | 4 | 5 | 8 | 12 | 4 | 10 | 5 | 11 | 12 | 14 | 14 | 37 | 30 | 25 | 19 |
| | N. E. | 1 | 4 | 8 | 13 | 7 | 11 | 17 | 19 | 11 | 11 | 10 | 11 | 32 | 16 | 28 | 47 |
| | Calm. | 11 | 26 | 15 | 15 | 17 | 19 | 5 | 10 | 10 | 6 | 16 | 16 | 32 | 53 | 47 | 34 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Deadwood, Dak.† | N. | .... | .... | .... | .... | .... | .... | 14 | 21 | 30 | 16 | 34 | .... | 70 | .... | .... | .... |
| | N. W. | .... | .... | .... | .... | .... | .... | 11 | 2 | 1 | 5 | 3 | .... | 9 | .... | .... | .... |
| | W. | .... | .... | .... | .... | .... | .... | 5 | 4 | 3 | 4 | 5 | .... | 12 | .... | .... | .... |
| | S. W. | .... | .... | .... | .... | .... | .... | 11 | 2 | 2 | 7 | 2 | .... | 11 | .... | .... | .... |
| | S. | .... | .... | .... | .... | .... | .... | 38 | 44 | 51 | 38 | 35 | .... | 124 | .... | .... | .... |
| | S. E. | .... | .... | .... | .... | .... | .... | 8 | 3 | 5 | 5 | 5 | .... | 15 | .... | .... | .... |
| | E. | .... | .... | .... | .... | .... | .... | 1 | 0 | 1 | 0 | 1 | .... | 2 | .... | .... | .... |
| | N. E. | .... | .... | .... | .... | .... | .... | 1 | 1 | 0 | 1 | 0 | .... | 1 | .... | .... | .... |
| | Calm. | .... | .... | .... | .... | .... | .... | 4 | 7 | 0 | 14 | 8 | .... | 22 | .... | .... | .... |
| | Blank. | .... | .... | .... | .... | .... | .... | 0 | 0 | 0 | 0 | 0 | .... | 0 | .... | .... | .... |

*Local observations commenced April 1, 1878, and were temporarily suspended June 22, 1878, owing to sickness of observer.

†Opened December 25, 1877; closed May 31, 1878.

*Statement showing how many times the wind was observed blowing, &c.*—Continued.

| Station. | Wind. | July, 1877. | August. | September. | October. | November. | December. | January, '78. | February. | March. | April. | May. | June. | Spring. | Summer. | Autumn. | Winter. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Denison, Tex | N. | 5 | 17 | 12 | 18 | 9 | 5 | 6 | 7 | 15 | 7 | 9 | 8 | 31 | 30 | 30 | 18 |
| | N. W. | 3 | 8 | 8 | 11 | 30 | 16 | 29 | 28 | 14 | 11 | 7 | 7 | 32 | 18 | 49 | 73 |
| | W. | 0 | 0 | 3 | 4 | 7 | 8 | 10 | 6 | 10 | 11 | 1 | 1 | 22 | 1 | 14 | 24 |
| | S. W. | 9 | 5 | 2 | 9 | 8 | 10 | 3 | 3 | 5 | 6 | 4 | 8 | 15 | 22 | 19 | 16 |
| | S. | 17 | 14 | 8 | 16 | 11 | 17 | 11 | 15 | 20 | 27 | 29 | 19 | 76 | 50 | 35 | 43 |
| | S. E. | 32 | 29 | 31 | 18 | 14 | 21 | 20 | 14 | 12 | 19 | 23 | 23 | 54 | 84 | 63 | 55 |
| | E. | 7 | 7 | 13 | 8 | 3 | 8 | 8 | 8 | 7 | 4 | 12 | 9 | 23 | 23 | 24 | 24 |
| | N. E. | 17 | 11 | 12 | 9 | 5 | 8 | 5 | 2 | 9 | 3 | 8 | 11 | 20 | 39 | 26 | 15 |
| | Calm. | 3 | 2 | 1 | 0 | 3 | 0 | 1 | 1 | 1 | 2 | 0 | 4 | 3 | 9 | 4 | 2 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Denver, Col | N. | 10 | 9 | 14 | 14 | 8 | 11 | 7 | 20 | 10 | 13 | 22 | 18 | 45 | 37 | 36 | 38 |
| | N. W. | 16 | 20 | 15 | 19 | 12 | 7 | 9 | 6 | 22 | 11 | 18 | 13 | 51 | 49 | 46 | 22 |
| | W. | 11 | 13 | 4 | 4 | 10 | 4 | 7 | 8 | 9 | 19 | 5 | 4 | 33 | 28 | 18 | 19 |
| | S. W. | 8 | 2 | 4 | 1 | 8 | 7 | 3 | 4 | 12 | 6 | 6 | 22 | 16 | 13 | 13 | 13 |
| | S. | 27 | 14 | 20 | 19 | 24 | 42 | 42 | 17 | 12 | 15 | 16 | 11 | 43 | 52 | 63 | 101 |
| | S. E. | 10 | 17 | 19 | 17 | 14 | 7 | 19 | 18 | 23 | 8 | 10 | 19 | 41 | 46 | 50 | 44 |
| | E. | 7 | 6 | 5 | 8 | 1 | 3 | 2 | 6 | 8 | 2 | 7 | 4 | 17 | 17 | 14 | 11 |
| | N. E. | 3 | 3 | 7 | 9 | 10 | 9 | 2 | 5 | 3 | 9 | 8 | 9 | 20 | 15 | 26 | 16 |
| | Calm. | 1 | 9 | 2 | 2 | 3 | 3 | 2 | 1 | 2 | 1 | 1 | 6 | 4 | 16 | 7 | 6 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Detroit Mich | N. | 5 | 11 | 5 | 1 | 9 | 7 | 12 | 7 | 10 | 5 | 3 | 7 | 18 | 23 | 15 | 26 |
| | N. W. | 9 | 13 | 7 | 12 | 8 | 7 | 4 | 10 | 14 | 9 | 12 | 11 | 35 | 33 | 27 | 21 |
| | W. | 14 | 15 | 12 | 15 | 19 | 8 | 23 | 9 | 9 | 13 | 24 | 10 | 48 | 39 | 46 | 40 |
| | S. W. | 33 | 34 | 25 | 23 | 19 | 24 | 12 | 22 | 23 | 18 | 15 | 19 | 56 | 86 | 67 | 58 |
| | S. | 5 | 8 | 8 | 10 | 11 | 5 | 20 | 5 | 5 | 6 | 3 | 8 | 14 | 21 | 29 | 30 |
| | S. E. | 2 | 4 | 12 | 5 | 6 | 0 | 1 | 3 | 3 | 8 | 5 | 4 | 16 | 10 | 23 | 4 |
| | E. | 8 | 4 | 11 | 9 | 8 | 18 | 7 | 6 | 16 | 10 | 19 | 12 | 45 | 24 | 28 | 31 |
| | N. E. | 14 | 4 | 9 | 18 | 9 | 14 | 11 | 22 | 13 | 21 | 12 | 17 | 46 | 35 | 36 | 47 |
| | Calm. | 3 | 0 | 1 | 0 | 1 | 10 | 3 | 0 | 0 | 0 | 0 | 2 | 0 | 5 | 2 | 13 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dodge City, Kans | N. | 10 | 10 | 4 | 36 | 29 | 22 | 42 | 32 | 17 | 23 | 13 | 19 | 53 | 39 | 60 | 96 |
| | N. W. | 2 | 2 | 7 | 5 | 18 | 11 | 6 | 2 | 13 | 12 | 8 | 1 | 33 | 5 | 30 | 19 |
| | W. | 3 | 3 | 7 | 4 | 5 | 7 | 4 | 3 | 5 | 5 | 6 | 2 | 16 | 8 | 16 | 14 |
| | S. W. | 4 | 3 | 6 | 2 | 1 | 8 | 8 | 9 | 12 | 14 | 11 | 5 | 37 | 12 | 9 | 25 |
| | S. | 33 | 29 | 36 | 16 | 19 | 24 | 20 | 15 | 19 | 7 | 15 | 27 | 41 | 80 | 71 | 59 |
| | S. E. | 25 | 26 | 10 | 13 | 11 | 6 | 6 | 7 | 6 | 13 | 12 | 14 | 31 | 65 | 34 | 19 |
| | E. | 9 | 9 | 9 | 5 | 2 | 6 | 3 | 2 | 8 | 8 | 9 | 9 | 25 | 27 | 16 | 11 |
| | N. E. | 7 | 7 | 7 | 11 | 4 | 4 | 4 | 12 | 9 | 6 | 12 | 12 | 27 | 26 | 22 | 20 |
| | Calm. | 0 | 4 | 4 | 1 | 1 | 5 | 0 | 2 | 4 | 2 | 7 | 1 | 13 | 5 | 6 | 7 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dubuque, Iowa | N. | 8 | 20 | 5 | 12 | 15 | 8 | 18 | 12 | 14 | 15 | 8 | 12 | 37 | 40 | 32 | 38 |
| | N. W. | 20 | 15 | 10 | 21 | 20 | 14 | 16 | 6 | 11 | 18 | 25 | 5 | 54 | 40 | 51 | 36 |
| | W. | 11 | 12 | 6 | 11 | 9 | 7 | 2 | 1 | 10 | 9 | 12 | 13 | 31 | 36 | 26 | 10 |
| | S. W. | 11 | 15 | 13 | 7 | 6 | 9 | 7 | 7 | 12 | 9 | 3 | 7 | 24 | 33 | 26 | 23 |
| | S. | 10 | 10 | 30 | 12 | 18 | 21 | 13 | 16 | 13 | 2 | 7 | 11 | 22 | 31 | 60 | 50 |
| | S. E. | 20 | 10 | 9 | 9 | 12 | 4 | 7 | 3 | 16 | 13 | 19 | 16 | 48 | 46 | 30 | 14 |
| | E. | 1 | 1 | 5 | 6 | 6 | 4 | 8 | 13 | 5 | 13 | 5 | 10 | 23 | 12 | 17 | 23 |
| | N. E. | 10 | 3 | 5 | 12 | 4 | 10 | 15 | 10 | 8 | 5 | 10 | 9 | 23 | 22 | 21 | 44 |
| | Calm. | 2 | 7 | 7 | 3 | 0 | 16 | 7 | 7 | 4 | 6 | 4 | 7 | 14 | 16 | 10 | 30 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Duluth, Minn | N. | 4 | 18 | 14 | 12 | 20 | 12 | 13 | 6 | 13 | 5 | 6 | 5 | 24 | 27 | 46 | 31 |
| | N. W. | 25 | 18 | 16 | 16 | 26 | 16 | 16 | 6 | 8 | 8 | 21 | 5 | 37 | 48 | 58 | 38 |
| | W. | 10 | 8 | 5 | 2 | 2 | 14 | 11 | 2 | 0 | 7 | 11 | 3 | 18 | 21 | 9 | 27 |
| | S. W. | 8 | 16 | 0 | 3 | 1 | 8 | 19 | 15 | 7 | 4 | 8 | 1 | 19 | 25 | 4 | 42 |
| | S. | 2 | 2 | 1 | 2 | 5 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 4 | 8 | 2 |
| | S. E. | 0 | 1 | 8 | 35 | 6 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 3 | 1 | 49 | 1 |
| | E. | 0 | 2 | 26 | 11 | 6 | 9 | 7 | 5 | 0 | 1 | 1 | 0 | 2 | 2 | 43 | 21 |
| | N. E. | 36 | 24 | 11 | 6 | 13 | 17 | 12 | 31 | 37 | 45 | 28 | 48 | 110 | 107 | 30 | 60 |
| | Calm. | 9 | 4 | 9 | 6 | 11 | 17 | 14 | 17 | 27 | 17 | 18 | 28 | 62 | 41 | 26 | 48 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Eastport, Me | N. | 6 | 10 | 7 | 17 | 15 | 21 | 14 | 18 | 15 | 27 | 7 | 3 | 49 | 19 | 39 | 53 |
| | N. W. | 4 | 4 | 16 | 21 | 20 | 35 | 31 | 25 | 30 | 6 | 14 | 12 | 50 | 20 | 57 | 91 |
| | W. | 6 | 8 | 7 | 10 | 9 | 9 | 12 | 17 | 5 | 2 | 6 | 4 | 13 | 18 | 26 | 38 |
| | S. W. | 12 | 8 | 12 | 6 | 13 | 11 | 11 | 7 | 14 | 4 | 3 | 6 | 21 | 26 | 31 | 29 |
| | S. | 55 | 25 | 30 | 11 | 11 | 4 | 6 | 4 | 16 | 19 | 29 | 47 | 64 | 127 | 52 | 14 |
| | S. E. | 0 | 2 | 2 | 0 | 4 | 2 | 4 | 0 | 1 | 5 | 3 | 2 | 9 | 4 | 6 | 6 |
| | E. | 2 | 8 | 8 | 12 | 7 | 3 | 10 | 7 | 5 | 7 | 11 | 2 | 23 | 12 | 22 | 20 |
| | N. E. | 0 | 12 | 4 | 12 | 7 | 5 | 4 | 5 | 6 | 16 | 14 | 7 | 36 | 19 | 23 | 14 |
| | Calm. | 8 | 16 | 9 | 3 | 4 | 3 | 1 | 1 | 1 | 4 | 0 | 7 | 11 | 31 | 16 | 5 |
| | Blank. | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |

*Statement showing how many times the wind was observed blowing, &c.*—Continued.

| Station. | Wind. | July, 1877. | August. | September. | October. | November. | December. | January, '78. | February. | March. | April. | May. | June. | Spring. | Summer. | Autumn. | Winter. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Erie, Pa. | N. | 11 | 7 | 9 | 4 | 10 | 4 | 6 | 3 | 7 | 7 | 7 | 7 | 21 | 25 | 23 | 13 |
| | N. W. | 5 | 4 | 9 | 14 | 5 | 13 | 12 | 6 | 9 | 1 | 10 | 6 | 20 | 15 | 28 | 31 |
| | W. | 24 | 25 | 12 | 12 | 19 | 9 | 18 | 13 | 18 | 23 | 27 | 24 | 68 | 73 | 43 | 40 |
| | S. W. | 15 | 9 | 3 | 10 | 11 | 17 | 7 | 5 | 5 | 5 | 12 | 5 | 22 | 20 | 24 | 29 |
| | S. | 14 | 35 | 26 | 29 | 33 | 16 | 30 | 26 | 24 | 19 | 10 | 19 | 53 | 68 | 88 | 72 |
| | S. E. | 5 | 4 | 10 | 4 | 1 | 3 | 2 | 5 | 3 | 6 | 3 | 3 | 12 | 12 | 15 | 10 |
| | E. | 2 | 4 | 6 | 2 | 4 | 2 | 5 | 1 | 6 | 0 | 4 | 2 | 10 | 8 | 12 | 8 |
| | N. E. | 10 | 1 | 10 | 15 | 3 | 26 | 8 | 20 | 14 | 13 | 13 | 13 | 40 | 24 | 28 | 54 |
| | Calm. | 7 | 4 | 5 | 3 | 4 | 3 | 5 | 5 | 7 | 16 | 7 | 11 | 30 | 22 | 12 | 13 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 |
| Escanaba, Mich. | N. | 15 | 20 | 16 | 25 | 16 | 21 | 30 | 36 | 26 | 26 | 18 | 28 | 70 | 72 | 57 | 87 |
| | N. W. | 10 | 11 | 4 | 10 | 12 | 8 | 20 | 7 | 10 | 10 | 16 | 5 | 36 | 26 | 20 | 35 |
| | W. | 5 | 4 | 13 | 13 | 18 | 6 | 11 | 1 | 1 | 6 | 6 | 4 | 13 | 13 | 44 | 18 |
| | S. W. | 7 | 8 | 2 | 9 | 12 | 17 | 15 | 6 | 7 | 4 | 5 | 3 | 16 | 18 | 23 | 38 |
| | S. | 36 | 24 | 33 | 9 | 13 | 12 | 11 | 23 | 18 | 16 | 24 | 30 | 58 | 90 | 55 | 46 |
| | S. E. | 10 | 4 | 1 | 5 | 6 | 11 | 2 | 1 | 9 | 4 | 3 | 9 | 16 | 23 | 12 | 14 |
| | E. | 0 | 0 | 0 | 3 | 1 | 6 | 2 | 1 | 4 | 15 | 10 | 3 | 29 | 3 | 4 | 9 |
| | N. E. | 7 | 5 | 8 | 16 | 4 | 7 | 1 | 6 | 16 | 5 | 7 | 6 | 28 | 18 | 28 | 14 |
| | Calm. | 3 | 8 | 13 | 3 | 8 | 5 | 1 | 3 | 2 | 4 | 4 | 2 | 10 | 13 | 24 | 9 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fort Bayard, N. Mex.* | N. | .... | .... | 8 | 7 | 0 | 4 | 14 | 0 | 0 | .... | .... | .... | .... | .... | 15 | 18 |
| | N. W. | .... | .... | 13 | 8 | 17 | 22 | 41 | 64 | 51 | .... | .... | .... | .... | .... | 38 | 127 |
| | W. | .... | .... | 2 | 3 | 7 | 8 | 16 | 6 | 2 | .... | .... | .... | .... | .... | 12 | 30 |
| | S. W. | .... | .... | 33 | 47 | 39 | 2 | 2 | 2 | 16 | .... | .... | .... | .... | .... | 110 | 6 |
| | S. | .... | .... | 4 | 0 | 0 | 8 | 7 | 5 | 14 | .... | .... | .... | .... | .... | 4 | 20 |
| | S. E. | .... | .... | 3 | 2 | 0 | 5 | 0 | 1 | 1 | .... | .... | .... | .... | .... | 5 | 6 |
| | E. | .... | .... | 2 | 0 | 0 | 10 | 1 | 3 | 0 | .... | .... | .... | .... | .... | 2 | 14 |
| | N. E. | .... | .... | 16 | 15 | 22 | 11 | 6 | 0 | 1 | .... | .... | .... | .... | .... | 53 | 17 |
| | Calm. | .... | .... | 9 | 11 | 5 | 23 | 6 | 3 | 8 | .... | .... | .... | .... | .... | 25 | 32 |
| | Blank. | .... | .... | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .... | .... | .... | .... | .... | 0 | 0 |
| Fort Craig, N. Mex.† | N. | .... | 10 | 4 | 7 | 4 | 12 | 9 | 2 | 0 | .... | .... | .... | .... | .... | 15 | 23 |
| | N. W. | .... | 14 | 28 | 22 | 36 | 41 | 43 | 52 | 34 | .... | .... | .... | .... | .... | 86 | 136 |
| | W. | .... | 1 | 8 | 9 | 17 | 3 | 2 | 0 | 3 | .... | .... | .... | .... | .... | 34 | 5 |
| | S. W. | .... | 13 | 14 | 20 | 11 | 12 | 10 | 6 | 22 | .... | .... | .... | .... | .... | 45 | 28 |
| | S. | .... | 8 | 12 | 7 | 4 | 4 | 1 | 4 | 0 | .... | .... | .... | .... | .... | 23 | 9 |
| | S. E. | .... | 14 | 10 | 5 | 3 | 2 | 3 | 5 | 20 | .... | .... | .... | .... | .... | 18 | 10 |
| | E. | .... | 16 | 10 | 1 | 3 | 2 | 3 | 1 | 1 | .... | .... | .... | .... | .... | 14 | 0 |
| | N. E. | .... | 10 | 2 | 4 | 7 | 11 | 14 | 2 | 7 | .... | .... | .... | .... | .... | 13 | 27 |
| | Calm. | .... | 5 | 2 | 4 | 5 | 6 | 8 | 8 | 6 | .... | .... | .... | .... | .... | 11 | 22 |
| | Blank. | .... | 2 | 0 | 14 | 0 | 0 | 0 | 4 | 0 | .... | .... | .... | .... | .... | 14 | 4 |
| Fort Gibson, Ind. Ter. | N. | 11 | 13 | 9 | 16 | 19 | 25 | 25 | 27 | 17 | 7 | 10 | 12 | 34 | 36 | 44 | 77 |
| | N. W. | 4 | 4 | 3 | 11 | 16 | 6 | 10 | 8 | 9 | 12 | 14 | 14 | 35 | 22 | 40 | 24 |
| | W. | 5 | 5 | 4 | 3 | 6 | 4 | 2 | 4 | 6 | 8 | 1 | 5 | 15 | 15 | 13 | 10 |
| | S. W. | 2 | 6 | 6 | 4 | 1 | 3 | 4 | 2 | 5 | 4 | 2 | 6 | 11 | 14 | 11 | 9 |
| | S. | 30 | 23 | 15 | 23 | 23 | 27 | 18 | 16 | 18 | 23 | 20 | 18 | 70 | 71 | 61 | 61 |
| | S. E. | 23 | 20 | 26 | 22 | 13 | 20 | 18 | 18 | 15 | 15 | 15 | 9 | 45 | 61 | 61 | 66 |
| | E. | 16 | 10 | 15 | 9 | 8 | 6 | 13 | 6 | 10 | 13 | 10 | 18 | 33 | 44 | 32 | 25 |
| | N. E. | 2 | 1 | 4 | 4 | 0 | 1 | 0 | 0 | 4 | 3 | 9 | 3 | 16 | 6 | 8 | 1 |
| | Calm. | 0 | 2 | 8 | 1 | 4 | 1 | 3 | 3 | 9 | 5 | 3 | 5 | 17 | 7 | 13 | 7 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fort Sully, Dak.‡ | N. | 2 | 1 | 4 | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| | N. W. | 40 | 27 | 24 | 34 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| | W. | 2 | 2 | 2 | 2 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| | S. W. | 1 | 1 | 0 | 0 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| | S. | 8 | 3 | 6 | 2 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| | S. E. | 32 | 35 | 27 | 14 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| | E. | 1 | 3 | 5 | 4 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| | N. E. | 0 | 1 | 1 | 4 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| | Calm. | 7 | 20 | 21 | 32 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| | Blank. | 0 | 0 | 0 | 0 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... |
| Galveston, Tex. | N. | 9 | 11 | 13 | 13 | 25 | 10 | 11 | 15 | 6 | 7 | 5 | 4 | 18 | 24 | 51* | 26 |
| | N. W. | 5 | 7 | 4 | 8 | 8 | 16 | 19 | 10 | 5 | 0 | 0 | 2 | 11 | 14 | 20 | 45 |
| | W. | 1 | 5 | 4 | 3 | 7 | 2 | 6 | 9 | 8 | 0 | 1 | 3 | 9 | 9 | 14 | 17 |
| | S. W. | 5 | 5 | 5 | 0 | 3 | 5 | 8 | 5 | 10 | 17 | 5 | 7 | 32 | 17 | 8 | 18 |
| | S. | 13 | 5 | 17 | 11 | 10 | 3 | 16 | 19 | 18 | 22 | 38 | 46 | 78 | 64 | 38 | 38 |
| | S. E. | 33 | 31 | 25 | 29 | 11 | 16 | 11 | 11 | 22 | 27 | 29 | 19 | 78 | 83 | 65 | 28 |
| | E. | 14 | 16 | 11 | 21 | 12 | 35 | 12 | 11 | 12 | 3 | 8 | 4 | 23 | 34 | 44 | 58 |
| | N. E. | 13 | 11 | 10 | 8 | 13 | 6 | 9 | 4 | 11 | 8 | 7 | 5 | 28 | 20 | 31 | 19 |
| | Calm. | 0 | 2 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 2 | 1 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Local observations commenced August 9, 1877, and discontinued April 10, 1878. †Local observations commenced July 9, 1877, and discontinued April 10, 1878. ‡Station closed October 31, 1877.

*Statement showing how many times the wind was observed blowing, &c.*—Continued.

| Station. | Wind. | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | Spring. | Summer. | Autumn. | Winter. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grand Haven, Mich.. | N. | 3 | 6 | 0 | 3 | 15 | 7 | 13 | 6 | 8 | 2 | 7 | 19 | 17 | 28 | 18 | 26 |
| | N. W. | 16 | 20 | 12 | 17 | 1 | 8 | 9 | 4 | 11 | 12 | 23 | 12 | 46 | 48 | 30 | 21 |
| | W. | 13 | 10 | 2 | 9 | 17 | 9 | 10 | 8 | 8 | 13 | 10 | 13 | 31 | 36 | 28 | 27 |
| | S. W. | 20 | 29 | 18 | 17 | 9 | 14 | 13 | 14 | 15 | 11 | 17 | 10 | 43 | 50 | 44 | 41 |
| | S. | 16 | 5 | 18 | 14 | 12 | 11 | 14 | 11 | 5 | 10 | 8 | 13 | 23 | 34 | 44 | 36 |
| | S. E. | 5 | 8 | 8 | 4 | 14 | 16 | 14 | 11 | 18 | 16 | 9 | 3 | 43 | 16 | 26 | 41 |
| | E. | 10 | 0 | 4 | 15 | 8 | 11 | 13 | 16 | 9 | 9 | 8 | 10 | 26 | 20 | 27 | 40 |
| | N. E. | 4 | 6 | 13 | 14 | 13 | 13 | 4 | 9 | 16 | 16 | 8 | 5 | 40 | 15 | 40 | 26 |
| | Calm. | 6 | 9 | 15 | 0 | 1 | 4 | 3 | 5 | 3 | 1 | 3 | 5 | 7 | 20 | 16 | 12 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Indianapolis, Ind .... | N. | 7 | 10 | 7 | 8 | 7 | 9 | 5 | 12 | 5 | 7 | 10 | 10 | 22 | 27 | 22 | 26 |
| | N. W. | 6 | 13 | 6 | 8 | 8 | 5 | 14 | 17 | 18 | 17 | 10 | 11 | 45 | 30 | 22 | 30 |
| | W. | 9 | 9 | 4 | 11 | 16 | 10 | 15 | 4 | 11 | 12 | 24 | 10 | 47 | 28 | 31 | 29 |
| | S. W. | 19 | 7 | 15 | 9 | 12 | 13 | 12 | 6 | 7 | 13 | 11 | 13 | 31 | 39 | 36 | 31 |
| | S. | 10 | 5 | 7 | 20 | 13 | 22 | 12 | 10 | 14 | 7 | 8 | 10 | 29 | 25 | 40 | 44 |
| | S. E. | 12 | 5 | 8 | 14 | 9 | 14 | 16 | 11 | 22 | 16 | 13 | 10 | 51 | 27 | 31 | 41 |
| | E. | 3 | 1 | 4 | 4 | 7 | 4 | 5 | 5 | 7 | 8 | 6 | 9 | 21 | 13 | 15 | 14 |
| | N. E. | 12 | 5 | 12 | 5 | 4 | 8 | 9 | 16 | 9 | 10 | 11 | 13 | 30 | 30 | 21 | 33 |
| | Calm. | 15 | 38 | 27 | 14 | 14 | 8 | 5 | 3 | 0 | 0 | 0 | 4 | 0 | 57 | 55 | 16 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Indianola, Tex. ..... | N. | 6 | 5 | 14 | 15 | 33 | 20 | 20 | 19 | 5 | 9 | 4 | 2 | 18 | 13 | 62 | 59 |
| | N. W. | 0 | 2 | 1 | 6 | 8 | 5 | 17 | 7 | 14 | 5 | 0 | 0 | 19 | 2 | 15 | 29 |
| | W. | 1 | 0 | 0 | 0 | 0 | 2 | 4 | 7 | 4 | 1 | 2 | 2 | 7 | 3 | 0 | 13 |
| | S. W. | 1 | 0 | 6 | 2 | 1 | 4 | 5 | 7 | 5 | 2 | 4 | 1 | 11 | 8 | 9 | 16 |
| | S. | 32 | 27 | 20 | 14 | 14 | 5 | 17 | 9 | 17 | 30 | 31 | 43 | 78 | 102 | 57 | 31 |
| | S. E. | 29 | 24 | 16 | 27 | 14 | 14 | 10 | 15 | 23 | 29 | 34 | 26 | 80 | 79 | 57 | 39 |
| | E. | 10 | 17 | 15 | 17 | 7 | 23 | 5 | 10 | 16 | 4 | 14 | 10 | 34 | 37 | 39 | 38 |
| | N. E. | 8 | 10 | 7 | 12 | 13 | 20 | 15 | 10 | 9 | 9 | 4 | 6 | 22 | 24 | 32 | 45 |
| | Calm. | 6 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 8 | 2 | 0 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jacksonville, Fla .... | N. | 1 | 3 | 6 | 5 | 9 | 11 | 10 | 9 | 2 | 2 | 3 | 3 | 7 | 7 | 20 | 30 |
| | N. W. | 1 | 3 | 5 | 9 | 16 | 10 | 7 | 15 | 6 | 5 | 8 | 9 | 19 | 13 | 30 | 32 |
| | W. | 2 | 2 | 2 | 8 | 13 | 17 | 31 | 12 | 9 | 15 | 10 | 3 | 34 | 7 | 23 | 60 |
| | S. W. | 12 | 13 | 3 | 5 | 5 | 4 | 8 | 14 | 10 | 10 | 16 | 13 | 36 | 38 | 13 | 26 |
| | S. | 12 | 6 | 10 | 5 | 3 | 0 | 5 | 3 | 15 | 10 | 8 | 11 | 33 | 29 | 18 | 8 |
| | S. E. | 35 | 19 | 9 | 9 | 7 | 4 | 3 | 5 | 10 | 13 | 20 | 10 | 43 | 64 | 25 | 12 |
| | E. | 12 | 12 | 14 | 13 | 8 | 18 | 5 | 4 | 15 | 4 | 13 | 24 | 32 | 48 | 35 | 27 |
| | N. E. | 15 | 27 | 30 | 36 | 22 | 23 | 21 | 20 | 24 | 18 | 7 | 7 | 49 | 49 | 88 | 64 |
| | Calm. | 3 | 8 | 11 | 3 | 7 | 5 | 3 | 2 | 2 | 13 | 8 | 10 | 23 | 21 | 21 | 10 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Keokuk, Iowa ..... | N. | 11 | 15 | 10 | 13 | 14 | 13 | 14 | 20 | 12 | 15 | 14 | 16 | 41 | 42 | 37 | 47 |
| | N. W. | 12 | 6 | 6 | 16 | 16 | 11 | 18 | 8 | 11 | 19 | 18 | 15 | 48 | 33 | 38 | 37 |
| | W. | 7 | 6 | 3 | 6 | 11 | 11 | 10 | 4 | 12 | 7 | 10 | 6 | 29 | 19 | 20 | 25 |
| | S. W. | 12 | 9 | 12 | 9 | 2 | 18 | 10 | 7 | 10 | 8 | 5 | 5 | 23 | 26 | 23 | 35 |
| | S. | 20 | 12 | 23 | 11 | 11 | 16 | 10 | 14 | 8 | 7 | 14 | 15 | 29 | 47 | 45 | 40 |
| | S. E. | 7 | 13 | 14 | 9 | 14 | 9 | 9 | 5 | 18 | 14 | 9 | 7 | 41 | 27 | 37 | 23 |
| | E. | 13 | 2 | 6 | 8 | 9 | 3 | 9 | 5 | 11 | 5 | 7 | 12 | 23 | 27 | 23 | 17 |
| | N. E. | 4 | 10 | 4 | 14 | 6 | 10 | 11 | 14 | 6 | 11 | 8 | 6 | 25 | 20 | 24 | 35 |
| | Calm. | 7 | 20 | 12 | 7 | 7 | 2 | 2 | 7 | 5 | 4 | 8 | 8 | 17 | 35 | 26 | 11 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Key West, Fla..... | N. | 2 | 3 | 7 | 9 | 18 | 23 | 29 | 12 | 11 | 10 | 3 | 8 | 24 | 13 | 34 | 64 |
| | N. W. | 6 | 9 | 4 | 5 | 8 | 3 | 2 | 14 | 9 | 12 | 6 | 11 | 27 | 26 | 17 | 19 |
| | W. | 3 | 6 | 6 | 4 | 0 | 3 | 3 | 3 | 8 | 4 | 0 | 12 | 18 | 21 | 10 | 9 |
| | S. W. | 8 | 17 | 5 | 2 | 4 | 0 | 1 | 3 | 3 | 7 | 6 | 5 | 16 | 30 | 11 | 4 |
| | S. | 4 | 6 | 3 | 9 | 6 | 0 | 7 | 8 | 4 | 9 | 4 | 12 | 17 | 22 | 18 | 15 |
| | S. E. | 20 | 10 | 6 | 1 | 3 | 11 | 7 | 13 | 16 | 24 | 18 | 8 | 58 | 38 | 20 | 31 |
| | E. | 44 | 18 | 25 | 35 | 16 | 10 | 15 | 11 | 25 | 16 | 39 | 27 | 80 | 89 | 76 | 36 |
| | N. E. | 2 | 12 | 16 | 27 | 33 | 42 | 23 | 15 | 17 | 5 | 10 | 4 | 32 | 18 | 76 | 80 |
| | Calm. | 4 | 12 | 8 | 1 | 2 | 1 | 6 | 5 | 0 | 3 | 1 | 3 | 4 | 19 | 11 | 12 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kittyhawk, N. C ..... | N. | 7 | 4 | 12 | 9 | 13 | 17 | 14 | 17 | 8 | 1 | 7 | 4 | 16 | 15 | 34 | 48 |
| | N. W. | 1 | 2 | 5 | 4 | 6 | 6 | 9 | 3 | 4 | 6 | 9 | 7 | 19 | 10 | 15 | 18 |
| | W. | 5 | 4 | 2 | 11 | 9 | 10 | 14 | 7 | 5 | 13 | 8 | 7 | 20 | 10 | 22 | 31 |
| | S. W. | 30 | 24 | 6 | 12 | 12 | 19 | 16 | 17 | 23 | 18 | 24 | 16 | 65 | 70 | 30 | 52 |
| | S. | 15 | 10 | 1 | 8 | 8 | 4 | 2 | 2 | 5 | 7 | 5 | 6 | 17 | 31 | 17 | 8 |
| | S. E. | 9 | 10 | 4 | 9 | 12 | 1 | 7 | 7 | 10 | 11 | 14 | 13 | 35 | 32 | 25 | 15 |
| | E. | 4 | 4 | 14 | 11 | 9 | 1 | 6 | 3 | 14 | 11 | 6 | 10 | 31 | 18 | 34 | 10 |
| | N. E. | 21 | 34 | 44 | 29 | 21 | 33 | 25 | 27 | 24 | 23 | 18 | 20 | 65 | 81 | 94 | 85 |
| | Calm. | 1 | 1 | 2 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 2 | 1 | 2 | 3 | 2 | 3 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Statement showing how many times the wind was observed blowing, &c.*—Continued.

| Station. | Wind. | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | Spring. | Summer. | Autumn. | Winter. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Knoxville, Tenn. | N. | 15 | 7 | 16 | 11 | 15 | 6 | 7 | 5 | 2 | 1 | 7 | 11 | 10 | 33 | 42 | 18 |
| | N. W. | 15 | 9 | 6 | 7 | 10 | 1 | 7 | 11 | 10 | 2 | 11 | 7 | 23 | 31 | 23 | 19 |
| | W. | 5 | 8 | 2 | 2 | 2 | 5 | 19 | 5 | 8 | 10 | 15 | 8 | 33 | 21 | 6 | 29 |
| | S. W. | 11 | 15 | 1 | 13 | 21 | 19 | 12 | 18 | 22 | 26 | 16 | 23 | 64 | 49 | 35 | 49 |
| | S. | 30 | 9 | 7 | 7 | 2 | 1 | 1 | 2 | 2 | 3 | 2 | 5 | 7 | 34 | 16 | 4 |
| | S. E. | 7 | 8 | 3 | 2 | 2 | 3 | 2 | 2 | 3 | 1 | 1 | 3 | 5 | 18 | 7 | 7 |
| | E. | 2 | 4 | 6 | 2 | 1 | 5 | 2 | 2 | 5 | 2 | 5 | 3 | 12 | 9 | 9 | 9 |
| | N. E. | 5 | 12 | 23 | 15 | 12 | 26 | 20 | 8 | 13 | 9 | 16 | 7 | 38 | 34 | 50 | 54 |
| | Calm. | 3 | 21 | 26 | 34 | 25 | 27 | 23 | 31 | 28 | 36 | 20 | 23 | 84 | 47 | 85 | 81 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| La Crosse, Wis. | N. | 10 | 28 | 14 | 17 | 23 | 14 | 20 | 30 | 27 | 20 | 23 | 18 | 70 | 56 | 54 | 64 |
| | N. W. | 9 | 9 | 4 | 11 | 14 | 9 | 8 | 7 | 3 | 11 | 17 | 10 | 31 | 28 | 29 | 24 |
| | W. | 11 | 8 | 5 | 18 | 6 | 6 | 8 | 2 | 6 | 13 | 14 | 9 | 33 | 28 | 29 | 16 |
| | S. W. | 23 | 12 | 12 | 5 | 3 | 6 | 5 | 1 | 11 | 7 | 6 | 10 | 24 | 45 | 20 | 12 |
| | S. | 31 | 34 | 41 | 20 | 32 | 39 | 25 | 29 | 22 | 15 | 11 | 23 | 48 | 88 | 93 | 93 |
| | S. E. | 5 | 1 | 6 | 2 | 5 | 3 | 5 | 2 | 14 | 14 | 12 | 13 | 40 | 19 | 13 | 10 |
| | E. | 2 | 0 | 3 | 2 | 3 | 6 | 8 | 7 | 6 | 3 | 4 | 0 | 13 | 2 | 8 | 21 |
| | N. E. | 1 | 0 | 3 | 12 | 2 | 6 | 10 | 5 | 4 | 7 | 6 | 7 | 17 | 8 | 17 | 21 |
| | Calm. | 1 | 1 | 2 | 6 | 2 | 4 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 10 | 9 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *La Mesilla, N. Mex. | N. | .... | .... | 2 | 1 | 8 | 8 | 21 | 8 | 1 | .... | .... | .... | .... | .... | 11 | 37 |
| | N. W. | .... | .... | 7 | 7 | 0 | 2 | 8 | 5 | 5 | .... | .... | .... | .... | .... | 14 | 15 |
| | W. | .... | .... | 0 | 0 | 6 | 9 | 4 | 17 | 10 | .... | .... | .... | .... | .... | 6 | 30 |
| | S. W. | .... | .... | 9 | 19 | 14 | 10 | 1 | 6 | 16 | .... | .... | .... | .... | .... | 42 | 17 |
| | S. | .... | .... | 1 | 3 | 2 | 2 | 2 | 2 | 6 | .... | .... | .... | .... | .... | 6 | 6 |
| | S. E. | .... | .... | 5 | 11 | 4 | 7 | 5 | 2 | 6 | .... | .... | .... | .... | .... | 20 | 14 |
| | E. | .... | .... | 3 | 0 | 1 | 3 | 2 | 8 | 6 | .... | .... | .... | .... | .... | 4 | 13 |
| | N. E. | .... | .... | 0 | 3 | 7 | 5 | 3 | 3 | 1 | .... | .... | .... | .... | .... | 10 | 11 |
| | Calm. | .... | .... | 63 | 49 | 48 | 47 | 47 | 33 | 42 | .... | .... | .... | .... | .... | 160 | 127 |
| | Blank. | .... | .... | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .... | .... | .... | .... | .... | 0 | 0 |
| †Laredo, Tex. | N. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 8 | 10 | 2 | .... | .... | .... | .... |
| | N. W. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 5 | 0 | 1 | .... | .... | .... | .... |
| | W. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 3 | 0 | 1 | .... | .... | .... | .... |
| | S. W. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 2 | 0 | 2 | .... | .... | .... | .... |
| | S. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 6 | 8 | 14 | .... | .... | .... | .... |
| | S. E. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 28 | 39 | 50 | .... | .... | .... | .... |
| | E. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 21 | 23 | 17 | .... | .... | .... | .... |
| | N. E. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 15 | 11 | 2 | .... | .... | .... | .... |
| | Calm. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 2 | 2 | 1 | .... | .... | .... | .... |
| | Blank. | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | 0 | .... | .... | .... | .... |
| Leavenworth, Kans. | N. | 22 | 25 | 14 | 34 | 21 | 25 | 25 | 35 | 15 | 15 | 11 | 14 | 41 | 61 | 69 | 85 |
| | N. W. | 5 | 7 | 6 | 11 | 25 | 8 | 20 | 6 | 25 | 18 | 15 | 7 | 58 | 19 | 42 | 34 |
| | W. | 0 | 2 | 0 | 0 | 2 | 2 | 3 | 1 | 3 | 3 | 2 | 0 | 8 | 2 | 2 | 6 |
| | S. W. | 4 | 2 | 0 | 0 | 0 | 4 | 1 | 0 | 4 | 7 | 2 | 4 | 13 | 10 | 6 | 5 |
| | S. | 39 | 31 | 41 | 24 | 19 | 40 | 24 | 25 | 18 | 16 | 16 | 17 | 50 | 87 | 84 | 89 |
| | S. E. | 13 | 17 | 11 | 9 | 12 | 7 | 4 | 5 | 13 | 7 | 15 | 5 | 35 | 35 | 32 | 16 |
| | E. | 3 | 2 | 0 | 2 | 4 | 1 | 4 | 3 | 4 | 9 | 8 | 5 | 21 | 10 | 6 | 8 |
| | N. E. | 3 | 5 | 3 | 5 | 3 | 1 | 3 | 7 | 4 | 6 | 6 | 3 | 16 | 11 | 11 | 11 |
| | Calm. | 4 | 2 | 0 | 8 | 4 | 5 | 9 | 2 | 7 | 9 | 18 | 35 | 34 | 41 | 21 | 16 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Los Angeles, Cal. | N. | 0 | 5 | 14 | 28 | 35 | 34 | 35 | 18 | 18 | 9 | 8 | 5 | 35 | 10 | 77 | 87 |
| | N. W. | 16 | 6 | 9 | 3 | 3 | 2 | 16 | 8 | 13 | 2 | 4 | 1 | 19 | 23 | 15 | 26 |
| | W. | 30 | 64 | 41 | 37 | 22 | 6 | 4 | 7 | 9 | 13 | 13 | 24 | 35 | 118 | 100 | 17 |
| | S. W. | 14 | 6 | 8 | 10 | 3 | 4 | 5 | 9 | 12 | 23 | 19 | 27 | 54 | 47 | 21 | 18 |
| | S. | 12 | 2 | 4 | 0 | 3 | 18 | 7 | 4 | 3 | 5 | 10 | 5 | 18 | 19 | 7 | 29 |
| | S. E. | 7 | 2 | 4 | 1 | 0 | 6 | 6 | 4 | 3 | 4 | 11 | 7 | 18 | 10 | 5 | 16 |
| | E. | 5 | 2 | 1 | 4 | 1 | 6 | 5 | 13 | 6 | 10 | 10 | 10 | 26 | 17 | 6 | 24 |
| | N. E. | 0 | 1 | 7 | 6 | 14 | 11 | 11 | 13 | 20 | 7 | 5 | 3 | 32 | 4 | 27 | 35 |
| | Calm. | 7 | 5 | 2 | 4 | 9 | 6 | 4 | 8 | 9 | 17 | 13 | 8 | 39 | 20 | 15 | 18 |
| | Blank. | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| Louisville, Ky. | N. | 10 | 15 | 23 | 6 | 12 | 12 | 3 | 11 | 9 | 8 | 11 | 7 | 28 | 32 | 41 | 26 |
| | N. W. | 7 | 20 | 9 | 8 | 5 | 6 | 3 | 13 | 8 | 10 | 6 | 13 | 24 | 40 | 22 | 22 |
| | W. | 10 | 15 | 5 | 12 | 17 | 10 | 22 | 7 | 12 | 14 | 15 | 6 | 41 | 31 | 34 | 89 |
| | S. W. | 28 | 9 | 6 | 4 | 14 | 20 | 19 | 14 | 17 | 21 | 19 | 16 | 57 | 53 | 24 | 58 |
| | S. | 9 | 9 | 16 | 33 | 11 | 15 | 12 | 10 | 14 | 11 | 14 | 18 | 39 | 36 | 60 | 37 |
| | S. E. | 5 | 9 | 9 | 19 | 14 | 15 | 17 | 13 | 16 | 13 | 7 | 10 | 36 | 24 | 42 | 45 |
| | E. | 4 | 1 | 3 | 2 | 5 | 3 | 7 | 8 | 3 | 3 | 9 | 4 | 15 | 9 | 10 | 16 |
| | N. E. | 20 | 11 | 16 | 6 | 10 | 11 | 10 | 8 | 13 | 10 | 12 | 15 | 35 | 46 | 32 | 29 |
| | Calm. | 0 | 4 | 3 | 3 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 5 | 8 | 1 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Local observations began August 12, 1877, and discontinued April 10, 1878.
†Local observations commenced April 1, 1878.

*Statement showing how many times the wind was observed blowing, &c.*—Continued.

| Station. | Wind. | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | Spring. | Summer. | Autumn. | Winter. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lynchburg, Va | N. | 8 | 5 | 4 | 1 | 3 | 1 | 3 | 2 | 1 | 1 | 4 | 5 | 6 | 18 | 8 | 6 |
| | N. W. | 10 | 8 | 6 | 9 | 9 | 10 | 18 | 15 | 20 | 16 | 8 | 12 | 44 | 30 | 24 | 49 |
| | W. | 12 | 9 | 5 | 12 | 9 | 14 | 16 | 11 | 8 | 10 | 21 | 11 | 39 | 32 | 26 | 41 |
| | S. W. | 17 | 8 | 5 | 5 | 15 | 9 | 10 | 9 | 8 | 7 | 8 | 4 | 23 | 30 | 25 | 28 |
| | S. | 10 | 11 | 7 | 18 | 2 | 5 | 3 | 9 | 17 | 19 | 13 | 13 | 40 | 34 | 27 | 17 |
| | S. E. | 2 | 4 | 8 | 3 | 8 | 1 | 2 | 2 | 3 | 3 | 2 | 8 | 8 | 14 | 19 | 5 |
| | E. | 12 | 4 | 11 | 3 | 2 | 2 | 2 | 2 | 7 | 5 | 7. | 5 | 19 | 21 | 16 | 6 |
| | N. E. | 10 | 13 | 10 | 8 | 13 | 17 | 11 | 6 | 10 | 13 | 4 | 7 | 27 | 30 | 40 | 34 |
| | Calm. | 12 | 30 | 25 | 34 | 20 | 28 | 28 | 28 | 18 | 16 | 26 | 25 | 60 | 67 | 88 | 84 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Marquette, Mich | N. | 5 | 9 | 4 | 13 | 9 | 3 | 7 | 15 | 6 | 4 | 6 | 7 | 16 | 21 | 26 | 25 |
| | N. W. | 17 | 20 | 12 | 15 | 16 | 14 | 21 | 17 | 33 | 27 | 29 | 20 | 89 | 67 | 43 | 52 |
| | W. | 17 | 26 | 12 | 10 | 25 | 16 | 19 | 10 | 12 | 13 | 9 | 11 | 34 | 54 | 47 | 45 |
| | S. W. | 9 | 7 | 11 | 12 | 7 | 15 | 11 | 8 | 6 | 6 | 7 | 2 | 19 | 18 | 30 | 34 |
| | S. | 11 | 10 | 23 | 5 | 15 | 16 | 19 | 12 | 7 | 2 | 2 | 9 | 11 | 30 | 43 | 47 |
| | S. E. | 8 | 4 | 11 | 10 | 11 | 21 | 6 | 6 | 16 | 13 | 13 | 10 | 42 | 22 | 32 | 33 |
| | E. | 8 | 8 | 6 | 7 | 4 | 3 | 1 | 1 | 5 | 8 | 13 | 15 | 26 | 31 | 17 | 5 |
| | N. E. | 6 | 5 | 6 | 18 | 2 | 3 | 7 | 12 | 7 | 10 | 10 | 5 | 27 | 16 | 26 | 22 |
| | Calm. | 12 | 4 | 5 | 3 | 1 | 2 | 2 | 3 | 1 | 7 | 4 | 11 | 12 | 27 | 9 | 7 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Memphis, Tenn | N. | 16 | 17 | 17 | 8 | 8 | 3 | 8 | 13 | 5 | 10 | 8 | 16 | 23 | 49 | 33 | 24 |
| | N. W. | 11 | 20 | 6 | 7 | 15 | 20 | 8 | 12 | 11 | 9 | 11 | 17 | 31 | 48 | 28 | 40 |
| | W. | 4 | 2 | 3 | 5 | 13 | 5 | 17 | 9 | 10 | 9 | 4 | 4 | 23 | 10 | 21 | 31 |
| | S. W. | 24 | 14 | 7 | 9 | 12 | 12 | 18 | 5 | 12 | 15 | 21 | 10 | 48 | 48 | 28 | 35 |
| | S. | 13 | 7 | 2 | 16 | 10 | 17 | 7 | 10 | 12 | 19 | 23 | 17 | 54 | 37 | 28 | 34 |
| | S. E. | 6 | 7 | 6 | 23 | 7 | 12 | 13 | 13 | 22 | 11 | 5 | 10 | 38 | 23 | 36 | 38 |
| | E. | 1 | 2 | 11 | 4 | 8 | 10 | 8 | 8 | 3 | 5 | 11 | 5 | 19 | 8 | 23 | 26 |
| | N. E. | 7 | 16 | 27 | 11 | 12 | 9 | 10 | 10 | 14 | 8 | 9 | 10 | 31 | 33 | 50 | 29 |
| | Calm. | 11 | 8 | 11 | 10 | 5 | 5 | 4 | 4 | 4 | 4 | 1 | 1 | 9 | 20 | 26 | 13 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Milwaukee, Wis | N. | 1 | 7 | 7 | 4 | 7 | 11 | 10 | 12 | 7 | 17 | 7 | 9 | 31 | 17 | 18 | 33 |
| | N. W. | 13 | 13 | 6 | 15 | 22 | 12 | 24 | 11 | 13 | 9 | 10 | 11 | 32 | 37 | 43 | 47 |
| | W. | 21 | 20 | 14 | 14 | 18 | 14 | 17 | 7 | 9 | 8 | 20 | 4 | 37 | 45 | 46 | 38 |
| | S. W. | 14 | 17 | 24 | 16 | 19 | 10 | 13 | 15 | 11 | 13 | 12 | 11 | 36 | 42 | 50 | 47 |
| | S. | 8 | 4 | 6 | 6 | 4 | 5 | 9 | 5 | 3 | 8 | 3 | 9 | 14 | 21 | 16 | 19 |
| | S. E. | 18 | 17 | 12 | 9 | 9 | 11 | 4 | 7 | 21 | 13 | 11 | 13 | 45 | 48 | 30 | 22 |
| | E. | 11 | 4 | 7 | 7 | 4 | 7 | 8 | 8 | 5 | 8 | 17 | 16 | 30 | 31 | 18 | 23 |
| | N. E. | 5 | 11 | 13 | 22 | 7 | 8 | 7 | 18 | 22 | 13 | 13 | 15 | 48 | 31 | 42 | 33 |
| | Calm. | 2 | 0 | 1 | 0 | 0 | 6 | 1 | 1 | 2 | 1 | 0 | 2 | 3 | 4 | 1 | 8 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mobile, Ala | N. | 16 | 22 | 30 | 42 | 40 | 17 | 25 | 23 | 27 | 12 | 24 | 15 | 63 | 53 | 112 | 65 |
| | N. W. | 6 | 0 | 4 | 7 | 13 | 13 | 14 | 9 | 6 | 17 | 7 | 8 | 30 | 14 | 24 | 36 |
| | W. | 3 | 6 | 2 | 3 | 3 | 7 | 5 | 5 | 5 | 5 | 1 | 3 | 11 | 12 | 8 | 17 |
| | S. W. | 9 | 16 | 3 | 0 | 4 | 3 | 6 | 3 | 6 | 4 | 13 | 13 | 23 | 38 | 7 | 12 |
| | S. | 30 | 18 | 24 | 13 | 11 | 10 | 18 | 9 | 22 | 31 | 34 | 28 | 87 | 76 | 48 | 37 |
| | S. E. | 18 | 6 | 4 | 15 | 7 | 11 | 6 | 10 | 18 | 15 | 5 | 7 | 38 | 31 | 26 | 27 |
| | E. | 4 | 8 | 7 | 8 | 6 | 10 | 4 | 5 | 1 | 0 | 3 | 7 | 4 | 10 | 21 | 10 |
| | N. E. | 4 | 8 | 12 | 3 | 3 | 1 | 2 | 6 | 4 | 3 | 4 | 8 | 11 | 20 | 18 | 9 |
| | Calm. | 3 | 9 | 4 | 2 | 3 | 21 | 13 | 14 | 4 | 3 | 2 | 1 | 9 | 13 | 9 | 48 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Montgomery, Ala | N. | 15 | 13 | 17 | 6 | 13 | 7 | 6 | 6 | 10 | 6 | 14 | 6 | 30 | 34 | 36 | 19 |
| | N. W. | 5 | 10 | 6 | 20 | 24 | 17 | 21 | 18 | 13 | 12 | 8 | 22 | 33 | 37 | 50 | 56 |
| | W. | 9 | 7 | 3 | 5 | 11 | 7 | 22 | 9 | 10 | 14 | 21 | 8 | 45 | 24 | 19 | 38 |
| | S. W. | 10 | 5 | 4 | 1 | 4 | 5 | 5 | 10 | 5 | 8 | 12 | 11 | 25 | 26 | 9 | 20 |
| | S. | 18 | 4 | 6 | 8 | 4 | 5 | 7 | 4 | 13 | 7 | 13 | 9 | 33 | 31 | 18 | 16 |
| | S. E. | 18 | 8 | 7 | 14 | 13 | 12 | 12 | 15 | 21 | 22 | 11 | 10 | 54 | 36 | 34 | 39 |
| | E. | 6 | 9 | 14 | 16 | 7 | 19 | 11 | 9 | 6 | 8 | 3 | 8 | 17 | 23 | 37 | 39 |
| | N. E. | 7 | 24 | 24 | 13 | 4 | 9 | 7 | 9 | 6 | 5 | 3 | 9 | 14 | 40 | 41 | 25 |
| | Calm. | 5 | 13 | 9 | 10 | 10 | 12 | 2 | 4 | 9 | 8 | 8 | 7 | 25 | 25 | 29 | 18 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Morgantown, W. Va. | N. | 12 | 4 | 7 | 7 | 10 | 10 | 7 | 10 | 7 | 5 | 13 | 16 | 25 | 32 | 24 | 27 |
| | N. W. | 6 | 1 | 3 | 7 | 5 | 6 | 4 | 8 | 13 | 4 | 10 | 8 | 27 | 10 | 15 | 18 |
| | W. | 11 | 4 | 6 | 10 | 11 | 7 | 12 | 8 | 11 | 18 | 12 | 8 | 41 | 23 | 27 | 27 |
| | S. W. | 20 | 22 | 11 | 18 | 22 | 26 | 26 | 18 | 20 | 9 | 21 | 17 | 50 | 59 | 51 | 70 |
| | S. | 6 | 14 | 7 | 8 | 9 | 13 | 16 | 13 | 15 | 12 | 10 | 10 | 37 | 30 | 24 | 42 |
| | S. E. | 1 | 7 | 5 | 5 | 5 | 3 | 4 | 4 | 4 | 7 | 2 | 8 | 13 | 11 | 15 | 11 |
| | E. | 2 | 7 | 6 | 2 | 9 | 8 | 9 | 3 | 8 | 11 | 5 | 8 | 24 | 17 | 17 | 20 |
| | N. E. | 5 | 2 | 2 | 2 | 1 | 7 | 7 | 3 | 2 | 9 | 3 | 2 | 14 | 9 | 5 | 17 |
| | Calm. | 30 | 32 | 43 | 34 | 18 | 13 | 8 | 17 | 13 | 15 | 7 | 28 | 45 | 85 | 95 | 38 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Statement showing how many times the wind was observed blowing, &c.*—Continued.

| Station. | Wind. | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | Spring. | Summer. | Autumn. | Winter. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mount Washington, N. H. | N. | 6 | 1 | 3 | 16 | 1 | 16 | 4 | 3 | 6 | 6 | 5 | 8 | 17 | 15 | 20 | 23 |
| | N. W. | 56 | 55 | 57 | 52 | 41 | 50 | 60 | 54 | 54 | 21 | 46 | 37 | 121 | 148 | 150 | 164 |
| | W. | 6 | 6 | 10 | 6 | 17 | 8 | 12 | 8 | 10 | 5 | 6 | 9 | 21 | 21 | 33 | 28 |
| | S. W. | 7 | 7 | 2 | 5 | 4 | 1 | 3 | 3 | 5 | 5 | 6 | 7 | 16 | 21 | 11 | 7 |
| | S. | 4 | 6 | 1 | 4 | 11 | 1 | 4 | 0 | 2 | 17 | 8 | 8 | 27 | 18 | 16 | 5 |
| | S. E. | 0 | 1 | 0 | 7 | 7 | 0 | 6 | 6 | 4 | 3 | 6 | 6 | 13 | 7 | 14 | 12 |
| | E. | 0 | 0 | 4 | 0 | 6 | 5 | 2 | 0 | 1 | 10 | 9 | 2 | 20 | 2 | 10 | 7 |
| | N. E. | 7 | 0 | 3 | 3 | 3 | 11 | 2 | 9 | 8 | 21 | 6 | 4 | 35 | 11 | 9 | 22 |
| | Calm. | 7 | 17 | 10 | 0 | 0 | 1 | 0 | 1 | 3 | 2 | 1 | 9 | 6 | 33 | 10 | 2 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nashville, Tenn. | N. | 3 | 6 | 16 | 4 | 6 | 6 | 6 | 9 | 9 | 4 | 6 | 8 | 19 | 17 | 26 | 21 |
| | N. W. | 12 | 8 | 13 | 10 | 17 | 10 | 7 | 12 | 11 | 8 | 6 | 12 | 25 | 32 | 40 | 29 |
| | W. | 20 | 25 | 5 | 6 | 15 | 15 | 21 | 19 | 14 | 21 | 22 | 13 | 57 | 58 | 26 | 55 |
| | S. W. | 14 | 8 | 4 | 2 | 6 | 3 | 8 | 5 | 8 | 11 | 6 | 6 | 25 | 28 | 12 | 16 |
| | S. | 13 | 3 | 3 | 8 | 10 | 12 | 7 | 8 | 12 | 10 | 14 | 10 | 36 | 26 | 21 | 27 |
| | S. E. | 8 | 11 | 8 | 20 | 12 | 15 | 12 | 16 | 14 | 14 | 13 | 9 | 41 | 28 | 40 | 43 |
| | E. | 6 | 7 | 7 | 8 | 13 | 17 | 19 | 11 | 14 | 5 | 6 | 14 | 25 | 27 | 28 | 47 |
| | N. E. | 11 | 9 | 5 | 0 | 6 | 3 | 6 | 1 | 6 | 6 | 14 | 14 | 26 | 34 | 11 | 10 |
| | Calm. | 6 | 16 | 29 | 35 | 5 | 12 | 7 | 3 | 5 | 11 | 6 | 4 | 22 | 26 | 69 | 22 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| New Haven, Conn. | N. | 17 | 9 | 14 | 19 | 13 | 20 | 22 | 24 | 7 | 12 | 9 | 11 | 28 | 37 | 46 | 66 |
| | N. W. | 8 | 10 | 6 | 16 | 17 | 12 | 19 | 17 | 28 | 16 | 21 | 13 | 65 | 31 | 39 | 48 |
| | W. | 2 | 4 | 5 | 3 | 10 | 14 | 13 | 3 | 4 | 5 | 9 | 3 | 18 | 9 | 18 | 30 |
| | S. W. | 18 | 23 | 20 | 20 | 15 | 24 | 15 | 9 | 17 | 7 | 9 | 12 | 33 | 53 | 55 | 48 |
| | S. | 22 | 18 | 13 | 7 | 9 | 4 | 7 | 4 | 19 | 14 | 23 | 23 | 56 | 63 | 29 | 15 |
| | S. E. | 4 | 4 | 5 | 4 | 4 | 1 | 1 | 3 | 1 | 13 | 5 | 7 | 19 | 15 | 13 | 5 |
| | E. | 6 | 3 | 3 | 5 | 3 | 0 | 4 | 1 | 0 | 7 | 1 | 4 | 8 | 13 | 11 | 5 |
| | N. E. | 6 | 9 | 11 | 12 | 18 | 18 | 10 | 19 | 16 | 15 | 14 | 8 | 45 | 23 | 41 | 47 |
| | Calm. | 10 | 13 | 13 | 7 | 1 | 0 | 2 | 4 | 1 | 1 | 2 | 9 | 4 | 32 | 21 | 6 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| New London, Conn. | N. | 7 | 2 | 8 | 9 | 11 | 29 | 13 | 17 | 14 | 11 | 8 | 7 | 33 | 16 | 28 | 50 |
| | N. W. | 10 | 8 | 16 | 16 | 18 | 16 | 28 | 22 | 15 | 14 | 16 | 10 | 45 | 28 | 50 | 66 |
| | W. | 3 | 5 | 4 | 10 | 13 | 14 | 9 | 10 | 12 | 6 | 13 | 3 | 31 | 11 | 27 | 33 |
| | S. W. | 18 | 17 | 15 | 15 | 11 | 13 | 11 | 7 | 14 | 5 | 18 | 18 | 37 | 53 | 41 | 31 |
| | S. | 16 | 9 | 8 | 0 | 5 | 5 | 6 | 4 | 7 | 0 | 8 | 10 | 15 | 35 | 13 | 15 |
| | S. E. | 16 | 14 | 11 | 10 | 6 | 1 | 3 | 2 | 6 | 24 | 10 | 12 | 40 | 42 | 27 | 6 |
| | E. | 1 | 3 | 3 | 6 | 5 | 0 | 4 | 3 | 2 | 17 | 3 | 5 | 22 | 9 | 14 | 7 |
| | N. E. | 1 | 5 | 7 | 9 | 10 | 6 | 7 | 6 | 7 | 6 | 5 | 6 | 18 | 12 | 26 | 19 |
| | Calm. | 21 | 30 | 18 | 18 | 11 | 9 | 12 | 13 | 16 | 7 | 12 | 19 | 35 | 70 | 47 | 34 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| New Orleans, La. | N. | 6 | 14 | 17 | 26 | 22 | 10 | 15 | 8 | 9 | 8 | 6 | 8 | 23 | 28 | 65 | 33 |
| | N. W. | 14 | 11 | 8 | 13 | 15 | 20 | 20 | 18 | 8 | 10 | 7 | 7 | 25 | 32 | 36 | 58 |
| | W. | 6 | 12 | 5 | 0 | 7 | 8 | 14 | 11 | 8 | 13 | 4 | 7 | 25 | 25 | 12 | 33 |
| | S. W. | 6 | 9 | 5 | 0 | 5 | 1 | 9 | 10 | 12 | 12 | 11 | 19 | 35 | 34 | 10 | 20 |
| | S. | 8 | 8 | 6 | 2 | 5 | 1 | 2 | 3 | 5 | 8 | 17 | 7 | 30 | 23 | 13 | 6 |
| | S. E. | 24 | 10 | 12 | 17 | 9 | 7 | 13 | 11 | 24 | 25 | 23 | 13 | 72 | 47 | 38 | 31 |
| | E. | 11 | 12 | 21 | 21 | 14 | 36 | 12 | 13 | 14 | 8 | 5 | 9 | 27 | 32 | 56 | 61 |
| | N. E. | 15 | 15 | 14 | 12 | 13 | 10 | 2 | 7 | 12 | 3 | 12 | 3 | 27 | 33 | 4 | 19 |
| | Calm. | 3 | 2 | 2 | 2 | 0 | 0 | 6 | 3 | 1 | 3 | 8 | 17 | 12 | 22 | 0 | 9 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Newport, R. I. | N. | 7 | 4 | 11 | 12 | 15 | 24 | 10 | 16 | 10 | 9 | 8 | 8 | 27 | 19 | 38 | 50 |
| | N. W. | 11 | 8 | 13 | 16 | 13 | 12 | 14 | 21 | 19 | 16 | 15 | 10 | 50 | 29 | 42 | 47 |
| | W. | 2 | 3 | 3 | 7 | 14 | 20 | 22 | 10 | 9 | 7 | 10 | 7 | 26 | 12 | 24 | 52 |
| | S. W. | 27 | 29 | 26 | 24 | 16 | 21 | 24 | 12 | 19 | 9 | 31 | 27 | 59 | 83 | 66 | 57 |
| | S. | 21 | 19 | 14 | 4 | 9 | 6 | 4 | 2 | 12 | 7 | 4 | 13 | 23 | 53 | 27 | 12 |
| | S. E. | 8 | 8 | 6 | 15 | 8 | 0 | 1 | 3 | 5 | 19 | 10 | 10 | 34 | 26 | 29 | 4 |
| | E. | 1 | 5 | 2 | 1 | 10 | 0 | 4 | 4 | 3 | 10 | 0 | 1 | 13 | 7 | 13 | 8 |
| | N. E. | 7 | 5 | 10 | 11 | 3 | 6 | 9 | 7 | 8 | 11 | 12 | 8 | 31 | 20 | 24 | 22 |
| | Calm. | 9 | 12 | 5 | 3 | 2 | 4 | 5 | 9 | 8 | 2 | 3 | 6 | 13 | 27 | 10 | 18 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| New York, N. Y. | N. | 5 | 4 | 7 | 7 | 8 | 11 | 0 | 7 | 4 | 2 | 8 | 5 | 14 | 14 | 22 | 18 |
| | N. W. | 25 | 12 | 15 | 18 | 13 | 23 | 22 | 23 | 17 | 18 | 7 | 19 | 42 | 50 | 46 | 68 |
| | W. | 8 | 19 | 12 | 21 | 20 | 22 | 26 | 14 | 21 | 13 | 20 | 8 | 54 | 35 | 53 | 62 |
| | S. W. | 16 | 17 | 21 | 17 | 13 | 18 | 12 | 7 | 13 | 7 | 17 | 18 | 37 | 51 | 51 | 37 |
| | S. | 14 | 12 | 11 | 10 | 9 | 5 | 7 | 7 | 9 | 6 | 6 | 5 | 21 | 36 | 30 | 19 |
| | S. E. | 9 | 11 | 12 | 6 | 7 | 0 | 1 | 1 | 12 | 13 | 9 | 16 | 34 | 16 | 25 | 2 |
| | E. | 6 | 8 | 4 | 5 | 4 | 2 | 5 | 0 | 0 | 0 | 8 | 2 | 14 | 35 | 13 | 7 |
| | N. E. | 10 | 10 | 8 | 9 | 16 | 12 | 12 | 14 | 12 | 24 | 12 | 15 | 48 | 2 | 33 | 38 |
| | Calm. | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 11 | 5 | 1 | 6 | 2 | 12 | 0 | 0 | 19 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 |

*Statement showing how many times the wind was observed blowing, &c.*—Continued.

| Station. | Wind. | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | Spring. | Summer. | Autumn. | Winter. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Norfolk, Va. | N. | 7 | 7 | 11 | 15 | 14 | 18 | 15 | 20 | 14 | 9 | 15 | 14 | 38 | 28 | 40 | 53 |
| | N. W. | 4 | 5 | 4 | 12 | 3 | 7 | 13 | 5 | 5 | 11 | 9 | 11 | 25 | 20 | 19 | 25 |
| | W. | 4 | 4 | 0 | 2 | 7 | 9 | 14 | 5 | 4 | 5 | 5 | 5 | 14 | 13 | 9 | 28 |
| | S. W. | 22 | 18 | 4 | 13 | 6 | 16 | 11 | 10 | 17 | 15 | 20 | 17 | 52 | 57 | 23 | 37 |
| | S. | 35 | 21 | 8 | 23 | 26 | 11 | 12 | 18 | 19 | 13 | 17 | 19 | 49 | 75 | 57 | 41 |
| | S. E. | 5 | 12 | 26 | 7 | 10 | 1 | 5 | 8 | 15 | 13 | 10 | 9 | 38 | 26 | 43 | 14 |
| | E. | 4 | 9 | 16 | 6 | 8 | 12 | 8 | 3 | 6 | 11 | 5 | 6 | 22 | 19 | 30 | 23 |
| | N. E. | 12 | 13 | 19 | 12 | 11 | 18 | 6 | 13 | 13 | 12 | 10 | 7 | 35 | 32 | 42 | 37 |
| | Calm. | 0 | 4 | 2 | 3 | 5 | 1 | 9 | 2 | 0 | 1 | 2 | 2 | 3 | 6 | 10 | 12 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Platte, Nebr. | N. | 9 | 7 | 6 | 7 | 5 | 12 | 5 | 11 | 6 | 2 | 8 | 8 | 16 | 24 | 18 | 28 |
| | N. W. | 5 | 15 | 14 | 34 | 34 | 28 | 47 | 23 | 39 | 29 | 33 | 17 | 101 | 37 | 82 | 98 |
| | W. | 5 | 2 | 8 | 8 | 16 | 19 | 12 | 12 | 7 | 11 | 3 | 3 | 21 | 10 | 32 | 43 |
| | S. W. | 5 | 5 | 6 | 6 | 4 | 4 | 4 | 5 | 0 | 7 | 0 | 3 | 7 | 13 | 16 | 13 |
| | S. | 35 | 21 | 10 | 4 | 11 | 5 | 7 | 10 | 11 | 6 | 5 | 14 | 22 | 70 | 25 | 22 |
| | S. E. | 12 | 19 | 18 | 5 | 4 | 5 | 9 | 7 | 10 | 11 | 13 | 23 | 34 | 54 | 27 | 21 |
| | E. | 9 | 12 | 8 | 7 | 5 | 10 | 3 | 3 | 11 | 11 | 18 | 7 | 40 | 28 | 20 | 16 |
| | N. E. | 11 | 11 | 10 | 19 | 9 | 8 | 4 | 11 | 9 | 12 | 12 | 14 | 33 | 36 | 47 | 23 |
| | Calm. | 2 | 1 | 1 | 3 | 2 | 2 | 2 | 2 | 0 | 1 | 1 | 1 | 2 | 4 | 6 | 6 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Olympia, Wash. | N. | 15 | 29 | 10 | 17 | 10 | 11 | 6 | 9 | 12 | 11 | 13 | 14 | 36 | 58 | 37 | 26 |
| | N. W. | 25 | 6 | 6 | 6 | 4 | 1 | 3 | 3 | 5 | 6 | 8 | 9 | 19 | 40 | 16 | 7 |
| | W. | 14 | 4 | 0 | 2 | 1 | 5 | 2 | 3 | 8 | 10 | 7 | 10 | 25 | 28 | 12 | 10 |
| | S. W. | 16 | 17 | 22 | 18 | 16 | 9 | 16 | 15 | 21 | 22 | 32 | 17 | 75 | 50 | 56 | 40 |
| | S. | 8 | 12 | 33 | 26 | 49 | 48 | 41 | 30 | 22 | 22 | 13 | 13 | 57 | 33 | 108 | 128 |
| | S. E. | 0 | 0 | 2 | 0 | 3 | 9 | 7 | 5 | 0 | 4 | 2 | 4 | 6 | 4 | 5 | 21 |
| | E. | 3 | 0 | 1 | 3 | 0 | 4 | 1 | 1 | 2 | 2 | 3 | 4 | 7 | 7 | 4 | 6 |
| | N. E. | 7 | 5 | 2 | 2 | 3 | 2 | 1 | 1 | 2 | 0 | 3 | 8 | 5 | 20 | 7 | 4 |
| | Calm. | 5 | 20 | 5 | 19 | 4 | 4 | 16 | 8 | 21 | 13 | 12 | 11 | 46 | 36 | 28 | 28 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Omaha, Nebr. | N. | 13 | 14 | 11 | 31 | 21 | 22 | 26 | 33 | 19 | 18 | 14 | 12 | 51 | 39 | 63 | 81 |
| | N. W. | 13 | 17 | 12 | 14 | 23 | 18 | 22 | 10 | 18 | 19 | 19 | 17 | 56 | 47 | 49 | 50 |
| | W. | 3 | 1 | 4 | 5 | 2 | 4 | 6 | 0 | 6 | 7 | 7 | 2 | 20 | 6 | 11 | 10 |
| | S. W. | 6 | 3 | 6 | 3 | 1 | 6 | 4 | 1 | 5 | 8 | 4 | 4 | 17 | 13 | 10 | 11 |
| | S. | 40 | 24 | 38 | 18 | 22 | 24 | 24 | 23 | 17 | 8 | 11 | 21 | 26 | 85 | 78 | 71 |
| | S. E. | 12 | 19 | 12 | 15 | 9 | 12 | 4 | 5 | 13 | 9 | 17 | 16 | 39 | 47 | 36 | 21 |
| | E. | 2 | 7 | 2 | 2 | 6 | 2 | 3 | 3 | 3 | 8 | 19 | 6 | 30 | 15 | 10 | 8 |
| | N. E. | 3 | 3 | 1 | 2 | 4 | 0 | 2 | 1 | 4 | 11 | 10 | 4 | 25 | 10 | 7 | 3 |
| | Calm. | 1 | 4 | 4 | 3 | 2 | 5 | 2 | 8 | 8 | 2 | 2 | 8 | 12 | 13 | 9 | 15 |
| | Blank. | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Oswego, N. Y. | N. | 8 | 5 | 9 | 14 | 7 | 15 | 9 | 7 | 16 | 16 | 12 | 12 | 44 | 25 | 30 | 31 |
| | N. W. | 10 | 17 | 15 | 14 | 8 | 11 | 17 | 9 | 14 | 13 | 20 | 21 | 53 | 48 | 37 | 37 |
| | W. | 20 | 21 | 15 | 10 | 17 | 11 | 12 | 10 | 12 | 10 | 24 | 15 | 46 | 65 | 42 | 33 |
| | S. W. | 15 | 11 | 3 | 5 | 8 | 3 | 5 | 8 | 5 | 1 | 1 | 4 | 7 | 30 | 16 | 16 |
| | S. | 19 | 8 | 14 | 8 | 10 | 12 | 22 | 21 | 24 | 23 | 23 | 23 | 70 | 50 | 32 | 55 |
| | S. E. | 6 | 19 | 23 | 23 | 35 | 22 | 16 | 10 | 5 | 4 | 0 | 4 | 9 | 29 | 81 | 48 |
| | E. | 0 | 0 | 3 | 4 | 3 | 9 | 9 | 2 | 4 | 4 | 1 | 2 | 9 | 2 | 10 | 20 |
| | N. E. | 2 | 0 | 3 | 7 | 0 | 10 | 3 | 15 | 11 | 14 | 3 | 5 | 28 | 7 | 10 | 28 |
| | Calm. | 4 | 12 | 5 | 8 | 2 | 0 | 0 | 2 | 2 | 5 | 3 | 4 | 10 | 20 | 15 | 2 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pembina, Dak. | N. | 4 | 9 | 12 | 12 | 13 | 12 | 7 | 14 | 13 | 9 | 17 | 17 | 39 | 30 | 37 | 33 |
| | N. W. | 18 | 22 | 19 | 30 | 29 | 18 | 25 | 18 | 29 | 27 | 27 | 16 | 83 | 56 | 78 | 61 |
| | W. | 16 | 19 | 11 | 16 | 3 | 15 | 6 | 0 | 3 | 4 | 9 | 9 | 16 | 44 | 30 | 21 |
| | S. W. | 8 | 6 | 2 | 2 | 2 | 8 | 2 | 4 | 2 | 4 | 2 | 1 | 8 | 15 | 6 | 14 |
| | S. | 17 | 19 | 26 | 13 | 30 | 26 | 18 | 19 | 14 | 7 | 9 | 10 | 30 | 46 | 69 | 63 |
| | S. E. | 19 | 9 | 14 | 12 | 11 | 13 | 24 | 21 | 17 | 9 | 10 | 22 | 36 | 50 | 37 | 58 |
| | E. | 3 | 0 | 0 | 4 | 1 | 0 | 4 | 0 | 8 | 17 | 8 | 11 | 33 | 14 | 5 | 10 |
| | N. E. | 3 | 2 | 4 | 3 | 1 | 0 | 0 | 2 | 3 | 7 | 9 | 3 | 19 | 8 | 8 | 2 |
| | Calm. | 5 | 7 | 2 | 1 | 0 | 1 | 7 | 0 | 4 | 6 | 2 | 1 | 12 | 13 | 3 | 8 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Philadelphia, Pa. | N. | 7 | 15 | 11 | 8 | 13 | 7 | 7 | 9 | 9 | 6 | 12 | 6 | 27 | 28 | 32 | 23 |
| | N. W. | 12 | 15 | 12 | 13 | 16 | 20 | 19 | 24 | 20 | 18 | 17 | 18 | 55 | 45 | 41 | 63 |
| | W. | 20 | 20 | 8 | 11 | 13 | 15 | 20 | 8 | 15 | 11 | 16 | 12 | 42 | 52 | 32 | 43 |
| | S. W. | 19 | 16 | 18 | 28 | 17 | 20 | 21 | 10 | 17 | 7 | 17 | 17 | 41 | 52 | 63 | 51 |
| | S. | 3 | 7 | 9 | 6 | 7 | 5 | 3 | 6 | 13 | 9 | 14 | 8 | 36 | 18 | 22 | 14 |
| | S. E. | 5 | 1 | 6 | 6 | 3 | 1 | 1 | 2 | 3 | 9 | 2 | 3 | 14 | 9 | 15 | 4 |
| | E. | 16 | 14 | 6 | 2 | 9 | 3 | 6 | 2 | 4 | 13 | 4 | 5 | 21 | 35 | 17 | 11 |
| | N. E. | 11 | 5 | 17 | 18 | 10 | 22 | 15 | 23 | 12 | 16 | 10 | 20 | 38 | 36 | 45 | 60 |
| | Calm. | 0 | 0 | 3 | 1 | 2 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 0 | 1 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Statement showing how many times the wind was observed blowing, &c.*—Continued.

| Station. | Wind. | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | Spring. | Summer. | Autumn. | Winter. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pike's Peak, Colo | N. | 16 | 6 | 8 | 9 | 24 | 4 | 20 | 17 | 16 | 12 | 10 | 14 | 38 | 36 | 41 | 41 |
| | N. W. | 8 | 31 | 14 | 13 | 15 | 21 | 34 | 22 | 23 | 18 | 15 | 13 | 56 | 52 | 42 | 77 |
| | W. | 26 | 14 | 21 | 21 | 18 | 9 | 15 | 25 | 15 | 13 | 27 | 10 | 55 | 50 | 60 | 49 |
| | S. W. | 21 | 20 | 34 | 26 | 7 | 16 | 5 | 7 | 15 | 32 | 33 | 33 | 80 | 74 | 67 | 28 |
| | S. | 1 | 2 | 6 | 8 | 1 | 13 | 1 | 6 | 6 | 2 | 2 | 6 | 10 | 9 | 15 | 20 |
| | S. E. | 0 | 6 | 3 | 0 | 1 | 5 | 0 | 2 | 3 | 2 | 1 | 2 | 6 | 8 | 4 | 7 |
| | E. | 2 | 3 | 0 | 2 | 1 | 2 | 0 | 1 | 1 | 3 | 0 | 0 | 4 | 5 | 3 | 3 |
| | N. E. | 16 | 11 | 2 | 8 | 18 | 9 | 12 | 3 | 10 | 7 | 4 | 12 | 21 | 39 | 28 | 24 |
| | Calm. | 3 | 0 | 2 | 6 | 5 | 14 | 6 | 1 | 4 | 1 | 1 | 0 | 6 | 3 | 13 | 21 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Pioche, Nev | N. | .... | 5 | 17 | 36 | 25 | 13 | 8 | 11 | 13 | 13 | 17 | 10 | 43 | ..... | 78 | 32 |
| | N. W. | .... | 5 | 15 | 7 | 15 | 17 | 27 | 17 | 21 | 18 | 17 | 19 | 56 | .... | 37 | 61 |
| | W. | .... | 2 | 0 | 2 | 1 | 4 | 10 | 7 | 8 | 4 | 10 | 2 | 22 | .... | 3 | 21 |
| | S. W. | .... | 15 | 15 | 12 | 11 | 1 | 2 | 5 | 2 | 4 | 2 | 3 | 8 | ..... | 38 | 8 |
| | S. | .... | 44 | 35 | 34 | 36 | 41 | 34 | 38 | 39 | 38 | 35 | 43 | 112 | ..... | 105 | 118 |
| | S. E. | .... | 10 | 6 | 0 | 0 | 12 | 10 | 5 | 8 | 7 | 10 | 9 | 25 | .... | 6 | 27 |
| | E. | .... | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 | 1 | .... | 0 | 1 |
| | N. E. | .... | 2 | 2 | 2 | 1 | 2 | 0 | 0 | 1 | 2 | 2 | 1 | 5 | .... | 5 | 2 |
| | Calm. | .... | 9 | 0 | 0 | 1 | 2 | 2 | 1 | 0 | 4 | 0 | 1 | 4 | .... | 1 | 5 |
| | Blank. | .... | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pittsburgh, Pa | N. | 16 | 4 | 7 | 10 | 8 | 7 | 2 | 11 | 11 | 8 | 6 | 11 | 25 | 31 | 25 | 20 |
| | N. W. | 26 | 27 | 18 | 16 | 12 | 4 | 18 | 22 | 19 | 16 | 22 | 14 | 57 | 67 | 46 | 44 |
| | W. | 12 | 8 | 9 | 16 | 18 | 26 | 22 | 11 | 15 | 14 | 18 | 12 | 47 | 32 | 43 | 59 |
| | S. W. | 12 | 10 | 4 | 7 | 13 | 11 | 12 | 9 | 12 | 8 | 10 | 9 | 30 | 31 | 24 | 32 |
| | S. | 6 | 8 | 4 | 12 | 6 | 8 | 10 | 5 | 4 | 8 | 9 | 5 | 21 | 19 | 22 | 23 |
| | S. E. | 2 | 6 | 14 | 4 | 14 | 5 | 9 | 6 | 12 | 8 | 4 | 9 | 24 | 17 | 32 | 20 |
| | E. | 2 | 5 | 15 | 9 | 14 | 21 | 13 | 11 | 9 | 16 | 8 | 13 | 33 | 20 | 38 | 45 |
| | N. E. | 9 | 6 | 7 | 3 | 2 | 9 | 5 | 8 | 5 | 6 | 8 | 9 | 19 | 24 | 12 | 22 |
| | Calm. | 8 | 19 | 12 | 16 | 3 | 2 | 2 | 1 | 6 | 6 | 8 | 8 | 20 | 35 | 31 | 5 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Port Huron, Mich | N. | 17 | 9 | 4 | 7 | 7 | 10 | 7 | 11 | 20 | 20 | 11 | 10 | 51 | 36 | 18 | 28 |
| | N. W. | 5 | 9 | 6 | 9 | 8 | 7 | 12 | 6 | 8 | 4 | 11 | 8 | 23 | 22 | 23 | 25 |
| | W. | 12 | 14 | 11 | 11 | 9 | 8 | 18 | 9 | 7 | 12 | 17 | 8 | 36 | 34 | 31 | 35 |
| | S. W. | 12 | 14 | 8 | 19 | 20 | 23 | 11 | 8 | 11 | 10 | 9 | 5 | 30 | 31 | 47 | 42 |
| | S. | 25 | 13 | 25 | 14 | 20 | 14 | 22 | 24 | 13 | 8 | 10 | 18 | 31 | 56 | 59 | 60 |
| | S. E. | 3 | 7 | 8 | 13 | 9 | 11 | 5 | 2 | 13 | 14 | 7 | 5 | 34 | 15 | 30 | 18 |
| | E. | 2 | 2 | 6 | 7 | 10 | 5 | 7 | 7 | 8 | 3 | 2 | 1 | 13 | 5 | 23 | 19 |
| | N. E. | 13 | 13 | 14 | 11 | 5 | 11 | 10 | 16 | 9 | 16 | 24 | 27 | 49 | 53 | 30 | 37 |
| | Calm. | 4 | 12 | 8 | 2 | 2 | 4 | 1 | 1 | 4 | 3 | 2 | 8 | 9 | 24 | 12 | 6 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Portland, Me | N. | 8 | 4 | 10 | 21 | 14 | 26 | 19 | 16 | 15 | 17 | 5 | 3 | 37 | 15 | 45 | 61 |
| | N. W. | 8 | 10 | 7 | 12 | 12 | 13 | 24 | 18 | 12 | 6 | 16 | 12 | 34 | 30 | 31 | 55 |
| | W. | 5 | 7 | 7 | 5 | 12 | 16 | 12 | 9 | 17 | 5 | 10 | 5 | 32 | 17 | 24 | 37 |
| | S. W. | 21 | 8 | 22 | 15 | 17 | 15 | 14 | 15 | 17 | 7 | 12 | 14 | 36 | 43 | 54 | 44 |
| | S. | 19 | 19 | 16 | 6 | 7 | 3 | 1 | 2 | 6 | 12 | 21 | 20 | 39 | 58 | 29 | 6 |
| | S. E. | 13 | 13 | 6 | 8 | 9 | 2 | 2 | 1 | 3 | 7 | 9 | 12 | 19 | 38 | 23 | 5 |
| | E. | 4 | 9 | 4 | 6 | 5 | 0 | 4 | 1 | 3 | 20 | 6 | 5 | 29 | 18 | 15 | 5 |
| | N. E. | 7 | 10 | 6 | 11 | 7 | 8 | 12 | 13 | 14 | 12 | 8 | 6 | 34 | 23 | 24 | 33 |
| | Calm. | 8 | 13 | 12 | 9 | 7 | 10 | 5 | 9 | 6 | 4 | 6 | 13 | 16 | 34 | 28 | 24 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Portland, Oreg | N. | 39 | 28 | 16 | 26 | 7 | 13 | 7 | 2 | 6 | 5 | 7 | 8 | 18 | 75 | 49 | 22 |
| | N. W. | 8 | 25 | 13 | 6 | 2 | 7 | 7 | 12 | 23 | 28 | 36 | 56 | 87 | 89 | 21 | 26 |
| | W. | 4 | 0 | 1 | 2 | 3 | 3 | 2 | 0 | 4 | 15 | 8 | 5 | 27 | 9 | 6 | 5 |
| | S. W. | 4 | 7 | 11 | 8 | 12 | 6 | 2 | 1 | 9 | 6 | 4 | 1 | 19 | 12 | 31 | 9 |
| | S. | 27 | 25 | 38 | 22 | 33 | 27 | 23 | 30 | 17 | 10 | 18 | 5 | 45 | 57 | 93 | 80 |
| | S. E. | 3 | 4 | 3 | 0 | 4 | 6 | 20 | 22 | 22 | 20 | 15 | 8 | 57 | 15 | 7 | 48 |
| | E. | 0 | 0 | 3 | 5 | 7 | 19 | 23 | 8 | 4 | 2 | 1 | 5 | 7 | 5 | 15 | 50 |
| | N. E. | 7 | 4 | 2 | 2 | 2 | 3 | 6 | 3 | 4 | 2 | 2 | 1 | 8 | 12 | 6 | 12 |
| | Calm. | 1 | 0 | 3 | 22 | 20 | 9 | 3 | 6 | 4 | 2 | 2 | 1 | 8 | 2 | 45 | 18 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Portsmouth, N. C | N. | 3 | 12 | 12 | 14 | 15 | 20 | 6 | 5 | 2 | 6 | 6 | 6 | 14 | 21 | 41 | 31 |
| | N. W. | 2 | 3 | 2 | 3 | 7 | 5 | 11 | 11 | 4 | 7 | 12 | 8 | 23 | 13 | 12 | 27 |
| | W. | 6 | 2 | 0 | 9 | 10 | 9 | 7 | 1 | 4 | 7 | 6 | 4 | 17 | 12 | 19 | 17 |
| | S. W. | 9 | 4 | 1 | 1 | 3 | 10 | 15 | 9 | 18 | 17 | 13 | 14 | 48 | 27 | 5 | 34 |
| | S. | 44 | 33 | 10 | 17 | 13 | 6 | 2 | 4 | 17 | 19 | 27 | 20 | 63 | 97 | 40 | 12 |
| | S. E. | 3 | 9 | 6 | 1 | 3 | 2 | 10 | 2 | 8 | 9 | 7 | 7 | 24 | 19 | 10 | 14 |
| | E. | 9 | 9 | 21 | 10 | 12 | 2 | 4 | 3 | 4 | 1 | 3 | 5 | 8 | 23 | 43 | 9 |
| | N. E. | 16 | 11 | 34 | 25 | 17 | 29 | 26 | 27 | 28 | 14 | 17 | 23 | 59 | 50 | 76 | 82 |
| | Calm. | 1 | 10 | 4 | 7 | 10 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 8 | 11 | 21 | 2 |
| | Blank. | 0 | 0 | 0 | 6 | 0 | 8 | 12 | 22 | 7 | 9 | 1 | 3 | 17 | 8 | 6 | 42 |

* Observations commenced July 28, 1877.

*Statement showing how many times the wind was observed blowing, &c.*—Continued.

| Station. | Wind. | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | Spring. | Summer. | Autumn. | Winter. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Punta Rassa, Fla. | N. | 0 | 1 | 0 | 5 | 15 | 9 | 12 | 2 | 7 | 2 | 3 | 2 | 12 | 3 | 20 | 23 |
| | N. W. | 5 | 2 | 3 | 16 | 13 | 12 | 25 | 21 | 11 | 17 | 6 | 8 | 34 | 15 | 32 | 58 |
| | W. | 9 | 17 | 21 | 1 | 5 | 5 | 6 | 10 | 9 | 12 | 17 | 16 | 38 | 42 | 27 | 21 |
| | S. W. | 21 | 18 | 9 | 9 | 6 | 3 | 2 | 4 | 5 | 11 | 21 | 20 | 37 | 59 | 24 | 9 |
| | S. | 1 | 5 | 1 | 9 | 4 | 1 | 3 | 12 | 15 | 17 | 7 | 2 | 39 | 8 | 14 | 16 |
| | S. E. | 15 | 6 | 6 | 4 | 2 | 9 | 16 | 10 | 14 | 12 | 12 | 10 | 38 | 31 | 12 | 35 |
| | E. | 35 | 29 | 29 | 14 | 13 | 19 | 4 | 4 | 20 | 12 | 21 | 15 | 53 | 79 | 56 | 27 |
| | N. E. | 7 | 13 | 18 | 35 | 21 | 35 | 19 | 19 | 12 | 7 | 5 | 15 | 24 | 35 | 74 | 73 |
| | Calm. | 0 | 2 | 1 | 0 | 3 | 0 | 6 | 2 | 0 | 0 | 1 | 2 | 1 | 4 | 4 | 8 |
| | Blank. | 0 | 0 | 2 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 |
| Red Bluff, Cal. | N. | 17 | 15 | 17 | 43 | 36 | 52 | 24 | 17 | 10 | 21 | 36 | 35 | 67 | 67 | 96 | 93 |
| | N. W. | 8 | 8 | 42 | 17 | 12 | 12 | 6 | 4 | 13 | 17 | 13 | 11 | 43 | 27 | 71 | 22 |
| | W. | 0 | 1 | 5 | 1 | 2 | 2 | 0 | 2 | 1 | 0 | 6 | 1 | 7 | 2 | 8 | 4 |
| | S. W. | 7 | 5 | 0 | 2 | 2 | 0 | 5 | 6 | 0 | 1 | 0 | 4 | 7 | 16 | 4 | 11 |
| | S. | 39 | 31 | 13 | 14 | 20 | 9 | 24 | 23 | 25 | 17 | 22 | 28 | 64 | 98 | 47 | 56 |
| | S. E. | 11 | 23 | 12 | 6 | 8 | 10 | 20 | 23 | 20 | 26 | 9 | 10 | 64 | 44 | 26 | 53 |
| | E. | 2 | 0 | 0 | 4 | 0 | 1 | 8 | 2 | 3 | 1 | 5 | 1 | 9 | 3 | 4 | 11 |
| | N. E. | 5 | 0 | 0 | 0 | 7 | 7 | 3 | 4 | 1 | 2 | 1 | 0 | 4 | 5 | 7 | 14 |
| | Calm. | 4 | 10 | 1 | 6 | 3 | 0 | 3 | 3 | 5 | 5 | 1 | 0 | 11 | 14 | 10 | 6 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rochester, N. Y. | N. | 0 | 6 | 7 | 2 | 3 | 6 | 1 | 1 | 5 | 5 | 10 | 8 | 20 | 20 | 12 | 8 |
| | N. W. | 10 | 9 | 24 | 10 | 6 | 7 | 13 | 8 | 15 | 12 | 13 | 8 | 40 | 27 | 18 | 28 |
| | W. | 42 | 35 | 25 | 28 | 31 | 23 | 30 | 28 | 28 | 23 | 37 | 28 | 88 | 105 | 84 | 81 |
| | S. W. | 13 | 17 | 23 | 10 | 16 | 14 | 15 | 16 | 12 | 5 | 10 | 15 | 27 | 45 | 49 | 45 |
| | S. | 2 | 9 | 14 | 10 | 10 | 7 | 10 | 4 | 4 | 10 | 7 | 14 | 21 | 25 | 34 | 21 |
| | S. E. | 4 | 7 | 6 | 9 | 19 | 7 | 14 | 7 | 11 | 10 | 6 | 7 | 27 | 18 | 34 | 28 |
| | E. | 2 | 3 | 4 | 11 | 4 | 15 | 8 | 7 | 8 | 10 | 4 | 4 | 22 | 9 | 19 | 30 |
| | N. E. | 12 | 6 | 9 | 12 | 1 | 13 | 2 | 13 | 10 | 14 | 6 | 6 | 30 | 24 | 22 | 28 |
| | Calm. | 2 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 3 | 1 | 1 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Roseburg, Oreg. | N. | .... | 48 | 15 | 23 | 4 | 5 | 0 | 3 | 9 | 17 | 23 | 48 | 40 | .... | 42 | 8 |
| | N. W. | .... | 7 | 13 | 3 | 2 | 4 | 3 | 3 | 6 | 21 | 28 | 10 | 55 | .... | 18 | 10 |
| | W. | .... | 4 | 15 | 17 | 13 | 3 | 8 | 5 | 9 | 5 | 3 | 1 | 17 | .... | 45 | 16 |
| | S. W. | .... | 3 | 5 | 5 | 9 | 4 | 11 | 18 | 12 | 9 | 4 | 1 | 25 | .... | 19 | 33 |
| | S. | .... | 2 | 4 | 2 | 12 | 5 | 22 | 20 | 9 | 3 | 4 | 0 | 16 | .... | 18 | 47 |
| | S. E. | .... | 0 | 0 | 2 | 8 | 4 | 3 | 12 | 5 | 1 | 2 | 1 | 8 | .... | 10 | 19 |
| | E. | .... | 2 | 1 | 1 | 4 | 6 | 8 | 2 | 6 | 1 | 3 | 0 | 10 | .... | 6 | 16 |
| | N. E. | .... | 5 | 7 | 1 | 0 | 15 | 2 | 0 | 3 | 3 | 3 | 3 | 9 | .... | 8 | 17 |
| | Calm. | .... | 22 | 30 | 39 | 38 | 47 | 36 | 21 | 34 | 30 | 23 | 26 | 87 | .... | 107 | 104 |
| | Blank. | .... | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sacramento, Cal. | N. | 5 | 4 | 17 | 26 | 26 | 37 | 19 | 11 | 10 | 10 | 14 | 7 | 34 | 16 | 69 | 67 |
| | N. W. | 2 | 8 | 14 | 12 | 6 | 2 | 4 | 6 | 5 | 9 | 10 | 9 | 24 | 19 | 32 | 12 |
| | W. | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 4 | 2 | 4 | 1 | 10 | 6 | 6 | 4 |
| | S. W. | 29 | 18 | 13 | 11 | 5 | 5 | 4 | 7 | 17 | 22 | 23 | 17 | 62 | 64 | 29 | 16 |
| | S. | 40 | 50 | 36 | 24 | 15 | 14 | 28 | 22 | 34 | 31 | 28 | 50 | 93 | 140 | 75 | 64 |
| | S. E. | 12 | 8 | 4 | 7 | 7 | 10 | 28 | 27 | 14 | 8 | 10 | 2 | 32 | 22 | 18 | 65 |
| | E. | 0 | 0 | 1 | 0 | 6 | 10 | 0 | 1 | 3 | 2 | 0 | 1 | 5 | 1 | 7 | 11 |
| | N. E. | 1 | 0 | 0 | 2 | 8 | 4 | 3 | 9 | 1 | 1 | 1 | 0 | 3 | 1 | 10 | 7 |
| | Calm. | 1 | 3 | 3 | 9 | 15 | 10 | 6 | 8 | 5 | 5 | 3 | 3 | 13 | 7 | 27 | 24 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Salt Lake City, Utah. | N. | 17 | 11 | 13 | 10 | 6 | 6 | 4 | 4 | 15 | 10 | 9 | 14 | 34 | 42 | 20 | 14 |
| | N. W. | 25 | 30 | 25 | 26 | 25 | 30 | 22 | 15 | 14 | 30 | 30 | 21 | 74 | 76 | 76 | 67 |
| | W. | 5 | 2 | 5 | 2 | 17 | 17 | 6 | 5 | 6 | 3 | 5 | 8 | 14 | 15 | 24 | 28 |
| | S. W. | 1 | 2 | 0 | 3 | 6 | 5 | 5 | 1 | 1 | 6 | 4 | 1 | 11 | 4 | 9 | 11 |
| | S. | 4 | 8 | 6 | 5 | 8 | 7 | 10 | 18 | 10 | 10 | 2 | 2 | 22 | 14 | 19 | 35 |
| | S. E. | 16 | 8 | 15 | 8 | 11 | 12 | 23 | 17 | 16 | 12 | 17 | 15 | 45 | 39 | 34 | 52 |
| | E. | 12 | 13 | 8 | 15 | 11 | 10 | 10 | 6 | 10 | 8 | 13 | 17 | 31 | 42 | 34 | 26 |
| | N. E. | 3 | 10 | 5 | 10 | 4 | 5 | 1 | 7 | 10 | 8 | 8 | 8 | 26 | 21 | 19 | 13 |
| | Calm. | 10 | 9 | 12 | 14 | 2 | 1 | 12 | 11 | 11 | 3 | 5 | 4 | 19 | 23 | 28 | 24 |
| | Blank. | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| San Diego, Cal. | N. | 4 | 9 | 7 | 11 | 10 | 9 | 8 | 6 | 7 | 11 | 7 | 7 | 25 | 20 | 28 | 23 |
| | N. W. | 37 | 41 | 24 | 20 | 25 | 13 | 19 | 19 | 29 | 14 | 10 | 12 | 53 | 90 | 69 | 51 |
| | W. | 16 | 16 | 16 | 16 | 6 | 5 | 8 | 12 | 11 | 21 | 28 | 26 | 61 | 58 | 38 | 25 |
| | S. W. | 10 | 10 | 7 | 12 | 8 | 6 | 4 | 1 | 8 | 17 | 21 | 29 | 46 | 49 | 22 | 11 |
| | S. | 17 | 6 | 15 | 8 | 2 | 5 | 4 | 9 | 7 | 10 | 9 | 7 | 26 | 30 | 20 | 18 |
| | S. E. | 2 | 2 | 2 | 3 | 2 | 8 | 4 | 5 | 2 | 0 | 7 | 2 | 2 | 6 | 7 | 17 |
| | E. | 1 | 2 | 1 | 2 | 7 | 9 | 4 | 5 | 8 | 9 | 5 | 3 | 22 | 6 | 10 | 18 |
| | N. E. | 0 | 0 | 5 | 16 | 28 | 34 | 31 | 13 | 16 | 5 | 2 | 0 | 23 | 0 | 49 | 78 |
| | Calm. | 6 | 7 | 13 | 10 | 7 | 4 | 11 | 14 | 5 | 3 | 4 | 4 | 12 | 17 | 30 | 29 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

* Station opened July 15, 1878.

*Statement showing how many times the wind was observed blowing, &c.*—Continued.

| Station. | Wind. | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | Spring. | Summer. | Autumn. | Winter. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sandusky, Ohio | N. | .... | .... | 3 | 6 | 6 | 5 | 9 | 10 | 11 | 4 | 8 | 4 | 23 | .... | 15 | 24 |
| | N. W. | .... | .... | 7 | 10 | 6 | 4 | 8 | 13 | 13 | 12 | 13 | 13 | 38 | .... | 23 | 25 |
| | W. | .... | .... | 7 | 9 | 6 | 11 | 10 | 7 | 11 | 10 | 17 | 7 | 38 | .... | 22 | 37 |
| | S. W. | .... | .... | 18 | 20 | 32 | 32 | 19 | 18 | 20 | 15 | 18 | 16 | 53 | .... | 70 | 69 |
| | S. | .... | .... | 18 | 16 | 18 | 7 | 15 | 14 | 8 | 9 | 3 | 120 | 20 | .... | 52 | 38 |
| | S. E. | .... | .... | 10 | 5 | 7 | 1 | 2 | 2 | 8 | 9 | 8 | 6 | 25 | .... | 22 | 5 |
| | E. | .... | .... | 8 | 5 | 9 | 17 | 17 | 10 | 16 | 17 | 14 | 15 | 47 | .... | 22 | 44 |
| | N. E. | .... | .... | 18 | 13 | 5 | 14 | 4 | 10 | 6 | 13 | 12 | 17 | 31 | .... | 36 | 28 |
| | Calm. | .... | .... | 1 | 0 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | .... | 2 | 2 |
| | Blank. | .... | .... | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .... | 0 | 0 |
| Sandy Hook, N. J | N. | 1 | 4 | 9 | 5 | 7 | 10 | 5 | 12 | 8 | 6 | 4 | 2 | 18 | 7 | 21 | 27 |
| | N. W. | 9 | 8 | 8 | 21 | 19 | 17 | 28 | 19 | 14 | 14 | 19 | 17 | 47 | 34 | 48 | 64 |
| | W. | 15 | 19 | 14 | 22 | 12 | 17 | 23 | 15 | 19 | 12 | 21 | 12 | 52 | 46 | 48 | 55 |
| | S. W. | 14 | 21 | 16 | 9 | 8 | 17 | 5 | 5 | 13 | 7 | 8 | 17 | 28 | 52 | 33 | 27 |
| | S. | 19 | 18 | 10 | 6 | 14 | 7 | 6 | 5 | 17 | 6 | 10 | 12 | 33 | 49 | 30 | 18 |
| | S. E. | 21 | 10 | 16 | 16 | 10 | 1 | 9 | 4 | 7 | 21 | 17 | 11 | 45 | 42 | 42 | 14 |
| | E. | 2 | 2 | 6 | 2 | 8 | 3 | 2 | 5 | 4 | 22 | 6 | 12 | 32 | 16 | 16 | 10 |
| | N. E. | 10 | 9 | 8 | 12 | 12 | 21 | 11 | 17 | 11 | 2 | 8 | 7 | 21 | 26 | 32 | 49 |
| | Calm. | 2 | 2 | 3 | 0 | 0 | 0 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 4 | 3 | 6 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| San Francisco, Cal | N. | 0 | 0 | 0 | 9 | 26 | 31 | 16 | 9 | 9 | 2 | 0 | 0 | 11 | 0 | 35 | 56 |
| | N. W. | 1 | 0 | 4 | 12 | 14 | 14 | 4 | 14 | 9 | 4 | 4 | 0 | 17 | 1 | 30 | 32 |
| | W. | 35 | 41 | 30 | 38 | 20 | 10 | 8 | 11 | 18 | 34 | 35 | 17 | 87 | 93 | 88 | 29 |
| | S. W. | 53 | 47 | 46 | 20 | 1 | 5 | 5 | 11 | 22 | 32 | 42 | 62 | 96 | 162 | 67 | 21 |
| | S. | 2 | 3 | 3 | 5 | 2 | 7 | 5 | 4 | 12 | 5 | 3 | 7 | 20 | 12 | 10 | 16 |
| | S. E. | 1 | 1 | 2 | 3 | 15 | 15 | 37 | 23 | 18 | 8 | 6 | 3 | 32 | 5 | 20 | 75 |
| | E. | 0 | 1 | 1 | 0 | 0 | 4 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 9 |
| | N. E. | 0 | 0 | 1 | 3 | 2 | 2 | 6 | 3 | 3 | 0 | 0 | 0 | 3 | 0 | 6 | 11 |
| | Calm. | 1 | 0 | 3 | 3 | 10 | 5 | 8 | 8 | 2 | 5 | 3 | 1 | 10 | 2 | 16 | 21 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Santa Fé, N. Mex | N. | 14 | 9 | 10 | 9 | 28 | 15 | 48 | 29 | 29 | 12 | 6 | 12 | 47 | 35 | 47 | 92 |
| | N. W. | 13 | 9 | 4 | 5 | 15 | 8 | 8 | 9 | 10 | 8 | 7 | 10 | 25 | 32 | 24 | 25 |
| | W. | 2 | 5 | 1 | 5 | 4 | 8 | 2 | 9 | 8 | 22 | 11 | 2 | 41 | 9 | 10 | 19 |
| | S. W. | 12 | 13 | 15 | 20 | 8 | 12 | 7 | 7 | 7 | 12 | 21 | 15 | 40 | 40 | 43 | 26 |
| | S. | 5 | 4 | 6 | 1 | 2 | 3 | 3 | 6 | 2 | 3 | 10 | 10 | 15 | 19 | 9 | 12 |
| | S. E. | 13 | 14 | 16 | 17 | 9 | 8 | 6 | 8 | 21 | 13 | 12 | 16 | 46 | 43 | 42 | 22 |
| | E. | 16 | 17 | 18 | 15 | 13 | 7 | 7 | 6 | 8 | 9 | 8 | 11 | 25 | 44 | 46 | 20 |
| | N. E. | 17 | 11 | 16 | 17 | 8 | 27 | 11 | 3 | 7 | 7 | 7 | 6 | 21 | 34 | 41 | 41 |
| | Calm. | 1 | 11 | 4 | 4 | 3 | 5 | 1 | 7 | 1 | 4 | 11 | 8 | 16 | 20 | 11 | 13 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Savannah, Ga | N. | 2 | 6 | 7 | 13 | 19 | 9 | 12 | 13 | 6 | 6 | 7 | 7 | 19 | 15 | 39 | 34 |
| | N. W. | 3 | 9 | 5 | 9 | 14 | 11 | 21 | 12 | 9 | 16 | 7 | 7 | 32 | 19 | 28 | 44 |
| | W. | 10 | 3 | 2 | 4 | 8 | 17 | 15 | 12 | 15 | 13 | 18 | 8 | 46 | 21 | 14 | 44 |
| | S. W. | 24 | 21 | 5 | 6 | 11 | 1 | 7 | 6 | 10 | 18 | 22 | 14 | 50 | 59 | 22 | 14 |
| | S. | 20 | 16 | 16 | 8 | 4 | 7 | 9 | 11 | 20 | 18 | 16 | 25 | 60 | 61 | 28 | 27 |
| | S. E. | 10 | 9 | 8 | 13 | 6 | 11 | 1 | 3 | 9 | 5 | 7 | 6 | 27 | 25 | 27 | 15 |
| | E. | 6 | 13 | 18 | 18 | 10 | 20 | 15 | 10 | 11 | 11 | 14 | 12 | 36 | 31 | 40 | 45 |
| | N. E. | 8 | 8 | 24 | 8 | 13 | 11 | 11 | 14 | 4 | 3 | 2 | 9 | 9 | 25 | 45 | 36 |
| | Calm. | 10 | 8 | 5 | 14 | 5 | 6 | 2 | 3 | 3 | 0 | 0 | 2 | 3 | 20 | 24 | 11 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Shreveport, La | N. | 24 | 25 | 22 | 7 | 19 | 9 | 6 | 10 | 8 | 4 | 9 | 11 | 21 | 60 | 48 | 25 |
| | N. W. | 1 | 5 | 4 | 7 | 12 | 17 | 12 | 8 | 5 | 10 | 4 | 6 | 19 | 12 | 23 | 37 |
| | W. | 9 | 3 | 3 | 10 | 13 | 6 | 23 | 18 | 14 | 8 | 2 | 7 | 24 | 19 | 26 | 47 |
| | S. W. | 5 | 2 | 3 | 3 | 2 | 0 | 2 | 2 | 5 | 3 | 6 | 10 | 14 | 17 | 8 | 4 |
| | S. | 14 | 9 | 5 | 13 | 16 | 15 | 6 | 14 | 20 | 18 | 34 | 19 | 72 | 42 | 34 | 35 |
| | S. E. | 13 | 14 | 9 | 21 | 5 | 12 | 11 | 10 | 10 | 12 | 12 | 15 | 34 | 42 | 35 | 33 |
| | E. | 11 | 14 | 16 | 13 | 6 | 6 | 7 | 8 | 11 | 6 | 5 | 4 | 22 | 29 | 35 | 21 |
| | N. E. | 5 | 9 | 8 | 5 | 4 | 3 | 6 | 3 | 6 | 3 | 5 | 5 | 14 | 19 | 17 | 12 |
| | Calm. | 11 | 12 | 20 | 14 | 13 | 25 | 20 | 11 | 14 | 26 | 16 | 13 | 56 | 36 | 47 | 56 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| †Silver City, N. Mex. | N. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 5 | .... | .... | .... | .... |
| | N. W. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 8 | .... | .... | .... | .... |
| | W. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 14 | .... | .... | .... | .... |
| | S. W. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 8 | .... | .... | .... | .... |
| | S. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 48 | .... | .... | .... | .... |
| | S. E. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | .... | .... | .... | .... |
| | E. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | .... | .... | .... | .... |
| | N. E. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | .... | .... | .... | .... |
| | Calm. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 5 | .... | .... | .... | .... |
| | Blank. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | .... | .... | .... | .... |

*Observations commenced August 2, 1877. †Local observations commenced May 21, 1878.

*Statement showing how many times the wind was observed blowing, &c.*—Continued.

| Station. | Wind | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | Spring. | Summer. | Autumn. | Winter. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Smithville, N. C. | N. | 6 | 14 | 28 | 23 | 23 | 28 | 25 | 24 | 12 | 13 | 11 | 8 | 36 | 28 | 74 | 77 |
| | N. W. | 4 | 9 | 9 | 6 | 9 | 10 | 7 | 12 | 7 | 5 | 10 | 11 | 22 | 24 | 24 | 29 |
| | W. | 6 | 8 | 5 | 8 | 10 | 16 | 18 | 8 | 7 | 10 | 3 | 6 | 20 | 20 | 23 | 42 |
| | S. W. | 33 | 17 | 4 | 4 | 7 | 12 | 12 | 11 | 16 | 28 | 18 | 16 | 62 | 66 | 15 | 35 |
| | S. | 26 | 18 | 9 | 11 | 9 | 4 | 5 | 7 | 22 | 19 | 31 | 25 | 72 | 69 | 29 | 16 |
| | S. E. | 3 | 6 | 9 | 6 | 6 | 2 | 2 | 5 | 11 | 3 | 6 | 5 | 20 | 14 | 21 | 9 |
| | E. | 6 | 16 | 9 | 21 | 9 | 8 | 8 | 11 | 14 | 9 | 7 | 9 | 30 | 31 | 39 | 27 |
| | N. E. | 5 | 5 | 17 | 13 | 16 | 13 | 15 | 6 | 4 | 3 | 5 | 9 | 12 | 19 | 46 | 34 |
| | Calm. | 4 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 2 | 1 | 2 | 5 | 2 | 1 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Springfield, Mass. | N. | 11 | 8 | 11 | 22 | 15 | 20 | 16 | 22 | 22 | 18 | 13 | 9 | 53 | 28 | 48 | 58 |
| | N. W. | 11 | 7 | 6 | 10 | 17 | 9 | 18 | 12 | 12 | 12 | 18 | 15 | 42 | 33 | 33 | 39 |
| | W. | 4 | 5 | 3 | 3 | 9 | 7 | 15 | 8 | 12 | 7 | 13 | 4 | 32 | 13 | 15 | 30 |
| | S. W. | 5 | 12 | 6 | 6 | 6 | 7 | 8 | 6 | 6 | 6 | 5 | 8 | 17 | 25 | 18 | 21 |
| | S. | 29 | 19 | 34 | 20 | 16 | 14 | 18 | 8 | 19 | 9 | 24 | 33 | 52 | 81 | 70 | 40 |
| | S. E. | 1 | 0 | 1 | 4 | 1 | 0 | 0 | 0 | 1 | 10 | 1 | 0 | 12 | 1 | 6 | 0 |
| | E. | 3 | 3 | 1 | 1 | 0 | 1 | 0 | 0 | 2 | 1 | 0 | 4 | 3 | 10 | 2 | 1 |
| | N. E. | 9 | 9 | 6 | 6 | 8 | 1 | 8 | 8 | 7 | 16 | 10 | 6 | 33 | 24 | 20 | 17 |
| | Calm. | 20 | 30 | 22 | 21 | 18 | 34 | 10 | 20 | 12 | 11 | 9 | 11 | 32 | 61 | 61 | 64 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Saint Mark's, Fla. | N. | 5 | 13 | 8 | 15 | 35 | 16 | 19 | 21 | 15 | 11 | 11 | 16 | 37 | 34 | 58 | 56 |
| | N. W. | 9 | 4 | 5 | 12 | 16 | 17 | 23 | 13 | 9 | 9 | 13 | 2 | 31 | 15 | 33 | 53 |
| | W. | 6 | 9 | 5 | 2 | 2 | 5 | 6 | 5 | 6 | 13 | 4 | 6 | 23 | 21 | 9 | 16 |
| | S. W. | 10 | 9 | 6 | 5 | 5 | 1 | 6 | 7 | 10 | 4 | 8 | 13 | 22 | 32 | 16 | 14 |
| | S. | 18 | 14 | 17 | 14 | 6 | 1 | 10 | 10 | 14 | 23 | 27 | 23 | 64 | 55 | 37 | 21 |
| | S. E. | 12 | 4 | 3 | 9 | 7 | 23 | 8 | 9 | 17 | 9 | 7 | 7 | 33 | 23 | 19 | 40 |
| | E. | 11 | 10 | 7 | 14 | 9 | 6 | 2 | 5 | 4 | 4 | 1 | 5 | 9 | 26 | 30 | 13 |
| | N. E. | 2 | 5 | 18 | 10 | 6 | 10 | 8 | 7 | 5 | 3 | 4 | 3 | 12 | 10 | 34 | 34 |
| | Calm. | 20 | 25 | 21 | 12 | 4 | 5 | 11 | 7 | 13 | 14 | 18 | 15 | 45 | 60 | 37 | 23 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Saint Michael's, Alaska. | N. | 16 | 22 | 37 | 17 | 24 | 14 | 6 | 16 | 15 | 5 | 21 | 18 | 41 | 56 | 78 | 36 |
| | N. W. | 3 | 0 | 8 | 7 | 1 | 0 | 1 | 1 | 1 | 1 | 8 | 7 | 10 | 10 | 16 | 2 |
| | W. | 12 | 7 | 5 | 8 | 0 | 1 | 0 | 1 | 5 | 13 | 3 | 7 | 21 | 26 | 13 | 2 |
| | S. W. | 16 | 11 | 5 | 4 | 3 | 17 | 0 | 3 | 8 | 14 | 11 | 18 | 33 | 45 | 12 | 20 |
| | S. | 15 | 29 | 7 | 16 | 25 | 24 | 15 | 10 | 1 | 7 | 7 | 12 | 15 | 56 | 48 | 49 |
| | S. E. | 3 | 1 | 2 | 4 | 3 | 6 | 0 | 5 | 0 | 2 | 3 | 2 | 5 | 6 | 9 | 11 |
| | E. | 13 | 12 | 12 | 19 | 13 | 16 | 23 | 5 | 8 | 26 | 14 | 5 | 48 | 30 | 44 | 44 |
| | N. E. | 10 | 1 | 12 | 13 | 20 | 14 | 39 | 30 | 51 | 21 | 24 | 21 | 96 | 32 | 45 | 88 |
| | Calm. | 5 | 10 | 2 | 5 | 1 | 1 | 9 | 13 | 4 | 1 | 2 | 0 | 7 | 15 | 8 | 23 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Saint Louis, Mo. | N. | 10 | 14 | 15 | 12 | 12 | 16 | 14 | 17 | 10 | 14 | 12 | 15 | 36 | 39 | 39 | 47 |
| | N. W. | 15 | 19 | 11 | 15 | 13 | 6 | 18 | 16 | 15 | 13 | 17 | 10 | 45 | 44 | 30 | 40 |
| | W. | 8 | 13 | 2 | 8 | 22 | 11 | 16 | 7 | 11 | 8 | 8 | 10 | 27 | 31 | 32 | 34 |
| | S. W. | 7 | 4 | 4 | 6 | 5 | 7 | 4 | 2 | 8 | 11 | 5 | 2 | 24 | 13 | 15 | 13 |
| | S. | 26 | 19 | 32 | 35 | 17 | 28 | 18 | 17 | 18 | 13 | 22 | 24 | 53 | 69 | 84 | 63 |
| | S. E. | 10 | 13 | 12 | 8 | 7 | 14 | 7 | 9 | 15 | 20 | 11 | 11 | 46 | 34 | 27 | 30 |
| | E. | 8 | 2 | 6 | 3 | 9 | 9 | 11 | 6 | 8 | 4 | 6 | 4 | 18 | 14 | 18 | 26 |
| | N. E. | 8 | 8 | 6 | 4 | 5 | 2 | 5 | 10 | 6 | 6 | 9 | 8 | 21 | 24 | 15 | 17 |
| | Calm. | 1 | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 2 | 1 | 3 | 6 | 6 | 8 | 4 | 0 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Saint Paul, Minn. | N. | 3 | 5 | 8 | 14 | 9 | 16 | 18 | 22 | 11 | 11 | 18 | 9 | 40 | 17 | 31 | 56 |
| | N. W. | 17 | 22 | 12 | 12 | 27 | 10 | 17 | 11 | 14 | 13 | 17 | 13 | 44 | 52 | 51 | 38 |
| | W. | 15 | 9 | 3 | 13 | 4 | 7 | 5 | 2 | 5 | 10 | 11 | 6 | 26 | 30 | 20 | 14 |
| | S. W. | 7 | 8 | 10 | 17 | 4 | 11 | 4 | 1 | 6 | 12 | 7 | 7 | 25 | 22 | 31 | 16 |
| | S. | 14 | 10 | 9 | 6 | 8 | 8 | 8 | 5 | 6 | 8 | 10 | 15 | 24 | 39 | 23 | 21 |
| | S. E. | 26 | 15 | 35 | 14 | 24 | 15 | 18 | 18 | 27 | 13 | 16 | 22 | 50 | 63 | 73 | 51 |
| | E. | 3 | 8 | 7 | 1 | 6 | 13 | 10 | 4 | 13 | 15 | 8 | 9 | 36 | 20 | 14 | 27 |
| | N. E. | 2 | 4 | 0 | 12 | 3 | 1 | 4 | 8 | 5 | 5 | 2 | 6 | 12 | 12 | 15 | 13 |
| | Calm. | 6 | 12 | 6 | 4 | 5 | 12 | 9 | 13 | 6 | 3 | 4 | 3 | 13 | 21 | 15 | 34 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Thatcher's Island, Mass. | N. | 7 | 5 | 4 | 9 | 5 | 12 | 6 | 10 | 10 | 10 | 12 | 6 | 32 | 18 | 18 | 28 |
| | N. W. | 14 | 12 | 11 | 15 | 30 | 31 | 35 | 22 | 26 | 10 | 16 | 14 | 52 | 40 | 56 | 88 |
| | W. | 4 | 3 | 3 | 8 | 5 | 16 | 18 | 14 | 10 | 6 | 8 | 3 | 24 | 10 | 16 | 48 |
| | S. W. | 18 | 18 | 30 | 10 | 12 | 9 | 15 | 13 | 12 | 3 | 7 | 28 | 22 | 64 | 52 | 37 |
| | S. | 25 | 26 | 18 | 13 | 16 | 7 | 3 | 2 | 14 | 21 | 20 | 16 | 55 | 67 | 47 | 12 |
| | S. E. | 6 | 9 | 6 | 9 | 5 | 0 | 5 | 3 | 5 | 11 | 8 | 7 | 24 | 22 | 20 | 8 |
| | E. | 6 | 8 | 0 | 5 | 7 | 1 | 5 | 3 | 4 | 13 | 5 | 6 | 22 | 20 | 12 | 9 |
| | N. E. | 10 | 10 | 16 | 23 | 10 | 15 | 2 | 14 | 11 | 13 | 12 | 9 | 36 | 20 | 49 | 31 |
| | Calm. | 3 | 2 | 2 | 1 | 0 | 2 | 4 | 3 | 1 | 3 | 5 | 1 | 9 | 6 | 3 | 9 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Statement showing how many times the wind was observed blowing, &c.*—Continued.

| Station. | Wind. | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | Spring. | Summer. | Autumn. | Winter. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Toledo, Ohio | N. | 5 | 4 | 15 | 10 | 3 | 10 | 7 | 10 | 2 | 5 | 0 | 4 | 7 | 13 | 28 | 27 |
| | N. W. | 7 | 3 | 2 | 1 | 7 | 2 | 6 | 6 | 14 | 4 | 1 | 0 | 19 | 10 | 10 | 14 |
| | W. | 19 | 21 | 10 | 15 | 11 | 8 | 21 | 8 | 23 | 14 | 28 | 22 | 65 | 62 | 36 | 37 |
| | S. W. | 20 | 9 | 13 | 12 | 18 | 23 | 15 | 7 | 10 | 8 | 8 | 6 | 26 | 35 | 43 | 45 |
| | S. | 13 | 12 | 10 | 22 | 15 | 14 | 13 | 13 | 8 | 16 | 18 | 14 | 42 | 39 | 47 | 40 |
| | S. E. | 2 | 6 | 2 | 2 | 3 | 0 | 3 | 0 | 3 | 4 | 2 | 3 | 9 | 11 | 7 | 3 |
| | E. | 6 | 7 | 5 | 6 | 9 | 1 | 9 | 2 | 15 | 16 | 5 | 1 | 36 | 14 | 20 | 12 |
| | N. E. | 10 | 6 | 4 | 8 | 8 | 19 | 6 | 15 | 14 | 16 | 26 | 26 | 56 | 42 | 20 | 40 |
| | Calm. | 11 | 25 | 29 | 17 | 16 | 16 | 13 | 23 | 4 | 7 | 5 | 14 | 16 | 50 | 62 | 52 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Tybee Island, Ga | N. | 3 | 8 | 11 | 5 | 11 | 6 | 6 | 10 | 5 | 5 | 3 | 3 | 13 | 14 | 27 | 22 |
| | N. W. | 2 | 4 | 4 | 9 | 17 | 11 | 11 | 14 | 4 | 9 | 11 | 10 | 24 | 16 | 30 | 36 |
| | W. | 9 | 7 | 4 | 7 | 9 | 18 | 27 | 11 | 14 | 14 | 10 | 4 | 38 | 20 | 20 | 56 |
| | S. W. | 5 | 6 | 3 | 2 | 8 | 2 | 2 | 3 | 5 | 6 | 9 | 8 | 20 | 19 | 13 | 7 |
| | S. | 42 | 28 | 14 | 8 | 7 | 8 | 10 | 12 | 24 | 28 | 33 | 31 | 85 | 101 | 29 | 30 |
| | S. E. | 14 | 8 | 16 | 6 | 9 | 4 | 6 | 8 | 15 | 7 | 11 | 14 | 33 | 36 | 31 | 18 |
| | E. | 4 | 20 | 11 | 26 | 7 | 9 | 6 | 10 | 20 | 15 | 16 | 13 | 51 | 37 | 44 | 25 |
| | N. E. | 8 | 11 | 27 | 26 | 20 | 30 | 20 | 15 | 5 | 4 | 0 | 7 | 9 | 26 | 73 | 65 |
| | Calm. | 6 | 1 | 0 | 4 | 2 | 5 | 5 | 1 | 1 | 2 | 0 | 0 | 3 | 7 | 6 | 11 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Umatilla, Oreg | N. | .... | 14 | 2 | 8 | 1 | 5 | 1 | 1 | 3 | 2 | 1 | 2 | 6 | .... | 11 | 7 |
| | N. W. | .... | 3 | 12 | 8 | 4 | 2 | 3 | 1 | 4 | 7 | 5 | 0 | 16 | .... | 24 | 6 |
| | W. | .... | 42 | 36 | 12 | 23 | 13 | 15 | 13 | 22 | 27 | 37 | 31 | 86 | .... | 71 | 41 |
| | S. W. | .... | 8 | 8 | 7 | 8 | 4 | 4 | 12 | 9 | 11 | 19 | 14 | 39 | .... | 23 | 20 |
| | S. | .... | 2 | 1 | 2 | 6 | 3 | 1 | 3 | 7 | 1 | 0 | 1 | 8 | .... | 9 | 7 |
| | S. E. | .... | 4 | 14 | 39 | 22 | 5 | 10 | 17 | 16 | 16 | 8 | 4 | 40 | .... | 75 | 32 |
| | E. | .... | 5 | 13 | 4 | 9 | 6 | 15 | 23 | 8 | 6 | 11 | 13 | 25 | .... | 26 | 44 |
| | N. E. | .... | 3 | 2 | 3 | 3 | 11 | 6 | 0 | 7 | 6 | 7 | 3 | 20 | .... | 8 | 17 |
| | Calm. | .... | 12 | 2 | 10 | 14 | 44 | 38 | 14 | 17 | 14 | 5 | 13 | 36 | .... | 26 | 96 |
| | Blank. | .... | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Vicksburg, Miss | N. | 13 | 17 | 16 | 14 | 11 | 2 | 10 | 14 | 5 | 8 | 8 | 9 | 21 | 39 | 41 | 26 |
| | N. W. | 3 | 14 | 4 | 10 | 23 | 16 | 18 | 8 | 9 | 9 | 2 | 2 | 20 | 19 | 37 | 42 |
| | W. | 6 | 4 | 6 | 7 | 3 | 9 | 12 | 11 | 5 | 12 | 7 | 10 | 24 | 20 | 16 | 32 |
| | S. W. | 6 | 6 | 5 | 7 | 9 | 8 | 11 | 8 | 17 | 13 | 23 | 14 | 53 | 26 | 21 | 27 |
| | S. | 3 | 4 | 7 | 11 | 3 | 8 | 5 | 3 | 9 | 14 | 26 | 17 | 49 | 24 | 21 | 16 |
| | S. E. | 7 | 11 | 15 | 25 | 16 | 23 | 19 | 24 | 16 | 17 | 8 | 12 | 41 | 30 | 56 | 66 |
| | E. | 0 | 8 | 15 | 6 | 16 | 10 | 8 | 5 | 14 | 9 | 9 | 6 | 32 | 14 | 31 | 23 |
| | N. E. | 2 | 7 | 18 | 10 | 8 | 6 | 2 | 8 | 12 | 5 | 6 | 8 | 23 | 17 | 36 | 16 |
| | Calm. | 53 | 22 | 4 | 3 | 7 | 11 | 8 | 3 | 6 | 3 | 4 | 12 | 13 | 87 | 14 | 22 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Virginia City, Mont. | N. | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 2 | 2 | 2 | 1 |
| | N. W. | 9 | 16 | 4 | 4 | 9 | 3 | 2 | 2 | 5 | 6 | 10 | 13 | 35 | 17 | 14 | 7 |
| | W. | 10 | 6 | 15 | 20 | 11 | 4 | 3 | 7 | 15 | 19 | 12 | 14 | 46 | 30 | 46 | 14 |
| | S. W. | 11 | 2 | 13 | 6 | 12 | 4 | 12 | 17 | 16 | 15 | 9 | 5 | 40 | 18 | 31 | 33 |
| | S. | 7 | 8 | 2 | 2 | 2 | 3 | 1 | 2 | 4 | 0 | 2 | 0 | 6 | 15 | 6 | 6 |
| | S. E. | 18 | 19 | 12 | 11 | 20 | 41 | 27 | 12 | 25 | 17 | 18 | 20 | 60 | 57 | 43 | 80 |
| | E. | 6 | 4 | 3 | 5 | 8 | 5 | 0 | 2 | 5 | 13 | 7 | 3 | 25 | 13 | 16 | 7 |
| | N. E. | 10 | 5 | 6 | 9 | 4 | 3 | 9 | 1 | 3 | 7 | 16 | 10 | 26 | 25 | 19 | 13 |
| | Calm. | 22 | 32 | 35 | 35 | 23 | 30 | 39 | 40 | 22 | 13 | 23 | 27 | 58 | 81 | 93 | 109 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Visalia, Cal | N. | 9 | 16 | 8 | 12 | 7 | 5 | 9 | 6 | 8 | 12 | 19 | 13 | 39 | 38 | 27 | 20 |
| | N. W. | 27 | 28 | 23 | 23 | 20 | 14 | 15 | 10 | 17 | 17 | 34 | 38 | 68 | 93 | 66 | 39 |
| | W. | 24 | 11 | 4 | 6 | 2 | 9 | 7 | 3 | 9 | 3 | 9 | 8 | 21 | 43 | 12 | 19 |
| | S. W. | 10 | 11 | 5 | 4 | 2 | 3 | 4 | 5 | 5 | 6 | 4 | 5 | 15 | 26 | 11 | 12 |
| | S. | 6 | 7 | 5 | 9 | 2 | 6 | 4 | 10 | 4 | 3 | 2 | 5 | 9 | 18 | 16 | 20 |
| | S. E. | 10 | 18 | 21 | 20 | 11 | 10 | 12 | 9 | 5 | 11 | 14 | 6 | 30 | 34 | 52 | 31 |
| | E. | 1 | 0 | 5 | 4 | 0 | 9 | 16 | 13 | 4 | 3 | 1 | 2 | 8 | 3 | 18 | 38 |
| | N. E. | 4 | 1 | 4 | 1 | 0 | 4 | 1 | 3 | 4 | 8 | 6 | 7 | 18 | 12 | 5 | 8 |
| | Calm. | 2 | 1 | 15 | 14 | 37 | 33 | 25 | 25 | 37 | 27 | 4 | 6 | 68 | 0 | 66 | 83 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Washington, D. C | N. | 14 | 11 | 14 | 6 | 8 | 5 | 12 | 12 | 13 | 6 | 16 | 13 | 35 | 38 | 28 | 29 |
| | N. W. | 15 | 22 | 10 | 22 | 27 | 22 | 34 | 26 | 25 | 23 | 26 | 17 | 74 | 54 | 59 | 82 |
| | W. | 12 | 11 | 3 | 5 | 4 | 7 | 7 | 5 | 7 | 6 | 8 | 10 | 21 | 33 | 12 | 19 |
| | S. W. | 14 | 11 | 3 | 3 | 3 | 4 | 7 | 4 | 5 | 2 | 6 | 9 | 13 | 34 | 66 | 15 |
| | S. | 17 | 19 | 20 | 24 | 22 | 16 | 7 | 12 | 26 | 18 | 21 | 22 | 65 | 58 | 11 | 9 |
| | S. E. | 3 | 5 | 3 | 5 | 3 | 10 | 5 | 7 | 6 | 8 | 6 | 6 | 20 | 14 | 30 | 35 |
| | E. | 4 | 2 | 12 | 8 | 10 | 6 | 6 | 4 | 6 | 14 | 3 | 5 | 23 | 11 | 32 | 22 |
| | N. E. | 10 | 7 | 15 | 9 | 8 | 15 | 14 | 10 | 4 | 10 | 6 | 6 | 20 | 23 | 26 | 16 |
| | Calm. | 4 | 5 | 10 | 11 | 5 | 8 | 1 | 4 | 1 | 3 | 1 | 2 | 5 | 11 | 0 | 39 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 18 |

* Station opened July 15, 1877.

*Statement showing how many times the wind was observed blowing, &c.*—Continued.

| Station | Wind. | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | Spring. | Summer. | Autumn. | Winter. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Winnemucca, Nev ... | N. | 5 | 2 | 3 | 12 | 11 | 12 | 17 | 10 | 14 | 6 | 14 | 14 | 34 | 21 | 26 | 30 |
| | N. W. | 5 | 0 | 4 | 3 | 2 | 1 | 0 | 2 | 0 | 6 | 8 | 3 | 14 | 8 | 9 | 3 |
| | W. | 10 | 6 | 13 | 5 | 3 | 2 | 2 | 2 | 1 | 4 | 11 | 2 | 16 | 18 | 21 | 6 |
| | S. W. | 38 | 44 | 36 | 24 | 28 | 19 | 28 | 28 | 34 | 32 | 25 | 27 | 91 | 109 | 88 | 75 |
| | S. | 9 | 10 | 5 | 13 | 9 | 6 | 8 | 11 | 15 | 14 | 10 | 6 | 39 | 25 | 27 | 25 |
| | S. E. | 0 | 1 | 2 | 7 | 2 | 0 | 0 | 1 | 2 | 2 | 0 | 2 | 4 | 3 | 11 | 1 |
| | E. | 5 | 8 | 4 | 6 | 4 | 6 | 0 | 6 | 2 | 5 | 6 | 3 | 13 | 16 | 14 | 12 |
| | N. E. | 17 | 19 | 15 | 20 | 28 | 39 | 29 | 14 | 12 | 16 | 9 | 28 | 37 | 64 | 63 | 82 |
| | Calm. | 4 | 3 | 8 | 3 | 3 | 8 | 9 | 10 | 13 | 5 | 10 | 5 | 28 | 12 | 14 | 27 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wilmington, N. C .... | N. | 4 | 4 | 7 | 8 | 6 | 6 | 5 | 0 | 3 | 7 | 8 | 9 | 18 | 17 | 21 | 20 |
| | N. W. | 6 | 8 | 4 | 11 | 13 | 16 | 13 | 16 | 8 | 11 | 13 | 8 | 32 | 22 | 28 | 45 |
| | W. | 5 | 3 | 5 | 3 | 6 | 6 | 13 | 3 | 5 | 3 | 3 | 5 | 11 | 13 | 14 | 22 |
| | S. W. | 86 | 27 | 9 | 6 | 13 | 20 | 15 | 14 | 30 | 35 | 26 | 19 | 91 | 82 | 28 | 49 |
| | S. | 10 | 7 | 0 | 5 | 2 | 5 | 0 | 2 | 4 | 11 | 13 | 17 | 28 | 34 | 7 | 7 |
| | S. E. | 14 | 18 | 7 | 22 | 12 | 5 | 9 | 16 | 21 | 7 | 11 | 6 | 39 | 38 | 41 | 30 |
| | E. | 5 | 7 | 11 | 5 | 10 | 2 | 5 | 0 | 9 | 4 | 7 | 5 | 20 | 17 | 26 | 7 |
| | N. E. | 9 | 15 | 39 | 25 | 19 | 33 | 24 | 13 | 10 | 8 | 4 | 8 | 22 | 32 | 83 | 70 |
| | Calm. | 4 | 4 | 8 | 8 | 9 | 0 | 0 | 11 | 3 | 4 | 8 | 13 | 15 | 21 | 25 | 20 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wood's Holl, Mass... | N. | 7 | 11 | 8 | 15 | 6 | 8 | 9 | 10 | 5 | 6 | 9 | 10 | 20 | 28 | 29 | 27 |
| | N. W. | 4 | 7 | 12 | 13 | 23 | 38 | 39 | 34 | 27 | 19 | 25 | 10 | 71 | 21 | 48 | 111 |
| | W. | 8 | 5 | 6 | 9 | 3 | 2 | 12 | 8 | 11 | 1 | 11 | 7 | 23 | 20 | 18 | 22 |
| | S. W. | 36 | 35 | 34 | 17 | 20 | 8 | 11 | 8 | 22 | 10 | 21 | 25 | 53 | 66 | 71 | 27 |
| | S. | 9 | 9 | 3 | 3 | 7 | 11 | 4 | 1 | 8 | 12 | 14 | 18 | 34 | 36 | 13 | 16 |
| | S. E. | 5 | 7 | 6 | 13 | 8 | 2 | 5 | 11 | 8 | 24 | 3 | 6 | 35 | 18 | 27 | 18 |
| | E. | 9 | 4 | 2 | 2 | 10 | 10 | 10 | 3 | 7 | 8 | 5 | 11 | 20 | 24 | 14 | 23 |
| | N. E. | 10 | 5 | 16 | 19 | 13 | 12 | 1 | 4 | 4 | 9 | 3 | 1 | 16 | 16 | 48 | 17 |
| | Calm. | 5 | 10 | 3 | 2 | 0 | 2 | 2 | 5 | 1 | 1 | 2 | 2 | 4 | 17 | 5 | 9 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Yankton, Dak ..... | N. | 6 | 8 | 11 | 5 | 8 | 7 | 8 | 13 | 14 | 4 | 7 | 3 | 25 | 17 | 24 | 28 |
| | N. W. | 15 | 16 | 11 | 28 | 31 | 23 | 33 | 18 | 21 | 23 | 24 | 21 | 68 | 52 | 70 | 74 |
| | W. | 9 | 4 | 9 | 10 | 2 | 13 | 6 | 5 | 9 | 17 | 5 | 8 | 31 | 21 | 21 | 24 |
| | S. W. | 7 | 4 | 7 | 13 | 3 | 10 | 15 | 9 | 7 | 9 | 4 | 6 | 20 | 17 | 28 | 34 |
| | S. | 14 | 23 | 18 | 5 | 12 | 7 | 6 | 9 | 5 | 7 | 11 | 19 | 23 | 56 | 35 | 22 |
| | S. E. | 20 | 16 | 14 | 11 | 18 | 9 | 9 | 16 | 20 | 9 | 15 | 20 | 44 | 65 | 43 | 34 |
| | E. | 6 | 14 | 11 | 9 | 9 | 10 | 7 | 5 | 8 | 12 | 17 | 6 | 37 | 26 | 29 | 22 |
| | N. E. | 6 | 3 | 5 | 11 | 4 | 7 | 5 | 6 | 8 | 8 | 9 | 5 | 25 | 14 | 20 | 18 |
| | Calm. | 1 | 5 | 4 | 1 | 3 | 7 | 4 | 3 | 1 | 1 | 1 | 2 | 3 | 8 | 8 | 14 |
| | Blank. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

## PAPER 19.

*Monthly and annual mean barometer, corrected for temperature and instrumental error only (observations taken at 7.35 a. m., 4.35 and 11 p. m., Washington mean time), from July, 1877, to June, 1878, inclusive.*

| Stations. | 1877. | | | | | | 1878. | | | | | | Annual means. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | |
| Albany, N. Y. | 29.692 | 29.699 | 29.819 | 29.799 | 29.877 | 29.900 | 29.799 | 29.717 | 29.683 | 29.571 | 29.658 | 29.667 | 29.740 |
| Alpena, Mich. | 29.293 | 29.276 | 29.354 | 29.334 | 29.331 | 29.408 | 29.349 | 29.293 | 29.251 | 29.117 | 29.219 | a29.223 | 29.287 |
| Atlantic City, N. J. | 29.938 | 29.937 | 30.058 | 30.026 | 30.101 | 30.139 | 30.043 | 29.940 | 29.957 | 29.809 | 29.899 | 29.902 | 29.979 |
| Augusta, Ga. | 29.835 | 29.811 | 29.833 | 29.881 | 29.921 | 30.011 | 29.908 | 29.808 | 29.840 | 29.681 | 29.809 | 29.799 | 29.845 |
| Baltimore, Md. | 29.921 | 29.915 | 30.043 | 30.024 | 30.083 | 30.164 | 30.048 | 29.921 | 29.929 | 29.779 | 29.888 | 29.883 | 29.966 |
| Barnegat, N. J. | 29.924 | 29.927 | 30.047 | 30.015 | 30.092 | 30.139 | 30.030 | 29.933 | 29.948 | 29.811 | 29.907 | 29.911 | 29.974 |
| Bismarck, Dak. | 28.101 | 28.264 | 28.070 | 28.191 | 28.177 | 28.176 | 28.135 | 28.044 | 28.052 | 27.903 | 28.093 | 28.084 | 28.107 |
| Boise City, Idaho | 27.083 | 27.118 | 27.124 | 27.188 | 27.276 | 27.266 | 27.201 | 27.052 | 27.117 | 27.034 | 27.081 | 27.095 | 27.111 |
| Boston, Mass. | 29.773 | 29.778 | 29.879 | 29.869 | 29.950 | 29.956 | 29.843 | 29.767 | 29.756 | 29.677 | 29.742 | 29.764 | 29.813 |
| Breckenridge, Minn. | 28.871 | 28.924 | 28.864 | 28.966 | 28.991 | 28.986 | 28.984 | 28.888 | 28.863 | 28.687 | 28.880 | 28.876 | 28.898 |
| Buffalo, N. Y. | 29.230 | 29.224 | 29.330 | 29.287 | 29.308 | 29.382 | 29.285 | 29.224 | 29.212 | 29.086 | 29.207 | 29.213 | 29.249 |
| Burlington, Vt. | 29.656 | 29.660 | 29.785 | 29.784 | 29.822 | 29.868 | 29.782 | 29.705 | 29.660 | 29.563 | 29.626 | 29.643 | 29.713 |
| Cairo, Ill. | 29.628 | 29.615 | 29.652 | 29.655 | 29.709 | 29.768 | 29.682 | 29.575 | 29.576 | 29.414 | 29.570 | 29.574 | 29.618 |
| Cape Hatteras, N. C. | 29.936 | 29.911 | 29.946 | 29.999 | 30.031 | 30.151 | 30.074 | 29.980 | 30.025 | 29.849 | 29.982 | 29.975 | 29.988 |
| Cape Henry, Va. | 29.949 | 29.940 | 30.018 | 30.025 | 30.070 | 30.141 | 30.038 | 29.943 | 29.953 | 29.807 | 29.907 | 29.922 | 29.976 |
| Cape Lookout, N. C. | 30.000 | 29.974 | 29.996 | 30.037 | 30.082 | 30.165 | 30.061 | 29.971 | 30.015 | 29.843 | 29.973 | 29.962 | 30.006 |
| Cape May, N. J. | 29.929 | 29.930 | 30.042 | 30.016 | 30.086 | 30.135 | 30.037 | 29.936 | 29.955 | 29.811 | 29.906 | 29.917 | 29.975 |
| Charleston, S. C. | 29.964 | 29.938 | 29.941 | 30.008 | 30.033 | 30.133 | 30.035 | 29.955 | 29.994 | 29.935 | 29.968 | 29.949 | 29.988 |
| Cheyenne, Wyo. | 24.094 | 24.135 | 24.046 | 24.026 | 23.996 | 24.005 | 23.923 | 23.835 | 23.911 | 23.825 | 23.962 | 24.077 | 23.986 |
| Chicago, Ill. | 29.256 | 29.254 | 29.301 | 29.267 | 29.299 | b29.355 | 29.296 | 29.207 | 29.196 | 29.064 | 29.214 | 29.223 | 29.243 |
| Cincinnati, Ohio | 29.276 | 29.267 | 29.306 | 29.312 | 29.378 | 29.456 | 29.363 | 29.265 | 29.275 | 29.124 | 29.273 | 29.267 | 29.297 |
| Cleveland, Ohio | 29.268 | 29.250 | 29.339 | 29.292 | 29.331 | 29.401 | 29.305 | 29.219 | 29.220 | 29.076 | 29.211 | 29.212 | 29.260 |
| Corsicana, Tex. | 29.515 | 29.509 | 29.492 | 29.511 | 29.634 | 29.669 | 29.603 | 29.462 | 29.461 | 29.321 | 29.452 | 29.448 | 29.506 |
| Davenport, Iowa | 29.339 | 29.344 | 29.360 | 29.359 | 29.409 | 29.437 | 29.390 | 29.305 | 29.263 | 29.120 | 29.278 | 29.294 | 29.325 |
| Deadwood, Dak.c | | | | | | | 25.303 | 25.214 | 25.289 | 25.179 | 25.336 | | |
| Denison, Texas | 29.196 | 29.191 | 29.186 | 29.191 | 29.300 | 29.330 | 29.251 | 29.129 | 29.123 | 28.986 | 28.791 | 29.124 | 29.150 |
| Denver, Colo | 24.809 | 24.855 | 24.772 | 24.783 | 24.768 | 24.778 | 24.705 | 24.600 | 24.646 | 24.570 | 24.711 | 24.812 | 24.734 |
| Detroit, Mich. | 29.273 | 29.431 | 29.345 | 29.296 | 29.326 | 29.412 | 29.317 | 29.249 | 29.239 | 29.096 | 29.235 | 29.254 | 29.289 |
| Dodge City, Kans. | 27.378 | 27.394 | 27.352 | 27.367 | 27.416 | 27.435 | 27.373 | 27.248 | 27.273 | 27.149 | 27.287 | 27.362 | 27.336 |
| Dubuque, Iowa | 29.246 | 29.260 | 29.279 | 29.280 | 29.319 | 29.348 | 29.310 | 29.227 | 29.187 | 29.034 | 29.204 | 29.211 | 29.242 |
| Duluth, Minn. | 29.208 | 29.241 | 29.237 | 29.297 | 29.319 | 29.330 | 29.341 | 29.259 | 29.227 | 29.058 | 29.195 | 29.229 | 29.245 |
| Eastport, Me. | 29.840 | 29.860 | 29.930 | 29.928 | 30.003 | 29.967 | 29.889 | 29.815 | 29.777 | 29.761 | 29.793 | 29.823 | 29.865 |
| Erie, Pa. | 29.240 | 29.219 | 29.319 | 29.273 | 29.297 | 29.380 | 29.270 | 29.205 | 29.201 | 29.069 | 29.204 | 29.206 | 29.240 |
| Escanaba, Mich. | d29.297 | 29.288 | 29.333 | 29.331 | 29.332 | 29.391 | 29.360 | 29.307 | 29.281 | 29.126 | 29.247 | 29.272 | 29.297 |
| Fort Gibson, Idaho | 29.425 | 29.431 | 29.426 | 29.430 | 29.520 | 29.561 | 29.481 | 29.350 | 29.373 | 29.204 | 29.346 | 29.360 | 29.409 |
| Fort Sully, Dak.e | 28.177 | 28.233 | 28.183 | 28.307 | | | | | | | | | |
| Galveston, Tex. | 29.961 | 29.940 | 29.895 | 29.943 | 30.062 | 30.105 | 30.052 | 29.920 | 29.913 | 29.778 | 29.907 | 29.888 | 29.947 |
| Grand Haven, Mich. | 29.294 | 29.293 | 29.353 | 29.311 | 29.342 | 29.411 | 29.353 | 29.259 | 29.259 | 29.113 | 29.262 | 29.276 | 29.294 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Indianapolis, Ind* | *29.197* | *29.185* | *29.242* | *29.219* | *29.247* | *29.309* | *29.219* | *29.126* | *29.138* | *28.986* | *29.146* | *29.149* | *29.180* |
| *Indianola, Tex* | *29.960* | *29.954* | *29.922* | *29.952* | *30.098* | *30.134* | *30.103* | *29.949* | *29.936* | *29.795* | *29.916* | *29.888* | *29.967* |
| *Jacksonville, Fla* | *30.011* | *29.973* | *29.951* | *30.008* | *30.056* | *30.159* | *30.069* | *29.967* | *30.016* | *29.867* | *29.986'* | *29.962* | *30.002* |
| *Keokuk, Iowa* | *29.276* | *29.289* | *29.282* | *29.343* | *29.400* | *29.424* | *29.376* | *29.276* | *29.245* | *29.108* | *29.268* | *29.272* | *29.297* |
| Key West, Fla | 29.974 | 29.959 | 29.912 | 29.939 | 29.978 | 30.060 | 30.035 | 29.958 | 29.985 | 29.880 | 29.986 | 29.962 | 29.969 |
| Kittyhawk, N. C | 29.971 | 29.956 | 30.014 | 30.045 | 30.087 | 30.145 | 30.046 | 29.957 | 29.996 | 29.823 | 29.950 | 29.951 | 29.995 |
| Knoxville, Tenn | 29.014 | 29.005 | 29.077 | 29.082 | 29.088 | 29.181 | 29.061 | 29.122 | 28.996 | 28.841 | 28.937 | 28.993 | 29.038 |
| La Crosse, Wis | 29.196 | 29.206 | 29.213 | 29.236 | 29.269 | 29.288 | 29.260 | 29.178 | 29.143 | 28.984 | 29.141 | 29.159 | 29.189 |
| Leavenworth, Kans | 29.115 | 29.108 | 29.192 | 29.122 | 29.192 | 29.211 | 29.277 | 29.036 | 29.017 | 28.871 | 29.026 | 29.056 | 29.102 |
| Lead City, Dak *f* | | | | | | | | | | | | 24.846 | |
| Los Angeles, Cal | 29.530 | 29.575 | 29.523 | 29.592 | 29.672 | 29.656 | 29.706 | 29.644 | 29.646 | 29.560 | 29.570 | 29.559 | 29.603 |
| Louisville, Ky | 29.416 | 29.403 | 29.455 | 29.446 | 29.492 | 29.563 | 29.453 | 29.358 | 29.378 | 29.219 | 29.375 | 29.355 | 29.409 |
| Lynchburg, Va | 29.307 | 29.305 | 29.393 | 29.378 | 29.425 | 29.484 | 29.384 | 29.267 | 29.294 | 29.161 | 29.273 | 29.277 | 29.329 |
| Marquette, Mich | 29.166 | 29.225 | 29.250 | 29.269 | 29.253 | 29.303 | 29.266 | 29.169 | 29.144 | 29.071 | 29.178 | 29.215 | 29.209 |
| Memphis, Tenn | 29.694 | 29.685 | 29.703 | 29.724 | 29.785 | 29.834 | 29.761 | 29.648 | 29.657 | 29.513 | 29.654 | 29.649 | 29.692 |
| Milwaukee, Wis | 29.287 | 29.300 | 29.344 | 29.323 | 29.327 | 29.359 | 29.261 | 29.188 | 29.167 | 29.021 | 29.174 | 29.191 | 29.245 |
| Mobile, Ala | 29.971 | 29.949 | 29.918 | 29.992 | 30.074 | 30.135 | 30.073 | 29.954 | 29.968 | 29.864 | 29.973 | 29.925 | 29.983 |
| Montgomery, Ala | 29.785 | 29.757 | 29.758 | 29.820 | 29.884 | 29.955 | 29.876 | 29.769 | 29.784 | 29.638 | 29.772 | 29.738 | 29.795 |
| Morgantown, W. Va | 28.953 | 28.943 | 29.014 | 28.989 | 29.019 | 29.088 | 28.982 | 28.874 | 28.892 | 28.753 | 28.894 | 28.897 | 28.941 |
| Mount Washington, N. H | 23.866 | 23.877 | 23.886 | 23.714 | 23.639 | 23.565 | 23.380 | 23.404 | 23.441 | 23.564 | 23.670 | 23.783 | 23.649 |
| Nashville, Tenn | 29.475 | 29.462 | 29.500 | 29.512 | 29.559 | 29.623 | 29.533 | 29.427 | 29.441 | 29.282 | 29.435 | 29.427 | 29.473 |
| New Haven, Conn | 29.823 | 29.824 | 29.947 | 29.913 | 29.995 | 30.025 | 29.917 | 29.834 | 29.828 | 29.722 | 29.804 | 29.819 | 29.871 |
| New London, Conn | 29.954 | 29.953 | 30.031 | 29.991 | 30.075 | 30.095 | 29.985 | 29.896 | 29.899 | 29.796 | 29.875 | 29.884 | 29.953 |
| New Orleans, La | 29.939 | 29.922 | 29.884 | 29.953 | 30.040 | 30.097 | 30.032 | 29.906 | 29.917 | 29.784 | 29.934 | 29.895 | 29.942 |
| Newport, R. I | 29.901 | 29.897 | 30.017 | 29.977 | 30.063 | 30.070 | 29.959 | 29.872 | 29.877 | 29.782 | 29.859 | 29.879 | 29.929 |
| New York, N. Y | 29.823 | 29.830 | 29.908 | 29.872 | 29.945 | 29.978 | 29.872 | 29.786 | 29.786 | 29.666 | 29.761 | 29.767 | 29.833 |
| Norfolk, Va | 29.927 | 29.920 | 30.001 | 30.014 | 30.062 | 30.128 | 30.026 | 29.932 | 29.955 | 29.790 | 29.915 | 29.911 | 29.965 |
| North Platte, Nebr | 27.042 | 27.082 | 27.018 | 27.082 | 27.092 | 27.107 | 27.048 | 26.969 | 26.976 | 26.856 | 26.992 | 27.055 | 27.026 |
| Olympia, Wash | 29.926 | 29.930 | 29.933 | 29.995 | 29.918 | 29.946 | 29.769 | 29.644 | 29.836 | 29.914 | 29.960 | 29.995 | 29.897 |
| Omaha, Nebr | 28.841 | 28.853 | 28.825 | 28.870 | 28.923 | 28.924 | 28.887 | 28.788 | 28.748 | 28.607 | 28.782 | 28.797 | 28.820 |
| Oswego, N. Y | 29.610 | 29.605 | 29.711 | 29.695 | 29.740 | 29.807 | 29.716 | 29.640 | 29.616 | 29.497 | 29.602 | 29.605 | 29.654 |
| Pembina, Dak | 29.024 | 29.093 | 29.035 | 29.183 | 29.182 | 29.158 | 29.203 | 29.102 | 29.083 | 28.894 | 29.059 | 29.060 | 29.090 |
| Philadelphia, Pa | 29.902 | 29.995 | 29.995 | 30.004 | 30.078 | 30.128 | 30.030 | 29.923 | 29.923 | 29.788 | 29.892 | 29.889 | 29.955 |
| Pike's Peak, Colo | 18.051 | 18.076 | 17.912 | 17.721 | 17.625 | 17.640 | 17.526 | 17.470 | 17.586 | 17.563 | 17.727 | 17.925 | 17.735 |
| Pioche, Nev *g* | | 24.119 | 24.069 | 24.025 | 24.104 | 24.035 | 24.033 | 23.914 | 23.973 | 23.892 | 23.959 | 24.042 | *h*24.015 |
| Pittsburgh, Pa | 29.159 | 29.154 | 29.225 | 29.202 | 29.236 | 29.301 | 29.196 | 29.106 | 29.118 | 28.979 | 29.118 | 29.116 | 29.159 |
| Port Huron, Mich | 29.271 | 29.239 | 29.349 | 29.323 | 29.330 | 29.407 | 29.304 | 29.244 | 29.235 | 29.095 | 29.226 | 29.242 | 29.272 |
| Portland, Me | 29.860 | 29.876 | 29.974 | 29.964 | 30.031 | 30.027 | 29.931 | 29.862 | 29.839 | 29.787 | 29.835 | 29.848 | 29.903 |
| Portland, Oreg | 29.927 | 29.933 | 29.963 | 30.015 | 29.980 | 29.993 | 29.829 | 29.707 | 29.870 | 29.944 | 29.983 | 29.989 | 29.928 |
| Punta Rassa, Fla | 30.010 | 29.993 | 29.955 | 29.981 | 30.024 | 30.125 | 30.077 | 29.981 | 30.021 | 29.910 | 30.020 | 29.992 | 30.007 |
| Red Bluff, Cal | 29.452 | 29.520 | 29.496 | 29.618 | 29.742 | 29.675 | 29.646 | 29.550 | 29.640 | 29.531 | 29.546 | 29.464 | 29.582 |
| Rochester, N. Y | 29.319 | 29.310 | 29.422 | 29.385 | 29.410 | 29.473 | 29.375 | 29.309 | 29.294 | 29.169 | 29.281 | 29.290 | 29.336 |
| Roseburg, Oreg *k* | | 29.448 | 29.491 | 29.546 | 29.527 | 29.486 | 29.340 | 29.255 | 29.406 | 29.454 | 29.485 | 29.489 | *h*29.448 |
| Sacramento, Cal | 29.740 | 29.814 | 29.780 | 29.887 | 30.024 | 29.963 | 29.957 | 29.872 | 29.936 | 29.811 | 29.822 | 29.750 | 29.863 |
| Salt Lake City, Utah | 25.594 | 25.641 | *b*25.610 | 25.627 | 25.744 | 25.706 | 25.669 | 25.550 | 25.592 | 25.485 | 25.553 | 25.608 | 25.615 |
| San Diego, Cal | 29.836 | 29.872 | 29.823 | 29.907 | 29.963 | 29.962 | 30.030 | 29.976 | 29.969 | 29.880 | 29.886 | 29.872 | 29.915 |
| Sandusky, Ohio *l* | | *m*29.280 | 29.377 | 29.335 | 29.367 | 29.444 | 29.351 | 29.269 | 29.271 | 29.126 | 29.265 | 29.268 | *n*29.305 |
| Sandy Hook, N. J | 29.928 | 29.927 | 30.058 | 30.019 | 30.096 | 30.137 | 30.029 | 29.939 | 29.941 | 29.807 | 29.899 | 29.905 | 29.974 |

*a* Two observations taken late; not used.
*b* One observation missed.
*c* Opened December 25, 1877; closed May 31, 1878.
*d* Six days' observations missed.
*e* Closed October 31, 1877.
*f* Opened June 1, 1878.
*g* Observations commenced July 29, 1877.
*h* Eleven months only.
*i* Nine observations missed.
*k* Observations commenced July 15, 1877.
*l* Observations commenced August 2, 1877.
*m* Thirty days' observations.
*n* Ten months and thirty days.

*Monthly and annual mean barometer, corrected for temperature and instrumental error only, &c.*—Continued.

| Stations. | 1877. | | | | | | 1878. | | | | | | Annual means. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | |
| San Francisco, Cal | 29.829 | 29.908 | 29.845 | 29.941 | 30.043 | 29.969 | 29.959 | 29.891 | 29.966 | 29.861 | 29.889 | 29.841 | 29.912 |
| Santa Fé, N. M | 23.375 | 23.401 | 23.332 | 23.254 | 23.261 | 23.256 | 23.184 | 23.099 | 23.176 | 23.114 | 23.226 | 23.310 | 23.249 |
| Savannah, Ga | 29.943 | 29.912 | 29.905 | 29.964 | 30.005 | 30.102 | 29.996 | 29.903 | 29.949 | 29.790 | 29.917 | 29.903 | 29.941 |
| Shreveport, La | 29.768 | 29.757 | 29.752 | 29.787 | 29.905 | 29.955 | 29.873 | 29.738 | 29.735 | 29.603 | 29.743 | 29.722 | 29.778 |
| Smithville, N. C | 29.998 | 29.973 | 29.988 | 30.051 | 29.972 | 30.164 | 30.073 | 29.980 | 30.014 | 29.855 | 29.989 | 29.984 | 30.003 |
| Springfield, Mass | 29.801 | 29.744 | 29.869 | 29.838 | 29.911 | 29.931 | 29.833 | 29.758 | 29.738 | 29.640 | 29.718 | 29.732 | 29.793 |
| Saint Louis, Mo | 29.416 | 29.414 | 29.450 | 29.433 | 29.493 | 29.528 | 29.462 | 29.361 | 29.353 | 29.201 | 29.362 | 29.366 | 29.403 |
| Saint Mark's, Fla | 29.998 | 29.973 | 29.947 | 30.002 | 30.073 | 30.130 | 30.089 | 29.999 | 30.017 | 29.870 | 29.998 | 29.956 | 30.004 |
| Saint Michael's, Alaska *a* | ..... | 29.679 | 29.729 | 29.579 | 29.518 | 29.434 | 29.418 | 29.446 | 29.622 | 29.576 | 29.805 | 29.686 | *b*29.590 |
| Saint Paul, Minn | 29.052 | 29.072 | 29.052 | 29.102 | 29.131 | 29.141 | 29.129 | 29.053 | 29.010 | 28.844 | 29.015 | 29.027 | 29.052 |
| Thatcher's Island, Mass | 29.879 | 29.883 | 29.999 | 29.974 | 30.049 | 30.047 | 29.947 | 29.869 | 29.857 | 29.782 | 29.846 | 29.863 | 29.916 |
| Toledo, Ohio | 29.295 | 29.271 | 29.350 | 29.315 | 29.360 | 29.432 | 29.329 | 29.257 | 29.230 | 29.083 | 29.230 | 29.234 | 29.282 |
| Tybee Island, Ga | 29.985 | 29.949 | 29.957 | 30.020 | 30.060 | 30.158 | 30.060 | 29.971 | 30.009 | 29.851 | 29.978 | 29.949 | 29.996 |
| Umatilla, Oreg. *a* | ..... | 29.593 | 29.610 | 29.738 | 29.743 | 29.812 | 29.680 | 29.470 | 29.602 | 29.591 | 29.618 | 29.605 | *b*29.643 |
| Vicksburg, Miss | 29.766 | 29.749 | 29.754 | 29.797 | 29.877 | 29.929 | 29.853 | 29.731 | 29.738 | 29.601 | 29.749 | 29.727 | 29.773 |
| Virginia City, Mont | 24.283 | 24.328 | 24.237 | 24.270 | 24.258 | 24.255 | 24.177 | 24.055 | 24.175 | 24.085 | 24.187 | 24.284 | 24.216 |
| Visalia, Cal | 29.414 | 29.501 | 29.510 | 29.613 | 29.754 | 29.698 | 29.725 | 29.655 | 29.680 | 29.545 | 29.541 | 29.471 | 29.676 |
| Washington, D. C | 29.856 | 29.857 | 29.971 | 29.949 | 30.032 | 30.080 | 29.977 | 29.869 | 29.884 | 29.725 | 29.848 | 29.844 | 29.908 |
| Wilmington, N. C | 29.936 | 29.912 | 29.934 | 30.003 | 30.019 | 30.113 | 29.994 | 29.911 | 29.953 | 29.785 | 29.918 | 29.909 | 29.949 |
| Winnemucca, Nev | 25.586 | 25.625 | 25.614 | 25.651 | 25.727 | 25.666 | 25.626 | 25.502 | 25.586 | 25.506 | 25.567 | 25.603 | 25.605 |
| Wood's Holl, Mass | 29.908 | 29.911 | 30.032 | 29.990 | 30.023 | 30.074 | 29.961 | 29.878 | 29.872 | 29.778 | 29.853 | 29.876 | 29.930 |
| Yankton, Dak | 28.655 | 28.687 | 28.732 | 28.637 | 28.769 | 28.760 | 28.719 | 28.618 | 28.588 | 28.442 | 28.632 | 28.647 | 28.657 |

*a* Observations commenced July 15, 1877.

*b* Eleven months only.

*Monthly and annual mean relative humidity; from observations taken at 7 a. m., 2 and 9 p. m. (local time), July, 1877, to June, 1878, inclusive.*

| Stations. | 1877. | | | | | | 1878. | | | | | | Annual means. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | |
| | Per ct. | Per ct. | Per ct. | Per ct. | Per ct. | Per ct. | Per ct. | Per ct. | Per ct. | Per ct. | Per ct. | Per ct. | Per ct. |
| Albany, N. Y | 69.0 | 70.9 | 67.4 | 79.9 | 76.8 | 75.4 | 79.3 | 80.6 | 68.8 | 72.0 | 64.1 | 67.7 | 72.7 |
| Alpena, Mich | 71.6 | 75.2 | 74.3 | 82.4 | 81.9 | 83.1 | 82.9 | 73.5 | 79.6 | 66.5 | 67.8 | d70.3 | 75.8 |
| Atlantic City, N. J | 86.5 | 82.6 | 81.4 | 80.7 | 74.8 | 78.4 | 84.5 | 80.7 | 81.1 | 81.0 | 77.4 | 83.5 | 81.0 |
| Augusta, Ga | 64.8 | 68.7 | 71.5 | 74.6 | 77.0 | 75.8 | 72.4 | 69.8 | 66.7 | 63.9 | 60.5 | 65.7 | 69.3 |
| Baltimore, Md | 67.4 | 62.9 | 70.5 | 70.3 | 67.6 | 64.9 | 71.3 | 66.9 | 64.2 | 60.6 | 62.9 | 64.6 | 66.2 |
| Barnegat, N. J | 84.4 | 79.4 | 79.4 | 78.3 | 77.1 | 76.3 | 79.4 | 76.7 | 77.0 | 77.9 | 76.8 | 81.5 | 78.7 |
| Bismarck, Dak | 63.6 | 54.4 | 47.1 | 64.4 | 76.6 | 76.4 | 77.4 | 81.6 | 70.6 | 61.8 | 58.8 | 64.4 | 66.4 |
| Boisé City, Idaho | 36.8 | 33.3 | 48.0 | 57.1 | 69.6 | 67.9 | 66.2 | 67.5 | 62.0 | 51.7 | 49.9 | 38.9 | 54.1 |
| Boston, Mass | 76.0 | 78.5 | 68.1 | 67.9 | 68.0 | 61.8 | 66.6 | 68.2 | 63.7 | 78.0 | 63.9 | 66.0 | 68.9 |
| Breckenridge, Minn | 71.1 | 71.2 | 69.9 | 72.8 | 81.8 | 87.9 | 84.7 | 85.5 | 76.3 | 71.0 | 65.2 | 75.2 | 76.0 |
| Buffalo, N. Y | 72.9 | 70.8 | 74.2 | 79.1 | 77.7 | 85.6 | 83.5 | 79.9 | 81.8 | 78.0 | 70.1 | 70.2 | 77.0 |
| Burlington, Vt | 65.3 | 70.9 | 67.3 | 73.2 | 70.4 | 69.1 | 67.9 | 64.4 | 64.8 | 71.3 | 62.1 | 61.7 | 67.4 |
| Cairo, Ill | 70.6 | 68.1 | 73.7 | 70.4 | 67.0 | 68.0 | 70.2 | 67.3 | 56.4 | 61.6 | 66.7 | 69.2 | 67.4 |
| Cape Hatteras, N. C | 80.0 | 78.3 | 79.7 | 76.3 | 75.7 | 76.0 | 73.9 | 79.7 | 86.4 | 87.6 | 80.4 | 83.4 | 79.8 |
| Cape Henry, Va | 76.7 | 77.0 | 79.7 | 72.8 | 74.9 | 71.6 | 75.9 | 73.9 | 73.0 | 75.0 | 73.4 | 73.7 | 74.8 |
| Cape Lookout, N. C | 78.4 | 74.9 | 75.4 | 75.8 | 75.5 | 76.1 | 74.2 | 73.1 | 75.6 | 77.0 | 74.2 | 73.8 | 75.3 |
| Cape May, N. J | 78.7 | 74.5 | 76.7 | 75.0 | 72.1 | 75.1 | 74.1 | 73.6 | 75.7 | 77.7 | 75.9 | 77.0 | 75.5 |
| Charleston, S. C | 71.8 | 72.2 | 75.3 | 75.5 | 74.2 | 70.8 | 68.3 | 68.8 | 68.4 | 68.4 | 69.0 | 69.9 | 71.0 |
| Cheyenne, Wyo | 31.4 | 36.8 | 42.4 | 61.1 | 64.9 | 48.0 | 52.1 | 48.4 | a58.9 | 48.9 | 58.3 | 57.9 | 50.8 |
| Chicago, Ill | 70.1 | 71.2 | 69.5 | 74.1 | 73.6 | a76.4 | 75.2 | 76.1 | 72.2 | 69.2 | 67.1 | 67.6 | 71.9 |
| Cincinnati, Ohio | 67.0 | 63.7 | 66.4 | 64.9 | 67.6 | 69.1 | 68.8 | 67.4 | 62.0 | 58.0 | 59.3 | 63.4 | 64.8 |
| Cleveland, Ohio | 65.4 | 62.6 | 68.5 | 67.5 | 66.1 | 76.0 | 76.8 | 74.3 | 71.6 | 64.1 | 61.6 | 63.7 | 68.2 |
| Corsicana, Tex | 65.0 | 60.0 | 68.0 | 73.0 | 65.0 | 68.7 | 68.0 | 61.0 | 50.0 | 62.0 | 71.0 | 76.4 | 65.7 |
| Davenport, Iowa | 64.6 | 66.4 | 65.9 | 74.7 | 74.2 | 77.4 | 75.4 | 72.1 | 66.6 | 62.8 | 67.2 | 67.3 | 69.5 |
| Deadwood, Dak.*b* | | | | | | | 61.7 | 66.9 | 70.1 | 70.3 | 72.2 | | |
| Denison, Tex | 61.0 | 55.3 | 68.6 | 75.0 | 67.3 | 72.3 | 71.4 | 69.5 | 48.7 | 62.8 | 72.3 | 76.0 | 66.7 |
| Denver, Col | 31.9 | 35.4 | 36.2 | 50.2 | 49.5 | 54.0 | 52.7 | 47.4 | 42.0 | 32.9 | 46.6 | 48.8 | 44.0 |
| Detroit, Mich | 64.5 | 67.7 | 70.7 | 71.5 | 75.4 | 79.9 | 78.6 | 75.8 | 75.6 | 64.1 | 60.9 | 63.5 | 70.7 |
| Dodge City, Kans | 56.1 | 61.7 | 55.0 | 65.1 | 62.1 | 70.7 | 71.7 | 70.6 | 54.5 | 52.1 | 60.7 | 67.2 | 62.3 |
| Dubuque, Iowa | 63.1 | 63.5 | 65.3 | 73.9 | 77.3 | 75.6 | 72.8 | 69.3 | 65.7 | 61.1 | 63.1 | 64.4 | 67.9 |
| Duluth, Minn | 70.3 | 65.3 | 73.3 | 76.8 | 77.9 | 78.8 | 76.9 | 75.6 | 71.5 | 70.8 | 64.4 | 72.3 | 73.0 |
| Eastport, Me | 78.9 | 80.6 | 75.7 | 73.4 | 77.4 | 73.8 | 81.0 | 82.2 | 74.7 | 79.2 | 78.2 | 78.3 | 77.8 |
| Erie, Pa | 71.6 | 70.6 | 74.8 | 72.8 | 72.0 | 79.1 | 80.4 | 76.9 | 77.8 | 71.7 | 69.7 | 69.9 | 73.9 |
| Escanaba, Mich | 69.4 | 70.2 | 73.0 | 77.1 | 76.8 | 79.7 | 76.3 | 71.3 | 72.2 | 69.9 | 67.5 | 67.9 | 72.6 |
| Fort Gibson, Ind. T | 68.3 | 67.1 | 69.7 | 71.5 | 67.3 | 67.9 | 68.7 | 65.1 | 56.2 | 64.0 | 71.0 | 73.3 | 67.5 |
| Fort Sully, Dak.*c* | 57.7 | 52.8 | 49.8 | 65.2 | | | | | | | | | |

a Thirty days only. b Opened December 25, 1877; closed June 1, 1878. c Closed October 31, 1877. d Twenty-nine days only.

*Monthly and annual mean relative humidity; from observations taken at 7 a. m., 2 and 9 p. m., &c.*—Coutinued.

| Stations. | 1877. | | | | | | 1878. | | | | | | Annual means. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | |
| | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per cl.* | *Per ct.* |
| Galveston, Tex | 70.3 | 67.1 | 74.9 | 81.3 | 71.6 | 83.5 | 73.7 | 70.1 | 74.7 | 76.8 | 77.3 | 75.2 | 74.7 |
| Grand Haven, Mich | 71.8 | 77.3 | 74.1 | 80.6 | 79.1 | 77.8 | 77.9 | 76.3 | 75.4 | 72.8 | 69.2 | 70.7 | 75.2 |
| Indianapolis, Ind | 67.6 | 68.7 | 70.4 | 68.1 | 71.4 | 72.5 | 69.1 | 65.7 | 61.5 | 60.2 | 62.2 | 59.7 | 66.5 |
| Indianola, Tex | 68.2 | 66.8 | 69.5 | 76.9 | 68.4 | 79.4 | 78.6 | 70.9 | 74.0 | 72.2 | 77.4 | 77.1 | 73.3 |
| Jacksonville, Fla | 68.7 | 71.5 | 74.9 | 74.1 | 71.8 | a70.0 | 67.8 | 68.5 | 66.4 | 63.9 | 59.6 | 68.9 | 68.8 |
| Keokuk, Iowa | 69.0 | 69.9 | 65.6 | 74.3 | 71.7 | 76.1 | 72.4 | 67.1 | 67.3 | 69.1 | 70.0 | 71.3 | 70.3 |
| Key West, Fla | 71.1 | 71.1 | 71.0 | 76.5 | 74.5 | 78.3 | 79.8 | 78.8 | 76.6 | 71.1 | 67.5 | 71.2 | 74.0 |
| Kittyhawk, N. C | 88.7 | 81.9 | 84.5 | 81.2 | 83.5 | 79.1 | 82.3 | 80.0 | 80.1 | 81.0 | 80.7 | 81.9 | 82.1 |
| Knoxville, Tenn | 68.3 | 65.0 | 72.4 | 72.0 | 69.0 | 68.3 | 71.0 | 68.0 | 55.5 | 61.0 | 63.0 | 68.0 | 66.8 |
| La Crosse, Wis | 67.7 | 64.3 | 67.5 | 75.4 | 79.7 | 74.5 | 77.3 | 62.5 | 65.2 | 62.0 | 63.5 | 67.4 | 68.9 |
| Leavenworth, Kans | 67.9 | 65.7 | 67.2 | 72.6 | 70.5 | 76.0 | 71.9 | 75.1 | 62.0 | 59.3 | 66.7 | 69.3 | 68.7 |
| Lead City, Dak | | | | | | | | | | | | b58.1 | |
| Los Angeles, Cal | 61.8 | 64.5 | 62.1 | 67.4 | 46.5 | 56.4 | 61.0 | 69.3 | 72.7 | 69.8 | 70.4 | 72.0 | 64.5 |
| Louisville, Ky | 68.0 | 68.7 | 71.3 | 67.8 | 73.2 | 72.8 | 65.9 | 63.9 | 55.3 | 56.3 | 58.5 | 58.6 | 65.0 |
| Lynchburg, Va | 58.6 | 60.9 | 67.3 | 62.9 | 59.1 | 59.3 | 62.2 | 56.9 | a53.2 | 55.7 | 60.4 | 62.2 | 59.9 |
| Marquette, Mich | 62.2 | 64.3 | 61.3 | 67.5 | 70.0 | 72.5 | 70.5 | 63.4 | 67.9 | 69.5 | 66.9 | 69.2 | 67.1 |
| Memphis, Tenn | 68.7 | 69.8 | 78.1 | 72.4 | 70.4 | 69.8 | 71.9 | 69.4 | 54.1 | 63.9 | 67.5 | 69.4 | 68.8 |
| Milwaukee, Wis | 72.3 | 69.9 | 69.6 | 77.9 | 82.3 | 81.5 | 83.4 | 79.5 | 82.6 | 78.2 | 75.5 | 76.9 | 77.5 |
| Mobile, Ala | 65.7 | 68.7 | 77.7 | 77.2 | 73.5 | 75.9 | 73.5 | 70.2 | 67.9 | 71.4 | 70.8 | 69.8 | 71.9 |
| Montgomery, Ala | 61.5 | 58.3 | 70.7 | 71.5 | 68.7 | 70.6 | 67.4 | 63.1 | 57.4 | 63.1 | 61.2 | 64.6 | 64.8 |
| Morgantown, W. Va | 68.4 | 68.5 | 72.5 | 67.7 | 64.1 | 67.3 | 71.1 | 68.8 | 63.4 | 59.5 | 65.2 | 66.8 | 66.9 |
| Mount Washington, N. H | 86.2 | 88.5 | 72.4 | 90.0 | 87.9 | 78.2 | 84.7 | 76.7 | 85.6 | 91.5 | 90.9 | 83.6 | 84.7 |
| Nashville, Tenn | 66.9 | 68.0 | 73.0 | 71.1 | 71.0 | 71.2 | 71.8 | 67.6 | 59.9 | 61.6 | 61.5 | 66.7 | 67.5 |
| New Haven, Conn | 71.4 | 72.2 | 71.8 | 73.8 | 70.5 | 66.1 | 73.7 | 69.2 | 68.9 | 72.5 | 66.9 | 74.1 | 70.9 |
| New London, Conn | 89.4 | 78.4 | 76.1 | 78.4 | 75.6 | 66.8 | 75.4 | 71.1 | 72.7 | 76.8 | 67.3 | 77.3 | 74.7 |
| New Orleans, La | 67.4 | 65.9 | 74.6 | 73.5 | 67.8 | 69.9 | 65.2 | 64.1 | 65.0 | 67.9 | 69.8 | 71.2 | 68.5 |
| Newport, R. I | 79.6 | 79.3 | 77.1 | 76.1 | 74.1 | 67.5 | 69.2 | 68.6 | 70.8 | 78.6 | 69.8 | 76.6 | 73.9 |
| New York, N. Y | 70.1 | 69.8 | 69.6 | 71.2 | 68.6 | 64.3 | 75.9 | 71.3 | 67.5 | 70.0 | 65.0 | 70.8 | 69.5 |
| Norfolk, Va | 74.8 | 78.2 | 80.0 | 79.4 | 77.4 | 71.9 | 77.6 | 75.0 | 67.2 | 69.7 | 68.6 | 68.9 | 74.1 |
| North Platte, Nebr | 47.2 | 57.5 | 52.9 | 64.8 | 64.3 | 68.4 | 68.4 | 66.3 | 61.4 | 54.5 | 64.4 | 69.7 | 61.6 |
| Olympia, Wash | 64.8 | 73.3 | 78.9 | 87.3 | 87.5 | 89.7 | 89.1 | 87.3 | 86.7 | 74.3 | 70.8 | 67.5 | 79.8 |
| Omaha, Nebr | 62.4 | a67.4 | 69.0 | 73.6 | 73.7 | 77.8 | 78.6 | 73.1 | 64.8 | 59.8 | 63.6 | 71.1 | 69.6 |
| Oswego, N. Y | 71.5 | 73.4 | 70.3 | 72.1 | 68.7 | 73.6 | 72.9 | 67.0 | 65.7 | 71.5 | 70.8 | 70.9 | 70.7 |
| Pembina, Dak | 69.3 | 68.9 | 68.1 | 71.4 | 75.9 | 79.9 | 76.9 | 77.0 | 73.8 | 67.7 | 66.6 | 69.4 | 72.1 |
| Philadelphia, Pa | 70.2 | 69.0 | 70.4 | 74.0 | 72.0 | 73.0 | 77.0 | 72.0 | 66.0 | 66.0 | 62.0 | 68.0 | 70.0 |
| Pike's Peak, Colo | 59.2 | 51.4 | 61.3 | 66.0 | 62.9 | 56.4 | 61.4 | 63.7 | 64.8 | 65.8 | 63.4 | 67.9 | 62.0 |
| Pioche, Nev | | c12.3 | 20.4 | 35.0 | 39.9 | 56.9 | 68.1 | 67.0 | 53.3 | 67.4 | 34.0 | 29.3 | d40.3 |
| Pittsburgh, Pa | 66.8 | 66.5 | 73.0 | 70.0 | 71.8 | 74.1 | 74.4 | 73.8 | 66.6 | 63.2 | 61.1 | 67.4 | 69.1 |
| Port Huron, Mich | 70.0 | 70.9 | 70.1 | 73.9 | 81.5 | 83.6 | 85.6 | 82.7 | 80.1 | 71.5 | 64.1 | 67.7 | 75.1 |
| Portland, Me | 73.1 | 77.9 | 68.8 | 73.5 | 72.1 | 67.5 | 70.4 | 69.5 | 67.1 | 75.1 | 68.2 | 71.5 | 71.2 |
| Portland, Oreg | 58.5 | 68.3 | 75.9 | 82.1 | 80.0 | 82.0 | 77.7 | 84.6 | 71.9 | 67.5 | 61.8 | 54.4 | 72.1 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Punta Rassa, Fla* | *69.5* | *70.9* | *b69.8* | *71.5* | *e73.5* | *70.2* | *74.7* | *74.7* | *73.2* | *72.2* | *68.6* | *75.8* | *f72.0* |
| *Red Bluff, Cal* | *31.6* | *29.9* | *30.3* | *42.2* | *74.4* | *73.6* | *80.8* | *79.1* | *74.5* | *58.6* | *48.1* | *33.7* | *54.7* |
| *Rochester, N. Y* | *61.2* | *67.7* | *68.2* | *74.9* | *73.9* | *81.8* | *81.5* | *79.9* | *74.5* | *71.1* | *65.4* | *65.4* | *72.1* |
| *Roseburg, Oreg* | | *g61.3* | *69.2* | *81.7* | *85.6* | *86.6* | *80.0* | *76.9* | *81.7* | *72.8* | *68.7* | *59.4* | *d74.9* |
| Sacramento, Cal | 43.0 | 46.0 | 43.0 | 49.0 | 72.0 | 74.0 | 79.0 | 80.0 | 74.0 | 65.6 | 57.0 | 53.0 | 61.3 |
| *Salt Lake City, Utah* | *24.1* | *25.1* | *b31.5* | *41.0* | *55.4* | *68.1* | *64.8* | *66.2* | *52.6* | *43.4* | *39.0* | *30.7* | *45.1* |
| *San Diego, Cal* | *73.8* | *77.2* | *74.2* | *73.8* | *55.5* | *61.4* | *68.1* | *74.9* | *78.9* | *74.9* | *75.1* | *76.0* | *72.0* |
| Sandusky, Ohio | | *a64.1* | 70.6 | 69.9 | 74.9 | 79.3 | 78.3 | 76.2 | 75.8 | 69.4 | 65.5 | 68.5 | *h72.0* |
| *Sandy Hook, N. J* | *81.0* | *76.7* | *75.7* | *75.8* | *75.2* | *74.0* | *79.9* | *75.2* | *75.4* | *80.0* | *70.4* | *75.5* | *76.2* |
| San Francisco, Cal | 75.2 | 79.5 | 70.8 | 71.1 | 74.7 | 73.0 | 75.1 | 74.1 | 75.6 | 70.4 | 69.0 | 73.2 | 73.5 |
| Santa Fé, N. Mex | 44.8 | 37.4 | 33.6 | 48.1 | 48.8 | 60.0 | 54.4 | 52.8 | 41.2 | 27.8 | 24.5 | 35.6 | 42.4 |
| Savannah, Ga | 70.3 | 72.2 | 77.1 | 77.1 | 72.3 | 69.4 | 66.1 | 66.8 | 65.8 | 67.5 | 64.7 | 69.4 | 69.9 |
| Shreveport, La | 67.4 | 59.4 | 72.9 | 77.7 | 71.2 | 73.3 | 73.6 | 71.6 | 55.0 | 64.2 | 69.9 | 75.2 | 69.3 |
| Smithville, N. C | 76.7 | 75.0 | 78.9 | 79.4 | 77.9 | 80.9 | 80.0 | 77.5 | 79.0 | 76.9 | 77.1 | 77.2 | 78.0 |
| Springfield, Mass | 69.0 | 70.8 | 67.6 | 70.9 | 67.2 | 60.2 | 64.5 | 63.8 | 62.5 | 66.2 | 59.0 | 67.0 | 65.7 |
| Saint Louis, Mo | 62.4 | 63.2 | 66.9 | 69.6 | 67.1 | 70.0 | 66.4 | 65.2 | 56.6 | 55.5 | 63.1 | 60.8 | 63.9 |
| Saint Mark's, Fla | 79.1 | 80.6 | 81.6 | 78.8 | 76.4 | 77.4 | 75.3 | 75.1 | 72.8 | 75.7 | 75.6 | 79.8 | 77.3 |
| Saint Michael's, Alaska *g* | | 89.9 | 87.5 | 90.0 | 85.0 | 97.6 | 99.6 | 97.9 | 94.9 | 90.2 | 89.3 | 86.0 | *d91.6* |
| Saint Paul, Minn | 62.1 | 72.2 | 66.0 | 70.6 | 74.4 | 78.9 | 79.7 | 72.0 | 65.6 | 58.2 | 56.7 | 69.0 | 68.8 |
| Thatcher's Island, Mass | 86.5 | 87.6 | 81.4 | 77.7 | 76.0 | 70.2 | 72.6 | 70.1 | 71.0 | 80.1 | 76.1 | 79.6 | 77.4 |
| Toledo, Ohio | 68.1 | 70.6 | 72.8 | 69.1 | 71.0 | 78.0 | 73.4 | 73.3 | 72.9 | 63.4 | 61.9 | 62.1 | 69.7 |
| Tybee Island, Ga | 78.0 | 76.7 | 81.8 | 79.3 | 79.8 | 81.0 | 78.7 | 78.5 | 75.1 | 75.2 | 73.2 | 73.6 | 77.6 |
| Umatilla, Oreg *g* | | 36.6 | 48.2 | 68.2 | 75.1 | 79.6 | 78.7 | 73.6 | 65.6 | 46.9 | 43.0 | 38.5 | *d59.5* |
| Vicksburg, Miss | 69.0 | 66.4 | 75.6 | 75.7 | 67.2 | 67.6 | 63.3 | 67.7 | 61.6 | 68.2 | 69.3 | 76.0 | 69.0 |
| Virginia City, Mont | 39.4 | 28.2 | 49.6 | 60.9 | 68.6 | 63.5 | 62.5 | 63.2 | 58.2 | 57.0 | 54.8 | 48.0 | 54.5 |
| Visalia, Cal | 33.8 | 32.4 | 41.1 | 54.0 | 70.4 | 75.1 | 74.7 | 78.0 | 75.6 | 66.6 | 47.9 | 42.4 | 57.7 |
| Washington, D. C | 71.7 | 71.3 | 75.9 | 74.8 | 73.2 | 71.3 | 76.8 | 70.4 | 63.8 | 63.0 | 66.6 | 66.7 | 70.5 |
| Winnemucca, Nev | 17.4 | 12.6 | 22.6 | 39.0 | 63.6 | 58.6 | 58.1 | 68.9 | 57.5 | 44.8 | 34.8 | 31.0 | 42.4 |
| Wilmington, N. C | 74.0 | 75.7 | 78.6 | 75.3 | 72.4 | 69.6 | 69.9 | 66.6 | 66.8 | 66.3 | 70.8 | 73.1 | 71.6 |
| Wood's Holl, Mass | 85.6 | 85.5 | 79.4 | 77.3 | 72.9 | 68.4 | 75.8 | 77.0 | 74.8 | 79.5 | 69.6 | 79.6 | 77.3 |
| Yankton, Dak | 68.4 | 66.9 | 65.2 | 69.8 | 73.3 | 78.5 | 74.1 | 75.8 | 63.0 | 64.6 | 64.9 | 72.4 | 69.7 |

*a* Thirty days only.
*b* Twenty-nine days only.
*c* Opened July 28, 1877.
*d* Eleven months only.
*e* Twenty-seven days only.
*f* Six days' observations missing.
*g* Opened July 15, 1877.
*h* Ten months and thirty days.

PAPER 21.—*Mean normal barometer (corrected for temperature and instrumental error only), from observations taken at 7.35 a. m., 4.35 and 11 p. m. (Washington mean time), from opening of station to and including June 30, 1877.*

| Station. | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. | Means. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Albany, N. Y | 29.857 | 29.819 | 29.755 | 29.726 | 29.712 | 29.711 | 29.717 | 29.772 | 29.766 | 29.744 | 29.797 | 29.767 | 29.762 |
| Alpena, Mich | 29.358 | 29.351 | 29.306 | 29.317 | 29.316 | 29.297 | 29.301 | 29.341 | 29.330 | 29.287 | 29.308 | 29.315 | 29.319 |
| Atlantic City, N. J | 30.149 | 30.093 | 30.007 | 29.979 | 29.991 | 29.988 | 29.990 | 30.016 | 30.013 | 30.013 | 30.045 | 30.042 | 30.027 |
| Augusta, Ga | 30.017 | 29.946 | 29.900 | 29.839 | 29.834 | 29.850 | 29.867 | 29.850 | 29.865 | 29.928 | 29.930 | 29.995 | 29.902 |
| Baltimore, Md | 30.130 | 30.060 | 29.996 | 29.950 | 29.960 | 29.950 | 29.953 | 29.995 | 30.021 | 30.037 | 30.032 | 30.077 | 30.013 |
| Barnegat, N. J | 30.081 | 30.067 | 29.992 | 29.956 | 29.959 | 29.958 | 29.947 | 29.983 | 29.980 | 29.985 | 30.019 | 30.014 | 29.995 |
| Bismarck, Dak | 28.228 | 28.260 | 28.187 | 28.159 | 28.054 | 28.087 | 28.143 | 28.115 | 28.232 | 28.167 | 28.176 | 28.151 | 28.163 |
| Boston, Mass | 29.922 | 29.840 | 29.794 | 29.773 | 29.797 | 29.798 | 29.804 | 29.860 | 29.874 | 29.863 | 29.840 | 29.846 | 29.843 |
| Breckenridge, Minn | 29.026 | 29.010 | 29.001 | 28.955 | 28.865 | 28.862 | 28.907 | 28.927 | 28.932 | 28.939 | 28.974 | 29.007 | 28.950 |
| Buffalo, N. Y | 29.329 | 29.301 | 29.241 | 29.238 | 29.254 | 29.237 | 29.255 | 29.313 | 29.315 | 29.290 | 29.276 | 29.286 | 29.278 |
| Burlington, Vt | 29.805 | 29.748 | 29.684 | 29.677 | 29.684 | 29.661 | 29.675 | 29.745 | 29.761 | 29.744 | 29.743 | 29.755 | 29.723 |
| Cairo, Ill | 29.744 | 29.722 | 29.657 | 29.585 | 29.584 | 29.589 | 29.631 | 29.624 | 29.661 | 29.704 | 29.699 | 29.766 | 29.664 |
| Cape Hatteras, N. C | 30.145 | 30.082 | 30.007 | 29.931 | 29.998 | 30.011 | 30.005 | 30.004 | 29.993 | 30.013 | 30.026 | 30.059 | 30.023 |
| Cape Henry, Va | 30.154 | 30.091 | 30.003 | 29.954 | 29.980 | 29.981 | 29.967 | 29.971 | 29.976 | 30.009 | 30.034 | 30.073 | 30.016 |
| Cape Lookout, N. C | 30.176 | 30.089 | 30.014 | 29.932 | 30.058 | 30.040 | 30.025 | 30.051 | 29.961 | 30.025 | 29.964 | 30.071 | 30.034 |
| Cape May, N. J | 30.120 | 30.026 | 30.000 | 29.959 | 29.976 | 29.972 | 29.976 | 90.004 | 30.022 | 30.042 | 30.034 | 30.080 | 30.018 |
| Charleston, S. C | 30.129 | 30.053 | 30.023 | 29.968 | 29.964 | 29.981 | 29.997 | 29.978 | 29.981 | 30.030 | 30.044 | 30.115 | 30.088 |
| Cheyenne, Wyo | 23.922 | 23.903 | 23.897 | 23.954 | 23.954 | 24.063 | 24.143 | 24.137 | 24.125 | 24.088 | 23.989 | 23.957 | 23.969 |
| Chicago, Ill | 29.364 | 29.348 | 29.296 | 29.261 | 29.248 | 29.237 | 29.287 | 29.306 | 29.311 | 29.314 | 29.317 | 29.348 | 29.303 |
| Cincinnati, Ohio | 29.474 | 29.425 | 29.366 | 29.316 | 29.333 | 29.312 | 29.346 | 29.362 | 29.400 | 29.424 | 29.412 | 29.456 | 29.385 |
| Cleveland, Ohio | 29.338 | 29.304 | 29.249 | 29.230 | 29.250 | 29.239 | 29.261 | 29.284 | 29.301 | 29.284 | 29.281 | 29.297 | 29.276 |
| Corsicana, Tex | 29.711 | 29.659 | 29.526 | 29.486 | 29.471 | 29.512 | 29.531 | 29.506 | 29.557 | 29.601 | 29.592 | 29.627 | 29.565 |
| Davenport, Iowa | 29.461 | 29.427 | 29.370 | 29.309 | 29.304 | 29.286 | 29.340 | 29.354 | 29.383 | 29.385 | 29.401 | 29.448 | 29.372 |
| Denison, Tex | 29.353 | 29.319 | 29.171 | 29.108 | 29.147 | 29.160 | 29.223 | 29.179 | 29.228 | 29.233 | 29.219 | 29.241 | 29.215 |
| Denver, Col | 24.721 | 24.703 | 24.681 | 24.730 | 24.707 | 24.792 | 24.873 | 24.863 | 24.867 | 24.846 | 24.772 | 24.726 | 24.773 |
| Detroit, Mich | 29.364 | 29.336 | 29.288 | 29.264 | 29.289 | 29.255 | 29.286 | 29.328 | 29.333 | 29.319 | 29.315 | 29.328 | 29.309 |
| Dodge City, Kans | 27.454 | 27.430 | 27.312 | 27.320 | 27.282 | 27.329 | 27.403 | 27.381 | 27.438 | 27.421 | 27.401 | 27.421 | 27.383 |
| Dubuque, Iowa | 29.402 | 29.374 | 29.299 | 29.269 | 29.266 | 29.204 | 29.271 | 29.331 | 29.313 | 29.295 | 29.313 | 29.318 | 29.305 |
| Duluth, Minn | 29.350 | 29.326 | 29.302 | 29.267 | 29.264 | 29.191 | 29.232 | 29.269 | 29.271 | 29.255 | 29.260 | 29.314 | 29.275 |
| Eastport, Me | 29.929 | 29.842 | 29.837 | 29.824 | 29.847 | 29.860 | 29.871 | 29.943 | 29.924 | 29.857 | 29.835 | 29.833 | 29.867 |
| Erie, Pa | 29.356 | 29.334 | 29.252 | 29.259 | 29.260 | 29.234 | 29.257 | 29.310 | 29.297 | 29.271 | 29.279 | 29.282 | 29.283 |
| Escanaba, Mich | 29.332 | 29.339 | 29.319 | 29.336 | 29.288 | 29.236 | 29.300 | 29.325 | 29.319 | 29.293 | 29.311 | 29.304 | 29.308 |
| Fort Gibson, Ind. Ter | 29.608 | 29.540 | 29.418 | 29.378 | 29.346 | 29.375 | 29.422 | 29.411 | 29.448 | 29.507 | 29.486 | 29.539 | 29.456 |
| Fort Sill, Ind. Ter | 28.913 | 28.900 | 28.739 | 28.691 | 28.680 | 28.699 | 28.776 | 28.740 | 28.780 | 28.800 | 28.806 | 28.806 | 28.777 |
| Galveston, Tex | 30.136 | 30.060 | 29.999 | 29.955 | 29.933 | 29.966 | 29.992 | 29.965 | 29.961 | 30.041 | 30.045 | 30.103 | 30.013 |
| Grand Haven, Mich | 29.366 | 29.368 | 29.321 | 29.298 | 29.305 | 29.267 | 29.315 | 29.340 | 29.349 | 29.329 | 29.335 | 29.356 | 29.329 |
| Indianapolis, Ind | 29.309 | 29.256 | 29.202 | 29.154 | 29.188 | 29.182 | 29.215 | 29.230 | 29.254 | 29.265 | 29.251 | 29.291 | 29.233 |
| Indianola, Tex | 30.108 | 30.096 | 30.011 | 29.976 | 29.948 | 29.978 | 30.018 | 29.996 | 29.982 | 30.058 | 30.029 | 30.070 | 30.022 |
| Jacksonville, Fla | 30.174 | 30.106 | 30.079 | 30.025 | 29.995 | 30.030 | 30.061 | 30.026 | 30.003 | 30.054 | 30.075 | 30.163 | 30.066 |
| Keokuk, Iowa | 29.462 | 29.428 | 29.366 | 29.299 | 29.286 | 29.266 | 29.328 | 29.347 | 29.375 | 29.387 | 29.399 | 29.445 | 29.366 |
| Key West, Fla | 30.113 | 30.077 | 30.062 | 30.016 | 29.965 | 30.021 | 30.043 | 29.996 | 29.954 | 29.951 | 30.015 | 30.095 | 30.026 |
| Kittyhawk, N. C | 30.181 | 30.120 | 30.033 | 29.957 | 30.029 | 30.029 | 30.024 | 30.022 | 29.993 | 30.020 | 30.022 | 30.044 | 30.040 |
| Knoxville, Tenn | 29.124 | 29.060 | 29.011 | 28.968 | 28.988 | 29.014 | 29.046 | 29.028 | 29.049 | 29.084 | 29.056 | 29.111 | 29.045 |
| La Crosse, Wis | 29.347 | 29.322 | 29.266 | 29.217 | 29.203 | 29.162 | 29.224 | 29.276 | 29.273 | 29.251 | 29.281 | 29.326 | 29.262 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Leavenworth, Kans* | *29.254* | *29.196* | *29.107* | *29.075* | *29.042* | *29.039* | *29.098* | *29.110* | *29.152* | *29.171* | *29.162* | *29.240* | *29.139* |
| *Louisville, Ky* | *29.559* | *29.525* | *29.465* | *29.409* | *29.414* | *29.412* | *29.440* | *29.455* | *29.478* | *29.512* | *29.497* | *29.555* | *29.477* |
| *Lynchburg, Va* | *29.406* | 29.317 | *29.294* | *29.259* | 29.291 | 29.277 | 29.279 | 29.309 | 29.338 | *29.353* | 29.339 | 29.387 | 29.321 |
| *Marquette, Mich* | *29.265* | 29.281 | *29.258* | *29.270* | *29.246* | *29.178* | 29.234 | 29.266 | 29.255 | 29.228 | 29.239 | 29.229 | 29.246 |
| Memphis, Tenn | 29.870 | 29.804 | 29.734 | 29.676 | 29.672 | 29.684 | 29.718 | 29.706 | 29.745 | 29.798 | 29.786 | 29.856 | 29.754 |
| Milwaukee, Wis | 29.301 | 29.274 | 29.266 | 29.193 | 29.228 | 29.192 | 29.247 | 29.274 | 29.270 | 29.254 | 29.259 | 29.277 | 29.253 |
| Mobile, Ala | 30.168 | 30.097 | 30.053 | 29.992 | 29.979 | 29.997 | 30.032 | 29.987 | 29.992 | 30.065 | 30.082 | 30.118 | 30.047 |
| Montgomery, Ala | 29.975 | 29.918 | 29.866 | 29.795 | 29.781 | 29.810 | 29.830 | 29.811 | 29.816 | 29.880 | 29.892 | 29.966 | 29.862 |
| Morgantown, W. Va | 29.049 | 28.961 | 28.869 | 28.867 | 28.893 | 28.933 | 28.950 | 28.972 | 28.960 | 28.983 | 28.932 | 28.986 | 28.946 |
| Mount Washington, N. H | 23.384 | 23.345 | 23.371 | 23.524 | 23.671 | 23.828 | 23.877 | 23.953 | 23.826 | 23.684 | 23.472 | 23.362 | 23.608 |
| Nashville, Tenn | 29.637 | 29.557 | 29.506 | 29.446 | 29.454 | 29.470 | 29.505 | 29.496 | 29.523 | 29.583 | 29.550 | 29.610 | 29.528 |
| New Haven, Conn | 29.990 | 29.942 | 29.869 | 29.842 | 29.866 | 29.867 | 29.878 | 29.932 | 29.928 | 29.908 | 29.912 | 29.939 | 29.906 |
| New London, Conn | 30.068 | 29.998 | 29.945 | 29.913 | 29.941 | 29.939 | 29.944 | 29.999 | 30.001 | 29.998 | 29.984 | 30.018 | 29.979 |
| New Orleans, La | 30.123 | 30.053 | 30.007 | 29.991 | 29.940 | 29.967 | 29.993 | 29.952 | 29.955 | 30.028 | 30.034 | 30.103 | 30.012 |
| Newport, R. I | 30.037 | 29.976 | 29.924 | 29.895 | 29.934 | 29.942 | 29.907 | 30.012 | 29.945 | 29.912 | 29.936 | 29.908 | 29.944 |
| New York, N. Y | 29.958 | 29.885 | 29.828 | 29.790 | 29.819 | 29.812 | 29.818 | 29.865 | 29.875 | 29.879 | 29.858 | 29.896 | 29.857 |
| Norfolk, Va | 30.122 | 30.049 | 29.994 | 29.943 | 29.968 | 29.967 | 29.968 | 29.987 | 30.004 | 30.037 | 30.025 | 30.085 | 30.012 |
| North Platte, Nebr | 27.093 | 27.085 | 26.988 | 27.000 | 26.951 | 27.007 | 27.065 | 27.051 | 27.136 | 27.094 | 27.063 | 27.065 | 27.050 |
| Omaha, Nebr | 28.976 | 28.941 | 28.873 | 28.809 | 28.798 | 28.803 | 28.860 | 28.873 | 28.906 | 28.912 | 28.918 | 28.958 | 28.852 |
| Oswego, N. Y | 29.742 | 29.719 | 29.656 | 29.644 | 29.651 | 29.628 | 29.640 | 29.701 | 29.699 | 29.686 | 29.682 | 29.690 | 29.678 |
| Pembina, Dak | 29.231 | 29.246 | 29.212 | 29.157 | 29.072 | 29.007 | 29.062 | 29.086 | 29.121 | 29.126 | 29.170 | 29.158 | 29.137 |
| Philadelphia, Pa | 30.127 | 30.051 | 29.982 | 29.940 | 29.966 | 29.948 | 29.948 | 29.997 | 30.016 | 30.027 | 30.019 | 30.070 | 30.008 |
| Pike's Peak, Col | 17.493 | 17.514 | 17.470 | 17.608 | 17.758 | 17.930 | 18.069 | 18.033 | 17.962 | 17.849 | 17.652 | 17.566 | 17.742 |
| Pittsburgh, Pa | 29.273 | 29.219 | 29.157 | 29.126 | 29.156 | 29.151 | 29.169 | 29.192 | 29.212 | 29.217 | 29.197 | 29.223 | 29.191 |
| Port Huron, Mich | 29.398 | 29.363 | 29.300 | 29.282 | 29.309 | 29.259 | 29.304 | 29.349 | 29.309 | 29.312 | 29.342 | 29.295 | 29.318 |
| Portland, Me | 30.004 | 29.925 | 29.880 | 29.873 | 29.887 | 29.888 | 28.891 | 28.969 | 28.976 | 29.955 | 29.928 | 29.947 | 29.927 |
| Portland, Oreg | 30.000 | 29.966 | 29.924 | 30.019 | 29.974 | 29.986 | 29.962 | 29.947 | 29.952 | 29.986 | 29.987 | 30.024 | *29.968 |
| Punta Rassa, Fla | 30.156 | 30.111 | 30.102 | 30.047 | 30.002 | 30.054 | 30.079 | 30.041 | 30.001 | 30.007 | 30.059 | 30.147 | 30.067 |
| Rochester, N. Y | 29.407 | 29.393 | 29.331 | 29.326 | 29.341 | 29.314 | 29.333 | 29.387 | 29.385 | 29.364 | 29.361 | 29.354 | 29.358 |
| Salt Lake City, Utah | 25.660 | 25.705 | 25.568 | 25.596 | 25.535 | 25.596 | 25.628 | 25.602 | 25.644 | 25.659 | 25.645 | 25.745 | 25.632 |
| San Diego, Cal | 30.026 | 30.012 | 29.992 | 29.975 | 29.906 | 29.891 | 29.893 | 29.876 | 29.870 | 29.928 | 29.984 | 30.015 | 29.947 |
| Sandy Hook, N. J | 30.131 | 30.075 | 29.991 | 29.956 | 29.960 | 29.963 | 29.962 | 30.003 | 29.998 | 30.010 | 30.043 | 30.026 | 30.010 |
| San Francisco, Cal | 30.023 | 30.020 | 30.006 | 30.004 | 29.913 | 29.899 | 29.882 | 29.881 | 29.881 | 29.951 | 30.011 | 30.035 | 29.959 |
| Santa Fé, N. Mex | 23.196 | 23.163 | 23.141 | 23.168 | 23.193 | 23.284 | 23.353 | 23.332 | 23.335 | 23.316 | (†) | 23.220 | 23.246 |
| Savannah, Ga | 30.119 | 30.048 | 30.005 | 29.948 | 29.941 | 29.961 | 29.986 | 29.958 | 29.958 | 30.011 | 30.021 | 30.105 | 30.005 |
| Shreveport, La | 29.977 | 29.894 | 29.830 | 29.782 | 29.779 | 29.792 | 29.807 | 29.803 | 29.801 | 29.877 | 29.873 | 29.940 | 29.846 |
| Smithville, N. C | 30.202 | 30.108 | 30.028 | 29.978 | 30.036 | 30.025 | 30.035 | 30.032 | 29.941 | 30.012 | 30.016 | 30.056 | 30.039 |
| Springfield, Mass | 29.983 | 29.912 | 29.887 | 29.824 | 29.845 | 29.854 | 29.833 | 29.911 | 29.862 | 29.831 | 29.923 | 29.887 | 29.879 |
| Saint Louis, Mo | 29.564 | 29.506 | 29.444 | 29.376 | 29.382 | 29.380 | 29.424 | 29.439 | 29.468 | 29.493 | 29.490 | 29.545 | 29.459 |
| Saint Mark's, Fla | 30.203 | 30.146 | 30.073 | 30.015 | 30.005 | 30.038 | 30.066 | 30.028 | 30.003 | 30.049 | 30.073 | 30.147 | 30.070 |
| Saint Paul, Minn | 29.178 | 29.140 | 29.119 | 29.050 | 29.043 | 29.007 | 29.074 | 29.100 | 29.112 | 29.093 | 29.115 | 29.147 | 29.098 |
| Thatcher's Island, Mass | 30.002 | 29.941 | 29.903 | 29.888 | 29.904 | 29.916 | 29.889 | 29.988 | 29.924 | 29.875 | 29.884 | 29.839 | 29.913 |
| Toledo, Ohio | 29.384 | 29.350 | 29.278 | 29.260 | 29.268 | 29.265 | 29.300 | 29.323 | 29.333 | 29.328 | 29.333 | 29.354 | 29.315 |
| Tybee Island, Ga | 30.193 | 30.128 | 30.051 | 29.984 | 30.003 | 30.024 | 30.016 | 30.010 | 29.994 | 30.047 | 30.067 | 30.115 | 30.053 |
| Vicksburg, Miss | 29.945 | 29.875 | 29.813 | 29.759 | 29.756 | 29.778 | 29.809 | 29.793 | 29.820 | 29.875 | 29.879 | 29.926 | 29.836 |
| Virginia City, Mont | 24.168 | 24.154 | 24.095 | 24.201 | 24.179 | 24.257 | 24.339 | 24.313 | 24.328 | 24.318 | 24.213 | 24.214 | 24.232 |
| Washington, D. C | 30.051 | 29.984 | 29.919 | 29.877 | 29.893 | 29.890 | 29.898 | 29.925 | 29.949 | 29.973 | 29.971 | 30.016 | 29.937 |
| Wilmington, N. C | 30.123 | 30.073 | 29.963 | 29.943 | 29.952 | 29.967 | 29.987 | 29.976 | 29.971 | 30.020 | 30.012 | 30.090 | 30.006 |
| Wood's Holl, Mass | 30.054 | 29.980 | 29.923 | 29.898 | 29.943 | 29.952 | 29.951 | 30.013 | 29.995 | 29.943 | 29.958 | 29.978 | 29.966 |
| Yankton, Dak | 28.809 | 28.802 | 28.731 | 28.681 | 28.613 | 28.608 | 28.674 | 28.686 | 28.740 | 28.727 | 28.738 | 28.765 | 28.714 |

* Corrected to agree with present elevation.

† The normal barometer for November not decided upon.

PAPER 22.

*Extracts from the Instructions to Observer Sergeants.*

* * * * * * *

6. The regular observations from will commence with the morning-observation of , and on and after that date seven observations will be made daily, three of which will form the *telegraphic* series, three the *local*, and one the *midday series.*

7. The observations forming the telegraphic series will be taken daily at a. m., p. m., and m. (local time), and, after the proper corrections have been made, will be written on Form 5, if the station is a telegraphic one, and also in the Daily Record of Observations and the Record of Bulletins (where this is authorized). At stations that do not report by telegraph, Form 5 will not be used.

8. The instruments will be read in the following order:

1. Barometer.
2. Thermometer.
3. Hygrometer.
4. Anemometer.
5. Anemoscope.
6. Rain-gauge.

9. The readings of the different instruments must be entered in the original record of observations as soon as made, and *not* copied in afterward from a slip of paper. Observers will habitually carry this book when making an observation, and enter the reading in *pencil*, as noted at the time. They will also enter in this book the proper corrections, as indicated by the marginal references. Pen and ink must *not* be used for entering any observation or correction in this record.

* * * * * * *

13. In addition to the telegraphic series of observations, three others, forming the local series, will be taken daily at 7 a. m., 2 p. m., and 9 p. m. (local time), respectively. These observations will be entered in the daily record in the same manner as the telegraphic observations, but on a separate sheet.

* * * * * * *

15. The midday series will consist of an observation taken daily at 12 m., Washington mean time, and will be entered in the daily record as a separate series. When this report is called for by telegraph from the central office, the *corrected* barometric reading, the direction of wind and state of weather, and the velocity of the wind in miles per hour will be given; the whole being sent in the same order in which they are here named, and in the regular cipher-word.

* * * * * * *

29. At all stations ordered to make river-reports, the depth of water will be observed at three o'clock (local time) each afternoon, and embodied in the regular p. m. telegraphic report.

30. Whenever any sudden or unusual change occurs in the condition of the river, a special series of observations will be reported in the usual manner at the next succeeding telegraphic report. These special reports will be continued tri-daily (one at each telegraphic report) until the river resumes its normal condition, when they will be discontinued.

* * * * * * *

32. The observations for the morning and midnight special river-reports will be made, if practicable, within an hour of the time of report.

Observers must exercise great care in making and recording the river-observations, in order that they may be relied upon as accurate by interested parties.

33. The amount of rain-fall (or melted snow) will be measured and reported at each of the three telegraphic reports only.

MAXIMUM THERMOMETER.

This instrument will be read daily at the time of making the 11 p. m. observation.

MINIMUM THERMOMETER.

The minimum thermometer will be read at the 7.35 a. m. and 11 p. m. observations. At the 7.35 a. m. observation, care must be taken not to disturb the index, which will be set at the time of taking the night observation only. The minimum temperature at the time of making the 7.35 a. m. observation will form a part of the regular telegraphic report from all stations.

WATER THERMOMETER.

34. At stations provided with this thermometer one observation will be made at three o'clock p. m. (local time), daily, of the temperature of the water at the surface and bottom of the lake, bay, or river upon which the station is located.

The observer will select some convenient spot on the shore (a wharf or pier when practicable), where a sufficient depth of water exists to give a positive difference be-

tween the surface and bottom temperatures, and will provide himself with enough strong cord to reach the bottom at the place selected. One end of this cord will be securely fastened to the wire handle at the upper end of the cylinder inclosing the thermometer.

In making the observations, the observer will first note the temperature of the air, then that of the surface-water, by immersing the thermometer in the upper stratum of water; and then, lowering the cylinder slowly to the bottom, will allow it to rest there long enough to fill; after which it will be drawn quickly to the surface, and the temperature shown by the thermometer carefully noted. The water will be poured out of these cylinders after each observation and the thermometer thoroughly dried.

These observations will be recorded on Form 31.

### WIND-VANE.

35. The observation of the vane requires more care than is usually given. In winds of considerable strength the vane is never at rest or fixed in the same direction; it oscillates incessantly, and its oscillations increase in extent with certain winds and with the violence of the wind. In such cases observers must *note the mean direction* between the extremes. When the wind is too light to move the vane, and when it is calm, no direction will be recorded. The attention of observers is called to this matter, in order to prevent them from recording a direction of the wind when it is calm. The direction of the wind will be designated by the eight principal points of the compass, beginning with the north and moving around by the eastward, and numbered from one to eight respectively.

In reporting changes in the *direction* of the wind, the terms *veering* and *backing* will be used. The term *veering* indicates the changing of the wind from N. to E. to S., and so on, or in the direction corresponding with the movements of the hands of a watch; while *backing*, being the reverse term, indicates that it changes from N. to W. to S., and so on.

### RAIN-GAUGE.

* * * * * * *

71. The rain-gauge will be placed, whenever practicable, with the top of the funnel-shaped collector twelve inches above the surface of the ground, firmly fixed in a vertical position, and protected from the interference of unauthorized persons. It will be examined at the time of making each of the three telegraphic observations, the amount of water it contains carefully measured by means of the graduated rod sent with each gauge, and then emptied and returned to its proper position. When a position at the level of the ground cannot be found with a sufficiently clear exposure, the gauge will be placed on the top of the instrument-room or roof of the building occupied by the observer, who will measure the height above the ground and report it to this office. The measuring-rod is graduated in inches and tenths of inches, and the proportion between the cylinder and funnel is as ten to one, so that ten inches upon the rod correspond with one inch of actual rain-fall, one inch on the rod to one-tenth of rain, and one-tenth on the rod to one-hundredth of rain. Snow will be melted, and then measured and reported in the same manner as rain, but the fact of its being melted snow must be noted under the head of remarks in the weekly reports. Whenever from any cause the snow cannot be melted, the depth will be measured and ten inches of snow reported as one inch of rain-fall.

### WATER-GAUGE.

Care must be taken, in making observations when the water is rough, to get the mean of the rise and fall of the waves. After securing the gauge, fix some point of reference, so that in case it should be destroyed another could be put up at the same height. This may be done by marking on some given point in the vicinity any given height of the water.

### SUNSET OBSERVATIONS.

* * * * * * *

The observer at each station will note, each day, at the exact time of sunset (which he will be furnished for this purpose) and for a time not to exceed thirty minutes after sunset, the character of the western sky and of the sunset, and will state this character at the time, in writing, as "Fair-weather sunset," "Doubtful sunset," or "Foul-weather sunset." The term "Fair-weather sunset" will express such condition of the sky, particularly the western, and such character of the sunset as is considered to indicate a clear day for the day ensuing. The term "Doubtful sunset" will indicate that the conditions are such as to leave the mind of the observer in doubt

as to what the sunset presages for the following day. The term "Foul-weather sunset" indicates that the sun is wholly obscured by clouds, and the appearances indicate a rainy, stormy, or unpleasant day for the day following.

1. A sunset prediction of one day is verified, or not verified, as the case may be, by the weather until sunset of the ensuing day.

2. The prediction "Foul" or "Fair" refers especially to rain, and does not refer, in any way, to amount or kind of clouds or fog.

3. The prediction "Foul" means that the appearance of the sky indicates *rain;* if *any* rain equaling or exceeding one one-hundredth of an inch falls before sunset on the ensuing day, the prediction is verified, and if not, it is *not* verified.

4. FAIR means that the appearance of the sky does not indicate rain, and if no rain equaling one one-hundredth of an inch falls, the prediction is verified; if *any rain* in excess of this amount does fall, the prediction is *not verified.*

5. DOUBTFUL sunsets cannot be verified.

6. The sunset prediction should be the last entry in the journal and abstract for the day, and its verification, as determined by the weather from the hour of prediction up to sunset of the ensuing day, will be entered on the same line with it.

The observer will endeavor to note either "Fair weather" or "Foul weather," noting as few "Doubtful" as possible. It is considered that practice will be found to make this comparatively easy. The note made for each evening will, at sunset *next* day, be noted in writing as "verified" or "not verified."

From and after the date at which the receipt of this order is acknowledged by telegraph from each station, it will be understood that an additional word is supposed to be added to the "midnight" telegraphic report from that station. If, after the cipher-word for thermometer, and before humidity, no word is added, it will be understood at this office that the station reporting reports a "Fair-weather sunset." If the station reports a "Doubtful sunset," it will do so by adding after the cipher-word for thermometer, and before humidity, the word "Doubt." If the report is "Foul-weather sunset," it will add in the same space the word "Foul."

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FORMS.

108. The following-named meteorological forms are furnished by this office for station use:

Form 1.—Telegraphic river-report.
Form 2.—Receiving-sheet.
Form 3.—Daily bulletin.
Form 4.—Weekly meteorological report.
Form 5.—Telegraphic report.
Form 8.—Weather-map.
Form 15.—Synopsis and indications.
Form 16.—Monthly chart.
Form 22.—Monthly mean.
Form 23.—Cautionary-signal blank.
Form 24.—Record of bulletins.
Form 25.—Telegraphic-message form.
Form 26.—River-bulletin.
Form 27.—Special river report.
Form 28.—Regular weekly river-report.
Form 30.—Weekly instruction-report.
Form 31.—Weekly report—temperature of water.
Form 32.—Monthly report—temperature of water.
Form 33.—Comparative barometric readings.
Form 34.—Annual mean or meteorological summary.
Form A.—Record of telegrams refused by telegraph company.
Form B.—Record of telegrams sent and received.
Check-lists.

109. Form 1 is used by the special river-observers for their reports, and should be made in duplicate; one copy for file in the telegraph-office at the schedule-times, and the other to be forwarded to this office at the end of each week.

110. Form 2 is for the use of the telegraph-operators in receiving the reports from other stations, and will be furnished by the observers in such quantities as may be required, care being taken to guard against wasteful and unnecessary use. The spaces will be filled up in regular order, commencing at the upper left-hand corner, and filling each space to the right in succession on the first line, and then commencing at the left-hand space of the second line, and so on. Observers will require the receiving-operators to sign and date each sheet, and also to note the time the reports upon it were received before taking it from the telegraph-office. The time of receipt from the operator will be noted by the observer or assistant. When the reports are received in duplicate by the operator, observers will retain the original sheets furnished them by this office.

After the reports are translated and entered in the bulletin, the receiving-sheets for each full report will be placed together, and folded neatly in three folds, parallel with the writing.

Each morning the three reports of the preceding day will be secured together, so as to form a single package. At the end of each week the seven daily packages of the week will be put in one neat package, and forwarded by mail to this office, with the name of station plainly written upon the outer fold of the outside sheet.

111. Form 3 is the daily bulletin issued for public information. The several columns will be filled up from the receiving-sheet, the words and figures being written plainly and distinctly.

When any part of a report is not received, or, if received, is evidently incorrect, the word "blank" will be written in the spaces to be filled by such part.

Absence of wind, of clouds, rain-fall, or change in barometer, thermometer, and river will be indicated by the figure zero.

112. Form 4 is the weekly report, and three copies will be forwarded to this office at the end of each week—one copy containing the full record of the telegraphic series of observations, one the record of the local series, and the third that of the midday observations.

In filling up this form, the *daily* means of the *local* (7, 2, and 9 o'clock) and the *weekly* means of the *telegraphic* barometric and thermometric observations will be entered in their proper columns, and the words "daily" and "weekly," respectively, added to the heading.

In the telegraphic series will be given, firstly, the mean of the morning; secondly, that of the afternoon; and, thirdly, that of the midnight observations.

* * * * * * *

115. An additional column will be ruled, under the head of "Remarks," on Form 4, containing the series of telegraphic observations, in which the a. m. readings of the minimum thermometer will be recorded.

An additional column will be ruled, under the head of "Remarks," on Form 4, for each series of observations, in which will be recorded the state of the weather. Absence of wind, clouds, rain-fall, &c., will be indicated by the figure zero.

When the upper clouds are obscured, the word "hidden" will be written on Form 4 in appropriate column.

116. Form 5 will be used for all telegraphic reports, and will be made out each time in duplicate, one copy for file in the telegraph-office for transmission by telegraph, and the other for transmission by mail to this office.

In making the duplicates of this form, carbon-paper and the stylus will be used, and *both* copies written at the same time.

The times of filing in the telegraph-office and the transmission of the reports must be filled in by the operator who receives and transmits them, and verified by his signature.

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124. When rain, snow, hail, or sleet have occurred since the last telegraphic report, and the quantity collected in the gauge is not sufficient to measure at the time of observation, the cipher-word "JOHNSON" will be written on Form 5 in the proper space to indicate precipitation, had it been measurable.

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130. Form 15 is for the synopsis and indications, and a copy properly filled up will be posted with each bulletin at all stations where they are received, and at which the farmers' bulletins are not printed. The midnight indications will be used with the morning bulletin, and the morning indications with the afternoon bulletin, whenever practicable. At stations where the afternoon, and not the midnight, indications are received, they will be used with the bulletin of the next morning.

In all cases the time and date of issue from Washington must be plainly written upon the form.

* * * * * * *

132. Form 16 is the meteorological chart, to be made out monthly at each station, and forwarded by mail to this office not later than the 10th of the month succeeding that for which it forms the record. In filling up this form, the following instructions will be observed:

The time of beginning and ending of all auroral displays will be recorded in the spaces between the two upper lines and under the proper dates, neatly written in black ink, the word auroras being written on the margin to the left of this record.

For the thermometer, take the daily reports, beginning with the morning report of the first day of the month; with a sharp pencil make a dot on the chart at the height at which the dry-bulb thermometer stood at the first observation, at its proper relative distance from the 12 m. (midday) line, as shown in Plate 2. Dot in a similar manner each of the seven observations. Join these dots with the pencil and after trace with ink.

Continue the same process with the wet-bulb thermometer, barometer, velocity of

the wind, and the relative humidity, making the direction of the wind in small letters opposite each observation.

The average amount of clouds for each day will be given in the space immediately above the 29.00 inch line on the chart, dividing the squares into 1, 2, 3, and 4 4ths respectively.

133. In deciding whether a day is clear, fair, or cloudy, its character will be determined by taking the sum of the entire number of fourths of clouds observed at 7 a. m., 2 p. m., and 9 p. m. A clear day will be one in which the sum of the observed fourths is three or less than three; a fair day, one in which the sum is from four to eight inclusive; and a cloudy day, one for which the sum is from nine to twelve, inclusive.

In filling up Form 16, the average cloudiness (in fourths) for the day will be entered. Average cloudiness will be found by dividing by three the sum above taken, and will be indicated as follows:

0 when the sum of the three observations is 0 or 1
1 when the sum of the three observations is 2, 3, or 4
2 when the sum of the three observations is 5, 6, or 7
3 when the sum of the three observations is 8, 9, or 10
4 when the sum of the three observations is 11 or 12

134. The commencement of rain or snow will be indicated by a fine line one-sixteenth of an inch, or less, in length; the rate of fall by a broken curved line, indicating the greater or less rapidity of the same; and the amount of water by a heavy straight line, conformably to any adopted scale, and with its right edge resting at the point representing the time it ceased. Should rain or snow continue falling after the midnight observation of any day, the heavy straight line, showing the amount fallen up to that time, will be drawn, while a second broken curved line will be started to show the continuance of the same.

The scale may be changed for a greater fall of rain than 1½ inches or a greater velocity of wind than 35 miles per hour, but in all cases the scales used must be made to cover equal fractional parts of inches and equal numbers of miles.

135. The mean barometer, mean temperature, prevailing wind, total number of miles traveled by the wind, and total rain-fall for the month must be entered in their proper places on the margin of the chart.

The name of the station and month for which prepared must always be plainly written on the right margin of the form. The range of temperature will be shown for each day by a vertical line crossing the temperature-curve.

136. Form 22 is used for the record of the daily and monthly means of the barometer and thermometer, with the prevailing direction of the wind, amount of rain-fall, and other data for the month.

In filling up this form, the daily means of the barometer and thermometer for the local series of observations will be obtained by dividing the sum of the 7 a. m., 2 p. m., and *double* the 9 p. m. observations by four.

The mean daily humidity will be obtained by dividing the sum of the 7 a. m., 2 p. m., and 9 p. m. observations by three. The *monthly* means will be obtained by dividing the sum of the daily means by the number of days' observations taken during the month.

The monthly mean of the *telegraphic* observations will be obtained by dividing the sum of the observations in each column by the number of days.

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138. Form 23 is for use at stations designated for the display of cautionary signals, and will be filled up and forwarded weekly to this office, whether signals have been ordered or not.

In the column of "Remarks" will be noted such special cases of benefits to commercial or other interests as may come to the observer's knowledge, and also the passage over the station of any storm for which signals were not ordered, with date and time, and the maximum velocity attained by the wind in each case. All casualties resulting from storms at any cautionary station will be reported, so far as they come within the knowledge of the observer.

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141. Form 26 is the river bulletin, and will be filled up as indicated by the several headings, and posted in such places as are found necessary to give suitable publicity to the reports and meet the wants of business men interested in them.

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143. Form 28 is for use at *all* river-stations, whether *regular* or *special*, and will be forwarded weekly to this office, properly filled up, as indicated by the several headings. Under the head of "Remarks" on this form will be noted all unusual occurrences connected with the stage of water in the river at and near the station, such as the presence of floating ice, timber, &c.; formation and breaking of ice-gorges and other obstructions; damages to levees; time of opening and closing of navigation; accident to gauge or change in location of same, &c.

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145. Form 31 is the weekly report of observations on temperature of water, one copy of which, properly filled up, will be forwarded regularly to this office and one copy retained for station-file.

146. Form 32 is the monthly report of observations on the temperature of water, of which *two* copies will be forwarded to this office on the first day of the month succeeding that of which it forms the record. The precise nature of the spot where the water-temperatures are taken must be noted under the head of "Remarks."

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148. Form 34 is for the annual mean, or meteorological summary, which must be posted up in a conspicuous place in the observer's office. On this form will be entered, on the first day of each month, the data for the preceding month, as indicated at the top of the several columns. A carefully-compared copy of this form must be forwarded to this office within fifteen days of the close of the year of which it forms the record, the original being kept for station-reference.

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154. In the journal will be entered daily all matters of interest not provided for in the various forms, such as meteoric and auroral displays, earthquakes, and unusual atmospheric appearances and disturbances, giving in each case, when possible, the time of beginning and duration of each. Especially will the observer enter a detailed account of the characteristic phenomena of every serious storm that passes over his station. In this book will also be noted all changes in location of office or instruments, the condition of the instruments, and, when damaged in any way, the cause of injury.

155. Observers will be particular to note in the journal every display of aurora, seeking, by inquiry of others if necessary, to make their record complete.

If the sky is obscured by clouds, so that the aurora, if present, cannot be observed, the word "obscured" will be entered in that part of the record devoted to auroral displays. If the sky is sufficiently clear for observation, the words "aurora" or "no aurora" will be entered according as one is visible or not. When observed, a full account of the phenomena will be entered in the journal, showing the exact minute of beginning and ending of the aurora, and the principal phases of changes that it experiences. The following particulars should be noticed: the azimuth and altitude of each extremity and of the crown of any arch of light, and the same data for any corona or glory that may be formed.

When the observer is familiar with the names of the principal fixed stars, he may locate the arch or crown by reference to them; but it is preferable that he should observe directly the altitude and azimuth.

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157. Observers must be particular as to the date of the aurora; and when it begins in the evening of one day and continues into the early morning of the next day, it will be entered as occurring on the *first* day, but its details will be given in the record as occurring between the hours of its actual beginning and ending. Thus, an aurora that began on the evening of the 12th of January, and continued until the early morning of the 13th, would be entered as the aurora of the 12th, but its details would be recorded as occurring, for instance, between the hours of 10 p. m. of January 12, and 2 a. m. of January 13.

158. All entries in the journal of occurrences and observations of any one day will be made under or opposite to that day, and not be entered as a subsequent date, as is frequently done. For example, an auroral display occurring May 23, should be entered opposite that date, and not referred to on the 24th, as having occurred "last evening."

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160. A monthly abstract of the entries in the journal will be forwarded to this office from stations east of the 100th meridian, within five days after the expiration of each month. At stations west of that meridian they must be mailed not later than the second of the month. This abstract must contain all the important entries of the journal, especial care being taken to exclude all matter relating to the ordinary routine of observations that are given on the various forms. The abstract should show clearly and briefly all matters of interest not provided for in the regular forms, such as meteoric and auroral displays, earthquakes, and other unusual atmospheric phenomena, giving, whenever practicable, the time of beginning and duration of each. In each day's abstract the subject of auroras will be noted briefly, in the authorized manner.

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162. At river-stations, all special phenomena that affect navigation will be noted, such as date of high and low water during the month, with monthly range at station; closing of river by ice; formation of ice or other gorges, with effect upon navigation, &c.

163. At lake and sea-coast stations, the number of cautionary signals displayed during the month will be reported, with results as far as known at each station; number of storms that passed over station for which cautionary signals were not ordered, dates, with velocity of wind, being stated in each instance.

164. Each abstract must show at its head the name of the station and month for which it is prepared, and at its close the official signature of the person making it. To facilitate reference, marginal notes will be made in red ink at the left of the vertical line on each page, upon the prominent subject mentioned in the text, as "aurora," "rain," "snow," "hail," "earthquakes," &c.

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167. The daily record of observations will be an exact copy of Form 4 and filled up in the same manner. The several series of observations will be entered in the same book, care being taken to date and time them properly. The telegraphic series will be entered first, followed by the local and midday series.

168. The record of bulletins, when its use is authorized at any station, will be filled up regularly from the daily bulletins, of which it is a copy.

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ORIGINAL RECORD OF OBSERVATIONS.

178. The "original record" is intended to furnish the central office with data for the correction of errors made at the several stations in reducing and copying the observations. To make it of any value for this purpose, the readings of the different instruments must be entered as made, and *not* copied in from a slip of paper. Observers will habitually carry this book when making an observation, and enter the readings in *pencil*, as noted at the time. They will also use this book for making the proper corrections, as indicated by the marginal references. Pen and ink must *not* be used for entering any observation or correction.

The velocity of the clouds will be indicated by a single letter, following the direction, as follows: C for "calm," S for "slowly," and R for "rapidly."

The character of wind will be indicated by the letters S for "steady," and V for "variable," following the direction.

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250. Observers will give close attention to the observation and record of all local premonitory signs of storms or changes of weather, and report them promptly to this office. The following points should be particularly noted before, during, and after a storm or change of weather; direction and force of the wind; kind, direction, motion, and appearance of the clouds; action of the barometer and thermometer, and such other purely local causes as appear to influence the results.

251. The attention of sergeants, or other enlisted men in charge of stations, is directed to the fact that they are required to make the reports absolutely correct, and that any shortcoming in this respect renders them liable to punishment. Aside from this, it should be kept constantly in mind that a single incorrect report may cause the loss of life and property to an unknown amount, and all reports must be made with this responsibility clearly in view. Whenever an observer is unable from any cause to get in his report, properly corrected, at the regular hours of report, he will *not* send the uncorrected portion, but will write the word "blank" in each of the spaces that would otherwise have been occupied by this portion of the report. Observers will *never* send any report or part of report which they have reason to believe is incorrect, and will bear in mind that it is safer and more in accordance with instructions to omit a report than to make a false one.

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PAPER 23.

OFFICE OF THE CHIEF SIGNAL-OFFICER,
*Washington, D. C., August* 15, 1878.

[Circular No. 8.]

This circular is published for the information of persons desiring to enter the service of the United States, with reference to the full duties of the Signal Service of the Army, including not only field signals and telegraphy, but also the observation and report of storms, by telegraph and signal, and display of cautionary signals, for the benefit of commerce and agriculture, under the joint resolution of Congress, approved February 9, 1870, the acts of Congress, approved June 10, 1872, March 3, 1873, June 23, 1874, and March 3, 1875, and the authorization of the Secretary of War, and for such other duties as may be required in connection therewith.

1. Entrance into this service is in every case by enlistment as a private soldier in the Regular Army of the United States, the pay, quarters, allowances, and duties being in the first instance, and unless changed after instruction, detail or promotion, as

hereinafter explained, those of a private soldier in the Signal Corps, U. S. A. All men enlisted are drilled in the use of arms, and disciplined in the duties of soldiers. The term of service is five years, unless sooner discharged. The Secretary War has power to grant discharges, which this office is authorized to promise when applied for on proper grounds, and at times when no special injury to the service would result therefrom; but, as a rule, no application for a discharge will be favorably entertained until after two years of faithful service, and not then except as above specified. With the single exception that men enlisting for the Signal Corps will not be transferred to any other branch of the Army, no promise will be given which can alter or affect the usual terms of enlistment. The service, while strictly military, is only probationary, with opportunities for advancement, depending mainly on the good conduct and capacity of each individual, and it is intended to place competent men, who enlist with a view to promotion to the grade of sergeant, on duty where instruction can be obtained and opportunity for study granted.

The Chief Signal-Officer, in his annual report for 1871 to the Secretary of War, recommended that a commission in the Army be given each year to the sergeant who shall in that year be reported as most distinguished for fidelity and ability, and in each of several subsequent years an enlisted man of the Signal Service was promoted to be a commissioned officer.

By an act of Congress, approved June 20, 1878, two sergeants of the Signal Corps may, in each year, be appointed to be second lieutenants.

Persons under twenty-one years of age are not enlisted, except where the applicant is over eighteen, and possesses special fitness for the service. In such cases the written consent of the parent or guardian must be given upon the prescribed form of enlistment paper.

2. Enlistments are confined to candidates who have passed an examination, prior to enlistment, before a board appointed by the Chief Signal-Officer, and before which they must appear, when notified, at their own expense if coming from a distance. Testimonials as to good character and capacity, signed by persons known at this office, must be presented, together with an application in the handwriting of the candidate (addressed to the Chief Signal-Officer of the Army), stating his age, past and present avocation, and residence. The examination will be chiefly directed to accurate spelling, legible handwriting, proficiency in arithmetic, with special attention to decimal fractions, and the geography of the United States. After a favorable report from the above-mentioned board, and also a physical examination by the surgeon, the candidate will be enlisted for the Signal Corps, and, as a rule, will be ordered for duty to Fort Whipple, Va., where he will be placed under the drill and discipline requisite for the Signal Service, which will continue for not less than two months. After that time, his conduct being good and reported as competent in drill and discipline, he will be ordered under special instruction to prepare for the duty of assistant to an observer on station; also performing the general duties of a soldier at hours when not required for instruction. When reported by the instructor as qualified the enlisted man will, as the wants of the service require, be detailed on the above-mentioned duty of assistant. The length of time between being ordered under instruction and being detailed as assistant varies with the capacity and conduct of the individual, but has averaged about three months.

3. All soldiers of the Signal Corps who have passed the above-described examination, and have been instructed and detailed on duty as assistant to an observer on station, or similar duty at this office, are required to perform such duties satisfactorily for twelve months before promotion from private to sergeant. As a rule, such men may, after the expiration of that time, be ordered to Fort Whipple as candidates for promotion, and after additional instruction, drill and discipline in the duties of soldiers are examined by a Board of Final Examination, also appointed by the Chief Signal-Officer, and meeting at this office, but different from the Board of Preliminary Examination before mentioned, both in its members and the character of examination, the latter being exclusively on the course of study and practice in reference to the special duties of the service, with which the candidate has had the opportunity to become familiar after his enlistment. They will also be examined by a Board of Officers, convened at Fort Whipple, as to their proficiency in the military duties of a sergeant. On passing these examination the candidates will, as vacancies occur, be promoted to be sergeants Signal Corps, U. S. A.

4. The duties of a sergeant on station, as also those of an assistant to an observer, will be chiefly those pertaining to the observation, record, and proper publication and report, at such times as may be required, of the state of the barometer, thermometer, hygrometer, rain-gauge, and other instruments (instruction in the use of which will be given under the directions of this office), and the report by telegraph or signal, at such times as indicated, and to such places as may be designated by the Chief Signal-Officer, of the observations as made, or such other information as may be required—the telegraphic reports to be forwarded by the regular telegraphic operators, or in such manner as may be directed. The utmost precision will be required in observa-

tions and reports. The specification of these particular duties is not to exclude such others connected therewith as may be necessary.

The object of this plan is to insure the correctness and regularity of reports by having them made under military control. As it is desired to make this body of men especially select, rigid examinations will be insisted upon.

All the duties will be performed strictly under the discipline of military law—all persons in the military service being subject to trial and punishment, under the Rules and Articles of War, for improper conduct or neglect of duty. The penalties for neglect of duty, bad conduct, &c., are dishonorable discharge, or such other punishment as a court-martial may direct, or as may be provided for by the customs of the service.

The United States is entitled to the whole time of the person enlisted; but the duties required on stations are of such a nature that, with care and diligence, some time between the hours of reports, when no active duty is pressing, will generally be at the disposal of the soldier, which may be devoted to reading or study. Most of those already enlisted have had such purposes in view. No employment of this nature can, however, be permitted to interfere, in any way, with that prompt and constant attention to duty which will be insisted upon.

5. The pay and allowances of enlisted men of the Signal Corps vary according to the character and place of the duties and the length of the service of each individual. The following table exhibits the average per month for five years, according to the present law:

| Rank. | When at Fort Whipple, Va., or at a military post. | When on station. | When at this office. |
|---|---|---|---|
| Sergeant | $39 37 | $79 87 | $99 37 |
| Corporal | 25 33 | 65 83 | 85 33 |
| First-class private | 22 22 | 62 72 | 82 22 |
| Second-class private | 18 16 | 58 66 | 78 16 |

NOTE.—In addition to the above, corporals and privates in charge of stations or serving as operators or repairmen on the United States telegraph lines carrying, or which may carry, commercial business, receive 35 cents per day extra.

Of the above amounts one dollar per month in the third year, two dollars per month in the fourth year, and three dollars per month in the fifth year are retained, and will not be paid until final discharge after faithful service. An allowance for clothing, averaging $4.17 per month for sergeants, $4.13 for corporals, and $3.99 for privates, is also included in the above, which, if clothing is not drawn in kind, is also retained until discharge. When at Fort Whipple enlisted men receive quarters and rations, and at all places are, when ill, provided with medical attendance and medicines.

6. Applications being frequently made for enlistment in this service, conditioned upon the applicant being placed upon some specified duty or stationed at a particular place, it is to be clearly understood that no such qualification of the contract of enlistment will be allowed or considered, the wants of the service, which cannot be known in advance, regulating all details of duty.

By order of the Chief Signal-Officer of the Army.

H. H. C. DUNWOODY,
*First Lieutenant Fourth Artillery, Acting Signal-Officer and Assistant.*

Official:

*Acting Signal-Officer and Assistant.*

———— ————, the undersigned, having read and understanding the above circular do, in accordance with its terms, offer ———— for enlistment as a private soldier in the Signal Corps, United States Army.

| Place. | Date. | Signature. | Witness to signature. |
|---|---|---|---|
| | | | |

NOTE.—The above form is to be used at the time of enlistment, and is not received as the application mentioned in paragraph 2 of the foregoing circular.

PAPER 24.

WAR DEPARTMENT,
*Washington City, May 9, 1878.*

SIR: I have the honor to invite your attention to the inclosed communication and proposed enactment, which has my full approval, with the hope that it may be adopted.

The extent of the Signal Service, and of the benefits it may render to the great commercial, shipping, and agricultural interests of the United States are hampered by the little force, now overworked, in the faithful discharge of a most onerous duty.

Disasters happen and will happen, which might be prevented. The fact is forced upon my notice by continued applications from different parts of the United States, made by the most prominent men, in such numbers and of such character, standing, and influence, that they cannot be disregarded. I ask earnest and favorable consideration of the subject.

Very respectfully, your obedient servant,

GEORGE W. McCRARY,
*Secretary of War.*

The Hon. H. B. BANNING,
*Chairman Military Committee, House of Representatives.*

WAR DEPARTMENT,
OFFICE OF THE CHIEF SIGNAL-OFFICER,
*Washington, D. C., May 9, 1878.*

SIR: I have the honor to recommend that the proposed enactment, herewith inclosed, may be submitted to the Military Committee of the House of Representatives, with the favorable indorsement of the Secretary of War. The Signal Service stands, after seven years' continuous and successful duty, on the point where the little additional force of a few enlisted men (the enactment provides fifty additional privates only), will double the benefits of the service to the people within the year. It is not a question of mere success, but of doubling success.

It is wrong, in the face of such facts, to either hesitate to ask for the aid or to deny it. The enactment asked is, as to the force actually necessary, and is the simplest justice to the American soldier and to the American citizen, who, entering the service for five years, without influence, ought of right, in the United States, to be able to maintain and advance himself by his own good work and honorable action in it.

I am, sir, very respectfully, your obedient servant,

ALBERT J. MYER,
*Brig. Gen. (Brt. Asst'd) Chief Signal-Officer, U. S. A.*

To the honorable the SECRETARY OF WAR.

"*Be it further enacted*, The enlisted force of the Signal Corps shall consist of one hundred and fifty sergeants, thirty corporals, and two hundred and seventy privates, who shall receive the pay of engineer soldiers of similar grades; and two sergeants may in each year be appointed to be second lieutenants."

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PAPER 25.

*Table showing division of Office of Chief Signal-Officer, by rooms, giving name of assistant in charge.*

| Designation of room. | Assistant in charge (present detail). | Remarks. |
|---|---|---|
| General correspondence and records. | First Lieut. H. H. C. Dunwoody, Fourth Artillery, Acting Signal-Officer and assistant. | |
| Station-room | First Lieut. C. E. Kilbourne, Second Artillery, Acting Signal-Officer and assistant. | Day and night work |
| Telegraph-room | do | Do. |
| Property | First Lieut. H. W. Howgate, Twentieth Infantry, Acting Signal-Officer and assistant. | |
| Printing and lithographing. | do | Day and night work. |
| Instrument-room | First Lieut. H. H. C. Dunwoody, Fourth Artillery, Acting Signal-Officer and assistant. | |
| International bulletin | do | |
| Fact-room | Cleveland Abbe, A. M., assistant at Office of the Chief Signal-Officer. | |
| Study-room | First Lieut. J. P. Story, Fourth Artillery, Acting Signal-Officer and assistant. | Day and night work. |
| Library | First Lieut. H. W. Howgate, Twentieth Infantry, Acting Signal-Officer and assistant. | |
| Map-room | do | |
| Artisan's room | do | |

PAPER 26.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
*Washington, D. C., July 2, 1877.*

The following rules in regard to sunset observations and verifications of reports based upon them are furnished for your information and guidance:

1. The observer at each station will note, each day, at the exact time of sunset (which he will obtain from circular No. 3, herewith inclosed), and for a time not to exceed thirty minutes after sunset, the character of the western sky and sunset, and will note in writing on Form Y, in the column for that date, the character at the time as "Fair-weather sunset," "Foul-weather sunset," or "Doubtful-weather sunset."

The term "Fair-weather sunset" will express such condition of the sky, particularly the western, and such character of the sunset, as is considered to indicate a fair day for the day *ensuing*.

The term "Foul-weather sunset" indicates that the appearances are such as to presage a rainy day for the day ensuing.

The term "Doubtful-weather sunset" will indicate that the conditions are such as to leave the mind of the observer in doubt as to what the sunset presages for the following day.

The prediction is for the period of time from the sunset of the day on which the prediction is made, until sunset of the following day; and at the expiration of the time for which the prediction is made the observer will note on Form Y, opposite the prediction and in the column headed "Report correct," the word *yes* or *no*, according as the prediction is or is not verified.

A sunset prediction of one day is verified or not verified, as the case may be, by the weather of the ensuing day.

The prediction "Foul" or "Fair" refers especially to rain, and does not refer in any way to amount or kinds of clouds or fog.

The prediction "Foul" means that the appearance of the sky indicates *rain;* if any rain equaling or exceeding one one-hundredth of an inch falls before sunset on the ensuing day the prediction is verified, and if not, it is not verified.

"Fair" means that the appearance of the sky does *not* indicate rain, and if no rain equaling or exceeding one one-hundredth of an inch falls, the prediction is verified. If any rain in excess of this amount does fall, the prediction is not verified.

"Doubtful" sunsets cannot be verified.

As soon as the observation has been taken and entered on Form Y the report will be enciphered (or written) on Form 5, in duplicate, and the form handed to the operator in the telegraph office as soon as possible after the observation is taken, for transmission to ———.

The signature of the operator must be obtained to both copies of each report, with the exact time of receipt by him. The operator will retain one copy of the report; the observer will retain the other copy until Monday of the following week, when he will forward the retained copies by mail to this office in the same envelope as Form X.

In filling up Form 5, carbon paper and stylus will be used in the following manner: Two sheets of the printed forms will be raised up and the piece of sheet-tin placed beneath them; one of the sheets will be spread smoothly on the tin; on this sheet will be placed a piece of carbon paper, and the other form will be placed on this. When the cipher-words representing the readings of the instruments are written in the proper spaces of the Form 5, the report will appear in duplicate.

The observations will be written on the Forms 5 in the following manner:

The name of station ( ) will be written in the upper left-hand or first space; the cipher-word for the sunset prediction in the second space, and will be found in the table showing amount of clouds at the time, opposite the sunset prediction, and under the letters showing the direction from which the wind is blowing at the time of observations.

In the third space will be written the cipher-word found opposite the observed reading of the barometer.

In the fourth space will be written the cipher-word found opposite the readings of the dry-bulb thermometer.

In the fifth space will be written the cipher-word found opposite the readings of the wet-bulb thermometer.

In the lower left-hand space will be written the cipher-word corresponding to the amount of rain-fall since the observation of preceding day.

The report will be signed with the surname only of the observer.

Examples are given of the proper manner of filling up Form 5.

EXAMPLE.

| Deadwood. | Abide. | Daunt. | Finny. | Finding. |
|---|---|---|---|---|
| Reduce. | | | | |

TRANSLATION.

| | |
|---|---|
| Station | Deadwood. |
| Sunset | Fair. |
| Direction of wind | S. E. |
| Amount of clouds in fourths | 0. |
| Barometer | 29.85. |
| Dry-bulb thermometer | 69°. |
| Wet-bulb thermometer | 64°. |
| Amount of rain-fall since last report | 1.20 inches. |

EXAMPLE.

| | | | | |
|---|---|---|---|---|
| Fetterman. | Dimly. | Calver. | Fiddle. | Festive. |
| Rebuke. | | | | |

TRANSLATION.

| | |
|---|---|
| Station | Fetterman. |
| Sunset | Doubtful. |
| Direction of wind | S. |
| Amount of clouds in fourths | ¼. |
| Barometer | 24.45. |
| Dry-bulb thermometer | 44°. |
| Wet-bulb thermometer | 33°. |
| Amount of rain-fall since last report | .85 inch. |

EXAMPLE.

| | | | | |
|---|---|---|---|---|
| Hamilton. | Elope. | Apron. | Few. | Fennel. |
| | | | | |

TRANSLATION.

| | |
|---|---|
| Station | Hamilton. |
| Sunset | Foul. |
| Direction of wind | E. |
| Amount of clouds in fourths | ¼. |
| Barometer | 18.75. |
| Dry-bulb thermometer | 39°. |
| Wet-bulb thermometer | 23°. |
| Amount of rain-fall since last report | None. |

If no rain has been collected in the rain-gauge since the last report, the cipher-word for rain-fall will be omitted from the report, and, until you have received a barometer, the word to express the reading of that instrument will also be omitted, and the words for the readings of dry-bulb and wet-bulb thermometers and amount of rain-fall be moved up one space.

The observation of the sunset, the direction of wind, and amount of clouds will be made at the times given in Circular No. 3. The observations of barometer, thermometers, and rain-fall since observation of preceding day will be taken at each day.

In the form for the "Meteorological Record" for the week (Form X) should be entered as soon as possible after the observation is taken, and in the proper columns, the date of observation, hour of observation, reading of aneroid barometer, readings of dry and wet bulb thermometers, direction of wind, and velocity of wind in miles per hour (estimated from the Signal Service scale), amount of clouds in fourths time (a. m. or p. m.), rain or snow began and ended, amount of rain or melted snow since last observation in inches and hundredths of an inch, states of the weather, and any remarks about the weather, which, in the opinion of the observer, will be of interest, such as dates of auroras, thunder-storms, &c.

This form, properly filled up, should be forwarded by the mail on Monday, in an envelope addressed

"THE CHIEF SIGNAL-OFFICER OF THE ARMY,"
"*Washington, D. C.*"

Form Y will be forwarded to this office on the *first* day of the month succeeding that of which it forms the record.

*Instructions for reading the instruments.*

ANEROID BAROMETER.

If the observer stands facing the barometer, the short arm will move to the right as the pressure of the atmosphere or weight of air increases, and to the left as the pressure diminishes. The long arm should be moved so as to coincide with or directly cover the short arm, and the reading of the barometer is obtained by reading from the lowest reading found on outer scale to the division of that scale to which the long arm points or which it covers. The inches and hundredths of inches are marked on the scale. The inches and hundredths are counted from left to right, or in the same direction as the hands of a watch move. The inches and hundredths are written in the same manner as dollars and cents, thus: One dollar and seventy-five cents would be written $1.75, or one and seventy-five-hundredths, $29.35, twenty-nine dollars and thirty-five-hundredths.

The barometer reading 29 inches and thirty-five-hundredths of an inch would be written 29.35 inches, &c.

THERMOMETER.

In reading the thermometer the observer should be careful to place the eye at the same level as the top of the column of mercury, otherwise the reading will not be correct.

WET-BULB THERMOMETER.

A piece of wicking six or eight inches in length should be used with this thermometer, one end being drawn over the bulb until it is entirely covered, and the other end placed in the cistern which is on the wooden frame. The cistern should be kept filled with pure rain-water at all times when the temperature of the air is above freezing-point, and the cover should be changed once a month and the bulb carefully cleaned. The cover can be kept clean by washing it (without removal) by use of a jet of water thrown from a small syringe.

When the temperature of the air is below the freezing-point the water will be emptied from the cistern and the bulb moistened with water. By watching the mercury in the tube it will be seen to fall for a few minutes and then to rise again. The height of the mercury, or reading of thermometer, when at its lowest point, should be read.

WIND-VANE.

The vane used for determining the direction of the wind must be set where the wind will act freely on it, and must never be sheltered by surrounding buildings or other objects.

The direction of wind is indicated by the point of the horizon from which it comes; thus a north wind is one blowing from the north, an east wind is one blowing from the east, a south wind is one blowing from the south, &c. The direction of the wind will be designated by the eight principal points of the compass, N., E., S., W., N. E., S. E., S. W., N. W.

The wind-vane and stand consist of the following parts:

1st. Upright staff about five feet in length, at the lower end of which should be cut a tenon about one inch in length; near upper end are two holes which cross each other at right angles, and through which are passed the iron arms (marked 3), at the ends of which are the letters N. and S. and E. and W. A hole is bored in the *upper* end of staff, in which the slender iron (marked 4) is screwed, and on which the wind-vane (marked 5) is placed.

2d. Four iron braces.

3d. Two iron arms, with letters N. and S. and E. and W. at the ends.

4th. Slender iron rod on which the vane is placed.

5th. Wind-vane.

To place the vane and stand in position, a small platform, about two and a half feet square, should be placed on roof of observer's office and carefully leveled. A hole to receive the tenon at the foot of staff should be cut in center of platform. Draw upon the platform the true meridian line passing through the center, and mark the ends of the line N. and S., respectively.

To determine the true meridian line, place the compass with its center over the center of the hole in the platform; place the eye at south end of needle, and mark on platform a point toward which the north end of needle points; place the eye at north

end of needle, and mark the point toward which the south end of needle points. Draw through the points thus determined and the center of platform a line, which will be the magnetic meridian.

The variation of the needle at your station is ° east; that is, the needle points ° east of the true north.

On Plate I will be seen two lines, which cross each other at the point O. One of these lines is marked simply "N." and "S."; the other line is marked "True N." and "True S." Place this plate with the point marked "O" at center of platform, and so that the line marked "N." and "S." immediately covers the line (or magnetic meridian) which has been marked on platform. Mark on the platform where the line marked "True N." and "True S." reaches edges of plate; a line drawn through these points and the center of platform, will be the true "N." and "S." line, or true meridian. Paint on the platform a circle (whose center coincides with the center of the platform) having a diameter of about two feet, and on this circle mark the four cardinal points N., E., S., and W., and the four intermediate points N. E., S. E., S. W., and N. W. Unscrew the nuts at ends of iron arms (3); take off the movable letters; pass the rods through the holes drilled near upper end of staff; put on the letters and screw on the nuts. Screw the slender iron rod (4) into the hole in end of staff. Place a screw about six inches above the lower end of staff, and immediately below the end of arm on which the letter N. is placed. Place the tenon at foot of staff in the hole in center of platform, and turn the staff until the screw under letter N. is immediately over the meridian line, the arm with letter N. will be immediately over the end of meridian line (marked "N"), and therefore points to the true north. Place the staff in a vertical position, this being determined by the use of a blumb-line; fasten one end of each of the iron braces (2) to the platform, and the other end to the staff, so as to hold the latter firmly in position. Place the wind-vane on the slender rod (4), passing the rod through the hole near center of vane.

In determining the direction of the wind at the time of observation, the division of the circle which most nearly coincides with the direction in which the arrow-head of vane points will be taken as the direction of the wind.

In winds of considerable strength, the vane is never at rest or fixed in the same direction; it oscillates incessantly, and its oscillations increase with the violence of the wind. In such cases observers must note the mean direction between the extremes. When the wind is too light to move the vane, and when it is calm, no direction will be recorded.

### RAIN-GAUGE.

The rain-gauge will be placed, whenever practicable, with the top of the funnel-shaped collector twelve inches above the surface of the ground, firmly fixed in a vertical position, and protected from the interference of unauthorized persons. It will be examined at time of making the daily observations, the amount of water it contains carefully measured by means of the graduated rod sent with each gauge, and then emptied and returned to its proper position. When a position at the level of the ground cannot be found with a sufficiently clear exposure, the gauge will be placed on the top of the instrument-room, or roof of the building occupied by the observer, who will measure the height above the ground and report it to this office.

The measuring-rod is graduated in or divided into inches and tenths of inches, and the proportion between the cylinder and funnel is as ten to one, so that ten inches upon the rod corresponds with one inch of actual rain fall, one inch on the rod to one-tenth of rain, and one-tenth on the rod to one-hundredth of rain. Snow will be melted and then measured, and reported in the same manner as rain, but the fact of its being melted show must be noted under the head of "remarks" in the weekly reports.

Whenever from any cause the snow cannot be melted, the depth will be measured, and ten inches of snow reported as one inch of rain. The rule for determining the amount of rain-fall from the amount of water collected in the tube is as follows, viz:

Measure the amount of water in the tube with the measuring-stick, which is divided into inches and tenths. Divide the amount of water found by ten; the quotient will be the amount of rain-fall.

### EXAMPLES.

| | |
|---|---|
| Amount of water in tube | 1.4 inches. |
| Amount of rain-fall | .14 inch. |
| Amount of water in tube | 15.6 inches. |
| Amount of rain-fall | 1.56 inches. |
| Amount of water in tube | 0.1 inch. |
| Amount of rain-fall | 0.01 inch. |

When reports cannot be forwarded on the day on which they are taken, they will not be transmitted by telegraph.

C. E. KILBOURNE,

*First Lieutenant Second U. S. Artillery, Acting Signal Officer and Assistant.*

## PAPER 27.

*Bulletin of international meteorological observations, taken simultaneously on October 1, 1877.*

7.35 a. m., Washington mean time.
2.12 a. m., Honolulu mean time.
6.7 a. m., Mexico mean time.
7.7 a. m., San José mean time.
7.25 a. m., Toronto mean time.
9.2 a. m., Paramaribo mean time.
0.6 p. m., Lisbon mean time.

0.28 p. m., Madrid mean time.
0.43 p. m., Greenwich mean time.
0.53 p. m., Paris mean time.
1.1 p. m., Brussels mean time.
1.4 p. m., Utrecht mean time.
1.13 p. m., Berne mean time,
1.26 p. m., Christiania mean time.

1.33 p. m., Copenhagen mean time.
1.33 p. m., Rome mean time.
1.37 p. m., Berlin mean time.
1.49 p. m., Vienna mean time.
1.55 p. m., Stockholm mean time.
1.57 p. m., Cape of Good Hope mean time.
2.18 p. m., Athens mean time.

2.39 p. m., Constantinople mean time.
2.44 p. m., St. Petersburg mean time.
4.33 p. m., Mauritius mean time.
6.36 p. m., Calcutta mean time.
8.49 p. m., Zi-ka-wei mean time.
10.2 p. m., Tokei (Yeddo) mean time.
10.23 p. m., Melbourne mean time.

### ALGERIAN SERIES.

[Furnished by the co-operation of General Teissier, Commandant Supérieur du Génie in Algeria.]

| Stations. | Barometer. | | | | Temperature of the air. | | Relative humidity. | Wind. | | | | Clouds. | | | | Rain-fall or melted snow in the past 24 hours. | | Weather. | Observer. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Corrected for instrumental error and temperature. | | Reduced to sea-level. | | | | | Direction. | Velocity. | | Force. | Amount. | | Direction. | | | | | |
| | Inches. | Millimeters. | Inches. | Millimeters. | Fahrenheit. | Centigrade. | Per cent. | From— | Miles per hour. | Meters per second. | 0—10. | Upper. 0—10. | Lower. 0—10. | Upper. From— | Lower. From— | Inches. | Millimeters. | | |
| Nemours | ..... | ..... | 30.05 | 763.3 | 76.6 | 24.8 | 56 | NNW. | ..... | ..... | 2 | ..... | 2 | ..... | ..... | 0 | 0 | Fair | Michel. |
| Algiers | ..... | ..... | 29.85 | 758.2 | 67.3 | 19.6 | 90 | NW. | ..... | ..... | 1 | ..... | 8 | ..... | ..... | 1.284 | 32.6 | Very cloudy. | Peter. |
| La Calle | ..... | ..... | 29.84 | 758.0 | 73.8 | 23.2 | 77 | ENE. | ..... | ..... | 3 | ..... | 4 | ..... | ..... | 0.236 | 6.0 | Cloudy | Fleury. |
| Tunis | ..... | ..... | 29.91 | 759.6 | 75.2 | 24.0 | 75 | E. | ..... | ..... | 4 | ..... | 2 | ..... | ..... | 0.051 | 1.3 | Fair | Jacques. |
| Sfax | ..... | ..... | 29.89 | 759.3 | 78.8 | 26.0 | ..... | ENE. | ..... | ..... | 3 | ..... | 8 | ..... | ..... | 0.276 | 7.0 | Very cloudy. | Husson. |
| Saida | ..... | ..... | 29.98 | 761.5 | 62.2 | 16.8 | ..... | W. | ..... | ..... | 4 | ..... | 6 | ..... | ..... | 0.189 | 4.8 | Cloudy | Millot. |
| Tebessa | ..... | ..... | 29.88 | 758.9 | ..... | ..... | ..... | NE. | ..... | ..... | 2 | ..... | 2 | ..... | ..... | 0 | 0 | Fair | Bourgeois. |
| Geriville | ..... | ..... | 29.94 | 760.4 | 68.4 | 20.2 | 49 | W. | ..... | ..... | 3 | ..... | 10 | ..... | ..... | 0.118 | 3.0 | Covered | Lemaillot. |
| Laghouat | ..... | ..... | 29.98 | 761.4 | 68.0 | 20.0 | 64 | W. | ..... | ..... | 4 | ..... | 4 | ..... | ..... | 0 | 0 | Cloudy | François. |
| Biskra | ..... | ..... | 29.93 | 760.3 | 77.2 | 25.1 | 25 | NW. | ..... | ..... | 3 | ..... | 5 | ..... | ..... | 0 | 0 | Cloudy | Kuntz. |

NOTE.—In the originals the distinction between the amount of upper and lower clouds is apparently not made. The weather is published as given. The rain-fall is measured at 7 a. m., local time. The elevation of Saida is 890? meters, or 2,919.9? feet; Tebessa, 1,088? m., or 3,569.4? feet; Geriville, 1,360? m., or 4,461.7? feet.

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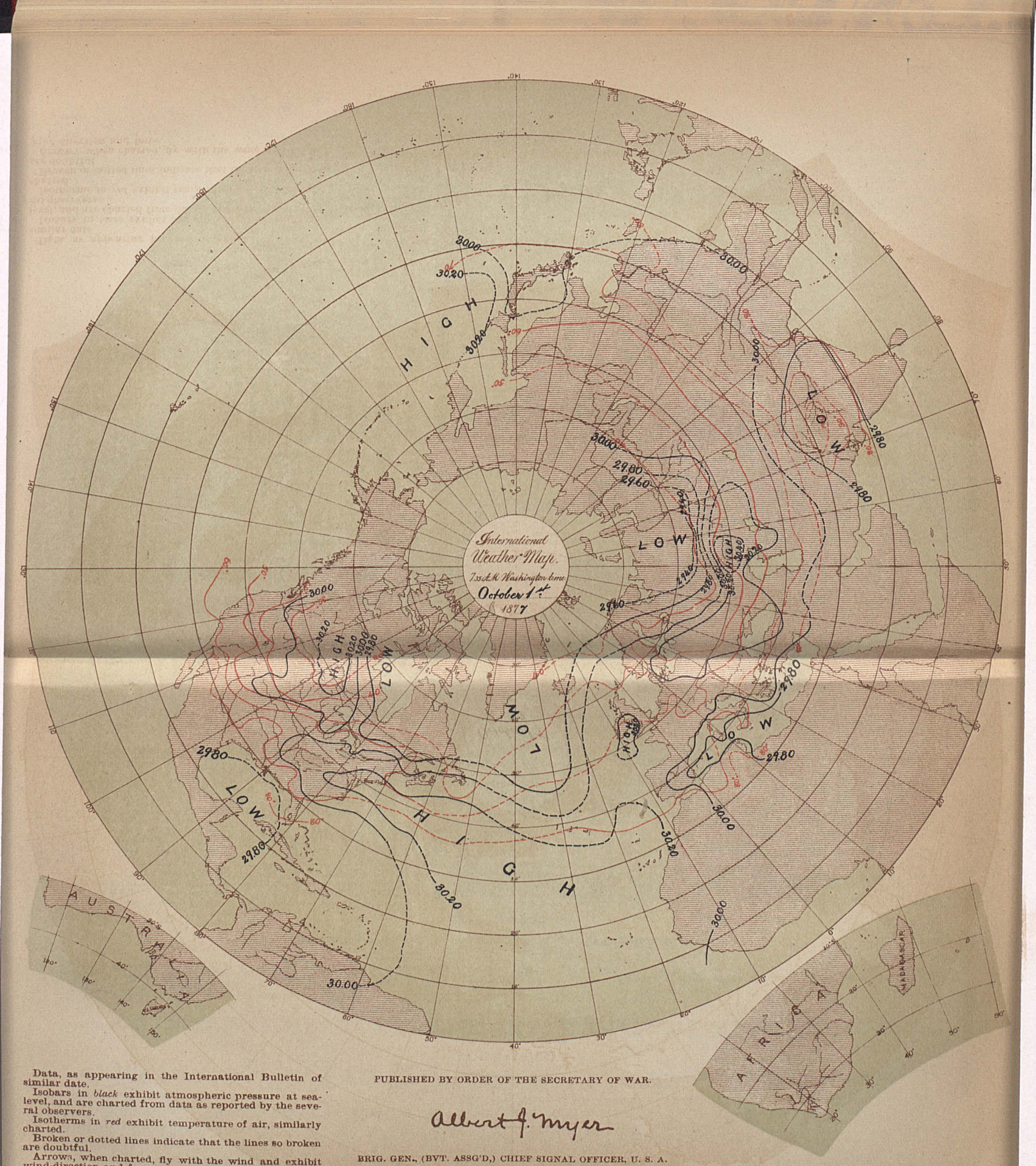


Data, as appearing in the International Bulletin of similar date.

Isobars in *black* exhibit atmospheric pressure at sea-level, and are charted from data as reported by the several observers.

Isotherms in *red* exhibit temperature of air, similarly charted.

Broken or dotted lines indicate that the lines so broken are doubtful.

Arrows, when charted, fly with the wind and exhibit wind-direction and force.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN., (BVT. ASSG'D,) CHIEF SIGNAL OFFICER, U. S. A.

THE HELIOTYPE PRINTING CO. 220 DEVONSHIRE ST. BOSTON

## AUSTRIAN SERIES.

[Furnished by the co-operation of Prof. Dr. Julius Hann, Director of the Imperial and Royal Central Meteorological Institute at Vienna.]

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Agram | 29.52 | 749.8 | 30.07 | 763.7 | 61.7 | 16.7 | 55 | NE. | ..... | ..... | 2 | ..... | 8 | ..... | ..... | 0.106 | 2.7 | Raining ..... | Prof. Ivan Stozir. |
| Cracow J. R. Observatory | 29.45 | 747.9 | 30.21 | 767.2 | 56.3 | 13.0 | 56 | NE. | ..... | ..... | 2 | ..... | 5 | ..... | ..... | 0 | 0 | ..... | Dr. Wierzbiski. |
| Eperies | 29.28 | 743.6 | 30.15 | 765.8 | 59.5 | 15.5 | 54 | Calm. | ..... | ..... | 0 | ..... | 5s | ..... | NW. | 0 | 0 | ..... | Julius Mikolik. |
| Gratz | 28.89 | 733.7 | 30.14 | 765.5 | 56.5 | 13.3 | 74 | SW. | ..... | ..... | 3 | ..... | 6 | ..... | ..... | 0 | 0 | ..... | Andreas Rospini. |
| Hermannstadt | 28.72 | 729.6 | 30.13 | 765.3 | 60.1 | 15.0 | 53 | SSE. | ..... | ..... | 4 | ..... | 0 | ..... | ..... | 0 | 0 | ..... | Prof. Reissenberger. |
| Kremsmünster | 28.64 | 727.5 | 29.97 | 761.2 | 57.2 | 14.0 | 65 | ENE. | ..... | ..... | 1 | ..... | 1 | ..... | ..... | 0 | 0 | ..... | Prof. C. Wagner. |
| Lemberg | 29.22 | 742.1 | 30.21 | 767.3 | 53.0 | 12.0 | 86 | SE. | ..... | ..... | 1 | ..... | 6 | ..... | ..... | 0 | 0 | ..... | Dr. T. Stanecki. |
| Pola | 29.89 | 759.3 | 30.00 | 762.1 | 65.5 | 18.0 | 48 | E. | ..... | ..... | 4 | ..... | 9ks | ..... | ..... | 0 | 0 | ..... | I. R. Hydrographic Office. |
| Szathmar | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | Johann Tamas, S. J. |
| Szegedin | 29.84 | 758.0 | 30.12 | 765.0 | 61.9 | 16.0 | 56 | Calm. | ..... | ..... | 0 | ..... | 5 | ..... | ..... | 0 | 0 | ..... | Karl Stancel. |
| Trieste | 29.94 | 760.5 | 30.04 | 763.1 | 64.0 | 17.8 | 57 | E. | ..... | ..... | 1 | ..... | 9 | ..... | ..... | 0 | 0 | ..... | P. Busin. |
| Vienna | 29.40 | 746.7 | 30.09 | 764.2 | 61.3 | 16.5 | 80 | S. | ..... | ..... | 2 | ..... | 7 | ..... | ..... | 0 | 0 | ..... | I. R. Central Met. Obs'y. |

NOTE.—The originals give, occasionally, the weather by the Vienna symbols or in general terms, and it is not always certain that they refer to the moment of observation. The distinction between upper and lower clouds is not made. At Lemberg the rain-fall is measured at 7 p. m., local time, and at Trieste at 7 a. m. of the following day. The elevation at Gratz is 343.5 meters, or 1,126.9 feet; Hermannstadt, 407.8 m., or 1,337.9 feet; Kremsmünster, 383.6 m., or 1,258.5 feet. At Eperies the observations have been taken at 2.0 instead of 2.8 p. m.; Gratz, at 2.0 instead of 1.45 p. m., local time.

## BELGIAN SERIES.

[Furnished by the co-operation of J. C. Houzeau, Director of the Royal Observatory at Brussels.]

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arlon | 28.56 | 725.3 | 30.05 | 763.2 | 60.1 | 15.6 | 66 | ENE. | ..... | ..... | 1 | ..... | 7 | ..... | ..... | 0 | 0 | ..... | Royal Observatory. |
| Brussels | 29.89 | 759.3 | 30.10 | 764.4 | 57.7 | 14.3 | 60 | NE. | ..... | ..... | 5 | ..... | 4 | ..... | N. | 0.008 | 0.20 | ..... | |
| Furnes | 30.10 | 764.4 | 30.12 | 765.0 | 56.7 | 13.7 | 80 | NW. | ..... | ..... | 2 | ..... | 10 | ..... | ..... | 0.283 | 7.2 | ..... | |
| Maeseyck | 29.96 | 761.0 | 30.09 | 764.3 | 55.6 | 13.1 | 83 | NNE. | ..... | ..... | 2 | ..... | 0 | ..... | ..... | 0 | 0 | ..... | |

NOTE.—In the originals the weather is occasionally given by the Vienna symbols. Except for Brussels, the distinction between upper and lower clouds is not made. The elevation of Arlon is 418 meters, or 1,371.4 feet. At Arlon the observations have been taken at 1.1 instead of 1.06 p. m.; Furnes, 1.0 instead of 0.54 p. m. Maeseyck, 1.0 instead of 1.06 p. m., local time.

## BRITISH SERIES.

[Furnished by the co-operation of Robert H. Scott, esq., F. R. S., Secretary of the Meteorological Council, London, Alexander Buchan, M. A., F. R. S. E., Secretary of the Scottish Meteorological Society, Edinburgh, and the respective observers.]

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aberdeen | 30.08 | 764.0 | 30.18 | 766.6 | 56.0 | 13.3 | .... | SE. | 4 | 1.8 | ..... | ..... | 1 | ..... | ..... | 0 | 0 | Blue sky.... | W. Boswell. |
| Ardrossan | 30.18 | 766.6 | 30.20 | 767.1 | 56 | 13.3 | .... | Calm. | ..... | ..... | 0 | ..... | 4 | ..... | ..... | ..... | ..... | Hazy..... | William McNeil. |
| Armagh, Observatory | ..... | ..... | 30.22 | 767.6 | 56.3 | 13.5 | .... | E.. | 3 | 1.3 | ... | ..... | 5 | ..... | ..... | ..... | ..... | D. clouds.... | S. Call. for Dr. Robinson. |
| Bidston (Liverpool Obs'y) | ..... | ..... | 30.19 | 766.8 | 58.4 | 14.7 | .... | ESE. | 4 | 1.8 | ... | ..... | 2 | ..... | ..... | ..... | ..... | Blue sky .... | John Hartnup. |
| Birr Castle (Parsonstown) | ..... | ..... | 30.20 | 767.1 | 64.7 | 18.2 | .... | Calm. | ..... | ..... | 0 | ..... | 2 | ..... | ..... | ..... | ..... | D. clouds.... | J. Dreyer. |
| Bradford, Yorkshire | 29.81 | 757.2 | 30.20 | 767.1 | 56.3 | 13.5 | .... | NE. | ..... | ..... | 1 | ..... | 3 | ..... | ..... | 0 | 0 | D. clouds.... | J. McLandsborough. |
| Bridgetown (Barbados) | 29.90 | 759.4 | 29.93 | 760.2 | 85.0 | 29.4 | .... | NE. | ..... | ..... | 1 | ..... | 2 | ..... | ..... | ..... | ..... | D. clouds.... | Private G. W. Roberts, A. H. C. |
| Cambridge, Observatory | ..... | ..... | 30.18 | 766.6 | 58.0 | 14.4 | .... | N. | ..... | ..... | 1 | ..... | 10 | ..... | ..... | ..... | ..... | Overcast .... | H. Todd. |

*Bulletin of international meteorological observations, taken simultaneously on October* 1, 1877—Continued.

BRITISH SERIES—Continued.

| Stations. | Barometer. Corrected for instrumental error and temperature. Inches. | Barometer. Corrected for instrumental error and temperature. Millimeters. | Barometer. Reduced to sea-level. Inches. | Barometer. Reduced to sea-level. Millimeters. | Temperature of the air. Fahrenheit. | Temperature of the air. Centigrade. | Relative humidity. Per cent. | Wind. Direction. From— | Wind. Velocity. Miles per hour. | Wind. Velocity. Meters per second. | Wind. Force. 0—10. | Clouds. Amount. Upper. 0—10. | Clouds. Amount. Lower. 0—10. | Clouds. Direction. Upper. From— | Clouds. Direction. Lower. From— | Rain-fall or melted snow in the past 24 hours. Inches. | Rain-fall or melted snow in the past 24 hours. Millimeters. | Weather. | Observer. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cardington | | | 30.19 | 766.8 | 57.4 | 14.1 | | E. | | | 1 | | 9 | | | | | Overcast | John McLaren. |
| Chatham, School M. E. | 30.05 | 763.3 | 30.18 | 766.6 | 59.2 | 15.1 | | NE. | | | 1 | | 8 | | | | | Fine | Lt. W. G. Morris, R. E. |
| Dartmoor | 28.72 | 729.5 | 30.18 | 766.6 | 60.0 | 15.6 | | NE. | | | 5 | | 3 | | | | | Fine | Alexander Watt. |
| Davos Platz (Switzerland) | | | | | | | | | | | | | | | | | | | Francis Redford, M. A. |
| Donaghadee | 30.18 | 766.6 | 30.21 | 767.3 | 57 | 13.9 | | SE. | | | 2 | | 10 | | | | | Overcast | J. MacGowan. |
| Dover | 30.12 | 765.0 | 30.15 | 765.8 | 57 | 13.9 | | NE. | | | 3 | | 7 | | | | | Gloomy | J. Costello. |
| Eccles (near Manchester) | | | 30.18 | 766.6 | 59.5 | 15.3 | | SE. | 0.8 | 0.4 | | | 9 | | | | | Overcast | Thomas Mackereth. |
| Falmouth, Observatory | 29.96 | 761.0 | 30.19 | 766.8 | 58.7 | 14.8 | | ENE. | | | 2 | | 1 | | | | | Hazy | The staff. |
| Fort Napier (Natal) | 28.02 | 711.7 | 30.25 | 768.3 | 67.9 | 19.9 | | NE. | | | 4 | | 8 | | | | | D. clouds | Pvt. G. Salmon, A. H. C. |
| Free Town (Sierra Leone) | | | 29.94 | 760.5 | 82 | 27.8 | | N. | | | 1 | | 4 | | | | | D. clouds | |
| Galway, Queen's College | | | | | 58 | 14.4 | | NE. | | | 1 | | 4 | | | | | D. clouds | B. G. Clare, for Professor Curtis. |
| Gibraltar (Mediterranean) | 29.98 | 761.5 | 30.02 | 762.5 | 70.0 | 21.1 | | NW. | | | 5 | | 8 | | | | | Overcast | Corp'l C. Aitken, A. H. C. |
| Glasgow, Observatory | 29.99 | 761.7 | 30.19 | 766.8 | 52.1 | 11.2 | | NNE. | | | 3 | | 6 | | | | | D. clouds | D. G. Maclean. |
| Great Yarmouth | 30.16 | 766.1 | 30.16 | 766.1 | 57 | 13.9 | | NE. | | | 2 | | 4 | | | | | D. clouds | G. T. Watson. |
| Greenwich, Royal Obs'y | 30.00 | 762.0 | 30.17 | 766.3 | 60.3 | 15.7 | | N. | | | 1 | | 8 | | | | | D. clouds | The staff, for G. B. Airy. |
| Guernsey | 29.92 | 760.0 | 30.14 | 765.5 | 61 | 16.1 | | NNE. | | | 2 | | 3 | | | | | D. clouds | Dr. S. E. Hoskins, F. R. S. |
| Helston | | | 30.16 | 766.1 | 62 | 16.7 | | E. | | | 4 | | 2 | | | 0.34 | 8.6 | D. clouds | M. P. Moyle. |
| Holyhead | 30.14 | 765.5 | 30.19 | 766.8 | 59 | 15.0 | | SSW. | | | 1 | | 3 | | | | | D. clouds | John Tilston. |
| Jersey | 29.87 | 758.7 | 30.16 | 766.1 | 64.5 | 18.1 | | NE. | | | 1 | | 5 | | | | | Gloomy | J. Fisher. |
| Kew, Observatory | | | 30.17 | 766.3 | 58.8 | 14.9 | | NNE. | 7 | 3.1 | | | 8 | | | | | Threatening | The Staff. |
| Kingstown | 30.19 | 766.8 | 30.22 | 767.6 | 57 | 13.9 | | NE. | | | 2 | | 8 | | | | | Overcast | George Mitchell. |
| Leicester, Museum | | | 30.21 | 767.3 | 55.9 | 13.3 | | NE. | | | 1 | | 10 | | | | | Overcast | Wm. J. Harrison, F. G. S. |
| Malta (Mediterranean) | 29.69 | 754.1 | 29.76 | 755.9 | 78 | 25.6 | | W. | | | 2 | | 4 | | | | | D. clouds | Sergeant Fred Francis, A. H. C. |
| Nairn | 30.08 | 764.0 | 30.16 | 766.1 | 54 | 12.2 | | Calm. | | | 0 | | | | | | | Hazy | W. D. Penny. |
| Nassau (Bahamas) | | | 29.86 | 758.4 | 83.0 | 28.3 | | Calm. | | | 0 | | 10 | | | Blank | Blank | Overcast | C. S. Duncombe. |
| Nottingham, Observatory | 30.01 | 762.2 | 30.20 | 767.1 | 61.3 | 16.3 | | NNE. | | | 2 | | 3ck | | NNE. | 0 | 0 | D. clouds | E. J. Lowe, F. R. S. |
| Oscott, St. Mary's College | 29.66 | 753.4 | 30.18 | 766.6 | 59.5 | 15.3 | | NNE. | | | 0–1 | | 8 | | | | | Hazy | Rev. Stephen Whitty. |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Oxford, Radcliffe Obs'y* | | | 30.18 | 766.6 | 56 | 13.3 | | N. | | | 1 | | 2 | | | | Blue sky | F. Lucas. |
| Plymouth | 30.10 | 764.5 | 30.18 | 766.6 | 61.0 | 16.1 | | ESE. | | | 2 | | 0 | | | | Blue sky | John Merrifield. |
| Roche's Point | 30.15 | 765.8 | 30.21 | 767.3 | | | | | | | | | | | | | | W. Kennedy. |
| St. Ann's Head | 30.04 | 763.0 | 30.20 | 767.1 | 60 | 15.6 | | ESE. | | | 1 | | 5 | | | | D. clouds | John C. Walker. |
| Sandwick Manse (Orkneys) | | | 30.16 | 766.1 | 52 | 11.1 | | S. | 5 | 2.2 | | | 10 | | | | Hazy | Rev. C. Clouston, LL.D. |
| Scutari, Cemetery (Turkey) | | | 30.10 | 764.5 | 70 | 21.1 | | NE. | | | 2 | | 2 | | | | D. clouds | Sergt. W. H. Lyne. |
| Sheffield | 29.97 | 761.2 | 30.21 | 767.3 | 58.8 | 14.9 | | ESE. | | | 1 | | 9 | | | 0 | Misty | W. F. Cooper. |
| Silloth Rectory | 30.16 | 766.1 | 30.19 | 766.8 | 59.3 | 15.2 | 60 | Calm. | | | 0 | | 0 | | | 0 | Blue sky | Rev. F. Redford, M. A. |
| Stonyhurst, Observatory | | | | | 55.8 | 13.2 | | E. | | | 0 | | 8 | | | | Hazy | Rev. S. J. Perry. |
| Stornoway, Lewes C. (Hebrides). | | | 30.12 | 765.0 | 56 | 13.3 | | WSW. | | | 2 | | 2 | | | | Blue sky | John Smith. |
| Stratfield Turgiss | 29.90 | 759.4 | 30.19 | 766.8 | 58.9 | 14.9 | | E. | | | 1 | | 3 | | | | D. clouds | Rev. C. H. Griffith, F. M. S. |
| Thurso | | | 30.04 | 763.0 | 54 | 12.2 | | SSW. | | | 1 | | 8 | | | | Overcast | John Trotter. |
| Truro, Royal Institution | | | 30.16 | 766.1 | 68 | 20.0 | | E. | | | 2 | | 4 | | | | D. clouds | W. Newcombe. |
| Valencia Observatory | | | 30.19 | 766.8 | 63.1 | 17.3 | | SW. | 9 | 4.0 | | | 1 | | | | Hazy | The staff. |
| SUB-SERIES. | | | | | | | | | | | | | | | | | | |
| Calf of Man (Isle of Man) | | | | | 59 | 15.0 | | E. | | | 1 | | 0 | | | 0 | | Henry Mercer. |
| Cape of Good Hope, Obs'y | 29.97 | 761.2 | 30.01 | 762.2 | 73.3 | 22.9 | 63 | NNW. | 9 | 4.0 | | 1 | 2 | | | | | The staff, for E. J. Stone. |
| Hobart Town (Tasmania) | | | 29.98 | 761.5 | 43.9 | 6.1 | 81 | SW. | | | 3 | | 8n | | | 0 | Squally | Francis Abbott, F. R. A. S. |
| Leith, Restalrig Park | | | 30.21 | 767.3 | 58.2 | 14.6 | | W. | | | 1 | | | | | 0 | Fine | Andrew Gibb. |
| Mauritius, Observatory | 29.86 | 758.4 | 30.05 | 763.2 | 72.8 | 22.7 | 73 | SSE. | 10.0 | 4.5 | | | 10 | | ESE. | | Drizzling | C. Meldrum. |
| Melbourne, Observatory | 30.08 | 764.0 | 30.17 | 766.3 | 48.3 | 9.1 | 82 | SW. | 16 | 7.2 | | | 7 | | | 0.06 | 1.5 | Rain-squalls. | R. L. J. Ellery. |
| Monach Light-house (Hebr) | | | 30.14 | 765.5 | 57 | 13.9 | | SSW. | | | 4 | | 10 | | | 0 | 0 | | J. Youngclause. |
| North Unst (Shetland Is) | | | 30.15 | 765.8 | 49 | 9.4 | | S. | | | 4 | 7 | 5 | W. | | | | | Robert Burnet. |

NOTE.—Generally, the originals do not give the relative humidity, rain-fall, or distinction between upper and lower clouds. They give the wind direction to 32 points; the weather by the Beaufort notation; the barometer for Cardington, Galway, Oxford, Sandwich, Leith, Monach, and North Unst as read off; the amount of cloudiness for Nairn and Stornoway by the scale 0 to 4. The wind-force is given by the scale 0 to 12 in the official series; 0 to 6 in the sub-series, except in pounds per square foot for Greenwich and Hobart Town. The rain-fall is measured at Aberdeen at 10 a. m; Bradford, 9 a. m.; Helston, 9 a. m.; Hobart Town, 7.30 a. m.; Nottingham, 6 p. m; Mauritius, 9 a. m.; Sheffield, 8 a. m., following day, local time. The elevation of Dartmoor is 1,400 feet, or 426.7 meters; Davos Platz, 5,105† ft., or 1,556.0† m.; Fort Napier, 2,200 ft., or 670.6 m.

| MARINE SERIES. *Vessels.* | | | | | | | | | | | | | | Sea or swell. Height scale 0-9 | Sea or swell. Direction from — | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. S. Algeria, N. 42° 32′, W. 59° 12′. | | | 30.28 | 769.1 | 56 | 13.3 | | W. | | | 1 | | 2 | | | 0* | | D. clouds | Capt. W. Watson. |
| S. S. Batavia, N. 49° 55′, W. 30° 45′. | | | 29.72 | 754.9 | 58 | 14.4 | | SW. | | | 5 | | 9 | | | 8 | WSW. | Showery | Capt. J. E. Mouland. |
| Ship Camperdown | | | | | | | | | | | | | | | | | | | Capt. A. T. Miller. |
| Brig Catherine | | | | | | | | | | | | | | | | | | | Capt. Adam Smith. |
| Barque Celeste | | | | | | | | | | | | | | | | | | | Capt. D. F. McKechnie. |
| S. S. Hibernia | | | | | | | | | | | | | | | | | | | Capt. W. R. Cato. |
| Barque Maroon | | | | | | | | | | | | | | | | | | | Capt. A. T. Brown. |
| Ship Mikado | | | | | | | | | | | | | | | | | | | Capt. C. C. Prehn. |
| S. S. Seine, N. 51° 26′, W. 34° 28′. | | | 29.64 | 752.8 | 58 | 14.4 | | WNW. | | | 5 | | 6 | | | 6 | SW. | D. clouds | Capt. H. Manning. |

*Feet.

*Bulletin of international meteorological observations, taken simultaneously on October 1, 1877*—Continued.

BRITISH SERIES—Continued.

| Stations. | Barometer. | | | | Temperature of the air. | | Relative humidity. | Wind. | | | | Clouds. | | | | Rain-fall or melted snow in the past 24 hours. | | Weather. | Observer. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Corrected for instrumental error and temperature. | | Reduced to sea-level. | | | | | Direction. | Velocity. | | Force. | Amount. | | Direction. | | Sea or swell. | | | |
| | | | | | | | | | | | | Upper. | Lower. | Upper. | Lower. | Height scale 0-9. | Direction from— | | |
| | Inches. | Millimeters. | Inches. | Millimeters. | Fahrenheit. | Centigrade. | Per cent. | From— | Miles per hour. | Meters per second. | 0—10. | 0—10. | 0—10. | From— | From— | Inches. | Millimeters. | | |
| Barque Sorata | | | | | | | | | | | | | | | | | | | Capt. Jas. J. Price. |
| Schooner Traveller, N. 43° 0′, W. 49° 25′. | | | 30.29 | 769.4 | 53 | 11.7 | | SW. | | | 2 | | 1 | | | 4 | N. | Blue sky | Capt. Alex. Simpson. |

NOTE.—The originals give the wind-direction to 32 points; the force by Beaufort scale, 0 to 12. The distinction between upper and lower clouds is made as to direction, but not as to amount. The height of sea-disturbance by the scale 0 to 9, except for steamship Algeria (Captain Watson), which gives estimated height of waves in feet. Weather by the Beaufort notation. The barometers and thermometers used by these observers have been generally carefully compared and corrected.

COSTA RICA SERIES.

[By authority of the Minister of Foreign Affairs. Furnished by the co-operation of Señor Federico Maison, Director of the Central Office of Statistics and Meteorology.]

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| San José | 26.25 | 666.7 | | | 68.4 | 20.2 | 92 | E. | | | 1 | 1c | | | | 0 | 0 | | Federico Maison. |

NOTE.—In the originals the barometer is given as read off; its instrumental error is not known; the elevation of San José is 1,145 meters, or 3,756.4 feet. The distinction between the upper and lower clouds is not made. The rain-fall is apparently measured at following midnight, and, in the originals, given in Spanish inches. It is not certain that the remarks in the weather column refer to the moment of observation.

## DANISH SERIES.

[Furnished by the co-operation of Capt. N. Hoffmeyer, Director of the Royal Danish Meteorological Institute at Copenhagen.]

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Copenhagen | 30.18 | 766.6 | 30.23 | 767.8 | 50.5 | 10.3 | 63 | SE. | | | 2 | | 9 | | | | | |
| Fanöe | 30.11 | 764.9 | 30.13 | 765.4 | 54.7 | 12.6 | 77 | SE. | | | 4 | | 10 | | | | | |
| Godthaab (Greenland) | | | | | | | | | | | | | | | | | | |
| Stykkisholm (Iceland) | 29.69 | 754.1 | 29.73 | 755.2 | 47.3 | 8.5 | 99 | SE. | | | 4 | | 8 | | | | | |
| Thorshavn (Faröe) | 30.01 | 762.2 | 30.04 | 763.1 | 52.7 | 11.5 | 89 | Calm. | | | 0 | | 10 | | | | | |
| Vestervig | 29.94 | 760.4 | 30.11 | 764.7 | 54.0 | 12.2 | 73 | ESE. | | | 2 | | 6 | | | | | |

NOTE.—The originals give the wind-force by the scale 0 to 6; occasionally weather by the Vienna symbols. No distinction between the amount of upper and lower clouds.

## FRENCH SERIES.

[Furnished by the co-operation of the Director of the Paris Observatory and the respective observers.]

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alençon, Normal School | 29.60 | 751.8 | 30.15 | 765.8 | 59.0 | 15 | 63 | NE. | | | 2 | | 0 | | | 0 | 0 | Clear | Collignon, Director. |
| Amiens, Normal School | 29.93 | 760.3 | 30.04 | 763.1 | 59.7 | 15.4 | 78 | WNW. | | | 2 | | 1 | | W. | | | Clear | Bonvarne, Director. |
| Avignon, Normal School | 29.93 | 760.2 | 30.01 | 762.2 | 70.2 | 21.2 | 36 | NW. | | | 1 | | 0 | | | 0 | 0 | Very clear | Mr. Girand, Director. |
| Bar-sur-Seine | 29.48 | 748.9 | 30.04 | 763.1 | 63.3 | 17.4 | 56 | ESE. | | | 2 | 2c | | | | 0 | 0 | Clear | C. Saillard. |
| Beaumette Obs'y (Angers) | 29.93 | 760.1 | 30.08 | 764.0 | 67.8 | 19.9 | 52 | N. | 2.0 | 0.9 | | | | | NE. | 0 | 0 | | Albert Cheux. |
| Beauvais | 29.84 | 757.9 | 30.12 | 765.1 | 59.4 | 15.2 | 60 | ENE. | | | 2 | | 1 | | NNE. | 0 | 0 | Clear | Normal School. |
| Besançon | 29.19 | 741.5 | 30.08 | 763.9 | 59.0 | 15 | 72 | SE. | | | 2 | | 0 | | | 0 | 0 | Clear | Normal School. |
| Bourg-en-Bresse | 29.15 | 740.4 | 30.07 | 763.8 | 65.3 | 18.5 | 54 | NW. | | | 2 | | 0 | | | 0 | 0 | Clear | Normal School. |
| Bourges, Normal School | 29.52 | 749.8 | 30.07 | 763.6 | 60.8 | 16 | 64 | NW. | | | 1 | | 2 | | NW. | 0 | 0 | Sl'tly cloudy | A. Wagner, Director. |
| Brest, Naval Observatory | 29.84 | 758.0 | 30.07 | 763.6 | 68.9 | 20.5 | 72 | NW. | | | 1 | | 5 | | Calm. | 0 | 0 | Foggy | The Staff. |
| Carcassonne, Normal School | 29.75 | 755.7 | 30.16 | 766.1 | 65.1 | 18.4 | 84 | E. | | | 4 | | 2 | | E. | 0 | 0 | Sl'tly cloudy | Vateau, Director. |
| Caen | | | | | | | | | | | | | | | | | | | Normal School. |
| Chartres, Normal School | 29.61 | 752.0 | 30.17 | 766.3 | 62.4 | 16.9 | 92 | N. | | | 2 | | 8 | | SE. | | | | Lequin, Director. |
| Châlons-sur-Marne, N. Sch'l | 29.77 | 756.1 | 30.08 | 764.1 | 63.7 | 17.6 | 71 | N. | | | 2 | | 2k | | SW. | 0 | 0 | Sl'tly cloudy | T. Leloup, Director. |
| Clermont-Fd., Puy de D. Obs | 28.68 | 728.5 | 29.99 | 761.8 | 69.3 | 20.7 | 43 | E. | | | 1 | | 0 | | | 0 | 0 | Clear | Alluard, Director. |
| Commercy, Normal School | 29.20 | 741.6 | 30.08 | 764.0 | 51.8 | 11 | 86 | E. | | | 2 | | 0 | | | 0 | 0 | Clear | Dr. Goulet, Director. |
| Commune de Gréasque | 28.91 | 734.3 | 30.05 | 763.3 | 72.0 | 22.2 | 26 | E. | | | 2 | | 5 | | E. | 0 | 0 | Half clouded | M. Kina. |
| Grenoble | | | | | | | | | | | | | | | | | | | Normal School. |
| La Roche-sur-Yon, N. Sch'l. | 29.83 | 757.7 | 30.04 | 763.0 | 68.0 | 20 | 72 | NW. | | | 2 | | 5 | | NW. | 0 | 0 | Cloudy | Mouillot, Director. |
| Le Mans, Normal School | 29.81 | 757.1 | 30.11 | 764.9 | 62.4 | 16.9 | 64 | NNE. | | | 2 | | 2 | | NE. | 0 | 0 | Sl'tly cloudy | Poirrier, Director. |
| Lons-Le-Saulnier, N. School | 29.13 | 740.0 | 30.04 | 763.0 | 61.3 | 16.3 | 75 | NW. | | | 1 | | 0 | | | 0 | 0 | Clear | Pin, Director. |
| Lorient, Naval Observatory | 30.04 | 762.9 | 30.13 | 765.4 | 69.4 | 20.8 | 61 | S. | | | 2 | | 2 | | SE. | 0 | 0 | ¼ covered | T. Carré, Director. |
| Mâcon, Normal School | 29.34 | 745.3 | 29.98 | 761.6 | 61.5 | 16.4 | 89 | NNE. | | | 6 | | 10 | | | 0 | 0 | Covered | M. Marchal, Director. |
| Metz | | | | | | | | | | | | | | | | | | | M. A. Schuster, Director. |
| Mirecourt | 28.97 | 735.8 | 30.01 | 762.3 | 56.5 | 13.6 | 66 | NNE. | | | 1 | | 2 | | NE. | 0 | 0 | Sl'tly cloudy | Normal School. |
| Nismes, Normal School | 29.87 | 758.7 | 30.07 | 763.8 | 61.7 | 16.5 | 72 | N. | | | 4 | | 0 | | | 0 | 0 | Clear | Boyer, Director. |
| Orleans, Normal School | 29.76 | 755.9 | 30.14 | 765.5 | 59.4 | 15.2 | 70 | NW. | | | 2 | | 0 | | | 0 | 0 | Clear | Bernard, Director. |
| Paris, Observatory | 29.85 | 758.2 | 30.09 | 764.3 | 58.8 | 14.9 | 68 | NNE. | | | 2 | | 0 | | | 0 | 0 | Clear | National Observatory. |
| Privas | | | | | | | | | | | | | | | | | | | Normal School. |
| Rochefort, Naval Obs'y | 30.04 | 762.9 | 30.07 | 763.7 | 71.6 | 22.0 | 43 | ENE. | | | 1 | | 0 | | | 0 | 0 | Clear | Lt. Decante, Director. |
| Rouen, Normal School | 30.02 | 762.6 | 30.11 | 764.8 | 64.8 | 18.2 | 55 | NE. | | | 2 | | 0 | | | 0 | 0 | Clear | F. Lucard, Director. |
| Tarbes, Normal School | 28.98 | 736.1 | 30.04 | 762.9 | 68.0 | 20 | 62 | W. | | | 2 | | 2 | | E. | 0 | 0 | Sl'tly cloudy | T. Hugues, Director. |
| Villefranche | | | | | | | | | | | | | | | | | | | Vilot, Director. |

*Bulletin of international meteorological observations, taken simultaneously on October* 1, 1877—Continued.

FRENCH SERIES—Continued.

| Stations. | Barometer. | | | | Temperature of the air. | | Relative humidity. | Wind. | | | | Clouds. | | | | Rain-fall or melted snow in the past 24 hours. | | Weather. | Observer. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Corrected for instrumental error and temperature. | | Reduced to sea-level. | | | | | Direction. | Velocity. | | Force. | Amount. | | Direction. | | | | | |
| | Inches. | Millimeters. | Inches. | Millimeters. | Fahrenheit. | Centigrade. | Per cent. | From— | Miles per hour. | Meters per second. | 0—10. | Upper. 0—10. | Lower. 0—10. | Upper. From— | Lower. From— | Inches. | Millimeters. | | |
| SUB-SERIES. | | | | | | | | | | | | | | | | | | | |
| Fort de France, Martinique | 29.84 | 758.0 | 29.87 | 758.7 | 82.4 | 28 | .... | ..... | ..... | ..... | .... | ..... | ..... | ..... | ..... | 0 | 0 | ..... | L'Abbé Marchési. |
| Marseilles, Observatory | ..... | ..... | 29.99 | 761.7 | 70.3 | 21.3 | 41 | W. | ..... | ..... | 2 | ..... | 7 | ..... | ..... | 0 | 0 | Partly cl'dy. | The Staff. |
| Mont-Louis | 24.88 | 632.0 | 30.20 | 767.0 | 51.8 | 11.0 | 63 | ESE. | 16.8 | 7.50 | .... | ..... | 4 | ..... | E. | 0 | 0 | ..... | Mr. Falguère. |
| Nice | ..... | ..... | ..... | ..... | ..... | ..... | .... | ..... | ..... | ..... | .... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | Dr. A. Niepce. |
| Paris Montsouris, Obs'y | 29.81 | 757.1 | 30.08 | 764.1 | 59.5 | 15.3 | 68 | N. | ..... | ..... | 2–3 | 1c | ..... | SW. | ..... | 0 | 0 | Clear | Marié Davy, Director. |
| Perpignan | ..... | ..... | 30.02 | 762.5 | 64.4 | 18.0 | 60 | SE. | 5.6 | 2.50 | .... | ..... | 1 | ..... | W. | 0 | 0 | ..... | Dr. Fines. |
| Pic du Midi (summit), H. P. | 21.32 | 541.5 | ..... | ..... | 35.6 | 2.0 | .... | NE. | ..... | ..... | 2 | ..... | 10 | ..... | ..... | ..... | ..... | Rainy | M. Baylac. |
| Pic du Midi (plantade), H. P. | 22.56 | 573.0 | ..... | ..... | 36.5 | 2.5 | .... | NE. | ..... | ..... | 3 | ..... | 10 | ..... | ..... | 0.063 | 1.6 | Rainy | Gen'l de Nansouty. |
| Saint Maur (near Paris) | 29.93 | 760.1 | 30.09 | 764.3 | 61.3 | 16.3 | 74 | NNW. | ..... | ..... | 1 | ..... | 0 | ..... | ..... | 0 | 0 | ..... | E. Renou. |
| Toulouse, Observatory | 29.35 | 745.4 | 30.07 | 763.6 | 63.5 | 17.5 | 55 | SE. | ..... | ..... | 1 | ..... | 1 | ..... | ..... | 0 | 0 | ..... | The Staff. |
| Tours | 29.95 | 760.6 | 30.14 | 765.6 | 67.3 | 19.6 | .... | NNW. | ..... | ..... | 1 | ..... | 4 | ..... | S. | 0 | 0 | ..... | C. Marquet. |
| Versailles (near Paris) | ..... | ..... | 30.10 | 764.5 | 61.9 | 16.6 | 72 | NE. | ..... | ..... | 1 | ..... | 0 | ..... | ..... | 0.006 | 0.14 | Very clear | Dr. A. Bérigny. |
| Zi-Ka-Wei (near Shanghai) | 30.03 | 762.8 | 30.06 | 763.4 | 59.0 | 15.0 | 78 | WSW. | 5.1 | 2.3 | .... | ..... | 0 | ..... | ..... | 0 | 0 | Clear | Marc Dechevrens, S. J. |

* Bouches-du-Rhône.

NOTE.—Generally, the originals give the wind-force by the scale 0 to 7; no distinction between upper and lower clouds, and, in the official series, the amount by the scale 0 to 4; the rain-fall as measured at 7, 8, or 9 a. m., except St. Maur 10 p. m., local time; at Clermont-Ferrand 9 a. m. of the following day; the weather in general terms as published; for Montsouris the barometer reduced to freezing but not to sea-level. The elevation of Clermont-Ferrand is 388 meters, or 1,272.9 feet; Commune de Gréasque, 322 meters, or 1,056.4 feet; Tarbes, 308 meters, or 1,010 feet; Mont-Louis, 1,586.40 meters, or 5,204.8 feet; Pic du Midi (summit), 2,877 meters, or 9,439.1 feet; Pic du Midi (plantade), 2,366 meters, or 7,762.1 feet. In correcting the Mont-Louis barometric observations for altitude the constant 135 millimeters has been added. At Clermont-Ferrand the observations have been taken at 0.50, instead of 0.55, p. m., local time.

## GERMAN SERIES.

*[Furnished by the co-operation of Prof. Dr. G. Neumayer, Director of the German Naval Observatory, Hamburg.]*

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Berlin | 29.98 | 761.5 | 30.15 | 765.8 | 57.2 | 14.0 | 62 | SE. | | | 1 | | 6 | | | 0 | 0 | | Prof. Arndt. |
| Breslau | 29.66 | 753.4 | 30.20 | 767.0 | 58.3 | 14.6 | 54 | ESE. | | | 3 | | 4 | | | 0 | 0 | | Royal University Obs'y. |
| Carlsruhe | 29.61 | 752.0 | 30.04 | 762.9 | 56.5 | 13.6 | 77 | ESE. | | | 1 | | 0 | | | 0 | 0 | | Albert Senz. |
| Cassel | 29.50 | 749.2 | 30.12 | 765.1 | 64.0 | 17.8 | 57 | E. | | | 2 | | 2 | NE. | | 0 | 0 | | Dr. H. Möhl. |
| Crefeld | 29.90 | 759.5 | 30.07 | 763.6 | 55.4 | 13.0 | 77 | NW. | | | 3 | | 0 | | | 0 | 0 | | Director Lose. |
| Emden | 30.07 | 763.8 | 30.11 | 764.7 | 58.3 | 14.6 | 71 | NE. | | | 3 | | 9 | | | 0 | 0 | | Prof. Prestel. |
| Franfort-on-the-Main | 29.71 | 754.6 | 30.07 | 763.8 | 60.8 | 16.0 | 52 | NE. | | | 1 | | 0 | | | 0 | 0 | | Physical Society. |
| Friedrichshafen | 28.63 | 727.1 | 30.07 | 763.7 | 52.9 | 11.6 | 86 | NNW. | | | 3 | | 10 | | | 0 | 0 | Foggy | M. Wilhelm. |
| Hamburg | 30.04 | 763.1 | 30.11 | 764.9 | 55.4 | 13.0 | 68 | SE. | | | 4 | | 8k; ck | SW. | | 0 | 0 | Fair | Capt. F. Hegemann. |
| Kiel | 30.12 | 765.1 | 30.14 | 765.5 | 54.3 | 12.4 | 72 | E. | | | 2 | | 10 | | | 0 | 0 | | Prof. G. Karsten. |
| Königsberg (Prussia) | 30.23 | 767.8 | 30.30 | 769.6 | 50.7 | 10.4 | 49 | SE. | | | | | | | | | | Fair | Prof. E. Luther. |
| Köslin | | | 30.24 | 768.1 | 51.8 | 11.0 | | SE. | | | 4 | | 0 | | | 0 | 0 | | H. Müller. |
| Leipsic, Observatory | 29.71 | 754.6 | 30.13 | 765.2 | 59.5 | 15.3 | 58 | ESE. | | | 3 | | 3 | ESE. | | 0 | 0 | | Prof. Bruhns. |
| Memel, Naval School | 30.31 | 769.8 | 30.35 | 771.0 | 49.1 | 9.5 | 55 | W. | | | 1 | | 1s | | | | | | Reinbrecht and Skalweit. |
| Neufahrwasser | 30.32 | 770.2 | 30.34 | 770.6 | 50.0 | 10.0 | 57 | E. | | | 2 | | 8 | | | 0 | 0 | | A. Lothes. |
| Posen | 29.96 | 761.0 | 30.25 | 768.3 | 56.5 | 13.6 | 70 | S. | | | 6-7 | | 9 | | | | | Cloudy | Dr. Magener. |
| Strassburg Obs'y (in Alsace) | 29.52 | 749.9 | 30.08 | 764.0 | 52.7 | 11.5 | 87 | Calm. | | | 0 | | 10 | | | 0 | 0 | Foggy | Dr. Schur. |
| Stuttgart | 29.09 | 738.8 | 30.02 | 762.5 | 59.0 | 15.0 | 63 | NE. | | | 1 | | 2 | E. | | 0 | 0 | | Prof. Schoder. |
| Troves (Trier) | 29.41 | 746.9 | 29.93 | 760.1 | 60.6 | 15.9 | 63 | NE. | | | 1 | | 0 | | | 0 | 0 | | Prof. Flesch. |
| Weissenburg (Bavaria) | 28.52 | 724.4 | 30.01 | 762.3 | 58.3 | 14.6 | 48 | SE. | | | 2 | | 2 | | SE. | 0 | 0 | | Dr. Von Bebber. |
| Wustrow, Naval School | 30.24 | 768.1 | 30.29 | 769.4 | 55.2 | 12.9 | 66 | ESE. | | | 3 | | 5 | | | | | Fair | E. F. Schütz. |

NOTE.—The elevation of Friedrichshafen is 413.3 meters, or 1,355.9 feet; Weissenburg, 431 meters, or 1,414.0 feet. In the originals the distinction between the amount of upper and lower clouds is not made. The barometer at Berlin, Königsberg, Posen, and Wustrow is given in Paris lines, and, except Wustrow, reduced to freezing but not to sea-level; the temperature by Reaumur scale; the wind-force at Carlsruhe by the scale 0 to 4; Crefeld, by the scale 0 to 12; the rain-fall at Berlin in Paris lines. It is not always certain that the rain-fall has been measured at, and the remarks in the weather column refer to, the moment of observation. At Königsberg the observations have been taken at 2 p. m. instead of 2.5 p. m.; Memel, 2.1 p. m. instead of 2.7 p. m.; Posen, 2 p. m. instead of 1.51 p. m., local time.

## GREEK SERIES.

[Furnished by the co-operation of Prof. Dr. J. F. Julius Schmidt, Director of the Royal Observatory at Athens.]

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Athens | 29.67 | 753.7 | 30.05 | 763.3 | 75.2 | 24.0 | | NE. | | | | | | | | | Half clear | Dr. J. F. J. Schmidt. |

NOTE.—The originals give the barometer reduced to freezing but not to sea-level; occasionally the kind of clouds and wind-force as published; the weather as published. They omit the humidity, amount of cloudiness, and rain-fall.

*Bulletin of international meteorological observations, taken simultaneously on October* 1, 1877—Continued.

INDIAN SERIES.

[Furnished by the co-operation of H. F. Blanford, Meteorological Reporter to the Government of India.]

| Stations. | Barometer. | | | | Temperature of the air. | | Relative humidity. | Wind. | | | Force. | Clouds. | | | | Rain-fall or melted snow in the past 24 hours. | | Weather. | Observer. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Corrected for instrumental error and temperature. | | Reduced to sea-level. | | | | | Direction. | Velocity. | | | Amount. | | Direction. | | | | | |
| | | | | | | | | | | | | Upper. | Lower. | Upper. | Lower. | | | | |
| | Inches. | Millimeters. | Inches. | Millimeters. | Fahrenheit. | Centigrade. | Per cent. | From— | Miles per hour. | Meters per second. | 0—10. | 0—10. | 0—10. | From— | From— | Inches. | Millimeters. | | |
| Kurrachee | 29.73 | 755.2 | 29.78 | 756.5 | 83.7 | 28.7 | 79 | WSW. | 33.0? | 14.8? | | | 0 | | | 0 | 0 | Blue sky | |
| Deesa | 29.33 | 745.0 | 29.79 | 756.7 | 97.5 | 36.4 | 33 | WSW. | | | | | 1 | SE. | | 0 | 0 | Misty | |
| Bombay | 29.78 | 756.3 | 29.81 | 757.2 | 78.7 | 25.9 | 91 | SW. | 8.0 | 3.6 | | | 10 | SSE. | S. | | | Raining | |
| Poona | 27.81 | 706.4 | 29.81 | 757.2 | 78.0 | 25.6 | 82 | NE. | | | | | 10 | | N. | 0.07 | 1.8 | Lightning | |
| Lahore | 28.97 | 735.8 | 29.76 | 754.2 | 90.1 | 32.3 | 35 | Calm. | 1.2 | 0.5 | | | 0 | | | 0 | 0 | Blue sky | |
| Belgaum | 27.36 | 694.9 | 29.92 | 760.0 | 71.4 | 21.9 | 89 | WSW. | 5.0 | 2.2 | | | 7 | SE. | WSW | 0.05 | 1.3 | D. clouds | |
| Bangalore | | | | | | | | | | | | | | | | | | | |
| Roorkee | 28.80 | 731.6 | 29.68 | 753.7 | 93.8 | 34.3 | 17 | NW. | 3.2 | 1.4 | | | | | | 0 | 0 | | |
| Agra | 29.13 | 739.8 | 29.67 | 753.6 | 100.7 | 38.2 | 18 | W. | | | | | | | | 0 | 0 | | |
| Trichinopoly | | | | | | | | | | | | | | | | | | | |
| Nagpur | 28.76 | 730.4 | 29.79 | 756.6 | 86.8 | 30.4 | 56 | E. | 2.5 | 1.1 | | | 7 | | | 0 | 0 | D. clouds | |
| Madras | | | | | | | | | | | | | | | | | | | |
| Lucknow | 29.34 | 745.2 | 29.70 | 754.3 | 95.1 | 35.1 | 22 | N. | 1.7 | 0.8 | | | | | | 0 | 0 | Blue sky | |
| Allahabad | 29.38 | 746.2 | 29.68 | 754.0 | 89.1 | 31.7 | 41 | Calm. | 2.7 | 1.2 | | | 0 | | | 0 | 0 | Blue sky | |
| Patna | 29.54 | 750.2 | 29.72 | 754.8 | 88.6 | 31.4 | 68 | E. | 1.1 | 0.5 | | | 2 | E. | E. | 0 | 0 | | |
| Hazaribagh | 27.78 | 705.7 | 29.78 | 756.5 | 80.3 | 26.8 | 55 | NNE. | 8.9 | 4.0 | | | 4 | | N. | 0 | 0 | | |
| Cuttack | 29.72 | 755.0 | 29.80 | 757.0 | 87.4 | 30.8 | 79 | SSW. | 1.2 | 0.5 | | | 4 | | | 0 | 0 | D. clouds | |
| Calcutta (Alipore) | 29.80 | 756.9 | 29.82 | 757.5 | 83.9 | 28.8 | 87 | SSW. | 6.0 | 2.7 | | | 1 | | | 0 | 0 | Blue sky | |
| Goalpara | 29.44 | 747.8 | 29.83 | 757.8 | 77.1 | 25.1 | 77 | Calm. | 3.1 | 1.4 | | | 9 | | S. | 0.55 | 14.0 | D. clouds | |
| Chittagong | 29.81 | 757.1 | 29.90 | 759.5 | 74.1 | 23.4 | 93 | ENE. | 2.0 | 0.9 | | | 10 | | | 0 | 0 | Gloomy | |
| Sibsagar | 29.55 | 750.5 | 29.89 | 759.1 | 76.1 | 24.5 | 85 | ENE. | 3.7 | 1.6 | | | 10 | W. | W. | 0 | 0 | Gloomy | |
| Rangoon | | | | | | | | | | | | | | | | | | | |
| Jubbulpore | 28.44 | 722.4 | 29.80 | 756.8 | 84.5 | 29.2 | 67 | NW. | 3.3 | 1.5 | | | 7 | W. | | 0 | 0 | D. clouds | |

NOTE.—The barometric observations refer to the Calcutta standard, which is believed to read 0.011 inch or 0.28 mm. higher than the Kew standard. In the originals the data are given to an additional decimal, and all conversions are published as given; the weather by the Beaufort notation, Vienna symbols, or special symbols; the distinction between the amount of upper and lower clouds is apparently not made. The elevation of Poona is 1,992.4 feet, or 606.3 meters; Bangalore, 2,989 feet, or 911.0 meters; Nagpur, 1,025 feet, or 312.4 meters; Hazaribagh, 2,010 feet, or 612.6 meters; Jubbulpore, 1,351 feet, or 411.8 meters.

## ITALIAN SERIES.

[Furnished by the co-operation of His Excellency the Minister of Agriculture, Industry, and Commerce, and the respective observers.]

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valdobbia | 22.22 | 564.5 | 30.09 | 764.3 | 40.8 | 4.9 | 86 | NNW. | | | 1 | | 10 | | | 0 | 0 | Ab. Dom. Mongini. |
| Stelvio | 22.22 | 564.5 | 30.11 | 764.8 | 34.9 | 1.6 | | ENE. | | | 1 | | 10 | | | 0 | 0 | Signora Ernesta Manfredi |
| Udine | 29.63 | 752.5 | 30.04 | 762.9 | 64.6 | 18.1 | 41 | SE. | 7.4 | 3.3 | | | 7 | | | 0 | 0 | Prof. Giovanni Clodig. |
| Padua | 29.92 | 760.0 | 30.03 | 762.8 | 64.6 | 18.1 | 46 | NE. | 11.2 | 5.0 | | | 8 | E. | | 0 | 0 | Prof. Dott. Lorenzoni. |
| Vicenza | 29.84 | 757.9 | 30.03 | 762.8 | 64.4 | 18.0 | 45 | S. | 2.5 | 1.1 | | | 2 | W. | | 0 | 0 | Conte Alm. Da Schio. |
| Verona | 29.80 | 757.0 | 30.02 | 762.6 | 71.6 | 22.0 | 46 | E. | 11.9 | 5.3 | | | 8 | W. | | 0 | 0 | Dott. B. Bertoncelli. |
| Bergamo | 28.75 | 730.2 | 30.06 | 763.5 | 59.0 | 15.0 | 60 | W. | | | 1 | | 10 | | | 0 | 0 | Prof. Trionfini Carlo. |
| Domodossola | 29.04 | 737.5 | 30.07 | 763.6 | 57.7 | 14.3 | 68 | S. | | | 6 | | 10 | | | 0 | 0 | Prof. Giuseppe Calza. |
| Milan | 29.58 | 751.2 | 30.10 | 764.4 | 60.4 | 15.8 | 67 | NE. | | | 2 | | 10 | E. | | 0 | 0 | Ab. Gio. Capelli. |
| Pavia | 29.72 | 754.8 | 30.07 | 763.6 | 61.3 | 16.3 | 59 | NE. | | | 2 | | 8 | NE. | | 0 | 0 | Prof. Gio. Cantoni. |
| Moncalieri | 29.16 | 740.7 | 30.07 | 763.8 | 61.0 | 16.1 | 59 | NNE. | 1.3 | 0.6 | | | 9 | W. | | 0 | 0 | Prof. P. F. Denza. |
| Mondovi | 28.16 | 715.3 | 30.08 | 764.0 | 57.2 | 14.0 | 49 | N. | | | 4 | | 7 | NW. | | 0 | 0 | Prof. D. C. Bruno. |
| Porto Maurizio | 29.77 | 756.1 | 29.98 | 761.6 | 68.7 | 20.4 | 25 | ENE. | | | 6 | | 7 | | | 0 | 0 | Prof. L. Vassallo. |
| Genoa | 29.82 | 757.3 | 29.98 | 761.6 | 68.4 | 20.2 | 40 | NW. | 7.4 | 3.3 | | | 2 | SW. | | 0 | 0 | Prof. G. M. Garibaldi. |
| Piacenza | 29.80 | 757.0 | 30.06 | 763.5 | 63.9 | 17.7 | 39 | E. | 9.4 | 4.2 | | | 6 | E. | | 0 | 0 | Dott. G. Manzi. |
| Parma | 29.72 | 754.9 | 30.04 | 762.9 | 64.4 | 18.0 | 41 | NE. | | | 4 | | 5 | | | 0 | 0 | Prof. P. Pigorini. |
| Florence | 29.74 | 755.4 | 30.00 | 761.9 | 67.5 | 19.7 | 37 | NE. | | | 6 | | 5 | SE. | | 0 | 0 | Cav. F. Meucci. |
| Leghorn | 29.88 | 758.9 | 29.96 | 761.0 | 67.6 | 19.8 | 35 | ENE. | 3.1 | 1.4 | | | 5 | | | 0 | 0 | Prof. P. Monte. |
| Siena | 28.76 | 730.5 | 29.97 | 761.1 | 64.0 | 17.8 | 40 | ENE. | 6.3 | 2.8 | | | 8 | N. | | 0 | 0 | Prof. L. Toscani. |
| Urbino | 28.50 | 724.0 | 30.07 | 763.7 | 57.0 | 13.9 | 81 | NE. | | | 2 | | 9 | | | 0 | 0 | Prof. P. Serpieri. |
| Pesaro | 29.97 | 761.3 | 30.02 | 762.5 | 61.3 | 16.3 | 76 | NW. | 6.3 | 2.8 | | | 10 | | | 0 | 0 | Prof. Luigi Guidi. |
| Ancona | 29.87 | 758.7 | 29.98 | 761.4 | 65.5 | 18.6 | 57 | N. | | | 4 | | 7 | | | 0 | 0 | Prof. F. DeBosis. |
| Grosseto | 29.86 | 758.5 | 29.97 | 761.3 | 70.5 | 21.4 | 36 | ENE. | | | 4 | | 5 | SE. | | 0 | 0 | Avv. P. Ponticelli. |
| Rome | 29.73 | 755.2 | 29.91 | 759.6 | 71.4 | 21.9 | 37 | W. | 3.1 | 1.4 | | | 1 | | | 0 | 0 | Profs. P. Secchi and L. Respighi. |
| Naples, O. U | 29.73 | 755.2 | 29.93 | 760.2 | 70.5 | 21.4 | 39 | SE. | | | 2 | | 10 | SSW. | | 0.031 | 0.8 | Prof. L. Palmieri. |
| Lecce | 29.66 | 753.4 | 29.91 | 759.7 | 68.2 | 20.1 | 65 | N. | 9.8 | 4.4 | | | 8 | SE. | | 0.087 | 2.2 | Prof. C. De Giorgi. |
| Cosenza | 29.13 | 739.8 | 30.00 | 762.0 | 62.6 | 17.0 | 88 | SE. | 1.3 | 0.6 | | | 10 | | | 0.350 | 8.9 | Prof. F. D. Conti. |
| Cagliari | 29.62 | 752.3 | 29.81 | 757.1 | 76.6 | 24.8 | 49 | S. | | | 2 | | 8 | NE. | | 0 | 0 | Prof. A. Pacinotti. |
| Riposto (Sicily) | 29.78 | 756.3 | 29.82 | 757.5 | 68.0 | 20.0 | 88 | SW. | | | 4 | | 10 | E. | | 4.684 | 119.0 | Prof. F. Cafiero. |
| Palermo | 29.48 | 748.9 | 29.73 | 755.2 | 73.4 | 23.0 | 75 | W. | 5.6 | 2.5 | | | 10 | | | 1.256 | 31.9 | Prof. G. Cacciatoro. |
| Caltanissetta | 27.86 | 707.6 | 29.77 | 756.2 | 67.3 | 19.6 | 96 | E. | | | 8 | | 10 | | | 1.528 | 38.8 | Prof. A. Pagani. |
| Syracuse | 29.71 | 754.6 | 29.78 | 756.5 | 73.4 | 23.0 | 86 | SE. | | | 6 | | 9 | E. | | 0.406 | 10.3 | Prof. V. Giuliano. |
| SUB-SERIES. | | | | | | | | | | | | | | | | | | |
| Naples, S. R | 29.39 | 746.6 | 29.95 | 760.7 | 66.6 | 19.2 | 88 | ESE. | 2.5 | 1.1 | | | 10 | | | 0 | 0 | Prof. F. Brioschi. |

NOTE.—The originals give the wind-force by the scale 0 to 4, or the velocity in kilometers per hour; no distinction between the amount of upper and lower clouds. The elevation of Stelvio is 2,543.0 meters, or 8,342.9 feet; Valdobbia, 2,548.0 m., or 8,359.3 ft.; Bergamo, 379.6 m., or 1,245.3 ft.; Mondovi, 556 m., or 1,824.2 ft.; Siena, 348.5 m., or 1,143.3 ft.; Urbino, 451 m., or 1,479.7 ft.; Caltanissetta, 570.3 m., or 1,871.0 ft.

## JAPANESE SERIES.

[Furnished by the co-operation of the Imperial Meteorological Observatory and the Imperial University of Tokei, Japan.]

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tokei (Yeddo) | | | | | | | | | | | | | | | | | | The Observatory. |
| Tokei (Yeddo) University | 29.87 | 758.7 | 29.97 | 761.2 | 60.5 | 15.8 | 94 | NW. | 5 | 2.2 | | | 1s | | | 0 | 0 | Fair ..... Prof. P. V. Veeder. |

*Bulletin of international meteorological observations, taken simultaneously on October* 1, 1877—Continued.

MEXICAN SERIES.

By authority of the Secretary of Public Works.

[Furnished by the co-operation of Señor Mariano Bárcena, Director of the Central Meteorological Observatory in the city of Mexico, and the respective observers.]

| Stations. | Barometer. | | | | Temperature of the air. | | Relative humidity. | Wind. | | | | Clouds. | | | | Rain-fall or melted snow in the past 24 hours. | | Weather. | Observer. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Corrected for instrumental error and temperature. | | Reduced to sea-level. | | | | | Direction. | Velocity. | | Force. | Amount. | | Direction. | | | | | |
| | Inches. | Millimeters. | Inches. | Millimeters. | Fahrenheit. | Centigrade. | Per cent. | From— | Miles per hour. | Meters per second. | 0—10. | Upper. 0—10. | Lower. 0—10. | Upper. From— | Lower. From— | Inches. | Millimeters. | | |
| Aguascalientes | | | | | | | | | | | | | | | | | | | I. N. Marin, M. D. |
| Córdoba | | | | | | | | | | | | | | | | | | | C. Peña, M. D. |
| Cuernavaca | | | | | | | | | | | | | | | | | | | L. Castillo, A. E. |
| Guadalajara | | | | | | | | | | | | | | | | | | | Prof. L. Perez. |
| Guanajuato | | | | | | | | | | | | | | | | | | | Prof. V. Fernandez. |
| Leon | | | | | | | | | | | | | | | | | | | Prof. M. Leal. |
| Mexico | 23.11 | 587.0 | 30.16 | 766.0 | 54.5 | 12.5 | 58 | W. | 0.2 | 0.11 | .... | 0 | 0 | | | 0 | 0 | Blue sky | Central Observatory. |
| Orizaba | | | | | | | | | | | | | | | | | | | N. N. |
| Orizaba | | | | | | | | | | | | | | | | | | | I. Orozco, M. D. |
| Pabellon (Aguascalts) | | | | | | | | | | | | | | | | | | | M. V. de Leon, M. E. |
| Puebla | | | | | | | | | | | | | | | | | | | Prof. B. Gonzalez. |
| Toluca | | | | | | | | | | | | | | | | | | | Prof. C. Velazquez. |
| Tlacotalpam | | | | | | | | | | | | | | | | | | | Prof. F. R. Bayly. |
| San Luis Potosí | | | | | | | | | | | | | | | | | | | G. Barroeta, M. D. |
| Vera Cruz | | | | | | | | | | | | | | | | | | | Prof. J. Rossell. |
| Zacatecas | | | | | | | | | | | | | | | | | | | J. A. Bonilla, M. E. |

NOTE.—The elevation of Aguascalientes is 1,861 m., or 6,105.4 ft.; Córdoba, 838 m., or 2,749.3 ft.; Cuernavaca, 1,510 m., or 4,953.9 ft.; Guadalajara, 1,560 m., or 5,117.9 ft.; Guanajuato, 2,010 m., or 6,594.2 ft.; Leon, 1,774 m., or 5,820 ft.; Mexico, 2,290 m., or 7,512.9 ft.; Orizaba, 1,223 m., or 4,012.4 ft.; Pabellon, 1,924.4 m., or 6,313.3 ft.; Puebla, 2,155 m., or 7,069.9 ft.; Toluca, 2,625 m., or 8,611.8 ft.; San Luis Potosí, 1,893 m., or 5,210.4 ft.; Zacatecas, 2,496 m., or 8,188.6 ft. The rain-fall is generally measured at 6 a. m., local time, at Córdoba at 2 p. m.

## NETHERLANDS' SERIES.

[Furnished by the co-operation of Professor Buys Ballot, Director of the Royal Meteorological Institute of the Netherlands at Utrecht.]

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flushing | 30.14 | 765.6 | 30.14 | 765.6 | 59.5 | 15.3 | .... | NNW. | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 0 | 0 | ..... | |
| Groningen | 30.03 | 762.8 | 30.09 | 764.2 | 56.1 | 13.4 | .... | NE. | ..... | ..... | 1 | ..... | ..... | ..... | ..... | 0 | 0 | ..... | |
| Helder | 30.09 | 764.3 | 30.09 | 764.3 | 56.1 | 13.4 | .... | N. | ..... | ..... | 2 | ..... | ..... | ..... | ..... | 0.020 | 0.5 | ..... | |
| Hellevoetsluis | ..... | ..... | 30.11 | 764.8 | 60.1 | 15.6 | 71 | NW. | ..... | ..... | 4 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | |
| Utrecht | 30.05 | 763.2 | 30.10 | 764.4 | 57.7 | 14.3 | 69 | N. | ..... | ..... | 3 | ..... | 2 | ..... | ..... | 0 | 0 | Light cloudy | H. v d Brink. |

NOTE.—The originals give the wind-pressure in kilograms per square meter: except Hellevoetsluis by force scale 0 to 12: they do not give the humidity; for Utrecht, they give the weather as published, from which the amount of cloudiness is taken by the scale 0 to 4, without distinguishing between upper and lower clouds.

## NORWEGIAN SERIES.

[Furnished by the co-operation of Prof. H. Mohn, Director of the Royal Norwegian Meteorological Institute, at Christiania.]

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bergen | 30.11 | 764.8 | 30.17 | 766.2 | 51.1 | 10.6 | 65 | Calm. | 0 | 0 | ..... | ..... | 1 | ..... | ..... | 0 | 0 | ..... | |
| Bröno | 29.94 | 760.5 | 29.98 | 761.5 | 43.5 | 6.4 | 86 | S. | 7 | 3 | ..... | ..... | 10 | ..... | ..... | 0 | 0 | ..... | |
| Christiania | 30.00 | 762.1 | 30.15 | 765.9 | 46.6 | 8.1 | 75 | NW. | 0 | 0 | ..... | ..... | 2 | ..... | ..... | 0 | 0 | ..... | |
| Tromsö | 29.70 | 754.4 | 29.74 | 755.5 | 31.8 | —0.1 | 100 | SW. | 4 | 2 | ..... | ..... | 10 | ..... | ..... | 0.197 | 5.0 | Snowing | |

NOTE.—The originals give the amount of cloudiness, without distinguishing between upper and lower clouds; occasionally the weather by the Vienna symbols. The cloudiness and weather at Bergen refer to $2^h$ p. m., local time, instead of $1^h\ 4^m$.

## PORTUGUESE SERIES.

[Furnished by the co-operation of J. C. de Brito Capello, Director of the Meteorological Observatory of the Infante Don Luiz at Lisbon.]

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Angra (Azores) | 29.91 | 759.7 | 30.10 | 764.5 | 70.2 | 21.2 | 92 | SW. | 10.9 | 8.9 | ..... | ..... | 10 | ..... | ..... | 3.582 | 91.0 | ..... | |
| Campo Major | 29.04 | 737.7 | 30.06 | 763.4 | 68.4 | 20.2 | 59 | NNW. | 11.2 | 5.0 | ..... | ..... | 7 | NNW | ..... | 0.110 | 2.8 | ..... | Dr. J. A. Sampaio. |
| Funchal (Madeira) | 30.15 | 765.9 | 30.23 | 967.7 | 73.4 | 23.0 | 61 | SW. | 11.9 | 5.3 | ..... | ..... | 7 | ..... | ..... | 0 | 0 | ..... | Dr. A. M. R. dos Santos. |
| Lisbon, Observatory | 29.76 | 756.0 | 30.12 | 765.0 | 67.8 | 19.9 | 59 | NNW. | 21.0 | 9.4 | ..... | ..... | 3 | ..... | ..... | 0 | 0 | ..... | Capt. D. A. de Cunha. |
| Ponta Delgada (Azores) | 30.12 | 765.1 | 30.19 | 766.9 | 70.5 | 21.4 | 91 | S. | 9.8 | 4.4 | ..... | ..... | 10 | ..... | ..... | 0.059 | 1.5 | ..... | The staff. |

NOTE.—The originals give the wind-velocity in kilometers for the hour preceding the observation; occasionally the weather by the Vienna symbols; the amount of cloudiness, without distinguishing between upper and lower clouds. The rain-fall at Lisbon is measured at noon instead of $0^h\ 6^m$ p. m.

| NAVAL SERIES. *Vessels.* | | | | | | | | | | | | | | | | Sea or swell. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | Height scale 0–9 | Direction from— | | |
| S. S. India | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | A. D. Pedroso, Com'd'nt. Lt. S. A. P. de Mirando. |

NOTE.—The originals give the barometer reduced to freezing but not to sea-level; the distinction between upper and lower clouds is made as to direction, but not as to amount; the weather by the Beaufort notation; they do not give the humidity.

*Bulletin of international meteorological observations, taken simultaneously on October* 1, 1877—Continued.

RUSSIAN SERIES.

[Furnished by the co-operation of Prof. H. Wild, Director of the Imperial Central Physical Observatory of Russia at St. Petersburg.]

| Stations. | Barometer. | | | | Temperature of the air. | | Relative humidity. | Wind. | | | | Clouds. | | | | Rain-fall or melted snow in the past 24 hours. | | Weather. | Observer. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Corrected for instrumental error and temperature. | | Reduced to sea-level. | | | | | Direction. | Velocity. | | Force. | Amount. | | Direction. | | | | | |
| | Inches. | Millimeters. | Inches. | Millimeters. | Fahrenheit. | Centigrade. | Per cent. | From— | Miles per hour. | Meters per second. | 0—10. | Upper. 0—10. | Lower. 0—10. | Upper. From— | Lower. From— | Inches. | Millimeters. | | |
| Warsaw | 29.86 | 758.4 | 30.29 | 769.3 | 51.8 | 11.0 | 54 | ESE. | 4 | 2 | | | 5 | | | | | | Astronomical Obs. |
| Wilna | 29.91 | 759.7 | 30.34 | 770.6 | 48.2 | 9.0 | 49 | W. | 2 | 1 | | | 3 | | | | | | Astronomical Obs. |
| Dorpat | 29.92 | 759.9 | 30.17 | 766.3 | 43.9 | 6.6 | 67 | WNW. | 7 | 3 | | | 7 | | | | | | Physical Cabinet. |
| St. Petersburg | 29.97 | 761.3 | 29.99 | 761.7 | 43.0 | 6.1 | 56 | WNW. | 16 | 7 | | | 8 | | | | | | Central Physical Obs. |
| Kuopio | 29.49 | 749.1 | 29.83 | 757.6 | 34.2 | 1.2 | 100 | WSW. | 27 | 12 | | | 10 | | | | | Snowing | Ch. Forsten. |
| Kieff | 29.65 | 753.0 | 30.30 | 769.6 | 46.2 | 7.9 | 54 | N. | 4 | 2 | | | 4 | | | | | | Physical Cabinet. |
| Nikolaiev | 30.27 | 768.8 | 30.34 | 770.6 | 56.8 | 13.8 | 41 | NE. | 0 | 0 | | | 0 | | | | | | Kurdakof. |
| Kertch | 30.28 | 769.1 | 30.30 | 769.6 | 61.2 | 16.2 | 59 | N. | 7 | 3 | | | 4 | | | | | | Lagorio. |
| Moscow | 29.49 | 749.1 | 30.06 | 763.4 | 40.1 | 4.5 | 43 | NE. | 9 | 4 | | | 7 | | | | | | Meteorological Obs. |
| Lugan | 30.01 | 762.2 | 30.21 | 767.4 | 47.5 | 8.6 | 35 | NW. | 13 | 6 | | | 2 | | | | | | Meteorological Obs. |
| Archangel | 29.54 | 750.3 | 29.56 | 750.8 | 33.4 | 0.8 | 92 | W. | 34 | 5 | | | 10 | | | | | Snowing | Ogorodnikof. |
| Tiflis | 28.70 | 728.9 | 30.09 | 764.2 | 68.2 | 20.1 | 24 | N. | 4 | 2 | | | 2 | | | | | | Physical Observatory. |
| Astrakhan | 30.19 | 766.9 | 30.11 | 764.8 | 50.5 | 10.3 | 40 | WNW. | 13 | 6 | | | 2 | | | | | | Sebastianof. |
| Kasan | 29.34 | 745.2 | 29.61 | 752.2 | 34.5 | 1.4 | 74 | WNW. | 7 | 3 | | | 7 | | | | | | Physical Cabinet. |
| Orenburg | 30.02 | 762.6 | 30.40 | 772.2 | 51.4 | 10.8 | .... | E. | 13 | 6 | | | 10 | | | | | | Tschernischef. |
| Ekaterinburg | 28.31 | 719.1 | 29.26 | 743.2 | 37.8 | 3.2 | 78 | W. | 2 | 1 | | | 8 | | | | | | Meteorological Obs. |
| Nukuss | 29.84 | 757.8 | 30.07 | 763.7 | 60.6 | 15.9 | 63 | WNW. | 2 | 1 | | | 0 | | | | | | |
| Kasaly | | | | | | | | | | | | | | | | | | | Bobrof. |
| Tashkend | 28.47 | 723.0 | 30.14 | 765.6 | 64.0 | 17.8 | 63 | N. | 7 | 3 | | | 10 | | | | | | Michelson. |
| Barnaul | 29.40 | 746.8 | 29.93 | 760.1 | 47.7 | 8.7 | 76 | NE. | 0 | 0 | | | 4 | | | | | | Meteorological Obs. |
| Yeniseisk | 29.87 | 758.8 | 30.02 | 762.5 | 41.0 | 5.0 | 84 | E. | 7 | 3 | | | 0 | | | | | | Marks. |
| Irkutsk | | | | | | | | | | | | | | | | | | | Usolzef. |
| Oorga | | | | | | | | | | | | | | | | | | | Mossin. |
| Peking (China) | 29.91 | 759.8 | 30.05 | 763.4 | 60.1 | 15.6 | 46 | Calm. | 0 | 0 | | | 10 | | | | | | Physical Observatory. |
| Nertchinsk | | | | | | | | | | | | | | | | | | | Meteorological Obs. |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Vladivostock* | | | | | | | | | | | | | | | | | | |
| *Nikolievsk on the Amoor* | | | | | 53.1 | 11.7 | 95 | Calm. | 0 | 0 | | 10 | | | | | | |

NOTE.—The originals give the amount of cloudiness without distinguishing between upper and lower clouds; occasionally the weather by the Vienna symbols; they *omit the rain-fall.* The elevation of Tiflis is 409 meters, or 1,341.8 feet; Ekaterinburg, 306.4? m., or 1,005.2? ft.; Tashkend, 494.2? m., or 1,621.3? ft.; Irkutsk, 392 m., or 1,286 ft.; Nertchinsk, 592.0? m., or 1,942.2? ft.; Oorga, 1,281.0? m., or 4,202.6? ft.

## SPANISH SERIES.

[Furnished by the co-operation of Antonio Aguilar, Director of the Royal Observatory at Madrid, and the respective observers.]

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Barcelona, Met. Observat'y. | | | | | | | | | | | | | | | | | | Antonio Rave, Director. |
| Bilbao, Met. Observatory | | | | | | | | | | | | | | | | | | Prof. Manuel de Naveran. |
| Burgos, Met. Observatory | | | | | | | | | | | | | | | | | | Domingo Martin y Perez. |
| Madrid, Royal Observatory. | 27.80 | 706.2 | 29.99 | 761.7 | 65.5 | 18.6 | 64 | NE. | 6.7 | 3.00 | | 0 | 8 | | | 0.051 | 1.3 | Almost cov'd | The Staff. |
| Murcia, Met. Observatory | | | | | | | | | | | | | | | | | | | Olayo Diaz, Director. |
| Santiago, Met. Observatory. | | | | | | | | | | | | | | | | | | | R. Gil Villanueva, Dir. |
| SUB-SERIES. | | | | | | | | | | | | | | | | | | | |
| Havana, Cuba, W. I | 29.76 | 755.8 | 29.84 | 757.9 | 81.1 | 27.3 | 87 | SSE. | 10.1 | 4.5 | | 7c | 1 ks | N. | | 0.087 | 2.2 | Fair | Benito Vines, S. J. |
| San Fernando, Naval Obs'y. | 29.99 | 761.6 | 30.08 | 764.1 | 67.5 | 19.7 | 69 | WNW. | 19.7 | 8.80 | | 0 | 6 | | NW. | 0 | 0 | | Capt. C. Pujazon, R. N., Director. |
| San Juan de Porto Rico, W.I. | | | 29.89 | 759.3 | 83.7 | 28.7 | 80 | SE. | 0 | 0 | | 6s | 1 k | | | 0.030 | 0.75 | Clear | Leonardo de Tejeda, Chief of Engineers. |

NOTE.—The originals give the weather in general terms as published; wind-velocity for Madrid in kilometers per hour; rain-fall for San Juan as measured at 4 p. m. instead of 8.19 a. m., local time, and for San Fernando at midnight following. The elevation of Burgos is 860 meters, or 2,821.4 feet; Madrid, 655.5 m., or 2,150.5 ft.

## SWEDISH SERIES.

[Furnished by the co-operation of Prof. R. Rubenson, Director of the Royal Swedish Meteorological Institute at Stockholm, and of Dr. H. H. Hildebrandsson, Chief of the Meteorological Division of the Upsala Observatory.]

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Haparanda | 29.80 | 756.8 | 29.84 | 757.8 | 40.3 | 4.6 | | NW. | | | 4 | 0 | | | 0 | 0 | | |
| Umea | 29.87 | 758.8 | 29.93 | 760.1 | 47.8 | 8.8 | 63 | N. | | | 2 | 6 | | | | | Raining | |
| Hernosand | 29.97 | 761.1 | 30.02 | 762.4 | 53.6 | 12.0 | 54 | WNW. | | | 4 | 7 | | | 0 | 0 | | |
| Stockholm | 29.96 | 760.9 | 30.13 | 765.4 | 51.1 | 10.6 | 74 | S. | | | 2 | 2 | | | 0 | 0 | | |
| Wisby | 30.18 | 766.5 | 30.24 | 768.0 | 49.3 | 9.6 | 69 | W. | | | 6 | 0 | | | 0 | 0 | | |
| SUB-SERIES. | | | | | | | | | | | | | | | | | | |
| Upsala | 30.04 | 763.1 | 30.12 | 765.0 | 52.0 | 11.1 | 53 | SW. | 9.4 | 4.2 | | 1 | NW. | | 0.005 | 0.12 | | Dr. Hildebrandsson. |

NOTE.—The originals give the wind-force by the scale 0 to 6, except Upsala; occasionally, the weather by the Vienna symbols, or in general terms; no distinction between the amount of upper and lower clouds. The rain-fall is measured at 8 a. m., local time, and apparently on the following day.

*Bulletin of international meteorological observations, taken simultaneously on October* 1, 1877—Continued.

## SWISS SERIES.

[Furnished by the co-operation of Prof. R. Wolf, Director of the Observatory at Zurich, and of Prof. E. Plantamour, Director of the Observatory at Geneva.]

| Stations. | Barometer. | | | | Temperature of the air. | | Relative humidity. | Wind. | | | | Clouds. | | | | Rain-fall or melted snow in the past 24 hours. | | Weather. | Observer. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Corrected for instrumental error and temperature. | | Reduced to sea-level. | | | | | Direction. | Velocity. | | Force. | Amount. | | Direction. | | | | | |
| | Inches. | Millimeters. | Inches. | Millimeters. | Fahrenheit. | Centigrade. | Per cent. | From— | Miles per hour. | Meters per second. | 0—10. | Upper. 0—10. | Lower. 0—10. | Upper. From— | Lower. From— | Inches. | Millimeters. | | |
| Geneva | 28.62 | 726.9 | 30.03 | 762.7 | 59.9 | 15.5 | 59 | NNE. | ..... | ..... | 1 | ..... | 2 | ..... | ..... | 0 | 0 | Vapory | The Observatory. |
| Zurich | 28.42 | 721.8 | 30.05 | 763.2 | 55.8 | 13.2 | 76 | W. | ..... | ..... | 1 | ..... | 4 | ..... | ..... | 0 | 0 | Bright | The Observatory. |

NOTE.—For Geneva the corresponding departures from the normal values are: Barometer, +0.4 mm.; thermometer, 0.0 cent.; relative humidity, −9 per cent.

NOTE.—The rain-fall is measured at Zurich at 7 a. m. on the following day. The originals give the barometer reduced to freezing but not to sea-level; the wind-force by the scale 0 to 4 for Zurich; the amount of cloudiness without distinguishing between upper and lower clouds; the weather in general terms. The elevation of Geneva is 408 meters, or 1,339 feet, and that of Zurich 470 meters, or 1,542 feet.

## TURKISH SERIES.

[Furnished by the co-operation of A. Coumbary, Effendi, Director of the Central Observatory at Constantinople, and of Prof. C. V. A. Van Dyck, Superintendent of the Lee Observatory at Beirut.]

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Constantinople | ..... | ..... | 30.15 | 765.9 | 66.6 | 19.2 | 56 | ENE. | 22 | 10.0 | ..... | ..... | 3 | ..... | NE. | 0 | 0 | ..... | The Observatory. |
| Fao (Persian Gulf) | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Salonica | ..... | ..... | 30.21 | 767.2 | 78.4 | 25.8 | .... | SW. | ..... | ..... | 1 | ..... | 10 | ..... | ..... | ..... | ..... | ..... | B. Stéfanidès. |
| Valona | ..... | ..... | 30.02 | 762.6 | 72.0 | 22.2 | .... | NW. | ..... | ..... | 1 | ..... | 5 | ..... | ..... | 0 | 0 | Cloudy | A. Bertrand. |
| Varna | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | Imperial Observatory. |
| SUB-SERIES. | | | | | | | | | | | | | | | | | | | |
| Beirut (Syria), Lee Obs'y | 29.83 | 757.7 | 29.94 | 760.5 | 86.2 | 30.1 | 65 | W. | ..... | ..... | 2 | ..... | 7c;k | ..... | SW. | 0 | 0 | D. clouds | Prof. C. V. A. Van Dyck. |

NOTE.—The originals give the wind-force by the scale 0 to 7 (except Beirut by the scale 0 to 12, and Constantinople velocity in meters per second); the weather in general terms as published, except Beirut by the Beaufort notation; no distinction between upper and lower clouds, and, except Constantinople and Beirut, the amount by the scale 0 to 4. It is assumed, except for Constantinople, that the barometer is reduced to sea-level.

## CANADIAN SERIES.

[Furnished by the co-operation of Prof. G. T. Kingston, Director of the Magnetic Observatory at Toronto, and Superintendent of the Meteorological Office of the Dominion of Canada, and the respective observers. Those marked with a star (*) are also telegraphed daily to the Office of the Chief Signal-Officer U. S. A.]

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bathurst, New Brunswick | 29.74 | 755.4 | 29.81 | 757.2 | 62.1 | 16.7 | 72 | SW. | 18 | 8.0 | | | 0 | | | | | | Hon. J. Ferguson. |
| Brockville, Ontario | | | 30.05 | 763.3 | 68 | 20.0 | | SW. | 8 | 3.6 | 2c | 0 | SW. | | | 0 | 0 | Fair | W. R. Bigg. |
| *Chatham, New Brunswick | | | 29.90 | 759.4 | 56 | 13.3 | 74 | SW. | 12 | 5.4 | 0 | 0 | | | | 0 | 0 | Clear | G. A. Blair. |
| Charlottetown, Pr. Edw. Isl | | | 30.01 | 762.2 | 60 | 15.6 | 62 | SW. | 15 | 6.7 | 0 | 5ks | SW. | | | 0 | 0 | Fair | H. J. Cundall, C. E. |
| Cornwall, Ontario | 29.78 | 756.4 | 29.97 | 761.2 | 69.8 | 21.0 | 68 | SE. | | | 5 | 10cs | 0 | SW. | | 0 | 0 | Fair | James Smith, M. A. |
| Dalhousie, New Brunswick | 29.79 | 756.7 | 29.82 | 757.4 | 58.4 | 14.7 | 75 | W. | | | 2 | | | | | 0 | 0 | Bright | H. A. Johnson. |
| Esquimault, Br. Columbia | 29.80 | 756.9 | 29.85 | 758.2 | 45.3 | 7.4 | 100 | N. | | | | 4cs | 0 | | | 0.23 | 5.8 | Cloudy | W. H. Bevis. |
| *Father Point, Quebec | | | 29.73 | 755.1 | 66 | 18.9 | 74 | S. | 29 | 13.0 | | 5k | Haze | W. | S. | 0 | 0 | Cloudy | J. McWilliams. |
| Fredericton, New Brunsw'k | 29.99 | 761.7 | 30.05 | 763.3 | 57.0 | 13.9 | 76 | S. | 2 | 0.9 | | | Haze | | | Inap. | Inap. | Hazy | Professor Harrison. |
| *Fort Garry, Manitoba | | | 30.23 | 767.8 | 30 | − 1.1 | 94 | NW. | 3 | 1.3 | | 2c | 2s | N. | N. | 0 | 0 | Fair | James Stewart. |
| Goderich, Ontario | 29.29 | 744.0 | 30.05 | 763.3 | 68.7 | 20.4 | 80 | SW. | | | 2 | 5k | 5n | W. | | 0 | 0 | Cloudy | H. J. Strang, M. A. |
| Granton, Ontario | 28.98 | 736.1 | 30.05 | 763.3 | 61 | 16.1 | 94 | S. | | | 1 | 0 | 0 | | | 0 | 0 | Clear | James Grant. |
| *Halifax, Nova Scotia | 30.01 | 762.2 | 30.15 | 765.8 | 56 | 13.3 | 56 | W. | 15 | 6.7 | | 0 | 0 | | | 0 | 0 | Clear | F. Allison, M. A. |
| Hamilton, Ontario | 29.72 | 754.9 | 30.08 | 764.0 | 69.7 | 20.9 | 77 | SW. | | | 4 | 2c | 0 | | | 0 | 0 | Clear | George Dickson, M. A. |
| Heart's Content, N. F | 30.00 | 762.0 | 30.02 | 762.5 | 49 | 9.4 | 81 | SW. | | | 4 | | 10n | | | 0 | 0 | Overcast | E. Weedon. |
| *Kingston, Ontario | 29.75 | 755.6 | 30.10 | 764.5 | 65 | 18.3 | 87 | S. | 12 | 5.4 | | 2c | 0 | Calm. | | 0 | 0 | Clear | S. Woods, M. A. |
| *Montreal, Quebec | 29.79 | 756.7 | 29.99 | 761.7 | 62 | 16.7 | 86 | SW. | 12 | 5.4 | | 5c | 5ks | SW. | SW. | 0 | 0 | Cloudy | C. H. McLeod, C. E. |
| *Parry Sound, Ontario | 29.30 | 744.2 | 29.97 | 761.2 | 66 | 18.9 | 89 | SW. | 7 | 3.1 | | 2ck | 5ks | SW. | SW. | 0 | 0 | Fair | Rev. R. Mosley. |
| Peterboro', Ontario | 29.30 | 744.2 | 30.03 | 762.7 | 67.1 | 19.5 | 84 | Calm. | | | 0 | | | | | 0 | 0 | Smoky | J. F. Jeffers, B. A. |
| Port Dover, Ontario | 29.41 | 747.0 | 30.08 | 764.0 | 67 | 19.4 | 89 | S. | 10 | 4.5 | | 5c | 0 | W. | | 0 | 0 | Fair | H. Morgan. |
| Port Hastings, Nova Scotia | 30.03 | 762.7 | 30.08 | 764.0 | 61.5 | 16.4 | | SW. | 8 | 3.6 | | | | | | 0 | 0 | Fine | Peter Grant. |
| Port Stanley, Ontario | 29.45 | 748.0 | 30.08 | 764.0 | 66 | 18.9 | 96 | S. | 2 | 0.9 | | 5ck | Haze | W. | | 0 | 0 | Fair | M. Payne. |
| *Quebec, Quebec | 29.62 | 752.3 | 29.94 | 760.5 | 62 | 16.7 | 83 | SW. | 3 | 1.3 | | | 10n | | SW. | 0 | 0 | Cloudy | Captain Ashe, R. N. |
| *Rockliffe, Ontario | 29.49 | 749.0 | 29.93 | 760.2 | 62 | 16.7 | 94 | Calm. | 0 | 0 | | 8ck | 0 | NW. | | Inap. | Inap. | Cloudy | W. H. McIntyre. |
| St. John, New Brunswick | 29.97 | 761.2 | 30.14 | 765.5 | 54 | 12.2 | 83 | S. | 6 | 2.7 | | 0 | 0 | | | 0 | 0 | | G. Murdock, C. E. |
| *Saugeen, Ontario | 29.30 | 744.2 | 29.98 | 761.5 | 69 | 20.6 | 86 | SW. | 6 | 2.7 | | | 10ks | | S. | 0 | 0 | Cloudy | K. Stewart. |
| Stayner, Ontario | | | 29.98 | 761.5 | 71 | 21.7 | 66 | W. | 8 | 3.6 | | | 10ks | | SW. | 0 | 0 | Cloudy | R. J. Cole. |
| Stratford, Ontario | 28.78 | 731.0 | 30.02 | 762.5 | 65.0 | 18.3 | 83 | SW. | 7 | 3.1 | | 2cs | 5s | N. | | 0 | 0 | Fair | C. J. MacGregor, M. A. |
| *Sydney, Cape Breton | 30.04 | 763.0 | 30.07 | 763.8 | 61 | 16.1 | 64 | SW. | 14 | 6.3 | | 5ck | 0 | NW. | | 0 | 0 | Fair | T. C. Hill. |
| *Toronto, Ontario | 29.69 | 754.1 | 30.06 | 763.5 | 66 | 18.9 | 84 | SW. | 4 | 1.8 | | 5cs | 2ks | W. | W. | 0 | 0 | Cloudy | *Magnetic Observatory.* |
| Windsor, Nova Scotia | | | | | | | | | | | | | | | | | | | Prof. John E. Oram. |
| Woodstock, Ontario | | | | | | | | | | | | | | | | | | | J. Montgomery. |
| *SUB-SERIES.* | | | | | | | | | | | | | | | | | | | |
| St Johns, Newfoundland | | | | | 47.0 | 8.3 | 85 | SW. | | | | 10k | 10s | | | 0.01 | 0.3 | Cloudy | John Delany. |

NOTE.—The originals for Brockville, Charlottetown, Port Dover, Port Stanley, Stayner, St. Johns, N. F., and those telegraphed, give the amount of cloudiness by the scale 0 to 4; for Bathurst not any distinction between upper and lower clouds. The elevation of Granton is 1,015 feet, or 309.4 meters; Stratford, 1,182 feet, or 360.3 meters.

## UNITED STATES SERIES.

[By authority of the Secretary of War. Furnished by the co-operation of Bvt. Brig. Gen. Albert J. Myer, Chief Signal-Officer, U. S. A.]

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Albany, N. Y | 29.97 | 761.2 | 30.20 | 767.1 | 56 | 13.3 | 73 | S. | 3 | 1.3 | | 0 | 0 | | | 0 | 0 | Clear | |
| Alpena, Mich | 29.31 | 744.7 | 29.94 | 760.5 | 65 | 18.3 | 89 | W. | 2 | 0.9 | | 2ck | 2s | W. | | 0.13 | 3.3 | Fair | |

*Bulletin of international meteorological observations, taken simultaneously on October 1, 1877—Continued.*

UNITED STATES SERIES—Continued.

| Stations. | Barometer. Corrected for instrumental error and temperature. | | Barometer. Reduced to sea-level. | | Temperature of the air. | | Relative humidity. | Wind. | | | Force. | Clouds. Amount. | | Clouds. Direction. | | Rain-fall or melted snow in the past 24 hours. | | Weather. | Observer. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Direction. | Velocity. | | | Upper. | Lower. | Upper. | Lower. | | | | |
| | Inches. | Millimeters. | Inches. | Millimeters. | Fahrenheit. | Centigrade. | Per cent. | From— | Miles per hour. | Meters per second. | 0—10. | 0—10. | 0—10. | From— | From— | Inches. | Millimeters. | | |
| Atlantic City, N. J | 30.22 | 767.6 | 30.24 | 768.1 | 62 | 16.7 | 88 | E. | 3 | 1.3 | .... | 0 | 0 | ..... | ..... | 0 | 0 | Clear | |
| Augusta, Ga | 29.91 | 759.7 | 30.09 | 764.3 | 68 | 20.0 | 69 | NE. | 5 | 2.2 | .... | ..... | 10s | ..... | NE. | 0 | 0 | Cloudy | |
| Baltimore, Md | 30.20 | 767.1 | 30.25 | 768.2 | 58 | 14.4 | 81 | N. | 2 | 0.9 | .... | aze. | Sm'e. | Calm. | Calm | 0 | 0 | Smoky | |
| Barnegat, N. J | 30.21 | 767.3 | 30.23 | 767.8 | 63 | 17.2 | 88 | N. | 6 | 2.7 | .... | 0 | 0 | ..... | ..... | 0 | 0 | Clear | |
| Bismarck, Dakota | 28.38 | 720.8 | 30.09 | 764.3 | 43 | 6.1 | 75 | NE. | 2 | 0.9 | .... | ..... | 10n | ..... | Calm | 0.01 | 0.3 | Light rain | |
| Boise City, Idaho | 27.07 | 687.6 | 29.67 | 753.6 | 44 | 6.7 | 51 | S. | 4 | 1.8 | .... | ..... | 10s | ..... | SW. | 0 | 0 | Cloudy | |
| Boston, Mass | 30.05 | 763.3 | 30.20 | 767.1 | 62 | 16.7 | 61 | SW. | 9 | 4.0 | .... | 0 | Haze. | ..... | ..... | 0 | 0 | Clear | |
| Brackettville, Tex | 28.76 | 730.5 | 29.75 | 755.6 | 73 | 22.8 | 54 | Calm. | 0 | 0 | .... | 5ck | ..... | Calm | ..... | 0 | 0 | Fair | |
| Breckenridge, Minn | 29.14 | 740.1 | 30.17 | 766.3 | 38 | 3.3 | 90 | N. | 5 | 2.2 | .... | ..... | 10ks | ..... | Calm | 0 | 0 | Cloudy | |
| Brownsville, Tex | 29.84 | 757.9 | 29.91 | 759.7 | 72 | 22.2 | 90 | Calm. | 0 | 0 | .... | 0 | 0 | ..... | ..... | 0 | 0 | Clear | |
| Buffalo, N. Y | 29.39 | 746.5 | 30.07 | 763.8 | 67 | 19.4 | 74 | SW. | 5 | 2.2 | .... | 1c | 0 | SW. | ..... | 0 | 0 | Clear | |
| Burlington, Vt | 29.85 | 758.2 | 30.10 | 764.5 | 64 | 17.8 | 62 | S. | 10 | 4.5 | .... | 0 | 0 | ..... | ..... | 0 | 0 | Clear | |
| Cairo, Ill | 29.68 | 753.9 | 30.06 | 763.5 | 70 | 21.1 | 79 | S. | 2 | 0.9 | .... | 10ck | 0 | Calm. | ..... | 0 | 0 | Cloudy | |
| Camp Grant, Arizona | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | |
| Camp Verde, Arizona | 26.72 | 678.7 | 30.21 | 767.3 | 60 | 15.6 | 70 | W. | ..... | ..... | .... | 5k | 0 | SW. | ..... | 0 | 0 | Fair | |
| Campo, Cal | 27.35 | 694.7 | 29.92 | 760.0 | 47 | 8.3 | 60 | E. | 3 | 1.3 | .... | 0 | 0 | ..... | ..... | 0 | 0 | Clear | |
| Cape Hatteras, N. C | 30.04 | 763.0 | 30.04 | 763.0 | 71 | 21.7 | 90 | NE. | 18 | 8.0 | .... | 2c | Haze. | SW. | ..... | 0 | 0 | Fair | |
| Cape Henry, Va | 30.13 | 765.3 | 30.16 | 766.1 | 70 | 21.1 | 75 | NE. | 18 | 8.0 | .... | 5cs | 0 | SE. | ..... | 0 | 0 | Fair | |
| Cape Lookout, N. C | 30.07 | 763.8 | 30.08 | 764.0 | 70 | 21.1 | 90 | NE. | 28 | 12.5 | .... | ..... | 10s | ..... | NE. | 0 | 0 | Threatening | |
| Cape May, N. J | 30.19 | 766.8 | 30.22 | 767.6 | 64 | 17.8 | 83 | NE. | 8 | 3.6 | .... | 0 | 0 | ..... | ..... | 0 | 0 | Clear | |
| Charleston, S. C | 30.00 | 762.0 | 30.07 | 763.8 | 68 | 20.0 | 79 | NE. | 12 | 5.4 | .... | ..... | 10s | ..... | NE. | 0 | 0 | Cloudy | |
| Cheyenne, Wyoming | 23.99 | 609.3 | 29.93 | 760.2 | 37 | 2.8 | 80 | SW. | 4 | 1.8 | .... | 0 | 0 | ..... | ..... | 0 | 0 | Clear | |
| Chicago, Ill | 29.28 | 743.7 | 29.95 | 760.7 | 68 | 20.0 | 79 | SW. | 8 | 3.6 | .... | 0 | Fog. | ..... | Calm | 0 | 0 | Clear | |
| Cincinnati, Ohio | 29.38 | 746.2 | 30.01 | 762.2 | 63 | 17.2 | 78 | SE. | 1 | 0.4 | .... | 0 | Fog. | ..... | SE. | 0 | 0 | Clear | |
| Cleveland, Ohio | 29.40 | 746.7 | 30.11 | 764.8 | 64 | 17.8 | 73 | E. | 8 | 3.6 | .... | ..... | Haze. | ..... | Calm | 0 | 0 | Hazy | |
| Concho, Tex | 27.99 | 710.9 | 29.62 | 752.3 | 67 | 19.4 | 84 | SW. | 4 | 1.8 | .... | 1c | 0 | SW. | ..... | 0 | 0 | Clear | |
| Corsicana, Tex | 29.47 | 748.5 | 29.92 | 760.0 | 68 | 20.0 | 84 | E. | 3 | 1.3 | .... | 0 | 0 | ..... | ..... | 0 | 0 | Clear | |
| Davenport, Iowa | 29.33 | 745.0 | 29.94 | 760.5 | 70 | 21.1 | 79 | SW. | 1 | 0.4 | .... | 4ck | 1s | Calm. | SW. | 0 | 0 | Fair | |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Denison, Tex* | *29.18* | *741.2* | *29.95* | *760.7* | *70* | *21.1* | *84* | *SE.* | *3* | *1.3* | | *0* | *0* | | | *0* | *0* | Clear |
| *Denver, Col* | *24.80* | *629.9* | *30.02* | *762.5* | *42* | *5.6* | *42* | *S.* | *4* | *1.8* | | *0* | *0* | | | *0* | *0* | Clear |
| *Detroit, Mich* | *29.37* | *746.0* | *30.01* | *762.2* | *67* | *19.4* | *69* | *SW.* | *5* | *2.2* | | *Ice* | *Sn'e.* | *Calm.* | *Calm.* | *0* | *0* | Fair |
| *Dodge City, Kan* | *27.36* | *694.9* | *29.62* | *752.3* | *52* | *11.1* | *86* | *NE.* | *14* | *6.3* | | *Haze.* | *5s* | *Calm.* | *E.* | *0* | *0* | Fair |
| *Dubuque, Iowa* | *29.27* | *743.4* | *29.95* | *760.7* | *66* | *18.9* | *84* | *N.* | *3* | *1.3* | | | *10s* | | *Calm.* | *0* | *0* | Cloudy |
| *Duluth, Minn* | *29.46* | *748.3* | *30.15* | *765.8* | *46* | *7.8* | *76* | *SE.* | *9* | *4.0* | | | *8s* | | *W.* | *Inap.* | *Inap.* | Cloudy |
| *Eagle Pass, Tex* | *29.11* | *739.4* | *29.83* | *757.7* | *69* | *20.6* | *70* | *N.* | *1* | *0.4* | | *Ick* | *0* | *NW.* | | *0* | *0* | Clear |
| *Eastport, Me* | *30.02* | *762.5* | *30.09* | *764.3* | *59* | *15.0* | *64* | *SW.* | *10* | *4.5* | | *Haze.* | *Haze.* | | *SW.* | *0* | *0* | Hazy |
| *Erie, Pa* | *29.38* | *746.2* | *30.07* | *763.8* | *67* | *19.4* | *68* | *S.* | *12* | *5.4* | | *2c* | *Haze.* | | | *0* | *0* | Fair |
| *Escanaba, Mich* | *29.43* | *747.5* | *30.08* | *764.0* | *50* | *10.0* | *79* | *N.* | *24* | *10.7* | | | *10s* | | *N.* | *0.26* | *6.6* | Cloudy |
| *Florence, Ariz* | *28.29* | *718.6* | *29.89* | *759.2* | *77* | *25.0* | *49* | *W.* | | | | *5k* | *0* | *W.* | | *0* | *0* | Fair |
| *Fort Bayard, N. M* | *24.06* | *611.1* | *30.06* | *763.5* | *56* | *13.3* | *56* | *NE.* | *8* | *3.6* | | *5cs* | *0* | *SW.* | | *0* | *0* | Fair |
| *Fort Craig, N. M* | *25.50* | *647.7* | | | *50* | *10.0* | *79* | *N.* | *1* | *0.4* | | *0* | *2s* | | *N.* | *0* | *0* | Fair |
| *Fort Gibson, Ind. T* | *29.41* | *747.0* | *29.93* | *760.2* | *71* | *21.7* | *80* | *SE* | *5* | *2.2* | | *2cs* | *2ks* | *Calm.* | *Calm.* | *0* | *0* | Fair |
| *Fort Griffin, Tex* | *28.55* | *725.2* | *29.78* | *756.4* | *66* | *18.9* | *78* | *Calm.* | *0* | *0* | | *8ck* | *0* | *N.* | | *0* | *0* | Cloudy |
| *Fort Saint Michael, Alaska* | | | | | | | | | | | | | | | | | | |
| *Fort Sill, Ind. T* | *28.71* | *729.2* | *29.78* | *756.4* | *70* | *21.1* | *84* | *E.* | *4* | *1.8* | | *0* | *8s* | | *W.* | *0.02* | *0.5* | Fair |
| *Fort Sully, Dakota* | *28.45* | *722.6* | *30.14* | *765.5* | *44* | *6.7* | *67* | *Calm.* | *0* | *0* | | *5c* | *0* | *Calm* | | *0* | *0* | Fair |
| *Galveston, Tex* | *29.84* | *757.9* | *29.88* | *758.9* | *74* | *23.3* | *81* | *E.* | *6* | *2.7* | | *0* | *0* | | | *0* | *0* | Clear |
| *Grand Haven, Mich* | *29.34* | *745.2* | *29.95* | *761.0* | *69* | *20.6* | *84* | *SW.* | *15* | *6.7* | | *2k* | *2s* | *W.* | *W.* | *0* | *0* | Fair |
| *Indianapolis, Ind* | *29.28* | *743.7* | *30.04* | *763.0* | *63* | *17.2* | *78* | *Calm.* | *0* | *0* | | *0* | *Sn'e.* | | *Calm.* | *0* | *0* | Clear |
| *Indianola, Tex* | *29.89* | *759.2* | *29.92* | *760.0* | *73* | *22.8* | *85* | *N.* | *15* | *6.7* | | *0* | *0* | | | *0* | *0* | Clear |
| *Jacksboro', Tex* | | | | | | | | | | | | | | | | | | |
| *Jacksonville, Fla* | *29.92* | *760.0* | *29.95* | *760.7* | *74* | *23.3* | *95* | *NE.* | *10* | *4.5* | | | *10n* | | *NE.* | *2.45* | *62.2* | Heavy rain |
| *Keokuk, Iowa* | *29.22* | *742.2* | *29.90* | *759.4* | *74* | *23.3* | *76* | *SW.* | *8* | *3.6* | | *2ck* | *Haze.* | *SW.* | *Calm.* | *0* | *0* | Fair |
| *Key West, Fla* | *29.77* | *756.1* | *29.89* | *756.9* | *82.5* | *28.1* | *81* | *S.* | *16* | *7.2* | | | *8s* | | *SW.* | *0.21* | *5.3* | Cloudy |
| *Kittyhawk, N. C* | *30.13* | *765.3* | *30.15* | *765.8* | *70* | *21.1* | *95* | *NE.* | *24* | *10.7* | | *0* | *2s* | | *Calm.* | *0* | *0* | Fair |
| *Knoxville, Tenn* | *29.11* | *739.4* | *30.10* | *764.5* | *61* | *16.1* | *77* | *Calm.* | *0* | *0* | | *0* | *Sm'e.* | | | *0* | *0* | Smoky |
| *La Crosse, Wis* | *29.27* | *743.4* | *29.99* | *761.7* | *59* | *15.0* | *81* | *N.* | *7* | *3.1* | | | *10s* | | *N.* | *0* | *0* | Cloudy |
| *La Mesilla, N. M* | *26.02* | *660.9* | *30.17* | *766.3* | *60* | *15.6* | *60* | *Calm.* | *0* | *0* | | *0* | *0* | | | *0* | *0* | Clear |
| *Laredo, Tex* | | | | | *76* | *24.4* | *86* | *E.* | *3* | *1.3* | | *0* | *0* | | | *0* | *0* | Clear |
| *Leavenworth, Kans* | *29.07* | *738.4* | *29.88* | *758.9* | *69* | *20.6* | *84* | *S.* | *4* | *1.8* | | *8ck* | *2s* | *W.* | *Calm.* | *0* | *0* | Cloudy |
| *Los Angeles, Cal* | *29.55* | *750.6* | *29.88* | *758.9* | *61* | *16.1* | *88* | *N.* | *2* | *0.9* | | | *10s* | | *N.* | *0* | *0* | Cloudy |
| *Louisville, Ky* | *29.50* | *749.3* | *30.04* | *763.0* | *65* | *18.3* | *83* | *NE.* | *1* | *0.4* | | *0* | *Fog.* | | *Calm.* | *0* | *0* | Foggy |
| *Lynchburg, Va* | *29.54* | *750.3* | *30.22* | *767.6* | *62* | *16.7* | *66* | *NE.* | *4* | *1.8* | | *0* | *5s* | | *W.* | *0* | *0* | Fair |
| *Maricopa Wells, Arizona* | | | | | *65* | *18.3* | *62* | *N.* | | | | *0* | *0* | | | *0* | *0* | Clear |
| *Marquette, Mich* | *29.37* | *746.0* | *30.08* | *764.0* | *48* | *8.9* | *77* | *N.* | *8* | *3.6* | | | *10s* | | *Calm.* | *0.60* | *15.2* | Cloudy |
| *Mason, Tex* | *28.29* | *718.6* | *29.99* | *761.7* | *67* | *19.4* | *84* | *Calm.* | *0* | *0* | | *0* | *2s* | | | *0* | *0* | Clear |
| *Memphis, Tenn* | *29.72* | *754.9* | *30.03* | *762.7* | *68* | *20.0* | *90* | *SE.* | *2* | *0.9* | | *2c* | *Fog.* | *SW.* | *Calm.* | *0* | *0* | Fair |
| *Milwaukee, Wis* | *29.35* | *745.5* | *30.03* | *762.7* | *55* | *12.8* | *87* | *NE.* | *20* | *8.9* | | | *10s* | | | *0* | *0* | Cloudy |
| *Mobile, Ala* | *29.83* | *757.7* | *29.87* | *758.7* | *73.5* | *23.1* | *74* | *NE.* | *8* | *3.6* | | | *10s* | | *E.* | *0* | *0* | Cloudy |
| *Montgomery, Ala* | *29.75* | *755.6* | *29.98* | *761.5* | *75.5* | *24.2* | *50* | *NE.* | *12* | *5.4* | | *5c* | *2ks* | *SW.* | *E.* | *0* | *0* | Fair |
| *Morgantown, W. Va* | *29.11* | *739.4* | *30.15* | *765.8* | *61* | *16.1* | *77* | *Calm.* | *0* | *0* | | *1c* | *Fog.* | *SW.* | | *0* | *0* | Fair |
| *Mt. Washington, N. H* | *24.02* | *610.1* | *30.38* | *771.6* | *51* | *10.6* | *93* | *NW.* | *30* | *13.4* | | | *Fog.* | | *NW.* | *0* | *0* | Foggy |
| *Nashville, Tenn* | *29.56* | *750.8* | *30.09* | *764.3* | *63* | *17.2* | *94* | *Calm.* | *0* | *0* | | *0* | *Fog.* | | *Calm.* | *0* | *0* | Foggy |
| *New Haven, Conn* | *30.11* | *764.8* | *30.22* | *767.6* | *59* | *15.0* | *81* | *Calm.* | *0* | *0* | | *Haze.* | *Fog.* | | *Calm.* | *0* | *0* | Fair |
| *New London, Conn* | *30.18* | *766.6* | *30.23* | *767.8* | *60* | *15.6* | *82* | *Calm.* | *0* | *0* | | | *Fog.* | | *N.* | *0* | *0* | Clear |
| *New Orleans, La* | *29.76* | *755.9* | *29.82* | *757.4* | *71.5* | *21.9* | *73* | *NE.* | *13* | *5.8* | | *4c* | *1s* | *S.* | *Calm.* | *0* | *0* | Fair |
| *Newport, R. I* | *30.18* | *766.6* | *30.23* | *767.8* | *62* | *16.7* | *78* | *SW.* | *4* | *1.8* | | *0* | *0* | | | *0* | *0* | Clear |
| *New York, N. Y* | *30.06* | *763.5* | *30.24* | *768.1* | *61* | *16.1* | *77* | *W.* | *2* | *0.9* | | *0* | *Fog.* | | | *0* | *0* | Clear |
| *Norfolk, Va* | *30.13* | *765.3* | *30.19* | *766.8* | *67* | *19.4* | *90* | *NE.* | *4* | *1.8* | | *5c* | *Haze.* | *NW.* | *Calm.* | *0* | *0* | Fair |
| *North Platte, Nebr* | *27.12* | *688.8* | *29.73* | *755.1* | *39* | *3.9* | *80* | *NE.* | *4* | *1.8* | | *0* | *Sm'e.* | | *Calm.* | *0* | *0* | Smoky |

*Bulletin of international meteorological observations, taken simultaneously on October* 1, 1877—Continued.

UNITED STATES SERIES—Continued.

| Stations. | Barometer. Corrected for instrumental error and temperature. Inches. | Barometer. Corrected for instrumental error and temperature. Millimeters. | Barometer. Reduced to sea-level. Inches. | Barometer. Reduced to sea-level. Millimeters. | Temperature of the air. Fahrenheit. | Temperature of the air. Centigrade. | Relative humidity. Per cent. | Wind. Direction. From— | Wind. Velocity. Miles per hour. | Wind. Velocity. Meters per second. | Wind. Force. 0—10. | Clouds. Amount. Upper. 0—10. | Clouds. Amount. Lower. 0—10. | Clouds. Direction. Upper. From— | Clouds. Direction. Lower. From— | Rain-fall or melted snow in the past 24 hours. Inches. | Rain-fall or melted snow in the past 24 hours. Millimeters. | Weather. | Observer. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Olympia, W. T. | 29.80 | 756.9 | 29.84 | 757.9 | 45 | 7.2 | 92 | Calm. | 0 | 0 | .... | ..... | 10n | ..... | n | 0.54 | 13.7 | Light rain | |
| Omaha, Nebr | 28.87 | 733.3 | 29.93 | 760.2 | 53 | 11.7 | 86 | N. | 11 | 4.9 | .... | ..... | 10s | ..... | n | 0 | 0 | Cloudy | |
| Oswego, N. Y | 29.78 | 756.4 | 30.10 | 764.5 | 64 | 17.8 | 81 | SE. | 6 | 2.7 | .... | 0 | Sm'e. | ..... | ..... | 0 | 0 | Clear | |
| Pembina, Dakota | 29.40 | 746.7 | 30.27 | 768.8 | 30 | — 1.1 | 89 | W. | 3 | 1.3 | .... | ..... | 10s | ..... | Calm. | 0 | 0 | Cloudy | |
| Philadelphia, Pa | 30.20 | 767.1 | 30.25 | 768.3 | 60 | 15.6 | 77 | NE. | 5 | 2.2 | .... | 0 | Fog. | ..... | Calm. | 0 | 0 | Clear | |
| Phœnix, Arizona | ..... | ..... | ..... | ..... | 67 | 19.4 | 59 | Calm. | ..... | ..... | ..... | 5ck | 0 | SW. | ... .. | 0 | 0 | Fair | |
| Pike's Peak, Col | 17.88 | 454.1 | 30.09 | 764.3 | 29 | — 1.7 | 59 | W. | 12 | 5.4 | .... | 5k | 0 | W. | ..... | 0 | 0 | Fair | |
| Pioche, Nev | 24.00 | 609.6 | 29.77 | 756.1 | 54 | 12.2 | 10 | S. | 7 | 3.1 | .... | 0 | 0 | ..... | ..... | 0 | 0 | Clear | |
| Pittsburg, Pa | 29.33 | 745.0 | 30.14 | 765.5 | 57 | 13.9 | 93 | Calm. | 0 | 0 | .... | 2k | Fog. | S. | Calm. | 0 | 0 | Fair | |
| Port Huron, Mich | 29.37 | 746.0 | 30.01 | 762.2 | 67 | 19.4 | 79 | SW. | 4 | 1.8 | .... | 10cs | Sm'e. | NW. | ..... | 0 | 0 | Cloudy | |
| Portland, Me | 30.07 | 763.8 | 30.12 | 765.0 | 57 | 13.9 | 63 | SW. | 12 | 5.4 | .... | 0 | Haze. | ..... | ..... | 0 | 0 | Clear | |
| Portland, Oregon | 29.84 | 757.9 | 29.94 | 760.5 | 47 | 8.3 | 85 | S. | 4 | 1.8 | .... | ..... | 10n | ..... | S. | 0.03 | 0.8 | Light rain | |
| Prescott, Arizona | 24.82 | 630.4 | 30.18 | 766.6 | 50 | 10.0 | 71 | Calm. | ..... | ..... | ..... | 0 | 2s | ..... | Calm. | 0 | 0 | Fair | |
| Punta Rassa, Fla | 29.80 | 756.9 | 29.82 | 757.4 | 78 | 25.6 | 86 | E. | 16 | 7.2 | .... | 2cs | 8ks | Calm. | E. | 0.48 | 12.2 | Threatening | |
| Red Bluff, Cal | 29.54 | 750.3 | 29.89 | 759.2 | 59 | 15.0 | 43 | SE. | 6 | 2.7 | .... | 5k | 2s | Calm. | Calm. | 0 | 0 | Fair | |
| Rochester, N. Y | 29.46 | 748.3 | 30.06 | 763.5 | 67 | 19.4 | 69 | SW. | 13 | 5.8 | .... | 0 | 0 | ..... | ..... | 0 | 0 | Clear | |
| Roseburg, Oregon | 29.34 | 745.2 | 29.92 | 760.0 | 45 | 7.2 | 84 | E. | 6 | 2.7 | .... | ..... | 10n | ..... | Calm. | 0.02 | 0.5 | Light rain | |
| Sacramento, Cal | 29.84 | 757.9 | 29.92 | 760.0 | 54 | 12.2 | 55 | S. | 4 | 1.8 | .... | 0 | Sm'e. | ..... | Calm. | 0 | 0 | Clear | |
| Saint Louis, Mo | 29.46 | 748.3 | 30.02 | 762.5 | 69 | 20.6 | 85 | S. | 3 | 1.3 | .... | ..... | Fog. | ..... | ..... | 0 | 0 | Foggy | |
| Saint Mark's, Fla | 29.90 | 759.4 | 29.91 | 759.7 | 70 | 21.1 | 95 | E. | 12 | 5.4 | .... | ..... | 10n | ..... | E. | 0.25 | 6.3 | Light rain | |
| Saint Paul, Minn | 29.20 | 744.7 | 30.04 | 763.0 | 48 | 8.9 | 85 | N. | 4 | 1.8 | .... | 0 | 0 | ..... | ..... | 0 | 0 | Clear | |
| Saint Paul's Island, Alaska | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | |
| Salt Lake City, Utah | 25.52 | 648.2 | 29.85 | 758.2 | 50 | 10.0 | 58 | NE. | 2 | 0.9 | .... | 0 | 0 | ..... | ..... | 0 | 0 | Clear | |
| San Antonio, Tex | 29.21 | 741.9 | 29.77 | 756.1 | 69 | 20.6 | 90 | SE. | 2 | 0.9 | .... | 0 | 0 | ..... | ..... | 0 | 0 | Clear | |
| San Diego, Cal | 29.84 | 757.9 | 29.91 | 759.7 | 63 | 17.2 | 83 | NE. | 1 | 0.4 | .... | ..... | 10s | ..... | Calm. | 0 | 0 | Cloudy | |
| Sandusky, Ohio | 29.43 | 747.5 | 30.08 | 764.0 | 68 | 20.0 | 64 | SW. | 2 | 0.9 | .... | 1c | Sm'e. | Calm. | Calm. | 0 | 0 | Clear | |
| Sandy Hook, N. J | 30.22 | 767.6 | 30.24 | 768.1 | 61 | 16.1 | 82 | W. | 2 | 0.9 | .... | 0 | Sm'e. | ..... | Calm. | 0 | 0 | Clear | |
| San Francisco, Cal | 29.93 | 760.2 | 29.99 | 761.7 | 53 | 11.7 | 73 | Calm. | 0 | 0 | .... | 0 | 0 | ..... | ..... | 0 | 0 | Clear | |
| Santa Fé, N. M | 23.30 | 591.8 | 29.84 | 757.9 | 49 | 9.4 | 57 | E. | 7 | 3.1 | .... | Haze. | 5ks | ..... | W. | 0 | 0 | Cloudy | |
| Savannah, Ga | 29.93 | 760.2 | 30.02 | 762.5 | 68 | 20.0 | 84 | E. | 11 | 4.9 | .... | ..... | 10s | ..... | E. | 0 | 0 | Cloudy | |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Shreveport, La* | *29.74* | *755.4* | *29.95* | *760.7* | *70* | *21.1* | *75* | *E.* | *2* | *0.9* | *0* | *0* | | | *0* | *0* | Clear | | |
| Smithville, N. C | *30.07* | *763.8* | *30.10* | *764.5* | *67* | *19.4* | *90* | N. | 12 | 5.4 | 10cs | 0 | Calm. | | 0 | 0 | Cloudy | | |
| Springfield, Mass | 30.02 | 762.5 | 30.15 | 765.8 | 57 | 13.9 | 81 | S. | 4 | 1.8 | 0 | 0 | | | 0 | 0 | Clear | | |
| Stanwix, Arizona | | | | | 70 | 21.1 | 67 | SW. | | | 0 | 5ks | | Calm. | 0 | 0 | Fair | | |
| Stockton, Tex | | | | | 70 | 21.1 | 66 | S. | 12 | 5.4 | 0 | 2s | | SW. | 0.05 | 1.3 | Fair | | |
| Thatcher's Island, Mass | 30.14 | 765.5 | 30.20 | 767.1 | 58 | 14.4 | 81 | SW. | 12 | 5.4 | 0 | 0 | | | 0 | 0 | Smoky | | |
| Toledo, Ohio | 29.39 | 746.5 | 30.04 | 763.0 | 67 | 19.4 | 84 | Calm. | 0 | 0 | 0 | Haze | | Calm. | 0 | 0 | Hazy | | |
| Tucson, Arizona | 27.47 | 697.7 | 30.02 | 762.5 | 70 | 21.1 | 75 | S. | | | 0 | 2ks | | S. | 0 | 0 | Fair | | |
| Tybee Island, Ga | 29.98 | 761.5 | 30.01 | 762.2 | 70 | 21.1 | 90 | NE. | 28 | 12.5 | | 10s | | Calm. | 0 | 0 | Th ening. | | |
| Umatilla, Oregon | 29.51 | 749.5 | 30.00 | 762.0 | 35 | 1.7 | 69 | SE. | 4 | 1.8 | 0 | 0 | | | 0 | 0 | Clear | | |
| Vicksburg, Miss | 29.70 | 754.4 | 29.96 | 761.0 | 69 | 20.6 | 79 | NE. | 6 | 2.7 | 0 | 0 | | | 0 | 0 | Clear | | |
| Virginia City, Montana | 24.18 | 614.2 | 29.66 | 753.4 | 34 | 1.1 | 79 | Calm. | 0 | 0 | | 10s | | Ca m. | 0 | 0 | Cloudy | | |
| Visalia, Cal | 29.58 | 751.3 | 29.95 | 760.7 | 51 | 10.6 | 59 | NW. | 1 | 0.4 | 0 | 0 | | | 0 | 0 | Clear | | |
| Washington, D. C | 30.13 | 765.3 | 30.25 | 768.3 | 59 | 15.0 | 81 | SE. | 1 | 0.4 | 0 | Fog. | | SE. | 0 | 0 | Fair | | |
| Wickenburg, Arizona | | | | | 56 | 13.3 | 30 | S. | | | 0 | 0 | | | 0 | 0 | Clear | | |
| Wilmington, N. C | 30.02 | 762.5 | 30.10 | 764.5 | 66 | 18.9 | 84 | NE. | 9 | 4.0 | 8c | 0 | W. | | 0 | 0 | Fair | | |
| Winnemucca, Nev | 25.54 | 648.7 | 29.90 | 759.4 | 40 | 4.4 | 32 | W. | 10 | 4.5 | 0 | 2s | | W. | 0 | 0 | Fair | | |
| Wood's Holl, Mass | 30.19 | 766.8 | 30.25 | 768.3 | 63 | 17.2 | 78 | SW. | 9 | 4.0 | 0 | 0 | | | 0 | 0 | Clear | | |
| Yankton, Dak | 28.82 | 732.0 | 30.15 | 765.8 | 36 | 2.2 | 80 | NW. | 3 | 1.3 | 0 | 0 | | | 0 | 0 | Clear | | |
| Yuma, Arizona | 29.67 | 753.6 | 29.84 | 757.9 | 61 | 16.1 | 36 | Calm. | 0 | 0 | 0 | 0 | | | 0 | 0 | Clear | | |
| SUB-SERIES. | | | | | | | | | | | | | | | | | | | |
| York Factory, B. A | 29.72 | 754.9 | 29.78 | 756.4 | 31.0 | 0.6 | 95 | W. | 10 | 4.5 | 0 | 7s | | W. | 0.20 | 5.1 | Fair | J. Fortescue, W. Wood. | |
| Havana, Cuba, W. I | 29.78 | 756.4 | 29.80 | 756.9 | 82 | 27.8 | 87 | S. | 4.8 | 2.1 | 8c | 2ks | NW. | Calm. | 0.16 | 4.1 | Cloudy | Charles Hasselbrink. | |
| Kingston, Jamaica, W. I | 30.09 | 764.3 | 30.10 | 764.5 | 83 | 28.3 | 83 | SE. | 7 | 3.1 | 5c | 2s | SE. | | 0 | 0 | | James Gall. | |
| Santiago de Cuba, W. I | 29.93 | 760.2 | 29.94 | 760.5 | 82 | 27.8 | 83 | Calm. | 0 | 0 | 0 | 1ks | | SE. | 0 | 0 | Fine | T. W. Beattie. | |
| Navassa, W. I | 29.84 | 757.9 | 29.92 | 760.0 | 84 | 28.9 | | SE. | | | 1 | | | | 0 | 0 | Clear | F. M. Everett. | |
| St. Thomas, W. I | | | | | 87 | 30.6 | 79 | Calm. | | | | 5ck | 4s | Calm. | Inap. | Inap. | | G. O. Gellich. | |
| Pt.-a-Pitre, G'd'loupe, W. I | 29.96 | 761.0 | 29.98 | 761.5 | 81 | 27.2 | 83 | SE. | | | | 2k | 5ks | SE. | | | | L. V. Bigard. | |
| Paramaribo, D. Guiana, S. A | | | 30.05 | 763.3 | 85 | 29.4 | 72 | E. | | | 3 | 4c | 0 | E. | 0.020 | 0.51 | Fair | C. J. Hering. | |
| Batavia, Dutch Guiana, S. A | | | | | | | | | | | | | | | | | | Dr. H. Groot. | |
| Medellin, Colombia, S. A | 25.29 | 642.4 | | | 65.2 | 18.4 | 89 | Calm. | | | 0 | 10cs; k | 0 | | 0 | 0 | Cloudy | Thomas Herran. | |
| Honolulu, Oahu, H. I | | | | | | | | | | | | | | | | | | Daniel Smith. | |
| Makawao, Maui, H. I | | | | | | | | | | | | | | | | | | F. L. Clarke. | |

NOTE.—The originals give the amount of cloudiness by the scale 0 to 4, except York Factory, Makawao, Medellin, and Paramaribo. The elevation of the barometer at Bismarck is 1,706 feet, or 520 meters; Boise City, 2,869 (?) feet, or 874.4 (?) meters; Brackettsville, 1,026 (?) feet, or 312.7 (?) meters; Camp Grant, 4,833 (?) feet, or 1,473.2 (?) meters; Camp Verde, 3,500 (?) feet, or 1,066.8 (?) meters; Campo, 2,486 (?) feet, or 757.8 (?) meters; Cheyenne, 6,057.3 feet, or 1,846.2 meters; Clifton, about 2,892 feet, or 881.5 meters; Concho, 1,750 feet, or 533.4 meters; Denver, 5,162 feet, or 1,573.4 meters; Dodge City, 2,486 feet, or 757.8 meters; Fort Craig, 4,622 (?) feet, or 1,408.8 (?) meters; Fort Bayard, 6,000 (?) feet, or 1,828.9 (?) meters; Fort Griffin, 1,270 (?) feet, or 387.0 (?) meters; Fort Sill, 1,100 (?) feet, or 335.3 (?) meters; Fort Sully, 1,678 (?) feet, or 511.4 (?) meters; Florence, 1,550 (?) feet, or 472.5 (?) meters; Jacksboro', 1,119.2 (?) feet or 341.1 (?) meters; Makawao, 2,205 feet, or 672.1 meters; Mason, 1,800 (?) feet, or 548.7 (?) meters; Morgantown, 1,027.9 feet, or 313.3 meters; Medellin, 4,876 feet, or 1,486.2 meters; Mount Washington, 6,285 feet, or 1,915.6 meters; North Platte, 2,846 feet, or 867.4 meters; Omaha, 1,054.6 feet, or 321.4 meters; Phœnix, 1,800 (?) feet, or 548.7 (?) meters; Pike's Peak, 14,150.7 feet, or 4,313.1 meters; Pioche, 5,778.6 (?) feet, or 1,761.4 (?) meters; Prescott, 5,580 (?) feet, or 1,700.9 (?) meters; Salt Lake City, 4,362.2 feet, or 1,329.6 meters; Santa Fé, 6,882.2 (?) feet, or 2,091.6 (?) meters; Stockton, 3,100 (?) feet, or 944.9 (?) meters; Tucson, 2,545 (?) feet, or 775.7 (?) meters; Virginia City, 5,480 (?) feet, or 1,670.3 (?) meters; Wickenburg, 2,050 (?) feet, or 624.9 (?) meters; Winnemucca, 4,322 feet, or 1,317.4 meters; Yankton, 1,278 feet, 389.5 meters. The following constants are added in correcting the barometric observations for altitude: Camp Verde, 3.488 inches; Campo, 2.57 inches; Cheyenne, 5.94 inches; Denver, 5.22 inches; Florence, 1.60 inches; Fort Bayard, 6.0 inches; La Mesilla, 4.15 inches; Makawao, 2.17 inches; Mount Washington, 6.36 inches; Pike's Peak, 12.21 inches; Pioche, 5.77 inches; Prescott, 5.36 inches; Salt Lake City, 4.33 inches; Santa Fé, 6.54 inches; Stockton, 3.00 inches; Tucson, 2.59 inches; Wickenburg, 2.09 inches; Winnemucca, 4.36 inches; Virginia City, 5.48 inches. The instrumental error of the barometer at Medellin is not known. It is not certain that the weather for Batavia refers to the moment of observation.

*Bulletin of international meteorological observations, taken simultaneously on October 1, 1877*—Continued.

## UNITED STATES NAVAL SERIES.

[By authority of the Secretary of the Navy. Furnished by the co-operation of the Navy Department, through Rear-Admiral Daniel Ammen, U. S. N., Chief of Bureau of Navigation.]

| Stations and vessels. | Barometer. | | | | Temperature of the air. | | Relative humidity. | Wind. | | | | Clouds. | | | | Rain-fall or melted snow in the past 24 hours. | | Sea-swell. | | Weather. | Observer. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | As reported.* | | Attached thermometer. | | | | | Direction. | Velocity. | | Force. | Amount. | | Direction. | | | | | | | |
| | Inches. | Millimeters. | Fahrenheit. | Centigrade. | Fahrenheit. | Centigrade. | Per cent. | From— | Miles per hour. | Meters per second. | 0—10. | Upper. 0—10. | Lower. 0—10. | Upper. From— | Lower. From— | Inches. | Millimeters. | Character. | Direction from— | | |
| Navy Yard (Mare Island, Cal.) | 29.96 | 761.0 | 55 | 12.8 | 54 | 12.2 | 55 | WSW. | 18 | 8.0 | ..... | ..... | 0 | ..... | ..... | 0 | 0 | ..... | ..... | Clear | |
| Navy Yard (Pensacola, Fla.) | 29.97 | 761.2 | ..... | ..... | 76 | 24.4 | 73 | NE. | 19 | 8.5 | ..... | ..... | 10 | ..... | SE. | 0.15 | 3.8 | ..... | ..... | D. clouds | |
| Navy Yard (Portsmouth, N. H.) | 30.19 | 766.8 | 68 | 20.0 | 57 | 13.9 | 75 | SW. | 3 | 1.3 | ..... | ..... | ..... | ..... | ..... | 0 | 0 | ..... | ..... | Clear | |
| Naval Hospital (Yokohama, Japan) | 29.89 | 759.2 | 69.5 | 20.8 | 66 | 18.9 | 94 | E. | ..... | ..... | 2 | ..... | 8s; smk | ..... | E. | 0 | 0 | ..... | ..... | Cloudy | |
| Adams (Montevideo, Uruguay) | 29.94 | 760.5 | 64 | 17.8 | 57 | 13.9 | 75 | SW. | ..... | ..... | 2 | ..... | 0 | ..... | ..... | 0 | 0 | Light. | W. | Blue sky | |
| Alert (Straits of Tsugar) | 30.05 | 763.3 | 69 | 20.6 | 69 | 20.6 | 90 | ESE. | ..... | ..... | 5–6 | ..... | 1 | ..... | SE. | ..... | ..... | Chop. | Cross. | Squally | |
| Alliance (Constantinople, Turkey) | 30.25 | 768.3 | 68 | 20.0 | 68 | 20.0 | 56 | NE. | ..... | ..... | 4 | ..... | 3 | ..... | NE. | ..... | ..... | ..... | ..... | Clear | |
| Ashuelot (Che-foo, China) | 30.10 | 764.5 | 70 | 21.1 | 62 | 16.7 | 51 | NNW. | ..... | ..... | 6–7 | ..... | 2 | ..... | N. | ..... | ..... | Chop mod | N. | Squally | |
| Canonicus (New Orleans, La.) | 29.85 | 758.2 | 54 | 12.2 | 72 | 22.2 | 76 | E. | ..... | ..... | 3 | ..... | 5 | ..... | ..... | ..... | ..... | ..... | ..... | Partly cl'dy | |
| Colorado (New York, N. Y.) | 30.31 | 769.9 | 65 | 18.3 | 63 | 17.2 | 78 | WNW. | 3 | 1.3 | ..... | ..... | 7 | ..... | WNW. | 0 | 0 | ..... | ..... | Dense fog | |
| Despatch (Beikos Bay, Bosphorus | 30.28 | 769.1 | 71 | 21.7 | 67 | 19.4 | 58 | NE. | ..... | ..... | 3–4 | ..... | 4 | ..... | NE. | ..... | ..... | Smooth. | ..... | Pleasant | |
| Franklin (Norfolk, Va.) | 30.22 | 767.6 | 67 | 19.4 | 68 | 20.0 | 100 | E. | 4 | 1.8 | ..... | ..... | 2 | ..... | E. | 0 | 0 | ..... | ..... | Clear | |
| Frolic (Barbadoes, W. I.) | 30.18 | 766.6 | 85 | 29.4 | 86 | 30.0 | 96 | SE. | ..... | ..... | 2 | ..... | 3k | ..... | Calm. | 0 | 0 | Smooth. | ..... | D. clouds | |
| Gettysburg (Naples, Italy) | 29.85 | 758.2 | ..... | ..... | 71 | 21.7 | 100 | NE. | ..... | ..... | 2 | ..... | 10 | ..... | Calm. | 0 | 0 | ..... | ..... | D. clouds | |
| Kearsarge (N. 1° 30', E. 102° 56') | 29.87 | 758.7 | ..... | ..... | 86 | 30.0 | 76 | N. & W. | ..... | ..... | 1 | ..... | 4 | ..... | ..... | 0 | 0 | Smooth. | ..... | D. clouds | |
| Lackawanna (Semi-ah-moo Bay, W. T.). | 29.90 | 759.4 | ..... | ..... | 49 | 9.4 | 85 | NE. | ..... | ..... | 2–3 | ..... | 10 | ..... | SSW. | ..... | ..... | Smooth. | ..... | D. clouds | |
| Marion (Smyrna, Turkey) | 30.00 | 762.0 | 76 | 24.4 | 78 | 25.6 | 57 | NW. | ..... | ..... | 3 | ..... | 5 | ..... | NW. | 0 | 0 | Smooth. | ..... | D. clouds | |
| Michigan (Erie, Pa.) | 29.62 | 752.3 | 72 | 22.2 | 71 | 21.7 | 66 | SE. | ..... | ..... | 2 | ..... | 0 | ..... | ..... | ..... | ..... | ..... | ..... | Clear | |
| Monocacy (Hakodadi, Japan) | 29.95 | 760.7 | 68 | 20.0 | 65 | 18.3 | 84 | ESE. | ..... | ..... | 4 | ..... | 10 | ..... | ESE. | ..... | ..... | Smooth. | ..... | Drizzling | |
| Monongahela (N. 37° 33', W. 63° 0') | 30.20 | 767.1 | 73 | 22.8 | 73 | 22.8 | 81 | ENE. | ..... | ..... | 6 | ..... | k | ..... | ..... | Light | Light | Moderate | N. & E. | D. clouds | |
| New Hampshire (Port Royal, S.C.) | 30.20 | 767.1 | ..... | ..... | 69 | 20.6 | 85 | NE. | 17 | 7.6 | ..... | ..... | 10 | ..... | NE. | 0 | 0 | ..... | ..... | D. clouds | |
| Omaha (S. 32° 59', W. 71° 40') | 29.88 | 758.9 | 61 | 16.1 | 61 | 16.1 | 82 | SE. | 4 | 1.8 | ..... | ..... | 1 | ..... | Calm. | 0 | 0 | Smooth. | ..... | Pleasant | |
| Onward (Callao, Peru) | 30.06 | 763.5 | 69 | 20.6 | 66 | 18.9 | 94 | S. | ..... | ..... | 1 | ..... | 10 | ..... | ..... | ..... | ..... | Long. | W. | Misty | |
| Ossipee (New York, N. Y.) | 30.29 | 769.4 | 68 | 20.0 | 61 | 16.1 | 94 | NW. | ..... | ..... | 0–1 | ..... | 1 | ..... | Calm. | ..... | ..... | ..... | ..... | Foggy | |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Palos (Poo-to, China)* | *30.14* | *765.5* | *69* | *20.6* | *68* | *20.0* | *60* | *Calm.* | | | *0* | | *0* | | | *0* | *0* | *Slight* | *S. & E.* | *Clear* |
| Pensacola (Mare Island, Cal.) | 30.07 | 763.8 | ..... | ..... | 62 | 16.7 | 83 | SW. | ..... | ..... | 3 | ..... | 0 | ..... | ..... | 0 | 0 | ..... | ..... | Clear |
| Plymouth (Lynn Haven Bay) | 30.48 | 774.2 | 74 | 23.3 | 71 | 21.7 | 100 | E. | ..... | ..... | 2 | ..... | 7 | ..... | S. | ..... | ..... | Moderate | E. | Cloudy |
| Ranger (Nagasaki, Japan) | 30.02 | 762.5 | ..... | ..... | 68 | 20.0 | 60 | Calm. | ..... | ..... | 0 | ..... | 2 | ..... | Calm. | 0 | 0 | ..... | ..... | Pleasant |
| Rio Bravo (Brownsville, Tex.) | 29.79 | 756.7 | ..... | ..... | 74 | 23.3 | 95 | NNW. | ..... | ..... | 1 | ..... | 0 | ..... | ..... | ..... | ..... | ..... | ..... | Blue sky |
| Santee (Annapolis, Md.) | 30.31 | 769.9 | 69 | 20.6 | 65 | 18.3 | 89 | NE. | ..... | ..... | 1 | ..... | 2 | ..... | E. | 0 | 0 | ..... | ..... | Clear |
| Saint Louis (League Island, Pa.) | 30.11 | 764.8 | 59 | 15.0 | 59 | 15.0 | (*) | SE. | ..... | ..... | 3 | ..... | 3 | ..... | SE. | 0 | 0 | ..... | ..... | Fair |
| Tennessee (N. 35° 12′, E. 139° 45′) | 29.92 | 760.0 | 72 | 22.2 | 68 | 20.0 | 79 | NNE. | 12 | 5.4 | ..... | ..... | 1 | ..... | N&E. | 0 | 0 | Light | N. & E. | Lightning |
| Trenton (Marseilles, France) | 30.08 | 764.0 | 73 | 22.8 | 70 | 21.1 | 70 | SW. | 4 | 1.8 | ..... | ..... | 2 | ..... | S&W. | 0 | 0 | ..... | ..... | D. clouds |
| Vandalia (Smyrna, Turkey) | 30.03 | 762.7 | 78 | 25.6 | 78 | 25.6 | 61 | W. | ..... | ..... | 2 | ..... | 4 | ..... | Calm. | ..... | ..... | ..... | ..... | D. clouds |
| Wabash (Boston, Mass.) | 30.21 | 767.3 | 61 | 16.1 | 61 | 16.1 | 71 | SW. | 2 | 0.9 | ..... | ..... | 0 | ..... | ..... | 0 | 0 | ..... | ..... | Blue sky |
| Wyoming (Washington, D. C.) | †30.50 | †774.7 | 63 | 17.2 | 64 | 17.8 | .... | E. | ..... | ..... | 1 | ..... | 0 | ..... | ..... | ..... | ..... | ..... | ..... | Hazy |

NOTE.—The originals generally give the wind-force by the scale 0 to 12, and the weather by the Beaufort notation; the distinction between the amount of upper and lower clouds is not made, and, apparently, the directon is frequently given as toward, instead of from; they do not give the humidity.

* It is not known that the barometer is corrected for temperature, instrumental error, or elevation.

† Aneroid barometer. ; Barometer corrected for instrumental error and reduced to sea-level.

*Bulletin of international meteorological observations, taken simultaneously on October 1, 1:77*—Continued.

UNITED STATES MARINE SERIES.

REPORTED TO THE OFFICE OF THE CHIEF SIGNAL-OFFICER OF THE ARMY.

PACIFIC MAIL STEAMSHIP COMPANY MARINE SERIES.

[Furnished by the co-operation of —— ——, president; Williams, Blanchard & Co., agents.]

| Names of vessels. | True course toward— | Hourly rate in knots. | Barometer reduced to sea-level. | | Temperature of the air. | | Relative humidity. | Wind. | | | | Clouds. | | | | Sea-swell. | | Weather. | Observer. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Direction. | Velocity. | | Force. | Amount. | | Direction. | | | | | |
| | | | | | | | | | | | | Upper. | Lower. | Upper. | Lower. | | | | |
| | | | Inches. | Millimeters. | Fahrenheit. | Centigrade. | Per cent. | From— | Miles per hour. | Meters per second. | 0—10. | 0—10. | 0—10. | From— | From— | Character. | Direction from— | | |
| Steamship Alaska | | | | | | | | | | | | | | | | | | | Capt. Seabury. |
| Steamship China | | | | | | | | | | | | | | | | | | | Capt. Berry. |
| Steamship City of New York | | | | | | | | | | | | | | | | | | | Capt. Cobb. |
| Steamship City of Panama | | | | | | | | | | | | | | | | | | | Capt. Howard. |
| Steamship City of Peking, N. 38° 44′, E. 145° 46′. | | | 30.21* | 767.3* | 68 | 20.0 | 84 | E. | | | 3 | | 3 | | E. | Small. | E. | D. clouds | Lieut. Z. L. Tanner, U. S. N. |
| Steamship City of Sydney | | | | | | | | | | | | | | | | | | D. clouds | Capt. Dearborn. |
| Steamship City of Tokio, N. 39° 06′, E. 150° 22′. | | | 30.23† | 767.8† | 66 | 18.9 | | ENE. | | | 7 | | 8 | | E. | Chop. | NE. & SE. | | Capt. Maury. |
| Steamship Colima | | | | | | | | | | | | | | | | | | | Capt. Searle. |
| Steamship Costa Rica | | | | | | | | | | | | | | | | | | | Capt. Whitebury. |
| Steamship Dakota | | | | | | | | | | | | | | | | | | | Capt. Morse. |
| Steamship Georgia | | | | | | | | | | | | | | | | | | | Capt. Cavarly. |
| Steamship Grenada | | | | | | | | | | | | | | | | | | | Capt. Connolly. |
| Steamship Wilmington | | | | | | | | | | | | | | | | | | | Capt. Austin. |

NOTE.—The originals give the wind-force by the scale 0 to 12, and weather by the Beaufort notation; not any distinction between upper and lower clouds.

* It is not known that the barometer is corrected for temperature, instrumental error, or elevation.

† Aneroid; instrumental error not known.

## WHITE STAR LINE MARINE SERIES.

[Furnished by the co-operation of Ismay, Imrie & Co., agents, Liverpool, and R. J. Cortis, agent, New York.]

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Steamship Adriatic | | | | | | | | | | | | | | | | | | Capt. H. H. Perry. |
| Steamship Baltic | | | | | | | | | | | | | | | | | | Capt. J. W. Jenning. |
| Steamship Britannic | | | | | | | | | | | | | | | | | | Capt. W. H. Thompson. |
| Steamship Celtic | | | | | | | | | | | | | | | | | | Capt. B. Gleadell. |
| Steamship Germanic | | | | | | | | | | | | | | | | | | Capt. C. W. Kennedy. |
| Steamship Republic | | | | | | | | | | | | | | | | | | |

## OCCIDENTAL AND ORIENTAL STEAMSHIP COMPANY MARINE SERIES.

[Furnished by the co-operation of George H. Bradbury, president; T. H. Goodman, agent.]

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Steamship Belgic | | | | | | | | | | | | | | | | | Capt. John Metcalf. |
| Steamship Gaelic, N. 21° 15′, E. 114° 54′ | | 29.97* | 761.2* | 80 | 26.7 | 100 | NNE | | 4 | S. | | NE. | Smooth | | D. clouds | | Capt. W. H. Kidley. |
| Steamship Oceanic, N. 34°, W. 131° | | 30.00 | 762.0 | 66 | 18.9 | 68 | Var. | | 3 | 5 | | NW. | Moderate. | NW. | D. clouds | | Capt. H. Parsell. |

NOTE.—The originals give the barometer as read off; wind-force by the scale 0 to 12; do not distinguish between upper and lower clouds. The position given for the Oceanic is that at noon, local time, instead of that at 7.35 a. m., Washington time.

* Aneroid.

## NORTH GERMAN LLOYD OF BREMEN MARINE SERIES.

[Furnished by the co-operation of A. Schumacher & Co., agents.]

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Steamship Baltimore | | | | | | | | | | | | | | | | | Capt. H. Andressen. |
| Steamship Berlin | | | | | | | | | | | | | | | | | Capt. C. Pohle. |
| Steamship Braunschweig | | | | | | | | | | | | | | | | | Capt. K. Undütsch. |
| Steamship Nürnberg, N. 49° 25′, W. 10° 54′ | | 30.00 | 762.0 | 60.0 | 15.6 | 82 | N | | 5 | c | | NW. | Tranquil. | WNW. | D. clouds | | Capt. A. Jaeger. |
| Steamship Ohio | | | | | | | | | | | | | | | | | Capt. G. Meyer. |

NOTE.—The originals give the barometer as read off; temperature by Réaumur scale, except for steamships Braunschweig, Nürnberg, and Ohio; wind-force by the scale 0 to 12; weather as published; do not generally give amount of cloudiness, nor distinguish between upper and lower clouds.

*Bulletin of international meteorological observations, taken simultaneously on October* 1, 1877—Continued.

UNITED STATES MARINE SERIES—Continued.

AMERICAN STEAMSHIP COMPANY MARINE SERIES.

[Furnished by the co-operation of H. D. Welsh, president; Peter Wright & Sons, general agents.]

| Names of vessels. | True course toward— | Hourly rate in knots. | Barometer reduced to sea-level. | | Temperature of the air. | | Relative humidity. | Wind. | | | Clouds. | | | | Sea-swell. | | Weather. | Observer. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Direction. | Velocity. | | Amount. | | Direction. | | Character. | Direction from— | | |
| | | | Inches. | Millimeters. | Fahrenheit. | Centigrade. | Per cent. | From— | Miles per hour. | Meters per second. | Upper. 0—10. | Lower. 0—10. | Upper. From— | Lower. From— | | | | |
| Steamship Illinois, N. 49° 42′, W. 39° 37′. | ..... | ... | *29.70 | *754.4 | 52 | 11.1 | (?) | W. | ... | ... | 7 | ... | 5 | ... | W. | Heavy. | W. | D. clouds.... | Capt. Shackelford. |
| Steamship Indiana, N. 45° 46′, W. 52° 51′. | ..... | ... | 30.23 | †767.8 | 49 | 9.4 | ... | NNW. | ... | ... | 7 | ... | 3 | ... | N. | Heavy. | NW. | Fine ..... | Capt. Sargent. |
| Steamship Ohio, Mersey River | ..... | ... | 30.18 | 766.6 | 58 | 14.4 | 82 | E. | ... | ... | 1 | ... | 0 | ... | ..... | ..... | ..... | ..... | Capt. Morrison. |
| Steamship Pennsylvania | ..... | ... | ..... | ..... | ..... | ..... | ... | ..... | ... | ... | ... | ... | ... | ... | ..... | ..... | ..... | ..... | Capt. Harris. |

NOTE.—The originals give the barometer as read off; the wind-force by the scale 0 to 12.

* Corrected for temperature and elevation, instrumental error not known.

† Aneroid; corrected for elevation, instrumental error not known.

RED STAR LINE MARINE SERIES.

[Furnished by the co-operation of James A. Wright, president; Peter Wright & Sons, agents.]

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Steamship Nederland | ..... | ... | ..... | ..... | ..... | ..... | ... | ..... | ... | ... | ... | ... | ... | ... | ..... | ..... | ..... | ..... | Capt. Randle. |
| Steamship Switzerland | ..... | ... | ..... | ..... | ..... | ..... | ... | ..... | ... | ... | ... | ... | ... | ... | ..... | ..... | ..... | ..... | Capt. Jackson. |
| Steamship Vaderland | ..... | ... | ..... | ..... | ..... | ..... | ... | ..... | ... | ... | ... | ... | ... | ... | ..... | ..... | ..... | ..... | Capt. Nichols. |

*ALLAN LINE MARINE SERIES.*

[Furnished by the co-operation of A. Schumacher & Co., agents.]

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Steamship Hibernian | ..... | .. | ..... | ..... | ..... | ..... | ... | ..... | ... | ... | ... | ... | .. | ... | ..... | ..... | ..... | ..... | |
| Steamship Scandinavian | ..... | ... | ..... | ..... | ..... | ..... | ... | ..... | ... | ... | ... | ... | .. | ... | ..... | ..... | ..... | ..... | Capt. W. Richardson. |

MARINE SERIES. (Miscellaneous.)

[Furnished by the co-operation of the observer named.]

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Schooner Addie Fuller, Beaufort, S. C. | ..... | .... | 30.02 | 762.5 | 71 | 21.7 | 80 | NE. | 10 | 4.5 | ... | ... | 10s | NE. | ..... | ..... | ..... | Overcast.... | Capt. James Jorgensen. |

NOTE.—The originals for the schooner Addie Fuller give the amount of cloudiness by the scale 0 to 4; the barometer as read off.

Collated at the Office of the Chief Signal-Officer of the Army, Washington, D. C.

The records which appear in this bulletin are copied from the regular exchanges of this office, made in each instance in compliance with an especial request, and are published for the uses of the co-operating observers. The barometric readings in the first two columns are reduced to freezing and their respective standards; those in the second two also to mean sea-level. For United States Marine Series the correction for instrumental error and the reduction to sea-level have been applied whenever they could be ascertained by means of reliable comparisons, made when the vessel was at or near land stations. The "weather" is generally published as given: D. clouds for detached clouds. When the distinction between the upper and lower strata of clouds is not reported, the *kinds* or *types*, viz: cirrus, cumulus, stratus, nimbus, scud, fracto, pallio, haze, fog, and smoke, as indicated, respectively, by the letters c, k, s, n, d, f, p, hz., fg., and sm'e, are generally published with the amount in the lower-cloud column. The distinction between the upper and lower strata is carefully made in the United States Series and a portion of the Canadian Series, and the types are indicated by the above letters or their combination in the proper column.

ALBERT J. MYER,
*Brigadier-General (Brevet Assigned), Chief Signal-Office U. S. A.*

PAPER 28.

# MONTHLY WEATHER REVIEW, JULY, 1877.

## INTRODUCTION.

The present review for the month of July depends on all data received up to the 14th of August from the Canadian meteorological service, the United States Navy, the Army post surgeons, voluntary observers, and the United States Signal Service. The most interesting features have been: first, the few storms reported at sea; second, the unusually large number of tornadoes occurring the first ten days of the month; third, the general diminution of grasshoppers and locusts, and the slight amount of damage done by them as compared with the several years previous.

## BAROMETRIC PRESSURE.

*In general.*—The general distribution of barometric pressure for the month is shown by the isobars on chart II, from which it will be seen that the highest pressure has been off the South Atlantic and Gulf coasts, both of these districts being included in the isobar of 30.00. The pressure has diminished very regularly from the coast in a northwest direction to Dakota, where the lowest average for the month will probably be found. There has been a general deficiency of pressure in comparison with past years, which is most marked in the South Atlantic States and the least marked in the northwest. In the Rocky Mountains the deficiency has been about .04 of an inch, and nearly the same on the Pacific slope.

*Barometric range.*—The general range of the barometer over the whole country east of the Rocky Mountains was about 1.03 inches, as may be seen from the following table, which gives the maximum and minimum pressures that occur on the tri-daily maps near the centers of the respective areas of high and low barometer:

LOW AREAS.

| No. | Location. | Date. | Minimum pressure. |
|---|---|---|---|
| I | Lake Huron | July 1, 7.35 a. m | 29.45 |
| II | Upper Mississippi Valley | July 2, 4.35 p. m | 29.56 |
| III | Lower Missouri Valley | July 6, 4.35 p. m | 29.46 |
| IV | East Gulf States | July 10, 4.35 p. m | 29.80 |
| V | Lower Missouri Valley | July 14, 4.35 p. m | 29.28 |
| VI | Lower Lakes | July 19, 7.35 a. m | 29.48 |
| VII | Manitoba | July 27, 4.35 p. m | 29.53 |
| VIII | Lower Missouri Valley | July 30, 4.35 p. m | 29.27 |

HIGH AREAS.

| No. | Location. | Date. | Maximum pressure. |
|---|---|---|---|
| I | South Atlantic States | July 1, 7.35 a. m | 30.17 |
| II | Norfolk | July 8, 7.35 a. m | 30.15 |
| III | South Atlantic States | July 15, 7.35 a. m | 30.14 |
| IV | Toronto | July 23, 7.35 a. m | 30.30 |
| V | Halifax | July 28, 7.35 a. m | 30.17 |
| VI | Montgomery | July 28, 7.35 a. m | 30.16 |
| VII | Quebec | July 31, 4.35 p. m | 30.20 |

*The greatest local barometric ranges* have been as follows: 0.94 at Bismarck and North Platte; 0.86 at Alpena, and 0.82 at Escanaba.

*The least local barometric ranges* have been: 0.29 at Galveston; 0.32 at Indianola; 0.35 at New Orleans, Vicksburg, Memphis, and Mobile.

*Areas of high pressure in general.*—The areas of high pressure have been of two kinds—partly encroachments of the high summer barometer that prevails over the North Atlantic Ocean, and partly due to areas of cold, dry air flowing from the great plateau east of the Rocky Mountains, and closing up the rear of the low pressures that have crossed the country during the month.

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# WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U.S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

TRACKS OF CENTRES OF AREAS OF LOW BAROMETER FOR JULY, 1877.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. A. SSG'D) CHIEF SIGNAL OFFICER. U. S. A

AVERAGE PROGRESS OF AREAS OF LOW BAROMETER EAST OF THE 100TH MERIDIAN.

| No. | Velocity. |
|---|---|
| I | 33 miles per hour. |
| II | 24 do. |
| III. | 31 do. |
| *IV. | — do. |
| V. | 21 do. |
| VI. | 12 do. |
| VII. | 24 do. |
| *VIII. | do. |

* Too indefinite to be charted.

NOTE.—The Roman letters show number and order of areas of low barometer. The figures above the lines show the days of the month; those below, 1, 2 and 3, indicate respectively the 7:35 A. M., the 4:35 P. M., and 11 P. M. observations. The small circles on the lines indicate the position of the centre of the area of low barometer on the day and report, written respectively above and below the line.

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### AVERAGE TEMPERATURES FOR JULY.

| DISTRICTS. | Average for July. Signal Service Observations. For several years. | For 1877. | Comparison of July, 1877, with the average for several years. |
|---|---|---|---|
| *St. Lawrence valley | 69°.2 | 70°.0 | Normal. |
| New England | 70 .0 | 69 .9 | Normal. |
| Middle Atlantic States | 77 .0 | 77 .8 | 0°.9 above. |
| South Atlantic States | 81 .5 | 82 .7 | 1°.2 above |
| Gulf States | 82 .6 | 83 .4 | 1°.2 above. |
| Lower Lake region | 70 .2 | 71 .1 | 0°.9 above. |
| *Upper Lake region | 67 .2 | 68 .3 | 1°.1 above. |
| Ohio valley and Tennessee | 78 .8 | 78 .5 | Normal. |
| Upper Mississippi valley | 75 .8 | 75 .4 | Normal. |
| Lower Missouri valley | 78 .1 | 76 .9 | 1°.2 below. |
| Upper Missouri valley | 72 .1 | 72 1 | Normal. |
| Minnesota | 68 .5 | 69 .8 | 1°.3 above. |
| Rocky Mountains stations | 65 .1 | 65 .8 | 0°.7 above |
| Pacific Coast | 64 .7 | 66 .0 | 1°.3 above. |

* Signal Service and Canadian Observations.

### TEMPERATURES OF WATER FOR JULY, 1877.

| STATIONS. | Temperatures a bottom. Maximum. | Minimum. | Average depth of water. Feet. |
|---|---|---|---|
| Alpena | 77° | 68° | 14 |
| Augusta | 90 | 83 | 6 |
| Baltimore | 82 | 76 | 11 |
| Buffalo | 80 | 68 | 13 |
| Cairo | 87 | 78 | 28 |
| Charleston | 87 | 82 | 43 |
| Chicago | 74 | 64 | 10 |
| Cleveland | 79 | 65 | 14 |
| Cincinnati | 84 | 76 | 14 |
| Detroit | 76 | 62 | 24 |
| Duluth | 69 | 43 | 13 |
| Eastport | 45 | 40 | 17 |
| Escanaba | 67 | 62 | 15 |
| Galveston | 91 | 82 | 8 |
| Grand Haven | 77 | 73 | 19 |
| Jacksonville | 85 | 79 | 12 |
| Keokuk | 83 | 71 | 8 |
| Knoxville | 87 | 80 | 13 |
| La Crosse | 80 | 72 | 6 |
| Louisville | 83 | 77 | 6 |
| Memphis | 84 | 77 | 20 |
| Marquette | 52 | 46 | 15½ |
| Milwaukee | 68 | 52 | 20 |
| Mobile | 89 | 84 | 16 |
| Montgomery | 89 | 81 | 5 |
| Nashville | 87 | 78 | 14 |
| New London | 69 | 60 | 12 |
| New York | 73 | 67 | 16 |
| Norfolk | 82 | 76 | 24 |
| *Omaha | 77 | 70 | 26 |
| Pittsburgh | 82 | 71 | 8 |
| Portland, Maine | 60 | 50 | 26 |
| San Francisco | 61 | 59 | 24 |
| St. Louis | 83 | 76 | 22 |
| St. Marks | 81 | 75 | 17 |
| St. Paul | 80 | 69 | 6 |
| Savannah | 86 | 83 | 8 |
| Toledo | 81 | 75 | 11 |
| Wilmington | 86 | 82 | 12 |
| Wood's Holl | 71 | 64 | 8 |
| Yankton | 80 | 70 | 10 |

* Observations only taken from the 1st to 14th.

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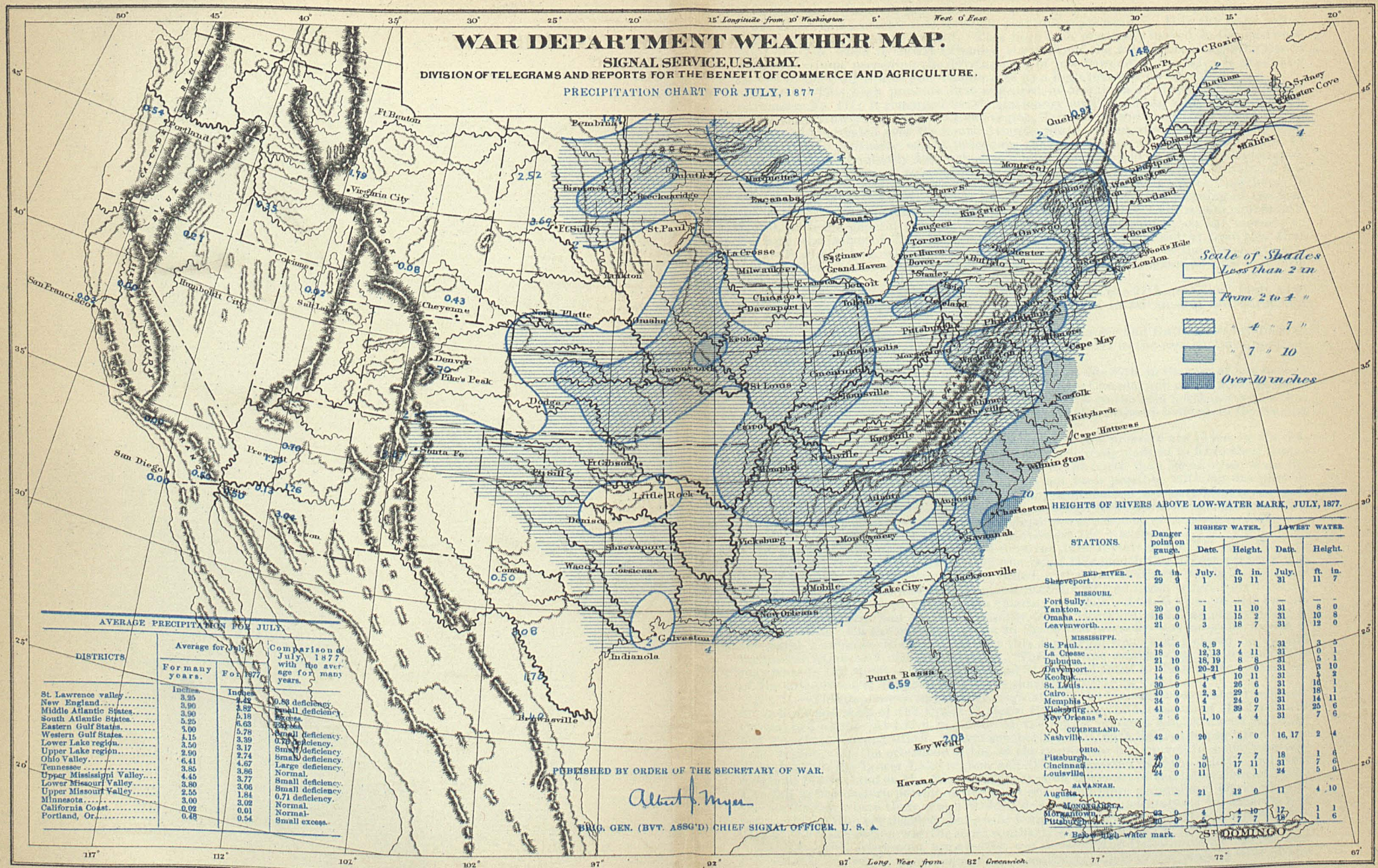
# WAR DEPARTMENT WEATHER MAP.

## SIGNAL SERVICE, U.S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

PRECIPITATION CHART FOR JULY, 1877




### AVERAGE PRECIPITATION FOR JULY.

| DISTRICTS | Average for July: For many years. | For 1877. | Comparison of July, 1877, with the average for many years. |
|---|---|---|---|
| | Inches. | Inches. | |
| St. Lawrence valley | 3.25 | 4.42 | 1.83 deficiency. |
| New England | 3.90 | 3.82 | Small deficiency. |
| Middle Atlantic States | 3.90 | 5.18 | Excess. |
| South Atlantic States | 5.25 | 6.63 | Excess. |
| Eastern Gulf States | 5.00 | 5.78 | Small deficiency. |
| Western Gulf States | 4.15 | 3.39 | 0.76 deficiency. |
| Lower Lake region | 3.50 | 3.17 | Small deficiency. |
| Upper Lake region | 2.90 | 2.74 | Small deficiency. |
| Ohio Valley | 6.41 | 4.67 | Large deficiency. |
| Tennessee | 3.85 | 3.86 | Normal. |
| Upper Mississippi Valley | 4.45 | 3.77 | Small deficiency. |
| Lower Missouri Valley | 3.80 | 3.06 | Small deficiency. |
| Upper Missouri Valley | 2.55 | 1.84 | 0.71 deficiency. |
| Minnesota | 3.00 | 3.02 | Normal. |
| California Coast | 0.02 | 0.01 | Normal. |
| Portland, Or | 0.48 | 0.54 | Small excess. |

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

### HEIGHTS OF RIVERS ABOVE LOW-WATER MARK, JULY, 1877.

| STATIONS. | Danger point on gauge. | HIGHEST WATER. Date. | HIGHEST WATER. Height. | LOWEST WATER. Date. | LOWEST WATER. Height. |
|---|---|---|---|---|---|
| RED RIVER. | ft. in. | July. | ft. in. | July. | ft. in. |
| Shreveport | 29 9 | 1 | 19 11 | 31 | 11 7 |
| MISSOURI. | | | | | |
| Fort Sully | — — | — | — — | — | — — |
| Yankton | 20 0 | 1 | 11 10 | 31 | 8 0 |
| Omaha | 16 0 | 1 | 15 2 | 31 | 10 8 |
| Leavenworth | 21 0 | 3 | 18 7 | 31 | 12 0 |
| MISSISSIPPI. | | | | | |
| St. Paul | 14 6 | 8, 9 | 7 1 | 31 | 3 5 |
| La Crosse | 18 0 | 12, 13 | 4 11 | 31 | 0 1 |
| Dubuque | 21 10 | 18, 19 | 8 8 | 31 | 5 1 |
| Davenport | 15 0 | 20-21 | 6 0 | 31 | 3 10 |
| Keokuk | 14 6 | 4 | 10 11 | 31 | 5 2 |
| St. Louis | 30 0 | 4 | 26 6 | 31 | 16 1 |
| Cairo | 40 0 | 2, 3 | 29 4 | 31 | 18 1 |
| Memphis | 34 0 | 4 | 24 0 | 31 | 14 11 |
| Vicksburg | 41 0 | 1 | 39 7 | 31 | 25 6 |
| New Orleans * | 2 6 | 1, 10 | 4 4 | 31 | 7 6 |
| CUMBERLAND. | | | | | |
| Nashville | 42 0 | 20 | 6 0 | 16, 17 | 2 4 |
| OHIO. | | | | | |
| Pittsburgh | 30 0 | 5 | 7 7 | 18 | 1 6 |
| Cincinnati | 50 0 | 10 | 17 11 | 31 | 7 6 |
| Louisville | 24 0 | 11 | 8 1 | 24 | 5 0 |
| SAVANNAH. | | | | | |
| Augusta | — — | 21 | 12 0 | 17 | 4 10 |
| MONONGAHELA. | | | | | |
| Morgantown | 23 0 | 4 | 4 10 | 17 | 1 1 |
| Pittsburgh | 30 0 | 4 | 7 7 | 18 | 1 6 |

* Below high-water mark.

No. I was the continuation of the high pressure No. VIII of June, which, on the morning of the 1st, was highest in the South Atlantic and Gulf States, where it ranged above 30.10. This pressure slowly diminished, with southerly winds, disappearing as a high area during the 5th and 6th.

No. II.—The barometer rose slowly in rear of low pressure No. II in the Lake region during the night of July 3 and 4. This high area gradually moved to the eastward until the 7th, when it slowly extended itself along the Atlantic coast, giving rise to southerly winds, preceding the development of low barometer No. III. It gradually moved to the Gulf States and disappeared as a high pressure on the 9th.

No. III.—This high pressure first appeared in Manitoba on the 9th, in rear of low barometer No. III; it remained nearly stationary until the 10th, when it moved in a southeasterly direction over the Lake region, Tennessee, and the Ohio Valley; on the 14th, it had extended over the South Atlantic States, where the pressure rapidly rose, giving rise to southerly winds, preceding the development of low barometer No. V; from that day it gradually diminished as a high pressure, and on the 18th disappeared.

No. IV.—The pressure rose rapidly in the northwest during the 19th, in rear of low barometer No. VI, and extended southerly to the Gulf, and gave rise to "northers" in Texas on the 20th and 21st; it then moved easterly until, on the morning of the 23d, the isobar of 30.20 extended over the Upper Mississippi Valley, Lake region, and Middle States, with the general pressure remarkably high for the month; on the morning of the 24th, the isobar of 30.20 had slowly moved to the east and south; from that time it slowly diminished, with southerly winds, while extending over the South Atlantic and East Gulf States until the afternoon of the 26th, when it ceased to exist as a high area.

No. V.—The pressure rose rapidly in Nova Scotia on the 27th, remained high until the 28th, and then diminished, with southerly winds, in advance of low barometer No. VIII.

No. VI.—The pressure rose slowly in the South Atlantic and Gulf States on the 27th and 28th, during the progress of low barometer No. VIII to the east, and disappeared, with southerly winds, on the 29th.

No. VII.—The pressure rose in the Lake region on the 30th, in the rear of low barometer No. VII, and moved in an easterly direction over Canada, and on the 31st extended over the New England and Middle States, giving rise to the cold northeast winds that prevailed at that time. The rest of the history of this pressure belongs to the August review.

*Areas of low pressure in general.*—Eight areas of low pressure are given in the following list, only six of which, however, were sufficiently defined to have their tracks charted. In general the storm-paths lie more to the north than for any year since the paths have been traced in this office. It has not been possible, with the insufficient data at hand, to determine whether or not any well-defined low area has moved from the Pacific coast over the Rocky Mountains, although there are several instances when the pressure has been low on the Pacific slope two or three days in advance of depressions becoming manifest in the extreme northwest and Manitoba.

No. I.—This depression was referred to in the June review as No. XII, and its path charted until 11 p. m. of June 30. On the 1st of this month the lowest pressure was central north of Lake Huron; rain prevailed, with warm southerly winds, in the Lake region, Canada, Middle and New England States, and cold north winds were blowing in the Upper Mississippi Valley, with clearing weather. At 4.35 p. m. of the 1st the center of the storm had advanced rapidly to the eastward, and was nearly north of Lake Ontario. On the morning of the 2d the lowest pressure was near the mouth of the Saint Lawrence River; in its rear this depression was rapidly closed up by cold northwest winds and clearing weather. The heaviest rain-falls on the limits of the map were in the Middle and New England States, and occur in the southeast quadrant of the low pressure; its path for July is charted entirely in Canada.

No. II.—This depression apparently originated in the high plateaus east of the Rocky Mountains and west of the Upper Missouri River. On the afternoon of the 1st it was central in Dakota. At 4.35 p. m. of the 2d, the lowest pressure had advanced eastward and was central near Duluth. Warm southerly winds, with light rain, prevailed in the Lake region. On the afternoon of the 3d the depression had moved in a southeasterly direction into the Lower Lake region, and then progressed over the Middle and New England States; and on the 4th it disappeared off the coast of the latter district. The rain-fall in the eastern portion of its track was much more general and heavy than in the northwest, where there was a decided deficiency in precipitation; its progress was not marked with very decided changes of temperature or by very high winds; its track east of the Lake region was the most southerly of any during the month.

No. III.—This depression, apparently, was developed in Dakota during the 5th and 6th instant, due to the prevalence of the southerly winds in the plateau west of the Mississippi River that had been constantly blowing in that direction from the Gulf of Mexico since the 1st of the month. At midnight of the 6th, the winds immediately east of the Rocky Mountains had shifted to colder northwest. On the afternoon of

the 7th, the lowest barometric pressure extended like a trough from Lake Superior to Kansas, and for the next two days opposing warm southerly and cold northerly winds prevailed on the opposite sides of this depression over the country from the lake region to the Indian Territory. At 7.35 a. m. of the 9th, the barometer was lowest near Lake Ontario; from that time the depression moved rapidly to the northeast, and on the 10th disappeared in the Gulf of the Saint Lawrence. This depression was chiefly remarkable for the destructive tornadoes that occurred in the West; for the heavy rainfall in Kansas occasioning destructive floods in the Missouri Valley. The heaviest rainfalls accompanying this depression were in its southwest quadrant, occurring after the veering of southerly winds to west and north.

No. IV.—The barometer fell on the 10th, in the South Atlantic and Gulf States, to the south of the high area, No. III. It was accompanied by general and heavy rainfall in those districts, but by slight changes in temperature and no high winds. There is no evidence of the translation of this area, and no path is charted.

No. V.—On the 13th, the winds in the Northwest shifted to southeast in advance of depression No. V, whose center, at 7.35 a. m. of the 14th, is charted in Dakota. On the afternoon of the 15th this depression extended in a barometric trough from Lake Superior to West Texas, with opposing north and south winds. The rainfall was light and unusually near the center of the depression. The storm was followed by a marked fall in temperature. The center is charted at 4.35 p. m. of the 15th, in Lake Superior. From that time there was no apparent translation of the depression. The barometer remained low in this region until the 17th, when its place was filled by the depression charted as low barometer No. VI.

No. VI.—This depression was probably developed in British America, east of the Rocky Mountains, during the 15th and 16th, in advance of the high pressure that was on the North Pacific coast at that time. On the 18th this depression moved in a southerly direction, and at 4.35 p. m. the barometer was lowest in Southern Michigan. It remained lowest in the Lower Lake region until the 19th, and then moved rapidly up the Saint Lawrence Valley, with a track too indefinite to chart after the 20th instant. This was one of the most southerly storms of the month, and, after the 17th, it became the best defined as a cyclone. It was rapidly followed by high area No. IV. During its progress very heavy and frequent rains fell east of the Mississippi River. There was a decided deficiency of precipitation in the Northwest. The rain fell in the greatest abundance in the southwest quadrant of the depression, as is frequently the case in the summer months.

No. VII.—A continued trough-like depression existed in Manitoba, Dakota, and the extreme Northwest, from the 24th of July until the 27th, in rear of high pressure No. IV. It had no track that, with the data in the possession of this office, can be charted up to that time, but on the morning of the 27th its center can be placed to the east of Pembina. It moved slowly to the southeast in the Lower Lake region, and, on the 29th, took a path slightly to the north of the Saint Lawrence River, and probably disappeared off the coast of the British maritime provinces in the early days of August. It was attended by numerous local but not heavy rains over the Lake region and New England States. Heavy rain fell at the same time in Texas, between the high area in the Gulf States and the high pressure in rear of this depression, moving in a southerly direction over the plains.

No. VIII.—At 7.35 a. m. of the 28th, a marked fall of the barometer took place in Manitoba and Dakota. By the 31st the winds immediately east of the Rocky Mountains had shifted to colder northwest. By the end of the month the depression was not sufficiently defined to have its track charted. But little rain fell. Its further history belongs to the August Review.

*Vessels experiencing storms at sea.*—Fourth, off Chincoteague, a revolving gale; 21st, N. 50° 35′, W. 19° 25′.

## TEMPERATURE OF THE AIR.

*In general.*—The general distribution of temperature for the month is shown by the isotherms on Chart No. II. A comparison with the averages for July, during the past seven years, shows that the temperatures have been about normal in the Saint Lawrence Valley, New England, Ohio Valley, Tennessee, and Upper Mississippi Valley; slightly above the average in the Middle, South Atlantic, and Gulf States, Lake region and Pacific coast.

*Monthly mean temperatures at special points* have been as follows: Mount Washington, 49°.2; Pike's Peak, 39°.1.

*Maximum and minimum temperatures.*—Maximum temperatures, at Signal Service stations, above 95°, were reported as follows: 96°, Boerne, Cheyenne, Galveston, Keokuk, La Crosse, Lynchburg, Memphis, Nashville, New Orleans, Pittsburgh, and Yankton; 97°, Fort Gibson, Indianola, Saint Louis, and Wilmington; 98°, Salt Lake City, Smithville, and Washington; 99°, Denver, Fort Sill, Norfolk, Omaha, Saint Mark's, Tybee Island, Vicksburg; 100°, Augusta, Charleston, Concho, Denison, Jacksonville, Mason, Mobile, and Savannah; 101°, Dodge City; 102°, Corsicana and Montgomery; 103°, Sac-

ramento; 104°, Laredo and Winnemucca; 106°, Brackettville and Boisé City, Idaho 107°, North Platte; 109°, Fort Sully and Rio Grande; 112°, Maricopa Wells; 113°, Yuma. Minimum temperatures below 40°: 23°, Pike's Peak; 34°, Mount Washington; 37°, Winnemucca; 38°, Virginia City. The maximum temperatures for the month may be divided into three periods, the first of which occurred from the 4th to the 8th, and was generally distributed over the country to the southwest of a line drawn from North Carolina to Minnesota; the second occurred from the 15th to the 18th over the Lake region, Upper Ohio Valley, and Maine; and the third from the 25th to the 30th in the Atlantic coast States, Lower Lake region, and Lower Michigan.

*Ranges of temperature.*—The largest diurnal ranges have been: 36° at Yankton and 38° at Pembina, 28th; 39° at Breckenridge, 29th, and Sacramento, 7th; 42° at Brackettville, 22d; 54° at Winnemucca, 28th.

*The largest monthly ranges* have been: 51°, Detroit, Dodge City, and Sacramento; 52°, Yankton and Stockton; 53°, Cheyenne; 55°, Brackettville and Maricopa Wells; 61°, Fort Sully; 62°, North Platte; 65°, Campo; 67°, Winnemucca.

*Frosts* were observed as follows: 30th and 31st, Camp Halleck, Nev.; 31st, Coalville, Utah, killing tender vegetation. Frosts at Summit, Colo., nightly.

*Ice.*—The formation of ice, rather than frosts, was reported from Fort Sanders, Wyo., on the 31st. Ice at Summit, Colo., quarter of an inch thick night of July 31 and August 1.

PRECIPITATION.

*In general.*—The general distribution of rain for the month is shown on Chart No. III. The region of heaviest rainfall is seen to extend along the East Gulf, South, and Middle Atlantic coasts, while over the entire country east of the 100th meridian the rainfall has been quite evenly distributed. Areas of light rainfall are, however, seen to exist in the interior of South Carolina and Georgia; in Texas and Indian Territory; in Lower Michigan and Canada; and from Eastern Iowa westward. Rains have fallen at almost all stations situated in the Rocky Mountain region and along the Pacific coast, but the amounts reported are generally quite small. The table of comparative values, given on Chart No. III, shows the rainfall to be near the normal in nearly all the districts, excepting in the Middle and South Atlantic States, where an excess of one inch and a quarter is reported, and in the Saint Lawrence Valley, where a deficiency of about three-fourths of an inch is reported.

*Special heavy rains.*—The following are the most notable cases of heavy rains that have been reported: 1st, North Volney, N. Y., 2.90 inches; Biddeford, Me., 8 inches in 3 hours; New London, Conn., 1.15 in 2¼ hours; Oswego, N. Y., 3.57 inches; Utica, N. Y., heaviest rainfall for years. 5th, Breckenridge, Minn., 2.02 inches in 1½ hours. 7th, Marquette, Mich., 1 inch in 30 minutes; Breckenridge, Minn., 2 inches in about 20 minutes, during a hurricane. 8th, La Crosse, Wis., 2.69. 10th, Sandy Springs, Md., 0.60 inch fell in 15 minutes; Savannah, Ga., 2.80 inches in 4½ hours. 15th, Guttenburg, Iowa, 2.02 inches fell in 35 minutes; Cleveland, Tenn., 3.1 inches fell in 1 hour and 20 minutes. 16th, Alpena, Mich., 1.36 inches; Brackettville, Tex., 2.49 inches; Merom, Ind., 5.91 inches. 17th, Independence, Kans, 3.37 inches. 18th, Fort Sill, Ind. T., 1.74 inches; Louisville, Ky., 2.64 inches. 20th, Atlantic City, 2.14 inches; 20th, 21st, and 22d, Cape Lookout, N. C., 5.69 inches; Cape Hatteras, 6.01 inches; Charleston, 7.33 inches; Wilmington, N. C., 6.87. 24th, Baltimore, 1.28 inches in 1 hour. 28th, Fort Sill, Ind. T., 1.97 inches; Rochester, N. Y., 2.05 inches. 29th, Fort Whipple, Va., 2.34. 30th, Trenton, N. J., 1 inch fell in 40 minutes; Hulmeville, Pa., 1.15 inches fell in 35 minutes; Bismarck, Dak., 0.45 inch fell in 30 minutes. 31st, Iowa City, Iowa, 2.50 inches fell in 1 hour.

*Small monthly rainfalls.*—The following stations report less than 0.5 of an inch: in California, Arizona, and the Rocky Mountain region; San Francisco, .02; Sacramento and San Diego, .00; Wickenburg, .18; Stanwix, .13; Winnemucca, .27; Salt Lake City and Fort Fred Steele, .08; Cheyenne, .43; Denver, .33.

*Large monthly rainfalls.*—Rain-falls to the amount of 7 inches or more were reported as follows: Cape Lookout, 8.78; Charleston, 10.21; Keokuk, 7.06; Mount Washington, 11.27; Norfolk, 7.97; Saint Mark's, 8.72; Wilmington, 9.35; Cape Hatteras, 9.80; Milford, Del., 7.90; Saint Mary's, Ga., 7.65; Milford, Ind., 7.69; New Orleans, 7.50; Trenton, N. J., 7.40; Vineland, N. J., 7.12; Moorestown, N. J., 7.43; Goldsborough, N. C., 7.56; Weldon, N. C., 7.76; Attaway Hill, N. C., 7.18; Hulmeville, Pa., 9.38; Cleveland, Tenn., 7.90; Prospect Hill, Va., 8.90; Utica, Wis., 8.30.

*Droughts.*—Droughts, injurious to vegetation, have been reported as follows: Illinois—Carbondale, drought during the month; Anna, on the 11th, relieved by subsequent rains. Massachusetts—Waltham, drought towards end of month. Texas—Clarksville, drought during month injurious to cotton and late corn; Denison, corn, cotton, and vegetables suffering greatly; Pilot Point, 16th, vegetation drying up for want of rain, relieved by heavy thunder-storm on the 18th. Virginia—Wytheville, drought ended on the 16th. Iowa—Nora Springs, latter part of month corn and potatoes suffering. Wisconsin—Waupaca, during month wells failing, brooks drying up,

swamps dry, crops damaged; hay, half-crop; wheat and oats, half to three-quarters of a crop; potatoes, small amount; no wild fruits, no apples. Dakota—Olivet, 15th. Ohio—Cleveland, 9th.

*Hail-storms.*—Hail-storms have been reported as follows: 1st, Kansas, Connecticut, Missouri, New York, New Jersey, Illinois, Dakota, Pennsylvania; 2d, Virginia, North Carolina, Illinois, Kansas; 3d, Delaware, New York, Pennsylvania; 5th, New York, Florida, Indiana, New Jersey, Ohio, Vermont, Virginia, Georgia, Dakota, Pennsylvania, Pembina, Dak.; 7th, Michigan; 8th, Wyoming, Iowa, New Mexico; 9th, Connecticut; 10th, Wyoming, Maine, Indiana; 11th, Texas; 13th, New Jersey, New Mexico; 15th, North Carolina; 17th, Kansas; 21st, Colorado; 22d, Virginia, New Mexico; 24th, Wyoming; 25th, Colorado; 26th, Colorado, Missouri, Dakota; 27th, Pennsylvania, Dakota; 28th, New York; 29th, New Mexico; 30th, New York, Dakota.

*Large hail-stones.*—1st, Connecticut, Southington, 1 inch in diameter; New York, Farmingdale, size of pigeon's eggs; New Jersey, Barnegat, 3 inches in circumference; Westown, 4 miles southeast of Philadelphia, stones ½ to 1¼ inches in diameter; path of storm 1,000 yards wide; course N. E. by N.; depth of hail ½ to 5 inches; destroyed all vegetable growth, killed one cow, several pigs, and chickens, &c. 2d, Asheville, N. C., stones as large as pigeon's eggs. 3d, Florida, Mayport, ½ inch in diameter; New York, Adams, 2¾ inches in diameter. 5th, Fort Rice, Dak., 3 inches in diameter; Ohio, Morristown, as large as hen's eggs. 7th, Michigan, Marquette, one hail-stone measured 9 inches in circumference; most were nearly egg-shape. 6th, New York, Rodman, 9 inches in circumference. 13th, New Jersey, Atlantic City, ½ inch in diameter. 15th, North Carolina, Greenville, as large as pigeon's eggs. 22d, Santa Fé, as large as pigeon's eggs. 30th, on the Yellowstone, as large as a man's clenched hand, perforating the tepees of the Crow Indians and killing a large number of ponies; at Bismarck, stones as large as pigeon's eggs.

*Snow.*—The 4th, at Summit, Colo., was celebrated by a snow-ball party, on snow-shoes, which afterward resolved itself into a flower-gathering party, the situation admitting of persons standing on the snow 3 feet deep and picking a large variety of Alpine flowers from the uncovered ground beyond the snow. On the 27th, 28th, and 29th snow fell at Pike's Peak.

*Rainy days.*—The number of days on which rain has fallen, as recorded by Signal Service observers, ranges as follows: New England, 10 to 20 days; Middle Atlantic, 13 to 18; South Atlantic, 9 to 14; East Gulf, 8 to 14; West Gulf, 7 to 13; Tennessee and Ohio Valley, 10 to 18; Lower Missouri Valley, 6 to 14; Upper Mississippi Valley, 6 to 10; Upper Lake region, 10 to 18; Lower Lake region, 10 to 14; Rocky Mountain stations, 1 to 19; California, 0 to 1; Oregon, 5.

*Cloudy days.*—The number of cloudy days reported during the month by voluntary observers and Army surgeons ranges about as follows: New England, 6 to 19 days; Middle Atlantic States, 5 to 20 days; South Atlantic States, 3 to 14 days; East Gulf States, 3 to 5 days; West Gulf States, 2 to 16 days; Tennessee and Ohio Valley, 5 to 13 days; Lower Missouri Valley, 2 to 23 days; Upper Mississippi Valley, 2 to 6 days; Lake region, 2 to 22 days.

*Rain from a cloudless sky* was observed at Bangor, Me., on the 17th.

## RELATIVE HUMIDITY.

The average relative humidity for the month ranges about as follows: New England, 65 to 85; Middle Atlantic States, 58 to 86; South Atlantic States, 65 to 78; East Gulf States, 62 to 79; West Gulf States, 65 to 70; Tennessee and Ohio Valley, 67 to 70; Lower Missouri Valley, 62 to 68; Upper Mississippi Valley, 62 to 69; Upper Lakes, 62 to 72; Lower Lakes, 61 to 70; San Diego, 74. High stations, uncorrected for altitude, report as follows: Mount Washington, 86; North Platte, 47; Cheyenne, 31; Denver, 32.

## WINDS.

*In general.*—The prevailing winds at Signal Service stations are shown by arrows on Chart No. II, from which it will be seen that southerly winds greatly predominated, tending to southeast west of the Mississippi, and to southwest along the Atlantic coast and Lake region.

*Total movements.*—The largest total movements are as follows: Mount Washington, 14,903 miles; Cape Lookout, 12,022; North Platte, 11,145; Pike's Peak, 11,090; Cape Hatteras, 10,176; Kittyhawk, 9,619; Breckenridge, 9,431.

*The smallest movements* are: Shreveport, 1,380; Nashville, 2,707; Augusta, 2,182; Lynchburg, 2,440.

*The highest velocities*, in miles per hour, have been: 1st, Sandy Hook, 73; 2d, Pike's Peak, 50; 19th, Cape Lookout, 60; 25th, Mount Washington, 65; 28th, Washington, D. C., 60; 30th, North Platte, 84 miles.

*Local storms, tornadoes, &c.*, have been reported as follows (unless specially noted, it

is understood that the following list of high winds includes only local storms, and not such gales as prevailed simultaneously over a large region): 1st, Rochester, N. Y., reports considerable damage by storms to houses, fruit trees, and standing grain; North Volney, N. Y., severe wind and hail-storms doing much damage; Wappinger's Falls, N. Y., tornado, damaging buildings and blowing down trees; a severe wind-storm at Coatesville, Pa., during which a number of houses were destroyed; tornadoes at Ercildoun, Chester County, and Parkersburg, Pa.; at Waverly, Johnson County, near Saint Paul; Jolly, Ind.; Richmond, Ky.; Gilsum and Sullivan, Chester County, New Hampshire; terrific storm at Marlborough, N. Y., much damage done; heavy storm at Lawrenceville, Pa., damage $30,000. 2d, tornadoes at Kingsburg, Ind. A destructive tornado occurred at Elkhart, Ind. It is stated that the day had been unusually warm with light breezes; about 4.30 p. m. there were two storms moving in nearly parallel paths to the east, one from the southwest, the other from the northwest. About 5.30 the upper stratum of air seemed agitated, and the higher clouds moved from opposite directions toward each other; below were some ash-colored clouds, which flew from all directions toward a common center. At this center the tornado struck the ground with a black column of cloud about forty rods wide, demolishing everything in its path. It followed the bank of the Saint Joseph River for nearly two miles, then lifted and sank again about two miles to the southeast, striking another stream. The center of the tornado was over the river, as shown by the trees, buildings, &c., falling toward the south. Many persons in the path of the tornado noticed a smell of sulphur. Some say the odor was the same as in the battery-room of a telegraph office. As is frequently the case, this tornado was followed by a very severe thunder-storm. This same evening (2d), at 6 p. m., a tornado passed near Goshen, Ind., tearing down houses and trees, and killing several people. Goshen lies about ten miles southeast of Elkhart, and it was probably the same tornado that visited both places. During the 1st and 2d, Illinois, Indiana, and Ohio were visited by an unusual number of tornadoes, destructive to life and property, occurring in advance (southeast quadrant) of depression charted as No. II on Map I of this review. 3d, tornadoes at Grantsville and Baltimore, Md., described as a very heavy storm, chimneys and trees blown down, wind must have reached 50 or 60 miles in elevated positions; damage to church, $1,000. Portsmouth, N. C., remarkable wind-squall or whirlwind at 3 p. m., driving sand-blasts before it, uprooting trees, destroying fences and out-buildings, sucking water from all ponds, and being followed by thunder-storm. 5th, Butler County, Ohio, tornado struck the ground in Liberty township, appearing to drop down from above in the form of a dense black cloud; bounding almost immediately, it struck again about a mile and a half distant in a southeasterly direction, uprooting trees, twisting off their trunks, demolishing houses and barns, destroying grain in the shock, growing corn, and sweeping away fences and orchards, disappearing beyond West Chester, near Pisgah. Severe tornado swept over Morrow County, Ohio, path 12 miles long and 1 mile wide. Severe storm in southern part of Allegheny County and a violent rain-storm passed over Berks County, Pennsylvania. Severe hail-storm at Charlottesville, Va. Jacksonburg, Ohio, hurricane from W. NW. to E. SE., damaging buildings, crops, and trees; as it passed through a forest thousands of small balls were seen about 100 feet from the ground, giving out a pale flame. Wytheville, Va., hurricane twisted off, near the base, six forest trees (five oaks and one walnut) from 1½ to 2 feet in diameter. Tybee Island, 2 miles west of station, at 5.35 p. m., waterspout bursted, making a whizzing noise, column about 100 feet high and 3 feet in diameter. Severe gale at Wautoma, Wis., unroofing buildings, uprooting trees, and destroying crops. 6th, heavy gale at Fernandina, Fla. 7th, Breckenridge, Minn., wind blowing 90 miles per hour for about 3 minutes, unroofing and demolishing buildings, leveling fences, twisting off tree-trunks, &c. Pelham, N. Y., tornado, tearing trees up by the roots; much damage to orchards. 7th, a very destructive tornado occurred at Pensaukee, Wis. It moved from the northwest to southeast; its track was 3 miles long and 1,000 feet wide; it lasted about two minutes; eight persons are known to have been killed; many were wounded; the damage to property was estimated at $300,000. 9th, Westfield, Mass., storm doing heavy damage, houses blown down, fences scattered, crops destroyed, and several lives reported lost. Tornado, with violent wind, rain, and hail at Galt, Ontario, at 5 a. m. 9th and 27th, Poughkeepsie, N. Y., severe wind-storms. 10th, New Orleans, La., at 6.55 p. m., a waterspout was observed apparently over the lake, moving toward the northwest, and followed by a heavy thunder-storm; Tybee Island, Georgia, two waterspouts observed 4 miles north of station at 6 p. m.; they were about 1 mile apart; columns long and of short duration. 11th, Tybee Island, Georgia, 8 miles northwest of station, in Jones River, two waterspouts at 11 a. m., columns appeared nearly 1 mile high and about 2 feet in diameter, distance apart about 4 rods, and lasting about fifteen minutes; at Indianola, Tex., early in the morning, waterspout formed in bay about 2 miles from shore, having an apparent diameter of 75 feet; traveled furiously for 7 miles and then broke, followed by rain at 7.35 a. m.; Savannah, Ga., waterspout observed a short distance south of the city in afternoon. 15th, Fort Whipple, Virginia, violent thunder-storms, lightning striking and shattering flag-staff. 16th, tornado in Dutchess and Cumberland Counties, New York. 27th,

severe gale, with hail and rain, at Richland Station, Pennsylvania; heavy wind-storm at Poughkeepsie, N. Y. 19th, tornado at Elizabeth, N. Y. 26th, Fort Sully, Dak., a hurricane described as follows: At 5 p. m. a few cumulo-stratus clouds appeared in the horizon; at 5.30 cumulo-stratus were forming over the station, spreading rapidly in every direction; at 6 p. m. the sky was entirely covered by swiftly moving clouds; at 6.20 the wind suddenly veered from SE. to W.; the wind blew in gust, and at 6.25 p. m. the anemometer, which previously registered 84 miles per hour, was torn from the roof, the chimneys quickly followed, and the building trembled like a leaf; the instrument shelter was blown down, as well as every board fence in and about the post; two houses were unroofed; the stockade, built of heavy timber and braced on both sides, was leveled to the ground, and one of the block-houses was moved 18 inches; at 6.30 p. m. rain, hail, and lightning commenced; at 7.40 p. m. the storm ceased. The highest wind was not registered; it was estimated at 100 miles per hour.

## VERIFICATIONS.

The detailed comparisons of the tri-daily weather indications with the telegraphic weather reports for the succeeding twenty-four hours shows a general percentage of omissions of 0.05 per cent., and of verifications of 84.1 per cent. Out of 3,702 predictions, 2,521, or 68.1 per cent., have been fully verified; 382, or 10.3 per cent., have been three-fourths verified; 547, or 14.8 per cent., have been one-half verified; 126, or 3.4 per cent., have been one-fourth verified; and 126, or 3.4 per cent., have failed. The percentages for the four elements have been: weather, 89.1; wind, 81.8; temperature, 86.6; barometer, 78.8. The percentages of verifications by geographical districts have been: New England, 84.5; Middle Atlantic States, 84.0; South Atlantic States, 82.1; East Gulf States, 81.9; West Gulf States, 85.6; Lower Lake region, 84.6; Upper Lake region, 82.9; Tennessee and Ohio Valley, 84.4; Upper Mississippi Valley, 86.4; Lower Missouri Valley, 84.6.

*Cautionary signals.*—During the month 29 cautionary signals have been displayed at stations on the Gulf and South Atlantic coasts and on the lakes. Of these, 23, or 79.3 per cent., were justified by subsequent high winds within 100 miles of the stations for which they were ordered, and 6, or 20.7 per cent., were not justified so far as known. Eighty-four instances of high winds, where no signals were displayed, have also been reported from these stations. Telegraphic communications with the North Carolina coast stations has continued interrupted during the month.

## NAVIGATION.

*Stages of water.*—In the table on chart No. III are given the highest and lowest readings on the river gauges for the month. A gradual fall has occurred in all the rivers throughout the month, with the following exceptions: slight rises in the Missouri at Omaha, on the 8th, 15th, and 16th; in the Mississippi at Saint Paul, from the 1st to 8th; at La Crosse, to the 12th, and from Dubuque to Saint Louis until about the 17th; in the Cumberland, at Nashville, from the 18th to the 20th; in the Ohio, at Pittsburgh, on the 5th, 10th, and 11th, 19th to 21st, and 28th to 31st; at Cincinnati, from the 6th to the 11th, and the 24th to the 27th; at Louisville, from the 7th to the 11th, and the 25th to the 28th. The Savannah rose at Augusta on the 20th, 21st, and 25th. The rise in the Missouri, at Omaha, on the 8th, was due to the water cutting a new channel across the bend and turning the main channel. On the 1st, the water in Lake Erie is reported to have risen several feet at Buffalo.

*Icebergs.*—None reported.

## TEMPERATURE OF WATER.

*In general.*—The temperature of water, as observed in rivers and harbors, is shown in the table on chart No. II. The average temperatures have been lowest at Eastport, 43°; and at Marquette, 49°. They have been highest at Galveston and Augusta, 87°; Montgomery, 85°; Mobile, 86°; Charleston, Knoxville, Savannah, and Wilmington, 84°.

*Maximum and minimum temperatures.*—The highest maxima have been: Galveston, 91°; Augusta, 90°; Montgomery and Mobile, 89°. The lowest minima have been: Eastport, 40°; Duluth, 43°; and Marquette, 46°.

*Ranges of temperatures.*—The least ranges have been: San Francisco, 2°; Savannah, 3°; Grand Haven and Wilmington, 4°; Charleston, Escanaba, Eastport, and Mobile, 5°.

## ATMOSPHERIC ELECTRICITY.

*Thunder-storms* were reported at stations as follows: 1st, New York, Rhode Island, Connecticut, Delaware, Illinois, Iowa, Kansas, Maine, Maryland, Massachusetts, Missouri,

Nebraska, New Hampshire, New Jersey, Ohio, Pennsylvania, Vermont, West Virginia, Dakota; 2d, Michigan, Canada, Illinois, Indiana, Iowa, Maine, Missouri, Nebraska, New York, Ohio, South Carolina, Virginia, Vermont, Pennsylvania, Kansas; 3d, New York, Virginia, Connecticut, Delaware, Louisiana, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Illinois, West Virginia, Indiana; 4th, Illinois, Indiana, Massachusetts, Minnesota, New Jersey, New York, Ohio, Texas, Virginia, Wisconsin, Tennessee, Kentucky; 5th, New York, Canada, Georgia, Illinois, Indiana, Kansas, Maine, Maryland, Massachusetts, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, South Carolina, Texas, Vermont, Virginia, Wisconsin, West Virginia, Florida, Kentucky; 6th, Dakota, Rhode Island, Alabama, Connecticut, Delaware, Georgia, Illinois, Indiana, Maine, Maryland, Massachusetts, New Jersey, South Carolina, Tennessee, Vermont, Florida; 7th, Canada, Iowa, Louisiana, Minnesota, Wisconsin, Michigan, Florida, Kansas; 8th, New York, Rhode Island, Wyoming Territory, Illinois, Indiana, Iowa, Kansas, Missouri, Nebraska, Ohio, Vermont, Wisconsin, Florida; 9th, Connecticut, Indiana, Kansas, Maine, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Vermont, Virginia, Wisconsin, Illinois, Kentucky, Wyoming Territory, Minnesota, Indian Territory, Missouri; 10th, Wyoming Territory, Connecticut, Georgia, Indiana, Maine, Maryland, Massachusetts, New Jersey, New York, North Carolina, Ohio, Texas, Vermont, Virginia, Tennessee, Minnesota, West Virginia, Alabama, New Hampshire, Louisiana; 11th, Dakota, Delaware, Iowa, Maryland, Nebraska, New Jersey, Pennsylvania, South Carolina, Texas, Virginia, Wyoming Territory, Georgia, North Carolina; 12th, Canada, Dakota, New York, Vermont, Michigan; 13th, Dakota, Connecticut, Massachusetts, Minnesota, New Jersey, New York, South Carolina, Maryland, Colorado, Rhode Island, Texas, Pennsylvania; 14th, Dakota, Maine, Nebraska, Tennessee, Texas, Massachusetts, Michigan; 15th, South Carolina, Illinois, Iowa, Kansas, Nebraska, North Carolina, Tennessee, Wisconsin, New Jersey, Vermont, Michigan, Texas, Missouri; 16th, Michigan, New York, Connecticut, Illinois, Indiana, Iowa, Kansas, Massachusetts, Missouri, Nebraska, Ohio, Tennessee, Texas, Virginia, Wisconsin, Vermont, West Virginia, Mississippi; 17th, New York, Connecticut, Iowa, Kansas, Maine, Massachusetts, Missouri, Nebraska, New Hampshire, New Jersey, North Carolina, Pennsylvania, Vermont, Virginia, Wisconsin, Michigan, Indian Territory, Maryland; 18th, Michigan, Canada, Illinois, Indiana, Kansas, New Jersey, New York, Ohio, Pennsylvania, Tennessee, Texas, Virginia, Maryland, Kentucky, Indian Territory; 19th, Michigan, New York, Connecticut, Maryland, New Jersey, New York; North Carolina, Pennsylvania, South Carolina, Virginia, West Virginia, Georgia, New Hampshire, Texas; 20th, Michigan, Nevada, New Jersey, North Carolina, Pennsylvania, South Carolina, Vermont, Virginia, Dakota, California; 21st, Georgia, North Carolina, South Carolina, Nevada; 22d, North Carolina, Tennessee, Virginia, Wisconsin, Michigan, West Virginia; 23d, New Jersey, North Carolina, Virginia, West Virginia, Tennessee, Florida; 24th, Wyoming Territory, Indiana, Louisiana, Missouri, Nebraska, Alabama, Virginia, Texas; 25th, Dakota, Michigan, Louisiana, Missouri, North Carolina, Ohio, Tennessee, Virginia, Illinois, Maine, West Virginia, Alabama, Texas; 26th, Alabama, Dakota, Illinois, Iowa, Maine, Michigan, Ohio, Pennsylvania, Vermont, Virginia, Wisconsin, North Carolina, Texas, Missouri, Nebraska, Kansas; 27th, Dakota, Nebraska, Alabama, Arkansas, Connecticut, Delaware, Illinois, Indiana, Iowa, Kansas, Louisiana, Maine, Missouri, New Jersey, New York, Ohio, Pennsylvania, Virginia, West Virginia, Michigan, Wisconsin, Indian Territory, Texas; 28th, Virginia, Illinois, Indiana, Iowa, Kansas, Maryland, Mississippi, Nebraska, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Kentucky, Indian Territory, West Virginia, Tennessee, Texas, Louisiana; 29th, Dakota, Georgia, Kansas, Maryland, Massachusetts, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Florida, Virginia, Indian Territory; 30th, Dakota, Nebraska, Arkansas, Connecticut, Kansas, New Jersey, New York, North Carolina, Pennsylvania, Virginia, South Carolina, Alabama, Georgia; 31st, Dakota, Illinois, Iowa, Missouri, Nebraska, New Jersey, New York, South Carolina, Vermont, Minnesota.

*Distant thunder or lightning* was reported as seen from stations in the respective States as follows: 1st, Dakota, Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Missouri, Nebraska, New Jersey, New York, Ohio, South Carolina, Tennessee, Virginia, Vermont; 2d, Alabama, Delaware, Georgia, Illinois, Indiana, Iowa, Maine, Maryland, Minnesota, Missouri, North Carolina, Ohio, Tennessee, Virginia, Wisconsin, West Virginia; 3d, Connecticut, Delaware, Florida, Georgia, Indiana, Iowa, Louisiana, Maryland, Mississippi, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Virginia; 4th, Georgia, Illinois, Indiana, Iowa, Kentucky, Michigan, Maryland, North Carolina, Ohio, South Carolina, Virginia, Wisconsin, West Virginia; 5th, Dakota, Delaware, Illinois, Indiana, Iowa, Louisiana, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Vermont, Virginia; 6th, Connecticut, Dakota, Georgia, Illinois, Missouri, New Jersey, New York, Texas, Vermont, Wyoming Territory; 7th, Dakota, Indiana, Illinois, Iowa, Kansas, Louisiana,

Michigan, Minnesota, Missouri, Nebraska, New York, Wisconsin, Wyoming Territory; 8th, Georgia, Illinois, Indiana, Iowa, Kansas, Massachusetts, Michigan, Missouri, New York, Ohio, Vermont; 9th, Florida, Georgia, Illinois, Iowa, Maine, Maryland, Massachusetts, Michigan, New York, Ohio, Pennsylvania, Tennessee, Texas, Vermont, Virginia; 10th, Indiana, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Mississippi, New Jersey, New York, North Carolina, Ohio, Texas, Utah, Vermont, Virginia; 11th, Alabama, Colorado, Louisiana, Maine, New Jersey, North Carolina, Tennessee, Virginia; 12th, Colorado, Dakota, Florida, Louisiana, Michigan, New York, Tennessee, Texas, Vermont; 13th, Colorado, Connecticut, Dakota, Iowa, Kansas, Maryland, Massachusetts, Minnesota, Nebraska, New Jersey, New York, Rhode Island, Texas; 14th, Alabama, Dakota, Iowa, Louisiana, Minnesota, Missouri, Texas; 15th, Alabama, Illinois, Iowa, Kansas, Louisiana, Michigan, Minnesota, Nebraska, New Mexico, North Carolina, Tennessee, Texas; 16th, Indian Territory, Indiana, Iowa, Kansas, Maryland, Michigan, Missouri, Nebraska, New York, North Carolina, Ohio, Pennsylvania, Texas, Virginia; 17th, Connecticut, Delaware, Illinois, Iowa, Kansas, Maine, Massachusetts, Michigan, Missouri, Nebraska, New York, North Carolina, Rhode Island, Tennessee, Vermont, Wisconsin; 18th, Alabama, Illinois, Iowa, Kentucky, Michigan, Nebraska, New York, Ohio, Pennsylvania, Texas, Virginia; 19th, Alabama, Indian Territory, Indiana, Iowa, Louisiana, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, Texas, Virginia; 20th, California, Colorado, Indiana, New Jersey, Pennsylvania, Vermont; 21st, Indian Territory, Michigan, New Mexico, South Carolina; 22d, Kansas, South Carolina; 23d, Georgia, Utah; 24th, California, Georgia, Indiana, Iowa, Kentucky, Missouri, Nebraska; 25th, Dakota, Illinois, Missouri, North Carolina, Ohio, Texas; 26th, Dakota, Illinois, Indiana, Iowa, Louisiana, Maine, Maryland, Michigan, Nebraska, New York, Ohio, Texas, West Virginia, Virginia; 27th, Alabama, Connecticut, Dakota, Indian Territory, Illinois, Indiana, Iowa, Kansas, Maryland, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Texas, Virginia; 28th, Connecticut, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Texas, Virginia; 29th, Dakota, Georgia, Indiana, Kentucky, Nebraska, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Texas; 30th, Connecticut, Dakota, Florida, Georgia, Indiana, Indian Territory, Maryland, New Hampshire, Nebraska, New Jersey, New York, Pennsylvania, Wyoming Territory, Virginia; 31st, Dakota, Georgia, Illinois, Iowa, Kansas, Maine, Missouri, Nebraska, New Jersey, North Carolina.

*Auroras* were observed as follows: 1st, Williamsport, Pa. 2d, Williamsport, Pa. 3d, Bangor, Me. 5th, Olympia, Wash. 6th, Vevay, Ind., Wappinger's Falls, N. Y. 7th, Sandwich, Ill., Bangor, Me.; Boston, Mass.; Duluth, Minn.; Pembina, Dak. 8th, Mount Forest, Can.; Minneapolis. 9th, Clear Creek, Neb.; Alpena and Escanaba, Mich.; Fort Brady, Mich. 10th, Escanaba, Mich. 11th, Mount Forest, Can. 21st, Burlington, Vt. 22d, Bangor, Me. 24th, Mount Forest, Can. 25th, Mount Forest, Can. 28th, Vevay, Ind. 30th, West Charlotte, Vt.; Fort Brady, Mich. 31st, Escanaba, Mich.; Fort Brady, Mich.; Minneapolis, Minn.

*Ground currents.*—Disturbances on lines of telegraph have been reported as follows: at Wappinger's Falls, N. Y., on the 17th; Santa Fé, N. Mex., 13th, 16th, 19th, 20th, so strong in some cases as to materially hinder operations of telegraph lines.

## OPTICAL PHENOMENA.

*Solar halos* were observed on the 1st in Illinois, New York, Ohio, Kansas. 2d, Connecticut, Kentucky, Maine, New York, Pennsylvania, Rhode Island. 3d, Kentucky, Maine, Massachusetts, New Hampshire, New York, Rhode Island. 4th, Louisiana, Nebraska, Ohio, Michigan. 5th, Kentucky, Maine, Massachusetts, New York, Rhode Island. 6th, Iowa, Massachusetts, Ohio, Utah, Maine. 7th, Iowa, New York. 8th, New York. 11th, Florida. 12th, Florida. 13th, Iowa, Nebraska, California, Mississippi, Florida. 14th, Tennessee, Kentucky. 15th, Connecticut, West Virginia, North Carolina, New York, Florida, New Hampshire. 16th, Iowa, Maine, Rhode Island. 17th, Illinois, Indiana, Georgia, South Carolina. 18th, Indiana, Massachusetts, South Carolina, Pennsylvania, Alabama, New York, Louisiana. 20th, Illinois. 22d, Indiana, Missouri, Ohio, Maine, Alabama. 23d, Michigan, Ohio, Kentucky, Rhode Island. 24th, New Jersey. 25th, Illinois, Michigan, South Carolina, Florida. 26th, Ohio, Dakota, South Carolina. 27th, North Carolina. 28th, Iowa, Nebraska, North Carolina, South Carolina. 30th, New York, Ohio, Indiana, Minnesota, Dakota.

*Lunar halos* were observed on the 1st, Illinois; 3d, Virginia; 6th, Utah; 10th, Missouri; 14th, Indiana, Missouri, Nevada; 15th, Indiana, North Carolina, Virginia, Ohio; 16th, Virginia, Connecticut, Minnesota, Texas; 17th, Indiana, Ohio, Tennessee, Kentucky, Texas; 18th, Delaware, Pennsylvania, New Jersey, Virginia, Ohio; 19th, North Carolina; 20th, Maine, Florida; 21st, Tennessee, Missouri; 22d, Indiana, Virginia, South Carolina, Kentucky, Ohio, Minnesota, Tennessee; 23d, Ohio, Massachusetts, Kentucky, Indiana, Rhode Island, Minnesota, Virginia; 24th, Indiana, Ohio, Tennessee, Minnesota, Kansas; 25th, Illinois, Massachusetts, South Carolina, Dakota; 26th,

Pennsylvania, Tennessee, Kentucky, North Carolina, Alabama; 27th, North Carolina, Missouri, Ohio; 28th, Kentucky, Nebraska, Pennsylvania; 29th, Canada, Ohio, North Carolina, Virginia, Connecticut; 30th, Dakota.

*Mirage* was observed at Westport, Mass., 15th; Genoa, Nebr., 31st; about 12 or 15 miles from Denver, Colo., down the valley of the Platte, 30th; Denver, Colo., 29th, 30th, 31st; Duluth, Minn., 14th; New London, Conn., 13th; Tybee Island, Ga., 26th, 27th, 28th.

*Rainbows.*—Four were observed at Vevay, Ind., on the 5th. "The rainbow proper presented a full and well-defined arch, extending from horizon to horizon; interior were three well and sharply defined images, the breadth of each decreasing toward the center. The exterior ring was but faintly defined in prismatic colors. It is noteworthy that not a drop of rain fell during the occurrence."

MISCELLANEOUS PHENOMENA.

*Botanical.*—Harvesting began as follows: *Barley*, 6th, Monticello, Iowa; 11th, Oregon, Mo. *Oats*, 13th, Creswell, Kans.; 18th, Jacksonburg, Ohio; 19th, Oregon, Mo.; 20th, Wappinger's Falls, N. Y.; 20th, 21st, Riley, Kans. *Rye*, 2d, Oregon, Mo.; 6th, Monticello, Iowa. *Wheat* (winter), 2d, (spring), 16th, Oregon, Mo.; 12th, Nichols, N. Y.; (spring), 13th, Creswell, Kans.; (spring), 21st, Monticello, Iowa. *Hay*, 3d, Monticello, Iowa, and Oregon, Mo.; 11th, Palermo, N. Y.; 14th, New London, Conn.; 19th, Jacksonburg, Ohio.

*Fruits.*—Blooming and ripening, are reported as follows: *Blackberries*, ripe, 4th, Independence, Kans.; 7th, Vineland, N. J.; 12th, Wappinger's Falls, N. Y.; 21st, Jacksonburg, Ohio. *Cherries*, ripe, 4th, Cornish, Me.; 12th, West Charlotte, Vt. *Currants*, ripe, 6th, Wappinger's Falls, N. Y. *Peaches*, ripe, 6th, Independence, Kans.; 16th (two weeks late), Carbondale, Ill. *Raspberries*, ripe, 1st, Monticello, Iowa; 4th, Jacksonburg, Ohio. *Apples*, ripe, 7th, Vineland, N. J.; 12th, Fort Madison, Iowa; 18th, Oregon, Mo.; 21st, Wappinger's Falls, N. Y. *Watermelons*, ripe, 16th, Carbondale, Ill. *Figs*, ripe, 4th, New Orleans, La. *Apricots*, ripening, 13th, Oregon, Mo.; ripe, 20th, Wappinger's Falls, N. Y. *Gooseberries*, ripe, 19th, Wappinger's Falls, N. Y.

*Flowers and trees.*—*Tiger lilies*, blooming, 14th, and *common lilies*, 16th, Monticello, Iowa. *White elder*, flowering, 5th, Cornish, Me. *Purple verrain*, flowering, 1st, and *common milkweed* and *pleurisy root*, 2d, Oregon, Mo. *Sweet elder*, blooming, 2d, Palermo, N. Y.

*Birds.*—9th, Contoocookville, N. H., *quail* heard—uncommon occurrence, happening not more than once in a season.

*Insects.*—*Katydids*, first heard, 12th, Anna, Ill.; 22d, Ringgold, Ohio; 26th, Hennepin, Ill., and Bethel, Ohio; 28th, Plattsmouth, Nebr., and Bloomfield, Wis.; seen hatching, 18th, Wappinger's Falls, N. Y. *Chintz bugs*, 15th, very numerous at Guttenburg, Iowa, "destroying thousands of bushels of wheat," Wautoma, Wis., damaging wheat, which yields only two-thirds of average crop. *Harvest flies*, 19th, Oregon, Mo., casting pupa coat; 25th, Woodstock, Vt.; 26th, Somerset, Mass. *Fireflies*, 21st, last seen at Linden, N. J. *Mass flies*, 15th, Ringgold, Ohio. *Grasshoppers*, Dakota, Morriston, destroying crops, 6th and 21st; Yankton, flying west and northwest, 3d, southeast, 17th and 28th. Nebraska, Genoa, flying north, 5th, 6th, 7th, 11th, 12th, 13th, 21st, 22d, and 25th, descending, 29th, flying south, 30th and 31st; Plattsmouth, flying north, 22d to 27th, none lighting; Clear Creek, flying southeast, 1st, northerly, 3d, 4th, 5th, 6th, and 7th, lighting, 9th, flying north, 10th, 12th, 13th, and 14th, lighting 15th, flying, 22d, 23d, 28th, 29th, and 30th. During the month they have injured wheat crop three-fourths, barley one-half, oats a small percentage, corn but little. North Platte, 3d, a few flying westward. Omaha, an immense swarm flying northwest, 11th, 12th, and 31st, none lighting. Minnesota, Saint Paul, flying southeast, 20th. Dakota, Bismarck, flying from southeast to northwest, 21st and 24th; north, 25th, 26th, and 27th; abundant on ground, 28th and 29th; destroying wheat, 31st. Minnesota, Breckenridge, flying north and northwest, 3d, 4th, 6th, 11th, 13th, 14th, 19th, 20th, 22d, and 30th; some damage done during month. Kansas, Fort Larned, flying north, very high; Creswell, flying from northeast to southwest; Denver, on the 31st, reports no flying grasshoppers yet and the native ones doing no damage. Missouri, Oregon, beginning to fly, 1st, flying south, 8th, northwest, 12th. Iowa, Council Bluffs, flying, 21st and 22d, resting, 23d; Fort Madison, flying high, not lighting, 29th, 30th, and 31st; Boonsboro', flying north, 21st; Vail, leaving, 10th, lighting and devouring buckwheat, green oats, &c., 29th and 30th; all left in a body 31st, little damage. *Locusts* (red-legged), Michigan, Oakland and Iona Counties, damaging crops, 6th. Utah Territory, flying south and east, 26th, lighting 27th, 28th, 29th, and 30th, "millions," 31st. Nebraska, North Platte, 31st, reports the absence of Rocky Mountain locusts.

*Polar bands.*—1st, Carthagena, Ohio. 3d, Wytheville, Va. 4th, New Hampshire. 5th, Wood's Holl, Mass. 8th, Wytheville, Va. 9th, Iowa City, Iowa. 11th, Gardiner, Me.; Iowa City, Iowa. 12th, Wytheville, Va.; Wood's Holl, Mass. 13th, Iowa City, Iowa. 14th, Iowa City, Iowa. 15th, Jacksonburg, Ohio. 17th, Tabor, Iowa; Freehold, N. J.; Iowa City, Iowa. 18th, Gardiner, Me. 22d, Auburn, N. H.; Freehold, N. J.; Carthagena, Ohio. 23d, Gardiner, Me.; Duluth, Minn. 25th, Jacksonburg, Ohio.

27th, Carthagena, Ohio. 28th, Guttenburg, Iowa; Iowa City, Iowa. 30th, Carthagena, Ohio; Wytheville, Va.

*Sunsets.*—The characteristics of the sky, as indicative of approaching fair or foul weather, have been observed daily, at sunset, at all Signal Service stations. The monthly means from 95 stations show that 52 doubtful cases or blanks were recorded, and that out of the remaining 2,857 cases 2,309 or 80.5 per cent. have been followed by the expected weather.

*Marsh fires*, reported as prevailing during the month in Eaton County, Michigan.

*Forest fires* near Bangor, Me., 24th; at Sacramento, Cal., from the 24th to the 31st; Stockton, Tex., 13th.

*Meteors* were observed as follows: 1st, Gilmore, Tex.; Savannah, Ga. 2d, Monticello, Iowa; Spartanburg, S. C., "blazed out in the zenith, passed rapidly westward, and exploded about 30° above the horizon, separating into many pieces"; Asheville, N. C.; Savannah, Ga.; Fayette, Miss. 4th, Woodstock, Md.; Waterbury, Vt. 6th, Monticello, Iowa. 7th, Como, Ill.; Wappinger's Falls, N. Y. 8th, Brookhaven, Miss.; Mount Auburn, Ohio; Savannah, Ga. 9th, Asheville, N. C. 10th, Woodstock, Md.; Atco, N. J. 11th, Leavenworth, Kans. 12th, Monticello, Iowa; Detroit, Mich.; Montgomery, Ala.; Savannah, Ga. 15th, Woodstock, Md.; Carthagena and Jacksonburg, Ohio; Cape Lookout, N. C. 20th, Wytheville, Va. 22d, Chambersburg, Pa. 23d, Sacramento, Cal. 24th, Council Bluffs, Iowa; Duluth, Minn. 25th, Vevay, Ind.; Woodstock, Md.; Tybee Island, Ga. 27th, Brookhaven, Miss.; Savannah and Tybee Island, Ga. 28th, Vevay, Ind.; Hector, N. Y.; Mount Auburn, Ohio; Boise City, Idaho. 29th, Afton, Iowa; Brookhaven, Miss.; Tybee Island, Ga.; Corsicana, Tex. 30th, Contoocookville, N. H.; Milton, Fla.; Vevay, Ind.; Monticello, Iowa; Cleveland, Ohio; Utica, Wis.; Duluth, Minn.; Leavenworth, Kans.; Boise City, Idaho. 31st, Vevay, Ind.; Brookhaven, Miss.; Bellefontaine and Cleveland, Ohio; Newcastle, Pa.; Indianapolis, Ind.; North Platte, Nebr.

*Zodiacal light.*—Southington, Conn., 7th; Monticello, Iowa, 12th, 13th, 14th, 29th, 30th; Jacksonburg, Ohio, 10th, 15th, 25th; Savannah, Ga., 1st, 8th, 9th, 28th.

*Earthquakes.*—9th, Sacramento, Cal.; lasting one minute; oscillations E. and W.; buildings sensibly shaken. 14th, Memphis, Tenn.; vibrations from SW. or W. to NE. or E.; buildings rocked somewhat. 15th, Carbondale, Ill.; consisting of three shocks, which appeared to come from the west, continuing about five seconds. 17th, River Du Loup, Quebec, Canada.

*Volcanoes.*—A volcanic eruption supposed to have originated in Cotopaxi, Ecuador, South America, spread desolation over the valleys of Chile and Tumbaca. A fearful noise was heard at Latacunga, followed by tremendous floods in the valleys of Cutuchi, San Felipe, Yanyanco, and Hacienda, carrying away cattle and bridges. All the haciendas on both sides of the river suffered enormously, and the destruction is said to have been terrible and complete.

## SOLAR PHENOMENA.

*Sun-spots.*—The following observations, made by Mr. D. P. Dodd, upon the spots on the sun, have been kindly communicated to the Signal Service by Rear-Admiral John Rodgers, U. S. N., Superintendent of the Naval Observatory:

| July, 1877. | No. of new— | | Reappeared by solar rotation. | | Disappeared by solar rotation. | | Total number visible. | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| | Groups. | Spots. | Groups. | Spots. | Groups. | Spots. | Groups. | Spots. | |
| 1—10 a. m. | 0 | 0 | 1 | 2 | 0 | 0 | 2 | 4 | |
| 2—10 a. m. | 0 | 1 | 0 | 0 | 1 | 2 | 1 | 3 | |
| 4—10 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | |
| 5— 6 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 7—11 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 8—10 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 9— 9 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 10— 6 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 11— 9 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 12— 9 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 13— 9 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 14— 7 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 15—10 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 17— 6 p. m. | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | |
| 18—10 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| 22— 2 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 24— 3 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 25—11 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 26—11 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 31— 7 a. m. | 1 | 5 | 0 | 0 | 0 | 0 | 1 | 5 | |

M. Albert Lancaster, meteorologist inspector in the Royal Observatory at Brussels, publishes a memoir in the "*Bulletin de l'Academie Royale*" for May, in which he makes a careful examination and comparison of the summer, winter, and annual temperatures at Brussels from 1833 to 1877, in reference to the activity of sun-spots for the same period, and draws the conclusion that the amount of heat thrown by the sun on the earth is greatest when the spots are the least in number, and that the researches of M. Köppen show the contrary during or after a period of maxima of spots; that the *variations* in the distribution of temperature on the globe are due, in great part, if not entirely, to the frequency of spots; that the influence of these spots are shown more clearly in low than in high latitudes; that the Gulf Stream offers, after each minimum of spots, the phenemenon of a temperature much above the mean, which renders the winter and summer of Europe exceptionally warm, and that to this increase of temperature in the Gulf Stream the northeastern coast of the United States is indebted to contrary north-polar currents whose temperature is below the mean. As a result of his examination, he announced that the approaching summer of 1877 would have, in Europe, a temperature above the mean, and in the east of the United States a temperature below the mean.

Dr. W. W. Hunter, the director-general of the statistical department of India, has made an investigation of the rain-fall in the Presidency of Madras for a period of sixty-four years, with a view of determining if any relation exists between the number of sun-spots and amount of rain. He finds that in a cycle of eleven years both sun-spots and rain-fall reach their minimum, consisting of the eleventh, first, and second years, and their maximum in the fifth year. He cautiously stated his general conclusions thus: "That while the statistical evidence discloses a cycle of drought in Southern India coincident in a marked manner with a corresponding cycle of sun-spots, it also tends to show that the average rain-fall of the years of minimum rain-fall in the said cycle approaches perilously near to the point of deficiency which causes famine; that the average is, however, above that point, and that, while we have reason to apprehend recurring droughts and frequent famines in these cyclic years of minimum rain-fall, the evidence is so far insufficient to warrant the prediction of a regularly recurring famine."

## NOTES AND EXTRACTS.

Prof. E. Loomis communicates to the American Journal of Science the following conclusions:

[Continued from the Review of June.]

4. In North America, south of latitude 35°, areas of low pressure are less frequent and generally exhibit a less depression than near latitude 45°, because the area over which a cyclonic movement of the winds prevails is small; and this area is small because, if a cyclonic area could be formed having a radius of 1,000 miles, with its center in latitude 30°, its circumference must extend southward to latitude 16°, where the trade winds are steady and seldom interrupted. Such a diversion of the winds toward the north, even if it could be produced, could not be long maintained; so that a large cyclonic area with its center in latitude 30° is well-nigh impossible, and it is impossible that there should be a great depression of the barometer in latitude 30°, except with a wind having a hurricane velocity. This is believed to be the reason why, in North America, the centers of great storms are generally found north of latitude 40°.

5. The causes which may produce a general movement of the atmosphere toward a central area are (A) unequal pressure, as shown by the barometer; (B) unequal temperature; and (C) unequal amount of aqueous vapor. Of these three causes the effect of the first is generally so decided that the influence of the other two causes can only be detected by careful observation; but when the pressure of the air is nearly uniform over a large extent of country, the influence of the other two causes is sometimes very palpable, and their influence is generally seen in a slight deflection of the winds from the direction they would have if wholly controlled by the first cause. I have made a considerable collection of facts illustrating the influence of temperature upon the direction of the winds, which I intend to publish hereafter.

6. A cyclonic movement of a large mass of air is generally attended by an upward motion in certain localities, chiefly on the eastern side of the center of low pressure, and this upward movement results in rain-fall. The rain-fall is then not generally the original cause of the barometric depression, but rather an incident of the cycloidal movement of the atmosphere. The fall of the barometer during a rain-storm cannot be ascribed to the simple condensation of the vapor of the atmosphere, as some have supposed, since a rain-fall of one or two inches, prevailing over an area of 300 miles in diameter near latitude 30°, produces scarcely an appreciable effect upon the barometer.

7. The progress of areas of low barometer, in all latitudes, is determined mainly by the same causes which determine the general system of circulation of the atmosphere, and their normal direction is changed by whatever causes may change the direction of the winds.

8. The heat which is liberated in the condensation of a large amount of aqueous vapor must exert an influence upon the movements of the air, so that while the rain is generally to be regarded, not as the original cause, but rather as one of the incidents of extensive cycloidal movement, if the rain-area has great geographical extent, it may have a decided influence upon the amount of the barometric depression and upon the velocity with which the storm advances; sometimes accelerating its motions, sometimes retarding it, and sometimes holding it nearly stationary in position for two or three days.

Published by order of the Secretary of War.

ALBERT J. MYER,
*Brig. Gen. (Brevet Assigned), Chief Signal-Officer, U. S. A.*

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PAPER 29.

## MONTHLY WEATHER REVIEW, AUGUST, 1877.

### INTRODUCTION.

The present review for the month of August depends upon all data received up to the 14th of September from the Canadian meteorological service, the United States Navy, the Army post-surgeons, voluntary observers, and the United States Signal-Service. The most interesting features have been: First, the unusually low barometric pressure over the Atlantic and Gulf States. Second, the general excess in temperature. Third, the large number of heavy local rains. Fourth, the general deficiency of rain in the Middle States, and consequent droughts.

### BAROMETRIC PRESSURE.

*In general.*—The general distribution of barometric pressure for the month is shown by the isobars on chart II, from which it will be seen that the highest pressure has been off the South Atlantic coast, a small portion of which is included in the isobar of 30.00. The pressure has diminished very regularly from the coast in a northwest direction to Dakota, where the lowest average for the month is found. There has been a general deficiency in pressure, which is the most decided in the South Atlantic and Gulf States, where the mean barometer is the lowest it has been since the organization of the meteorological division of the Signal Service. The pressure in the Rocky Mountains and on the Pacific coast has been nearly normal.

*Barometric range.*—The greatest range of the barometer over the whole country east of the Rocky Mountains was about 1.09 inches, as may be seen from the following table, which gives the maximum and minimum pressures that occur on the tri-daily maps near the centers of the respective areas of high and low barometer:

| LOW AREAS. | | | | HIGH AREAS. | | | |
|---|---|---|---|---|---|---|---|
| No. | Location. | Date. | Minimum pressure. | No. | Location. | Date. | Maximum pressure. |
| I | Fort Garry | Aug 1, 7.35 a. m. | 29.67 | I | Father Point | Aug. 1, 7.35 a. m | 30.32 |
| II | Chatham | Aug. 4, 4.35 p. m. | 29.54 | II | Breckenridge | Aug. 2, 7.35 a. m. | 30.23 |
| III | Bismarck | Aug. 4, 4.35 p. m. | 29.44 | III | Augusta | Aug. 12, 7.35 a. m | 30.13 |
| IV | ....do | Aug. 9, 4.35 p. m. | 29.02 | IV | Sydney | Aug. 26, 11.00 p. m. | 30.38 |
| V | ....do | Aug. 10, 4.35 p. m. | | V | Breckenridge | Aug. 31, 11.00 p. m. | 30.25 |
| VI | Omaha | Aug. 15, 4.35 p. m. | 29.69 | | | | |
| VII | Bismarck | Aug. 17, 4.35 p. m. | 29.71 | | | | |
| VIII | ....do | Aug. 19, 11.00 p. m. | 29.29 | | | | |
| IX | ....do | Aug. 20, 7.35 a. m. | | | | | |
| X | ....do | Aug. 23, 4.35 p. m. | 29.40 | | | | |
| | | Aug. 25, 11.00 p. m. | 29.39 | | | | |
| | | Aug. 30, 4.35 p. m. | 29.56 | | | | |

*The greatest local barometric ranges* have been as follows: 0.84 at Pembina, 0.72 at Breckenridge and Fort Dodge, 0.68 at North Platte, 0.70 at Eastport.

*The least local barometric ranges* have been as follows: 0.16 at Los Angeles; 0.17 at San Diego; 0.18 at Yuma; 0.19 at Key West; 0.32 at Galveston; 0.34 at Indianola;

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WAR DEPARTMENT WEATHER MAP.
SIGNAL SERVICE, U.S. ARMY.
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.
TRACKS OF CENTRES OF AREAS OF LOW BAROMETER FOR AUGUST, 1877.
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
Albert J. Myer
BRIG. GEN. (BVT ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.
AVERAGE PROGRESS OF AREAS OF LOW BAROMETER EAST OF THE 100TH MERIDIAN.
No. Velocity.
*I. — miles per hour.
*II. — do.
III. 17 do.
IV. 18 do.
V. 17 do.
*VI. — do.
VII. 17½ do.
*VIII. — do.
IX. 12½ do.
X. 38 do.
* Too indefinite to be charted.
NOTE.—The Roman letters show number and order of areas of low barometer. The figures above the lines show the days of the month; those below, 1, 2 and 3, indicate respectively the 7:35 A. M., the 4:35 P. M., and 11 P. M. observations. The small circles on the lines indicate the position of the centre of the area of low barometer on the day and report, written respectively above and below the line.
87° Long. West from 82° Greenwich
San Francisco
San Diego
Salt Lake City
Cheyenne
Denver
Pikes Peak
Santa Fe
North Platte
Omaha
Leavenworth
St. Louis
Cairo
Keokuk
Davenport
Chicago
Milwaukee
La Crosse
Duluth
Breckenridge
Ft. Benton
Virginia City
Ft. Gibson
Ft. Sill
Denison
Shreveport
Corsicana
Galveston
Indianola
Vicksburg
Memphis
Nashville
Knoxville
Atlanta
Montgomery
Mobile
New Orleans
Lake City
Jacksonville
Savannah
Charleston
Augusta
Wilmington
Cape Hatteras
Kittyhawk
Norfolk
Lynchburg
Cape May
Pittsburgh
Cleveland
Toledo
Detroit
Indianapolis
Cincinnati
Louisville
Buffalo
Rochester
Boston
Wood's Hole
New London
Portland
Halifax
Quebec
C. Rozier
Father Pt.
Chatham
Punta Rassa
Key West
Havana
S. DOMINGO

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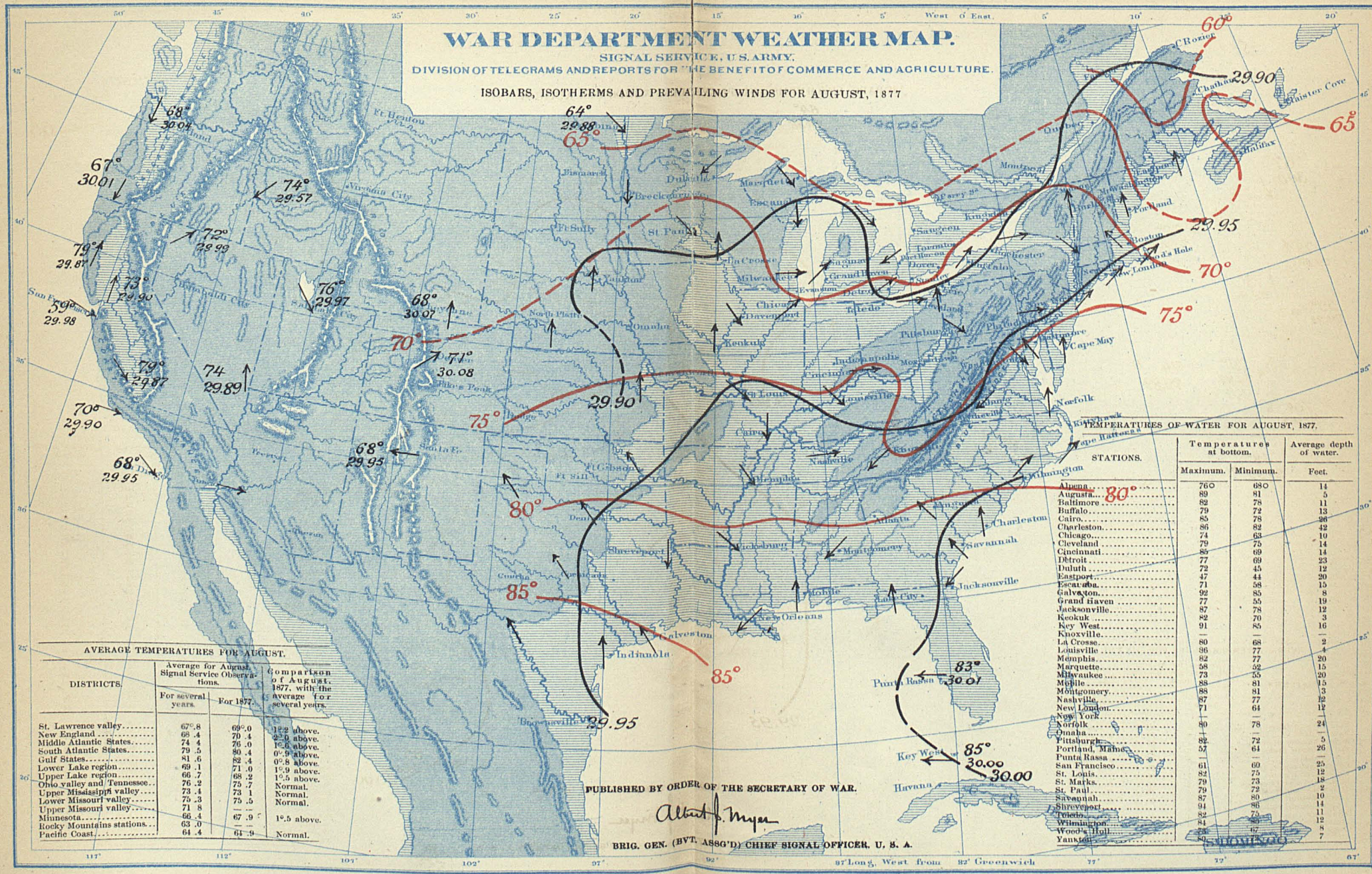
# WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U. S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

ISOBARS, ISOTHERMS AND PREVAILING WINDS FOR AUGUST, 1877




## AVERAGE TEMPERATURES FOR AUGUST.

| DISTRICTS. | Average for August, Signal Service Observations. For several years. | Average for August, Signal Service Observations. For 1877. | Comparison of August, 1877, with the average for several years. |
|---|---|---|---|
| St. Lawrence valley | 67°.8 | 69°.0 | 1°.2 above. |
| New England | 68 .4 | 70 .4 | 2°.0 above. |
| Middle Atlantic States | 74 .4 | 76 .0 | 1°.6 above. |
| South Atlantic States | 79 .5 | 80 .4 | 0°.9 above. |
| Gulf States | 81 .6 | 82 .4 | 0°.8 above. |
| Lower Lake region | 69 .1 | 71 .0 | 1°.9 above. |
| Upper Lake region | 66 .7 | 68 .2 | 1°.5 above. |
| Ohio valley and Tennessee | 76 .2 | 75 .7 | Normal. |
| Upper Mississippi valley | 73 .4 | 73 .1 | Normal. |
| Lower Missouri valley | 75 .3 | 75 .5 | Normal. |
| Upper Missouri valley | 71 .8 | — | — |
| Minnesota | 66 .4 | 67 .9 | 1°.5 above. |
| Rocky Mountains stations | 63 .0 | — | — |
| Pacific Coast | 64 .4 | 64 .9 | Normal. |

## TEMPERATURES OF WATER FOR AUGUST, 1877.

| STATIONS. | Temperatures at bottom. Maximum. | Temperatures at bottom. Minimum. | Average depth of water. Feet. |
|---|---|---|---|
| Alpena | 76° | 68° | 14 |
| Augusta | 89 | 81 | 5 |
| Baltimore | 82 | 78 | 11 |
| Buffalo | 79 | 72 | 13 |
| Cairo | 85 | 78 | 26 |
| Charleston | 86 | 82 | 42 |
| Chicago | 74 | 63 | 10 |
| Cleveland | 79 | 75 | 14 |
| Cincinnati | 85 | 69 | 14 |
| Detroit | 77 | 69 | 23 |
| Duluth | 72 | 45 | 12 |
| Eastport | 47 | 44 | 20 |
| Escanaba | 71 | 58 | 15 |
| Galveston | 92 | 85 | 8 |
| Grand Haven | 77 | 55 | 19 |
| Jacksonville | 87 | 78 | 12 |
| Keokuk | 82 | 70 | 3 |
| Key West | 91 | 85 | 16 |
| Knoxville | — | — | — |
| La Crosse | 80 | 68 | 2 |
| Louisville | 86 | 77 | 4 |
| Memphis | 82 | 77 | 20 |
| Marquette | 58 | 52 | 15 |
| Milwaukee | 73 | 55 | 20 |
| Mobile | 88 | 81 | 15 |
| Montgomery | 88 | 81 | 3 |
| Nashville | 87 | 77 | 12 |
| New London | 71 | 64 | 12 |
| New York | — | — | — |
| Norfolk | 80 | 78 | 24 |
| Omaha | — | — | — |
| Pittsburgh | 82 | 72 | 5 |
| Portland, Maine | 57 | 64 | 26 |
| Punta Rassa | — | — | — |
| San Francisco | 61 | 60 | 25 |
| St. Louis | 82 | 75 | 12 |
| St. Marks | 79 | 73 | 12 |
| St. Paul | 79 | 72 | 2 |
| Savannah | 87 | 80 | 10 |
| Shreveport | 94 | 86 | 14 |
| Toledo | 82 | 72 | 11 |
| Wilmington | 84 | 80 | 12 |
| Wood's Holl | 58 | 47 | 8 |
| Yankton | 80 | 67 | 7 |

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

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No. III.

AVERAGE PRECIPITATION FOR AUGUST.

| DISTRICTS. | Average for August. For many years. | Average for August. For 1877. | Comparison of August, 1877, with the average for many years. |
|---|---|---|---|
| | Inches. | Inches. | |
| St. Lawrence valley | 2.84 | 2.90 | Normal. |
| New England | 4.05 | 4.75 | 0.60 excess. |
| Middle Atlantic States | 4.60 | 2.10 | 2.50 deficiency. |
| South Atlantic States | 6.50 | 5.03 | 1.47 deficiency. |
| Eastern Gulf States | 5.80 | 4.91 | 0.89 deficiency. |
| Western Gulf States | 3.85 | 2.29 | 1.56 deficiency. |
| Lower Lake region | 3.00 | 3.09 | Normal. |
| Upper Lake region | 2.95 | 3.68 | 0.73 excess. |
| Ohio Valley | 3.27 | 2.90 | 0.37 deficiency |
| Tennessee | 3.77 | 4.07 | 0.30 excess. |
| Upper Mississippi Valley | 3.55 | 3.38 | 0.17 deficiency. |
| Lower Missouri Valley | 3.85 | — | — |
| Upper Missouri Valley | 2.95 | — | — |
| Minnesota | 3.60 | 2.02 | 1.58 deficiency. |
| California Coast | 0.10 | 0.00 | 0.10 deficiency. |
| Portland, Or. | 0.64 | 1.70 | 1.06 excess. |

HEIGHTS OF RIVERS ABOVE LOW-WATER MARK, AUGUST, 1877.

| STATIONS. | Danger point on gauge. | | Highest water. Date. | Highest water. Height. | | Lowest water. Date. | Lowest water. Height. | |
|---|---|---|---|---|---|---|---|---|
| RED RIVER. | ft. | in. | Aug. | ft. | in. | Aug. | ft. | in. |
| Shreveport | 29 | 9 | 1 | 11 | 2 | 31 | 3 | 6 |
| MISSOURI. | | | | | | | | |
| Fort Sully | — | — | — | — | — | — | — | — |
| Yankton | 20 | 0 | 1 | 7 | 11 | — | 5 | 9 |
| Omaha | 16 | 0 | — | — | — | — | — | — |
| Leavenworth | 21 | 0 | 1 | 11 | 9 | 31 | 8 | 7 |
| MISSISSIPPI. | | | | | | | | |
| St. Paul | 14 | 6 | 1 | 3 | 4 | 23, 29 | 1 | 10 |
| La Crosse | 18 | 0 | 1 † | – 0 | 2 | 26 † | – 2 | 3 |
| Dubuque | 21 | 10 | 1 | 4 | 11 | 24, 25, 26 | 2 | 0 |
| Davenport | 15 | 0 | 1 | 3 | 6 | 28 | 0 | 9 |
| Keokuk | 14 | 6 | 1 | 5 | 3 | 26, 27, 28 | 1 | 10 |
| St. Louis | 30 | 0 | 1 | 15 | 9 | 30, 31 | 9 | 8 |
| Cairo | 40 | 0 | 1 | 17 | 7 | 28 | 6 | 10 |
| Memphis | 34 | 0 | 1 | 14 | 3 | 31 | 6 | 1 |
| Vicksburg | 41 | 0 | 1 | 25 | 5 | 31 | 11 | 4 |
| New Orleans* | 2 | 6 | 1 | 7 | 8 | 30 | 13 | 7 |
| CUMBERLAND. | | | | | | | | |
| Nashville | 42 | 0 | 1 | 3 | 5 | 30 | 2 | 3 |
| OHIO. | | | | | | | | |
| Pittsburgh | 20 | 0 | 1 | 3 | 10 | 31 † | – 0 | 5 |
| Cincinnati | 50 | 0 | 6 | 8 | 5 | 20 | 4 | 0 |
| Louisville | 24 | 0 | 1, 8 | 5 | 2 | 23 | 2 | 11 |
| SAVANNAH. | | | | | | | | |
| Augusta | — | — | 9 | 7 | 4 | 20, 21 | 4 | 3 |
| MONONGAHELA. | | | | | | | | |
| Morgantown | 23 | 0 | 1 | 2 | 4 | 31 | 0 | 4 |
| Pittsburgh | 20 | 0 | 1 | 3 | 10 | 31 † | – 0 | 5 |
| ALABAMA. | | | | | | | | |
| Montgomery | — | | 1 | 5 | 6 | 25, 27 | 1 | 6 |

† Below high water mark. * … bench mark.

0.37 at Saint Mark's and San Antonio; 0.38 at Jacksonville, New Orleans, Corsicana, and Fort Gibson; 0.39 at Shreveport and Jacksboro'. An examination of the foregoing table shows that during August the least ranges have, in general, been near the coast, and the greatest in the plateau east of the Rocky Mountains.

*Areas of high pressure in general.*—The areas of high pressure during the month have been due, in part, to the encroachments of the general area of high pressure that exists during the summer months in the North Atlantic Ocean, and in part to cold, dry, air flowing from the Rocky Mountain region in British America, and entering the United States near Dakota and Minnesota—generally in rear of areas of low barometer. There also have been several instances of a marked rise of the barometer in advance of areas of depression, where the supply of air was not apparently obtained from either of the two sources above mentioned. This was notably the case when the barometer rose in Tennessee and the Ohio Valley in advance of depression No. VII, as described in high area No. IV.

No. I.—This is the pressure described as No. VII in the July review. On the morning of the 1st it was highest near Father Point, Canada, the isobar of 30.30 extending into Eastern Maine, and the isobar 30.20 nearly surrounding New England. It slowly extended along the North Atlantic coast, and disappeared as a high pressure on the 3d, with southerly winds, in advance of low barometer No. I.

No. II.—The barometer rose on the 2d in the Northwest and Upper Lake region, in rear of low pressure No. I, and moved in an easterly direction over the Lake region, with cold northerly winds, and, on the 4th and 5th, slowly extended to the East Gulf and South Atlantic coast, giving rise to the southerly winds that prevailed on the 6th and 7th from that coast to the Lake region. This high area was accompanied by the cold weather that lasted through the first week of August over the country east of the Mississippi River. It disappeared as a high pressure off the South Atlantic coast on the 7th.

No. III.—The pressure rose slightly above the average in the Gulf States on the 10th, and in the South Atlantic States on the 11th, in advance of low pressure No. IV, giving rise to the southerly winds that prevailed from the 10th to the 13th in Tennessee, the Ohio Valley, and Middle States. It had no movement of translation, and disappeared as a high pressure on the 15th.

No. IV.—This is the most interesting high area of the month; the pressure rose slowly on the 11th and 12th, with winds from the north and west, in Manitoba and the Northwest, in rear of depression No. IV. It remained nearly stationary until the 15th, when it gradually extended to the Gulf States, giving rise to light "northers" in Texas. On the 15th and 16th it extended, with diminishing pressure, into the South Atlantic States, giving rise to the southerly winds that blew from the 15th to 17th, inclusive, in those States. On the 18th, 19th, and 20th the highest pressure slowly moved into the Ohio Valley and Lower Lake region, with the barometer rising in advance of depression No. VII. On the 21st the highest pressure was in the Atlantic coast States and the Saint Lawrence Valley. On the morning of the 22d the highest barometer was near the Middle Atlantic coast, giving rise to southerly winds in the Middle States and New England and to northeast winds in the South Atlantic States. On the 23d, 24th, and 25th the highest pressure moved to Nova Scotia. On the 25th and 26th the pressure rose along the Atlantic coast in advance of depression No. IX, then central in the Northwest. On the morning of the 27th the isobar of 30.10 included all the country east of the Mississippi Valley, except the Upper Lake region. At 7.35 a. m. of the 28th the isobar of highest pressure, 30.20, had been transferred to the Middle and South Atlantic States and Tennessee. On the 28th and 29th, during the progress of low area No. IX across the lake region, the highest pressure was transferred to the Gulf States. On the morning of the 30th the isobar of 30.10 included all the Gulf States; it then slowly extended, with diminishing pressure, into the South Atlantic States, and at 11 p. m. of the 31st the high area was confined to the coast stations of the two last-named districts.

No. V.—The pressure rose rapidly in rear of depression No. X in Manitoba and the Northwest during the night of the 30th, accompanied by cold northerly winds. On the 31st the high barometer extended over the Upper Lake region, Lower Missouri and Upper Mississippi valleys. The further history of this area will belong to the September review.

*Areas of low pressure in general.*—Ten areas of low pressure are described in the following list, of which six only were sufficiently well defined to justify the charting of their tracks, as given on Map No. I: The charted tracks of centers of areas of low barometer show that the storms of this month were, in general, confined to the Northern States of the Union, and show a decided correspondence with those of previous years. There are three cases where the fall of the barometer on the North Pacific coast, taken in connection with the preceding and subsequent wind-directions, justify the belief that the corresponding areas of depression moved from the Pacific slope over the Rocky Mountains into the plateau east of these mountains and north of the Platte River, where their further history is given in Nos. III, IX, and X.

No. I.—This depression was described as No. VIII in the July review. The center of low pressure was, on the 1st, in Canada, and there is not sufficient data to justify the charting of its track. It disappeared in advance of high pressure No. II. The amount of precipitation, within the limits of the map, was unusually small.

No. II.—There was a marked fall of the barometer in the South Atlantic States on the 2d, which district was then, in all probability, in the northwest quadrant of an extensive depression, whose center was off that coast, and in or near the Gulf Stream. Northeast winds prevailed from New York to Florida. The depression moved along the Atlantic coast, accompanied by northeast winds, backing to northwest, until the afternoon of the 4th, when the pressure was lowest in Nova Scotia. At this time, it was apparently merged with the low area described as No. I, which joined it, moving in a southeasterly direction over the Saint Lawrence Valley. Light, but cold, rains fell at the Atlantic coast stations. Its track cannot be traced with sufficient accuracy to chart.

No. III.—On the 1st and 2d the barometer was low in British Columbia and Washington Territory. On the 2d the winds in the Lower Missouri Valley shifted to southerly, and on the 3d and 4th the same shift took place in the Upper Mississippi Valley. The lowest pressure was in Dakota on the 4th. The barometer rose in Manitoba on the 5th, with northwest winds in rear of this depression. On the 6th southerly winds prevailed from the Gulf and South Atlantic coast to the Lake region, while cold north and west winds were blowing in the Northwest. On the 7th the wind directions showed that the lowest pressure was north of Lake Superior. On the 8th the lowest barometer was central north of Lake Huron. Up to this time its path had been too indefinite to be charted; it then slowly progressed in a southeasterly direction, central in Ontario, Canada; it then moved with an easterly track over New England, and disappeared off the coast of Nova Scotia on the 11th. It was accompanied on the 9th and 10th by general rains in the Lake region, Middle States, and New England, which were the more abundant after the winds had shifted to colder north and west.

No. IV.—The northerly winds that had been blowing in the Northwest in rear of depression No. III, shifted on the 9th and 10th to a warmer southerly in advance of the low area now to be described. On the 10th the winds in Dakota and Wyoming shifted to colder northerly, and at 11 p. m. of this date the lowest pressure was near Omaha; up to this hour no recorded precipitation accompanied this depression, but on the 11th light rain generally fell in Tennessee, the Ohio and Upper Mississippi Valleys and Lake region. On the 12th the lowest pressure was in the Upper Lake region, but its track is too indefinite to be charted on that day. On the 13th the center of the depression appears to have been in Southern Michigan or Northern Indiana or Ohio. On the 14th the lowest pressure was over the Lake region, but its track cannot be accurately charted. On the 15th the low area moved across the Middle States, and on the 16th along the New England coast. This depression was unusually sluggish in its progress to the east, and especially so over the Lake region, where it was detained for four days. The high temperature that prevailed, with moist southerly winds, in its southeast quadrant during its progress, had much to do in raising the temperature of the Atlantic States above the mean for the month. Copious rains fell from the Mississippi River to the Atlantic coast, and apparently with equal frequency and abundance in the east, south, and west quadrants of this depression.

No. V.—On the 15th the winds in Dakota and Nebraska shifted to southerly in advance of a depression then developing in Montana. By the 16th the winds in the Northwest had shifted to the north and west, in rear of this low pressure, which passed beyond our stations into Canada, north of Lake Superior. Light rain accompanied this low area, which mostly fell in the southwest quadrant after the veering of the winds to colder northwest.

No. VI.—On the 17th a trough of low pressure extended from Lake Superior to Kansas, with opposing southerly and northerly winds. This low area remained nearly stationary in position, and was by the 18th filled up by the inflowing currents of air. Light rain fell on these two days in the Northwest and Lake region. No track is charted.

No. VII.—On the afternoon of the 18th a low pressure apparently developed in the plateau east of the Rocky Mountains and north of the Platte River. On the 19th, the winds in Wyoming had veered to colder northwest, and the center of the low area was in Dakota. On the 20th the low area moved slowly to the east. On the afternoon of the 21st, a trough-like depression extended from the Upper Lake region to the West Gulf States, into which blew cold northerly and warm southerly winds, giving rise to copious showers that fell from the Lake region to the Gulf. On the afternoon of the 22d, the trough of lowest pressure extended from Lake Erie to the East Gulf, with abundant precipitation, confined in general, to the limits of the isobars of lowest barometer. On the 23d, the isobars of lowest pressure assumed the more usual elliptical form, remaining nearly stationary over the Ohio Valley and Lake region. For several days the barometer had been slowly rising at the center of the depression, and, on the 24th and 25th, being filled up by the inflowing air, it ceased to exist as a low

pressure. On the 23d and 24th abundant rain fell in the Middle States and New England—the east quadrant of the depression. From the 22d to the 24th, its movements were so slow that the probable track of low barometer can only be charted by a broken line, which extended on the 23d nearly to Tennessee. This is the second instance in this month when the lakes appear to have exercised a detaining influence on the movement of translation of a low area to the east. In this depression, as well as No. IV, rain fell in equal abundance in the east, south and west quadrants of the low area, which is an unusual circumstance in storms of the United States, in the latitudes where the tracks of these low barometers are charted.

No. VIII.—On the 23d and 24th a slight depression moved from Dakota in a northeasterly direction to the north of Lake Superior; it only possessed features of little interest, and was rapidly followed by depression No. IX; its track is not charted.

No. IX.—On the 23d and 24th the barometer was low in Oregon and British Columbia, and the wind directions show that this depression had advanced on the 25th into Montana and Dakota. On the 26th and 27th cold northwest winds blew in Dakota and Manitoba, while southerly winds prevailed from the Gulf to the Lake region. On the 28th this depression, whose charted track is confined to the Northwest, was filled by air inflowing from the high areas to the north and south of it respectively. While it existed, abundant rain fell in its eastern quadrant, where heavy thunderstorms where generally reported.

No. X.—On the 28th the barometer fell at the North Pacific coast stations. On the 29th this depression crossed the Rocky Mountains, and there was a rapid fall of the barometer in the Northwest, where the northerly winds that had been closing up the rear of depression No. IX shifted to warmer southerly. At 4.35 p. m. of the 30th, the lowest pressure was in Minnesota, and colder northwest winds had begun to blow in Manitoba. At 7.35 a. m. of the 31st the lowest pressure extended in a trough from Lake Superior to Nebraska between the two areas of high barometer, one on the South Atlantic coast, and the other rapidly advancing with cold northerly winds from the British Possessions. At 11 p. m. the center of lowest pressure had moved into the Saint Lawrence Valley near Montreal. Considerable rain fell in the southeast quadrant of this depression, but was rapidly followed by clearing weather, due to the cold dry air furnished by the northwest winds. Its track shows that the velocity of the center of low barometer was much the greatest of any storm during the month. The further history of this low area will belong to the September Review.

### TEMPERATURE OF THE AIR.

*In general.*—The general distribution of temperature for the month is shown by the isotherms on Chart II. A comparison with the averages for August during the past seven years shows that the temperatures have been from one to two degrees above the normal throughout the Gulf and Atlantic States, Saint Lawrence Valley, Lake region and Minnesota, but have been about normal in the Ohio, Mississippi, and Missouri Valleys. On the Pacific coast, the monthly mean for San Diego is six degrees below the average; at San Francisco it is about normal, and at Portland, Oreg., two degrees above.

*Monthly mean temperatures at special points* have been as follows: Mount Washington, 48°.9.

*Maximum and minimum temperatures.*—Maximum temperatures, at Signal-Service stations, above 95°, have been reported as follows: 96°, Savannah, New Orleans, Leavenworth, Salt Lake City; 97°, Augusta, Galveston; 98°, Montgomery, Fort Gibson, Fort Sill, Boise City, Winnemucca; 99°, Mobile, Vicksburg, Shreveport, Denver; 100°, Indianola, Jacksborough, Concho, Dodge City; 102°, Denison, North Platte; 103°, Corsicana, Red Bluff, Visalia; 104°, Brackettville; 108°, San Antonio; 112°, Yuma; 116°, Stanwix. From stations not included in Signal Service, *extreme temperatures* have also been reported as follows: 100° at Fort Rice, Dak., Independence, Iowa; 101° at Atlanta, Ga.; 102° at Baton Rouge, La., Chepachet, R. I., Gilmer, Clarkesville, and Melissa, Tex.; 103° at Fort McKavett, Tex.; 104° at New Ulm and Mesquite, Tex.; 105° at Fort Lyon, Colo.; 108° at Fort McPherson, Nebr., Fresno, Cal.

*Minimum temperatures* below 45°: 44°, Cheyenne, Marquette; 43°, Boise City; 41°, Breckenridge; 40°, Pembina; 36°, Winnemucca. It will be seen that all the minima occurred north of the forty-first parallel of latitude and, excepting the one on Lake Superior, west of the ninety-sixth degree of longitude.

*The maximum temperatures* of the month occurred, in a general way, as follows: From the 1st to the 7th, in the Gulf States, Indian Territory, Georgia, Tennessee, the Ohio Valley, and Lower Lake region; from the 17th to the 24th, in Minnesota, the Lake region, and New England; on the 28th and 29th, in New England and the Middle States, and on the 30th and 31st, in the Missouri, Central Mississippi, and Ohio Valleys and interior of the Southern States.

The minima occurred on the 2d and 3d, along the New England coast; on the 4th, 5th, and 6th, over the Lake region, Middle States, and New England; from the 15th

to the 19th, in the Southern States and Ohio Valley; from the 22d to the 26th, over the Western plains and Mississippi Valley, and on the 31st in Northern New York and New England.

*Ranges of temperature.*—The largest monthly and diurnal ranges have been, respectively, as follows: Winnemucca, monthly, 66°, diurnal, 48°; Boise City, 55°, 39°; North Platte, 54°, 41°; Denver, 52°, 45°; Visalia, 51°, 44°; Pembina, 49°, 38°; Breckenridge, 49°, 42°; Roseburg, 47°, 40°; Red Bluff, 47°, 39°; Salt Lake City, 47°, 25°; Cheyenne, 47°, 43°; North Platte, 47°, 33°; Yankton, 47°, 31°. The least monthly and diurnal ranges have been, respectively: Key West, 17° and 16°; Cape Hatteras, 21°, 16°; Wood's Holl, 22°, 15°; Charleston, 22°, 17°; New Orleans, 23°, 16°; San Francisco, 23°, 19°; San Diego, 24°, 19°; Cape May, 24°, 17°; Cape Henry, 25°, 19°; Jacksonville, 25°, 20°. It is found, by comparison, that the monthly ranges exceed in general the diurnal by about ten degrees; that the least ranges occur, without exception, at sea-coast stations, the most exposed stations having the least ranges; and that the greatest ranges occur at the more elevated stations, especially in the region north of the fortieth parallel and west of the ninety-sixth meridian.

*Frosts* were observed as follows: On the 6th, at Denver, Colo.; 13th, at Logansport, Ind., and Cape May; 22d and 23d, at Fort Madison, Iowa; 26th, Camp Halleck, Nev., and Virginia City, Mont.; 27th, Bismarck, Dak.; 31st, Toledo, Ohio, and nightly at Halleck Station, Central Pacific Railroad, Nev., and Summit, Colo.

*Ice.*—The formation of ice, rather than frosts, was reported from Halleck Station, Nev., nightly during latter part of month.

PRECIPITATION.

*In general.*—The general distribution of rain for the month is shown on Chart No. III. The table in the lower left-hand corner gives the precipitation, in the various districts, by which it will be seen that there has been quite a large deficiency in the Middle, South Atlantic, and Gulf States, and in Minnesota, while a slight excess is reported in Tennessee and the Upper Lake region. It is a notable feature of the precipitation for this month, that the most of it has occurred during heavy showers of short duration and over quite limited areas, thus giving to certain districts an excess, at the expense of the surrounding country. Considerably over the average amount has fallen in Oregon, but, with one exception of 0.03, no rain is reported in California.

*Special heavy rains.*—The following are the most notable cases of heavy rains that have been reported: 1st, Key West, 1.47; Cape Lookout, 3.85 inches (1.50 inches in ten minutes). 2d, Goldsboro', N. C. (2d and 3d), 2.00 inches; Weldon, N. C., 2.62 inches; Greenville, N. C. (2d and 3d), 5.69 inches. 3d, Dodge City, Kans., 2.42; Cape Lookout, 3.10 inches. 6th, Denver, Colo., 1.00 in 25 minutes; Charleston, 1.27; Keokuk, Iowa, 2.40; North Platte, Nebr., 1.84. 7th, Portland, Me., 2.36; Fort Gibson, Ind. T., 1.94; Fort Sill, Ind. T., 1.21 inches; Goldsboro', N. C., 2.50 inches. 8th, Augusta, Ga., 1.82; Memphis, Tenn., 2.78; Escanaba, Mich., 1.27 inches in 20 minutes; Rio Grande, Tex., 2.65 inches; Forsyth, Ga., 2.50 inches, over 2 inches falling in 45 minutes; Brookhaven, Miss., 2.10 inches. 9th, Portland, Me., 2.15; Wilmington, N. C., 2.84; Orono, Me. (9th and 10th), 2.30 inches. 10th, Eastport, Me., 2.12. 11th, North Platte, Nebr. (in 30 minutes), 2.00. 12th, Cape May, N. J., 2.10; North Platte, Nebr., 1.44. 13th, New Haven, Conn., 2.75. 14th, Newark, N. J. Alpena, Mich., 2.50; Tybee Island, 2.02. 15th, Portsmouth, N. C., 2.29; Freehold, N. J., 2.48 inches. 16th, Mount Washington, N. H., 2.90. 18th, Hartford, Conn., 3.45 inches; Tybee Island, 1.80. 19th, Tybee Island, 2.45. 20th, Oregon, Me. (20th and 21st), 3.45 inches; Emerson, Nebr., 2.10 inches; Howard, Nebr., 2.02 inches; Wolfboro', N. H., 2.60 inches; Tabor, Iowa, 2.61 inches. 21st, Corsicana, Tex., 2.01; Fort Gibson, Ind. T., 1.42; Denison, Tex., 1.16; Jacksboro', Tex., 2.01; Louisville, Ill., 2.00 inches; Beloit, Wis., 2.00 inches. 22d (22d and 23d, Nashville, Tenn., 2.80); Saint Mark's, Fla., 3.95; Savannah, Ga., 1.92; Martinsville, Ill., 2.52 inches; Spiceland, Ind., 2.17 inches. 23d, Wilmington, N. C., 3.51; Alpena, Mich. (23d and 24th), 4.57; Alpena, Mich., 3.36 inches (1.07 inches in 35 minutes); Martinsville, Ill., 2.03 inches. 24th, Trenton, N. J., 4.30 inches. 25th, Albany, N. Y., 1.63; New London, Conn., 2.37 (25th and 26th); Mount Washington (25th and 26th), 3.83; Portland, Me. (Fort Preble), 25th and 26th, 2.20 inches; Atco, N. J., 2.68 inches; Lunenburg, Vt. (25th and 26th), 2.60 inches; Tabor, Iowa, 3.00 inches; Mystic, Conn., 4.00 inches; Somerset, Mass., 2.28 inches; Fall River, Mass. (25th and 26th), 2.60 inches; Springfield, Mo., 2.00 inches (in 20 minutes). 26th, Newport, R. I., 1.97; Breckenridge, Minn., 1.53; Nora Springs, Iowa (26th and 27th), 2.40 inches. 27th, La Crosse, Wis., 2.55; Boonsboro', Iowa (27th and 28th), 5.15 inches. 28th, Dubuque, Iowa, 2.80; Ames, Iowa (28th and 29th), 4.12 inches; Cleveland, Tenn., 2.60 inches; Geneva, Wis., 2.13 inches; Beloit, Wis., 4.00 inches. 29th, Milwaukee, Wis., 163; Boonsboro', Iowa, 4.10 inches. 30th, La Crosse, Wis., 1.69; Saint Paul, Minn., 1.83. 31st, Norfolk, Va., 1.75; Cleveland, Ohio, 2.59; Detroit, Mich., 2.02; Erie, Pa., 1.11; Port Huron, Mich., 1.22; Sandusky, Ohio, 2.80; Toledo, Ohio, 1.74; Mar-

tinsville, Ill., 2.75 inches; Painesville, Ohio, 2.80 inches; Hudson, Ohio, 3.40 inches; Venice, Ohio, 2.10 inches; Cleveland, Ohio, 2.07; Manitowoc, Wis., 2.19 inches.

*Small monthly rain-falls.*—The following stations report small rain-falls: In California: San Francisco, Sacramento, Visalia, Los Angeles, and San Diego report no rain-fall; Red Bluff, 0.03; in Arizona: Yuma, 0.06; Stanwix, 0.13; in Nevada: Winnemucca, 0.00; Pioche, 0.18; Salt Lake City, Utah, 0.28; Roseburg, Oreg., 0.25; Boise City, Idaho, 0.09; in Texas: Stockton, 0.37; Eagle Pass, 0.35; Edinburg, 0.11; Fredericksburg, 0.19; Castroville, 0.00; Shreveport, La., 0.20; in the Middle States, Baltimore, 0.64; Philadelphia, 0.66; in the Province of Ontario, Canada, Port Stanley, 0.96; Toronto, 0.12, and Kingston, 0.47.

*Large monthly rain-falls.*—Rain-falls of 7 inches or more are reported as follows: Mount Washington, 11.11; in Florida: Daytona, 10.77; Punta Rassa, 8.33; Saint Mark's, 7.90, and Saint Augustine, 7.05. North Carolina: Wilmington, 10.46; Greenville, 9.10. Brookhaven, Miss., 8.15; Boonsboro', Iowa, 10.00; Martinsville, Ill., 7.74; in Michigan: Alpena, 7.99; Detroit, 7.28; Fort Wayne, 7.75. In Maine: Portland, 7.90; Cornish, 7.45; and Chatham, N. B., 7.48.

*Droughts.*—Droughts, injurious to vegetation, have been reported as follows: Michigan—Salem, 22d, "The most severe drought known here for some time, rendering plowing impossible, terminated, but present showers will put ground in good condition;" Northport, "Corn and early potato crops injured by drought." Maryland—Baltimore, 25th, "In the country around, corn is suffering, grass badly burned, small streams and wells failing; Druid Lake lower than at any time since 1872;" Harford County, drought of greater or less severity. Pennsylvania—Philadelphia, records smallest rain-fall for seven years. Ohio and Indiana—in northern portions, "Especially dry summer; considerable portion of corn-crop utterly hopeless;" Ringgold, corn, potato, tobacco and fruit crops injured; Westerville, corn-crop suffering. Iowa—Rockford, 12th, "Crops suffering;" Cresco, 16th, "Country all parched up; corn and vegetables nearly destroyed;" Gutenberg, "Corn damaged by dry weather;" Nora Springs, drought continued until the 20th, injuring potatoes and corn. Texas—Clarksville, cotton growth checked by ten weeks' drought. Virginia—Wytheville, "Drought severe, ground too hard to plow." Tennessee—Knoxville, "Late crops injured by drought."

*Floods.*—New Jersey—16th, railroad track at Carpenterville flooded; 24th, Trenton, "Doing much damage and delaying almost all trains." New York—15th, Albany, basements flooded and much damage to new buildings and excavations. Connecticut—New Haven, 13th, damage to cellars, &c.; New London, 25th, damage to railroads $250,000. New Hampshire—Mount Washington, 26th, "Bridges in valleys around base of mountain washed away." Missouri—Saint Louis, 31st, streets flooded, Iron Mountain railroad track submerged.

*Hail-storms.*—Hail has been reported as follows: 2d, Bismarck, Dak.; 3d, Summit, Colo.; 5th, Breckenridge, Minn., North Argyle, N. Y.; 6th, Denver, Colo., Monticello, Iowa; 7th, Portland, Me., Mount Washington, N. H., Cheyenne, W. T., Lunenburg, Vt; 8th, Escanaba, Mich., North Argyle, Hector and Starkey, N. Y.; 10th, Owasco and Albany, N. Y., Mount Washington, N. H., Erie, Pa., Woodstock, Vt.; 11th, Cordova, Ill., Yankton, Dak., Boonsboro', Iowa; 12th, Harrisburg, Pa., Murphy, N. C.; 13th Canterbury, Del., Indianapolis, Ind., Vevay, Ind., Bethel, Ohio; 15th, Summit, Colo.; 16th, in northern part of New Jersey, Lehman and Delaware, Pike County, Pa., Fort Sanders, Wash. T., Como, Ill., Genoa, Nebr., Oneida, N. Y.; 17th, near Houston, Tex., Saint Louis, Mo., Port Bridger, Wash. T., Ringgold, Ohio; 18th, North Platte, Nebr., Rockford, Iowa, near Mendon, Mass., Jacksonburg, Ohio, Brownsville, Pa.; 19th, Camp Hancock, near Wilkesbarre, Pa., Fort Sanders, Wash. T.; 20th, Emerson and Genoa, Nebr., Oregon, Mo.; 21st, Fallston, Sandy Springs, and near Centreville, Md., track of storm two to three miles wide and nearly ten miles long; great damage to corn and fruit; Denison, Tex, Manitowoc, Wis., Brookhaven, Miss.; 22d, Southington, Conn.; 25th, Tabor, Iowa, Emerson, De Soto, Plattsmouth, Clear Creek, and Howard, Nebr., Oregon, Mo.; 26th, Linden, N. J.; 28th, Brookhaven, Miss., De Soto, Nebr., Beloit, Wis.; 29th, Amoskeag, N. H., Austin, Tenn.; 30th, Summit, Colo.; 21st, Sandusky, Cleveland, Painesville, Venice, Ohio, Milford, Ind., Detroit, Mich. Hail was reported on the summit of Pike's Peak on 14 days.

*Large hail-stones.*—8th, at Escanaba, stones unusually large. 9th, Gloucester, near Ottawa, Ontario, Canada, weighed 3 ounces, completely destroying crops. 19th, Camp Hancock, Wilkesbarre, Pa., large as marbles. 21st, Centreville, Md., one weighing one-fourth of a pound. 29th, Austin, Tex., large hail-stones, damaging tobacco and corn. 31st, Cleveland, Ohio, half inch to one and a quarter inch in diameter; Detroit, half inch in diameter.

*Snow.*—Snow was reported on ten days on the summit of Pike's Peak, Colo.

*Rainy days.*—The number of days on which rain has fallen, as recorded by Signal Service observers, ranges as follows: New England, 9 to 19; Middle Atlantic States, 8 to 14; South Atlantic States, 10 to 16; East Gulf States, 6 to 16; West Gulf States, 1 to 7; Tennessee and the Ohio Valley, 8 to 12; Missouri Valley, 9 to 10; Upper Mis-

sissippi Valley, 2 to 12; Upper Lake region, 7 to 16; Lower Lake region, 9 to 17; Rocky Mountain stations, 3 to 13; California, 0 to 2.

*Cloudy days.*—The number of cloudy days, reported during the month by voluntary observers and Army surgeons, ranges about as follows: New England, 4 to 13; Middle Atlantic States, 1 to 11; South Atlantic States, 0 to 5; East Gulf States, 1 to 7; West Gulf States, 0 to 3; Tennessee and Ohio Valley, 0 to 8; Lower Missouri Valley, 0 to 4; Upper Mississippi Valley, 0 to 7; Lake region, 0 to 11: Rocky Mountain stations, 0 to 7; California, 1 to 7.

## RELATIVE HUMIDITY.

The average relative humidity for the month ranges about as follows: New England, 71 to 88; Middle Atlantic States, 61 to 78; South Atlantic States, 69 to 78; East Gulf States, 58 to 81; West Gulf States, 55 to 67; Tennessee and Ohio Valley, 64 to 69; Lower Missouri Valley, 63 to 66; Upper Mississippi Valley, 56 to 70; Upper Lakes, 64 to 75; Lower Lakes, 63 to 73; California, 32 to 79.

High stations, not corrected for elevation, report as follows: Mount Washington, 88; North Platte, 57; Cheyenne, 37; Denver, 35; Santa Fé, 37; Salt Lake City, 25.

## WINDS.

*In general.*—The prevailing winds at Signal Service stations are shown by arrows on Chart No. II., from which it will be seen that the prevailing winds were southerly throughout the Atlantic States and west of the Mississippi, tending to westerly in the former and to easterly in the latter district. Throughout the Mississippi and Ohio Valleys, Tennessee and Lake region, the winds were northerly, tending to westerly, especially over the Lower Lakes, Ohio Valley, and Tennessee. On the Pacific coast the prevailing winds were northerly or westerly.

*Total movements.*—The largest total movements have been as follows: Mount Washington, 13,075 miles; North Platte, 9,591; San Francisco, 8,923; Cape May, 8,260; Dodge City, 8,127. The smallest movements have been as follows: Indianapolis, 2,012; Lynchburg, 2,026; Augusta, 2,107; Nashville, 2,247; Springfield, 2,320.

The highest velocities in miles per hour have been as follows: 5th, Breckenridge, 50 miles; 6th, Denver, 75; North Platte, 60; 7th, Cape Lookout, 60; 21st, Cambridge, 50; 28th, North Platte, 66; 29th, Morgantown, 59.

*Local storms, tornadoes,* &c., have been reported, as follows (unless specially noted, it is understood that the following list of high winds includes only local storms, and not such gales as prevailed simultaneously over a large region): 6th, about 4.50 p. m., a severe hail-storm visited Denver, Colo., lasting about twenty minutes. For about three minutes the wind blew from the northwest at the rate of 75 miles per hour, tearing off portions of the roofs of the jail and Broadway school building. The rain-fall was the heaviest experienced for several years, amounting to one inch in 25 minutes, flooding cellars and doing considerable damage to stocks. Hail commenced at 5 p. m., and fell for 8 minutes, doing extensive damage to window-glass. 6th, a severe wind and rain storm occurred at Council Bluffs, Iowa, between 2 and 3 o'clock a. m., coming from the northwest. The new building of the Deaf and Dumb Institution was left a mass of ruins; the roof was caught up bodily, carried to the southeast and literally torn into fragments, one piece, weighing not less than five tons, being carried 40 rods, while other pieces, weighing between two and three tons, were carried still farther away, and fragments scattered over the country for more than a mile. To give some idea of the force of the wind, the front wall of the main building, having a stone basement 2 feet in thickness, is said to have been moved 7 inches at the top, gradually decreasing to about one half an inch at the base; the brick walls of the third story in some places were blown entirely down, and the fourth story was almost entirely demolished. The buildings in the rear of the main building and somewhat protected, were also greatly damaged; the roofs of the engine and gas houses being torn away and two chimneys blown down. 8th, Starkey, N. Y., 1 p. m. Heavy hail-storm, lasting twenty minutes; came from NW.; path one mile wide. Hail-stones were size of cherries. Grape, peach, tobacco, and corn crop badly damaged. The wind preceding the hail, blew down trees, took tops off grain-stacks, &c. 9th, Orrville, Ohio, severe hail-storm, fields of corn destroyed, the stones being as large as walnuts. 10th. A tornado visited Coney Island, N. Y., doing considerable damage to hotels and bathing-houses; several beams and timbers of the new depot were also torn from their positions and the car-house blown level with the ground. 11th, early this morning a severe wind and hail storm visited Cordova, Ill., destroying two churches, two business houses, several dwellings, and doing considerable other damage; at Wolcott, near Davenport, Iowa, six horses were killed by lightning. 12th, Jamestown, N. Y., at 1.15 p. m., "during a thunder-storm, a ball of fire, apparently 2 feet in diameter, entered a church, killing one boy and severely burning several persons; instantly the whole interior of the building grew hot and dry, the air hard to breathe and supremely

oppressive." 12th, Louisville, Ky., 2 a. m., severe thunder-storm, doing some damage. 14th, New York, heavy thunder-storm, one schooner capsized and another struck by lightning; Clinton, Ill., severe storm, completely destroying a church, school-house, mill, and a number of dwellings, and doing great damage to crops; Stamford, Conn., violent tempest, uprooting trees, blowing down fences, destroying crops, track of devastation northeasterly and about half a mile wide; Ottawa, Ontario, Can., severe thunder-storm, doing considerable damage to buildings; at Aylwin a school-house was struck and damaged. 16th, a severe hail and thunder storm passed over northern part of New Jersey; the track at Carpenterville was flooded several inches deep with hail-stones and water; at Springtown, one child was killed by lightning and several others rendered insensible; Glen's Falls, N. Y., house struck by lightning and one person killed. 16th, Concord, N. H., severe thunder-storm, during which several persons were stunned; Guelph, Ontario, Can., heavy and prolonged thunder-storm, streets flooded and considerable damage to goods stored in cellars; one man was killed and another stunned by the lightning. 17th, a heavy hail and thunder storm raged from Houston, Tex., to south of Victoria. 18th, Hartford, Conn., 12.10 to 6.30 p. m., violent wind did much damage to trees and chimneys. Rain-fall, 3.45 inches, flooding streets and cellars. 18th, Goffstown Centre, N. H., 4 p. m., heaviest thunder-storm ever known; Methodist church completely destroyed, loss $4,000, and several other buildings damaged. 21st, Chestertown, Kent County, Maryland, a violent wind and hail storm, extending also to Queen Anne's County; hail-stones, large as hens' eggs, doing much damage to orchards and window-glass. 21st, about 4 p. m., the sixth and most destructive hail-storm of the season occurred between Centreville and Ruthsburg, Queen Anne's County, Maryland, coming from the east and veering to southwest. The hail-stones were as large as hens' eggs; one, weighing one-quarter of a pound, killing poultry and breaking the leg of a hog. The destruction to fruit and grass amounts to almost a total loss, while the corn is more than one-third destroyed. 21st, Oconto, Wis., severe squall, doing damage to shipping in harbor. 24th, a severe thunder-storm visited Rochester, Charlotte, and Summerville, Monroe County, New York, during which the lightning struck several buildings, stunning and burning a number of persons. A violent rain-storm also occurred in north portion of Harford County, Maryland, flooding streams and carrying away bridges, horses, cattle, and sheep. 25th, Omaha, Nebr., a severe wind and rain storm passed over Eastern Nebraska and Kansas, blowing a hurricane at Omaha about 3.30 a. m. Two spans of the Missouri River bridge, 150 feet each, and the stable of the Omaha Omnibus Company, were blown down. At Omaha, the tornado advanced from a point a little east of north along the course of the river; it appears that the atmospheric commotion was at first high above the country, and when the sudden fall of the river-embankment was reached it swooped down in its course, spread havoc in its path, and as suddenly lifted itself again above the surrounding country. One observer says he saw an immense cloud passing down the river, lifting up the water in vast quantities and whirling it around in a funnel-shape. The spans destroyed were at the eastern terminus of the bridge; the wrought-iron stringers and columns of the bridge-spans were twisted and bent like so many pieces of paper and carried partly into the river and partly against the eastern embankment of the river, on the south side of the bridge. 29th, New London, lightning struck barn at Fort Trumbull, killed one horse and set barn on fire. Macon, Ga., drayman struck and two mules killed by lightning. 30th, Pittsburgh, Pa., severe wind and rain storm, during which buildings and trees were damaged. 31st, Saint Louis, Mo., heavy wind and rain storm, doing considerable damage at the arsenal. Detroit, Mich., a series of storms, of unusual violence, uprooting trees, &c. Windsor, Ontario, violent wind and hail. Sandwich, Ontario, tornado moving in a southeasterly direction, damaged trees, houses, &c. Toledo, heavy wind, rain, and hail storm—hail as large as pigeons' eggs; wind, 36 miles per hour at 2 p. m. Collinwood, Cuyahoga County, Ohio, new chapel totally destroyed by windstorm. Sandusky, Ohio, a series of violent wind, rain, and hail storms visited this city hail as large as musket-balls. Cleveland, Ohio, a most severe wind and hail storm struck city about 10 a. m., hail-stones fell as large as walnuts; trees, flag-staffs, churches, &c., were much damaged. About 11 a. m. the water rose in the lake, at the mouth of the Cuyahoga River, about 3 feet, and flowed rapidly up stream, and about 4 p. m. again fell to about 40 inches below its normal height; at the government pier the total change in the water is reported to have been about 7 feet. Pittsburgh, Pa., severe wind and rain storm, damaging roofs, flooding cellars, &c. Erie, Pa., severe storm, with tremendous sea on lake. Ypsilanti, Mich., severe storm, damage several thousand dollars. Adrian, Mich., terrific storm.

### VERIFICATIONS.

*Indications.*—The detailed comparison of the tri-daily weather indications with the telegraphic weather reports for the succeeding twenty-four hours shows a general percentage of omissions of 0.5 per cent., and of verifications, of 82.7 per cent. Out of

3,698 predictions, 2,260, or 60.8 per cent., have been fully verified; 680, or 18.3 per cent., have been three-fourths verified; 487, or 13.1 per cent., have been one-half verified; 178, or 4.8 per cent., have been one-fourth verified; 93, or 2.5 per cent., have failed. The percentages of verifications for the four elements have been: weather, 83.3; wind, 79.5; temperature, 87.0; barometer, 81.8. The percentages of verifications by geographical districts have been: New England, 79.8; Middle States, 82.2; South Atlantic States, 81.1; East Gulf States, 81.6; West Gulf States, 85.0; Lower Lake region, 85.8; Upper Lake region, 82.3; Tennessee and the Ohio Valley, 80.9; Upper Mississippi Valley, 83.2; Lower Missouri Valley, 84.2.

*Cautionary signals.*—During the month 38 cautionary signals have been displayed at stations on the Gulf and Atlantic coasts, and on the lakes. Forty instances of high winds, where no signals were displayed, have also been reported from these stations. Telegraphic communication with the North Carolina coast stations was re-established on the 16th.

## NAVIGATION.

*Stages of water.*—In the table on Chart III are given the highest and lowest readings on the river gauges for the month, from which it will be seen that a general fall has taken place in all the rivers, averaging in the Missouri, Ohio, and Cumberland Rivers from 2 to 4 feet; in the Upper Mississippi, from 7 to 30 inches, and in the Lower Mississippi from 5 to 14 feet. Occasional slight rises have occurred in consequence of heavy rains, the most marked occurring in the Upper Mississippi during the last few days, and in the Missouri prior to the 21st, when a large portion of the river bank between Fort Leavenworth and Weston was washed away.

*Low water*, detrimental to navigation, has been reported as follows: In the Alleghany, so low as to preclude navigation; on the 9th, the Ohio was reported shoaling badly, and navigation has continued suspended at Pittsburgh throughout the month; 17th, Licking River too low for even tow-boats; Illinois River very low at Kickapoo; on the 14th, navigation was reported practically closed on the Yellowstone. The Upper Mississippi, at Keokuk, was so low that boats could not cross Des Moines Rapids; at Saint Louis, on the 14th, so low that none but small boats could pass on east side of arsenal, and, same date, channels at Memphis becoming alarmingly narrow and dangerous. New Orleans, 20th, great trouble to regulate packets in approaching landings. On the 23d, the Arkansas fell below 3 feet at Little Rock. On the 18th, the shipment of cattle at Shreveport was reported over until a rise occurred. Boats from Savannah to Augusta have had to land freight several miles below latter place.

## TEMPERATURE OF WATER.

*In general.*—The temperature of water, as observed in rivers and harbors, is shown in the table on chart No. II. The average temperatures have been lowest at Eastport, 45°, and Marquette, 55°; and highest at Shreveport, 90°; Galveston, 88°; Key West, 88°; Augusta, 85°.

*Maximum and minimum temperatures.*—The highest maxima have been: Shreveport, 94°; Galveston, 92°; Key West, 91°; and lowest *minima*: Eastport, 44°; Duluth, 45°; Marquette, 52°.

*Ranges of temperature.*—The least ranges have been: San Francisco, 1°; Norfolk, 2°; Eastport, 3°; Wilmington, Charleston, and Cleveland, 4°.

## ATMOSPHERIC ELECTRICITY.

*Thunder-storms* were reported at stations, in the respective States, as follows: 1st, Alabama, Michigan, Florida, Illinois, Indiana, Kansas, Louisiana, Mississippi, Tennessee, North Carolina, Nebraska, Missouri, New Mexico. 2d, Dakota, Georgia, Indiana, Kansas, Louisiana, Mississippi, Ohio, Tennessee, Texas, North Carolina, Michigan, Florida. 3d, Colorado, Connecticut, Louisiana, Maine, New Jersey, New York, North Carolina, New Hampshire, Georgia, Massachusetts, Wyoming Territory, Florida, Minnesota. 4th, Kansas, North Carolina, Wyoming Territory, Florida, New Mexico. 5th, Dakota, Maine, Colorado, Iowa, Kansas, Louisiana, Missouri, Nebraska, New York, Vermont, South Carolina, Florida, Minnesota. 6th, Indian Territory, Kansas, Illinois, Iowa, Louisiana, Mississippi, Nebraska, New York, Wisconsin, Florida, Colorado, Alabama, Dakota. 7th, Maine, Michigan, New York, Connecticut, Illinois, Indiana, Kansas, Louisiana, Massachusetts, Mississippi, New Jersey, North Carolina, Ohio, Texas, Vermont, Rhode Island, Tennessee, New Hampshire, Alabama, Florida, Georgia, Wisconsin, Indian Territory, Wyoming Territory. 8th, New York, Connecticut, Florida, Georgia, Illinois, Iowa, Kansas, Louisiana, Maine, Massachusetts, Mississippi, Missouri, Nebraska, New Hampshire, New Jersey, North Carolina, Pennsylvania, South Carolina, Tennessee, Michigan, Texas, New Mexico. 9th, New York, Connecticut, Maine, Massachusetts, New Jersey, Ohio, Pennsylvania, Vermont, North

Carolina, West Virginia, Georgia, Florida, Dakota. 10th, Massachusetts, New York, Connecticut, Dakota, Florida, Illinois, Indiana, Iowa, Maine, Nebraska, New Jersey, Pennsylvania, Vermont, New Hampshire, Missouri, Utah. 11th, Massachusetts, Nebraska, New York, Colorado, Dakota, Illinois, Indiana, Iowa, Kansas, Maine, Missouri, Ohio, Vermont, Wisconsin, Florida, Michigan, Wyoming Territory. 12th, New York, Colorado, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Missouri, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Vermont, Virginia, Wisconsin, Florida, Michigan, District of Columbia. 13th, Dakota, Georgia, New York, Connecticut, Illinois, Indiana, Kansas, Kentucky, Maine, Maryland, Massachusetts, New Jersey, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, Wisconsin, Rhode Island, West Virginia, Florida, Michigan, Alabama, Indian Territory, District of Columbia. 14th, New York, Wyoming Territory, Colorado, Connecticut, Dakota, Florida, Georgia, Illinois, Indiana, Louisiana, Maryland, Massachusetts, Mississippi, New Jersey, Ohio, Tennessee, Vermont, West Virginia, Michigan, Texas, New Mexico. 15th, Dakota, New York, Connecticut, Indiana, Maryland, Massachusetts, New Hampshire, New Jersey, North Carolina, Ohio, Pennsylvania, Virginia, Tennessee, West Virginia, Maine, Florida, Nebraska, Michigan, Texas, New Mexico. 16th, Indian Territory, Maine, Michigan, New York, Connecticut, Dakota, Florida, Illinois, Iowa, Kansas, Maryland, Massachusetts, Nebraska, New Hampshire, New Jersey, Ohio, Pennsylvania, Vermont, Wisconsin, Georgia, Texas. 17th, Connecticut, Florida, Illinois, Indiana, Kansas, Maine, Massachusetts, Mississippi, Missouri, Nebraska, New Hampshire, New York, Pennsylvania, Tennessee, Texas, Vermont, Wisconsin, West Virginia, Michigan, Indian Territory, North Carolina. 18th, Michigan, Connecticut, Illinois, Indiana, Iowa, Louisiana, Maine, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Texas, Vermont, Virginia, Wisconsin, West Virginia, Georgia, Florida, Minnesota, Idaho, Dakota, Colorado. 19th, Michigan, New York, Maine, Massachusetts, Mississippi, Ohio, Pennsylvania, Vermont, Virginia, Wisconsin, Indiana, Georgia, Wyoming Territory, Dakota. 20th, Alabama, Dakota, Indian Territory, Iowa, Kansas, Massachusetts, Maine, Nebraska, Ohio, Pennsylvania, West Virginia, Texas. 21st, Florida, Illinois, Indiana, Iowa, Maryland, Massachusetts, Mississippi, Missouri, New Jersey, Pennsylvania, Virginia, Wisconsin, Tennessee, West Virginia, Texas, Michigan, Georgia, Wyoming Territory, District of Columbia. 22d, Michigan, Connecticut, Florida, Georgia, Indiana, Massachusetts, Pennsylvania, Nebraska. 23d, Dakota, Michigan, Georgia, Massachusetts, North Carolina, Ohio, Florida. 24th, Dakota, Michigan, Florida, Iowa, Kansas, Maryland, Massachusetts, New Jersey, New York, Pennsylvania, Virginia, North Carolina, Minnesota. 25th, Dakota, New York, Florida, Iowa, Kansas, Massachusetts, Missouri, Nebraska, New Jersey, Pennsylvania, Vermont, Virginia, Rhode Island, Louisiana, Connecticut. 26th, Dakota, Connecticut, Florida, Illinois, Indiana, Iowa, Massachusetts, Minnesota, Mississippi, New Jersey, New York, Wisconsin, Georgia, Alabama. 27th, Dakota, Michigan, Georgia, Illinois, Indiana, Iowa, Maine, Massachusetts, New Hampshire, North Carolina, Wisconsin, Texas. 28th, Alabama, Dakota, Michigan, Illinois, Iowa, Louisiana, Massachusetts, Minnesota, Mississippi, Nebraska, New York, Tennessee, Texas, Wisconsin, Florida. 29th, Alabama, Dakota, Maine, New York, Connecticut, Illinois, Indiana, Iowa, Kentucky, Massachusetts, Nebraska, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Vermont, Texas, Rhode Island, West Virginia, Idaho. 30th, Dakota, Colorado, Iowa, Louisiana, Massachusetts, Minnesota, Mississippi, New Hampshire, Pennsylvania, South Carolina, Vermont, Virginia, Wisconsin, North Carolina, West Virginia, Maine. 31st, Michigan, Dakota, Illinois, Indiana, Iowa, Louisiana, Massachusetts, Mississippi, New Jersey, New York, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, Wisconsin, Alabama, West Virginia, Kentucky, North Carolina, Florida, Missouri.

*Distant thunder or lightning* was reported from stations in the respective States as follows: 1st, South Carolina, Georgia, Indian Territory, Louisiana, Illinois, Mississippi. 2d, North Carolina, Dakota, Texas, Virginia. 3d, Massachusetts, North Carolina, New Jersey, Georgia, Indiana, Texas, New Mexico, Dakota, Maine, Virginia, District of Columbia. 4th, Mississippi. 5th, Louisiana, Dakota, Alabama, Utah, North Carolina, Virginia. 6th, Georgia, Indian Territory, Louisiana, Iowa, Illinois, Texas. 7th, Indiana, North Carolina, Georgia, Alabama, Michigan, Texas, New Mexico, Ohio, Pennsylvania, Virginia. 8th, Virginia, Iowa, North Carolina, Massachusetts, Georgia, Louisiana, Texas, Illinois, New Jersey. 9th, North Carolina, Georgia, Florida, Michigan, Texas, New Mexico, Ohio. 10th, Massachusetts, North Carolina, New Jersey, Connecticut, Dakota, New York, Ohio. 11th, Indian Territory, Wisconsin, Iowa, Minnesota, Illinois. 12th, Pennsylvania, West Virginia, Iowa, Dakota, Wyoming, Minnesota, Connecticut, Illinois, Michigan, New York, Ohio, Virginia, Wisconsin. 13th, South Carolina, Tennessee, North Carolina, Georgia, Michigan, Iowa, Texas, Connecticut, Illinois, Maine. 14th, Virginia, Alabama, New York, North Carolina, Georgia, Illinois, Massachusetts, Tennessee. 15th, South Carolina, Pennsylvania, New York, New Jersey, Georgia, Connecticut, Dakota, Michigan, Texas, Ohio, Virginia. 16th, South Carolina, Pennsylvania, New York, Georgia, Indian Territory, Iowa,

Minnesota, Connecticut, Illinois, Ohio. 17th, Iowa, Massachusetts, Texas, Georgia, Illinois, New York, Wisconsin. 19th, Ohio, Dakota, Massachusetts. 20th, Minnesota. 21st, Louisiana, Nebraska. 22d, Alabama. 23d, West Virginia, Virginia. 24th, Virginia, Georgia, Dakota. 25th, Dakota, Minnesota, Connecticut, New York. 26th, Missouri, Minnesota, Massachusetts, Michigan. 27th, Iowa, Indiana, Illinois, Ohio. 28th, Michigan, Massachusetts, Kansas, New York, Virginia. 29th, Pennsylvania, New York, Maine, Georgia, Ohio, *Kansas, Connecticut, Illinois, Virginia.* 30th, Virginia, Georgia, Iowa, Alabama, North Carolina, Illinois, Wisconsin. 31st, South Carolina, Iowa, *North Carolina*, Georgia, Ohio, Florida, Dakota, Illinois, Indiana, New Jersey, Virginia, Wisconsin.

*Auroras* were observed as follows: Vevay, Ind., 2d and 5th. West Charlotte, Vt., 7th. Duluth, Minn., 8th, 16th, and 17th. Northport, Mich., 9th. Monticello, Iowa, 10th. Cambridge, Mass., and Cleveland, Ohio, 16th. Swanzey, N. H., 17th. Bangor, Me., 18th and 30th.

*Ground currents.*—Disturbances on lines of telegraph have been reported as follows: At Pike's Peak, Colo., 6th. Fort Sill, Ind. Ter., 7th. Laredo, Texas, 8th, 9th, and 10th. Bismarck, Dak., 24th (line not working) and 27th.

## OPTICAL PHENOMENA.

*Solar halos.*—1st, Michigan. 2d, Maine, Ohio, Rhode Island, Connecticut. 3d. Florida. 4th, Florida. 6th, Ohio, Kentucky. 7th, New York. 8th, Illinois. 9th, Louisiana. 10th, Iowa. 11th, Dakota, Illinois, Ohio, Kentucky, Florida, North Carolina, Michigan. 12th, Mississippi, Virginia. 13th, Georgia. 14th, South Carolina, 15th, North Carolina. 17th, Mississippi, New York, Connecticut, California. 18th, Maine, North Carolina. 20th, Connecticut, Massachusetts, New Jersey, New York, South Carolina, Rhode Island, Georgia, North Carolina. 21st, Illinois, Iowa, New York, Vermont, South Carolina, North Carolina, Connecticut. 22d, Illinois, Ohio, South Carolina, Kentucky, North Carolina. 23d, Wisconsin, South Carolina. 24th, Georgia. 25th, Rhode Island, North Carolina. 26th, Florida, Georgia, North Carolina, Connecticut. 27th, Illinois, Mississippi, Florida, Michigan, North Carolina. 28th, North Carolina, South Carolina, Louisiana. 29th, North Carolina. 30th, Michigan. 31st, Connecticut, Maine, New York, Rhode Island, Georgia.

*Lunar halos.*—1st, Connecticut. 14th, Indiana. 15th, Missouri. 16th, Texas, Missouri. 17th, Massachusetts, New Hampshire, Indiana, Ohio, Alabama, California. 18th, Virginia, South Carolina, New Hampshire, New Jersey, Georgia, Ohio, North Carolina. 19th, New Jersey, North Carolina, Tennessee, Virginia, New York, Ohio, Michigan. 20th, Iowa, Vermont, South Carolina, New Hampshire, North Carolina, Nebraska, Florida, Missouri, *Alabama, Michigan.* 21st, Indiana, Iowa, Maine, Michigan, New Jersey, New York, Ohio, Vermont, New Hampshire, Nebraska, Florida. 22d, Massachusetts, Michigan, Ohio, Virginia, West Virginia, North Carolina, Pennsylvania, Florida, Connecticut, Wisconsin, Minnesota. 23d, Massachusetts, Maine, Indiana, New York, Iowa, Connecticut, Missouri, Pennsylvania, Alabama, Minnesota. 24th, Massachusetts, Virginia, South Carolina, West Virginia, Iowa, Kansas, Georgia. 25th, Illinois, Massachusetts, New York, South Carolina, North Carolina, Indiana, Florida. 26th, Florida, Michigan, West Virginia, North Carolina, Missouri, District of Columbia. 27th, Missouri, Alabama, Georgia. 28th, Georgia, South Carolina, North Carolina, Minnesota. 29th, Wisconsin. 30th, Rhode Island, Missouri. 31st, New York.

*Mirage.*—2d, Olivet, Dak. 3d, Duluth, Minn. 4th and 15th, Tybee Island, Ga. 13th, Indianola, Tex. 25th, Rochester, N. Y.

## MISCELLANEOUS PHENOMENA.

*Birds.*—*Martins* had left Morgantown, W. Va., 11th, were leaving Bellefontaine, Ohio, on the 1st, and Jacksonburg, Ohio, on the 13th. *Swallows* had left Morgantown, W. Va., 17th; were seen flying southward in great numbers, at Daytona, Fla., 14th and 21st; congregating in large numbers at Baxter Springs, Kans., 2d; left Jacksonburg, Ohio, 23d; Bellefontaine, Ohio, leaving 22d. *Bobolinks* were last seen at Vermillion, N. Y., 1st. *Wild geese*, Sacramento, Cal. (first of season), passed from N., 30th. *Wild ducks* were seen at Lower Brule Agency, Dak., flying S., 26th. *Herons* were seen flying S., at Wappinger's Falls, N. Y., 26th.

*Insects.*—*Grasshoppers.* Minnesota, sixteen counties have sustained an appreciable loss from grasshoppers this year; in Kandiyohi and Chippewa, the destruction was complete, and in the remaining thirteen the ravages are estimated at one-half to three-fourths of a full crop. In a strip 50 miles in width by 125 in length, extending from Otter Tail Lake to the Minnesota River, fully one-fourth of the farmers raised nothing, and the remainder very little. Idaho, 7th, in Dixie Valley "hoppers" have destroyed oat crop. In Boise Valley, ravages thus far only partial and local. They are somewhat worse this year, but there has been nothing approaching to the ravages in the

region beyond the Rocky Mountains, Montana, Virginia City. 1st, large swarms flying northeast, first of season; Dakota, Bismarck, 2d, abundant, 9th, very few; Yankton, 1st, 12th, 15th; Fort Sisseton, fly SE. 1st and 2d; Olivet, 1st, large flight of locusts, S., and 8th, SE. Iowa, Des Moines Valley, grasshoppers plentiful, but doing no damage. Nebraska, North Platte, locusts flying west in myriads; Emerson, SW. 7th, 8th, 9th, 25th, and NE. 10th; Plattsmouth, SW. 2d, NW. 3d and 4th; Clear Creek, S. 1st, W. 2d, N. 3d, S. 6th to 9th, N. 19th, SW. 11th, 12th, 14th; Genoa, S. 1st, 2d, 6th, SE. 7th, S. and W. 8th to 14th, N. 19th. Utah, very little damage, except in Cache Valley. Canada, Ottawa, Augusta Township, 7th, so numerous that farmers were cutting oats in order to save them.

*Polar bands.*—Carthagena, Ohio, 1st, 6th, 7th, 11th; Gardiner, Me., 2d, 20th; Wytheville, Va., 5th, 6th, 9th, 22d, 23d, 25th, 26th, 27th; Auburn, N. H., 8th, 13th; Tabor, Ohio, 18th; Portsmouth, N. C. (from SW. to NE.), 20th; Woodstock, Vt., 21st, 23d; Rowe, Mass., 23d; Guttenburg, Iowa, 25th; Jacksonburg, Ohio, 25th; Freehold, N. J., 26th, 30th; Charleston, S. C., 29th.

*Sunsets.*—The characteristics of the sky, as indicative of approaching fair or foul weather, have been observed daily at sunset at all Signal-Service stations. The monthly means from 104 stations show that 75 doubtful cases or blanks were recorded, and that out of the remaining 3,149 cases, 2,521, or 80.6 per cent., have been followed by the expected weather.

*Forest fires.*—Wisconsin, 5th, the villages of Eaton and Benjamin, Brown County, were almost totally destroyed; the forest has been burning for five weeks, destroying millions of feet of lumber and thousands of dollars of other property; one family is said to have perished and four more families are missing; a large number of animals were also burned. Michigan, 13th, Roscommon County, large forest fires raging in this region, destroying thousands of dollars' worth of pine timber. Canada, 6th, Bertie Station, cedar bush burned over six miles. Morristown, Dak., 20th; Bismarck and Lower Brule Agency, Dak., 25th; *Monticello, Iowa,* S., 27th; Fort Sisseton, Dak., N. and E., 28th and 29th; Oregon, Mo. (in Kansas), 31st.

*Meteors.*—1st. Monticello, Iowa; North Volney, N. Y.; Tybee Island, Ga. 2d. Monticello and Davenport, Iowa; Linden, N. J.; Tybee Island, Ga.; La Crosse, Wis. 3d. Cresco and Davenport, Iowa; North Volney, N. Y.; Savannah, Ga. 4th. Southington, Conn.; Cresco and Davenport, Iowa; Litchfield, Mich.; Green Castle, Pa.; Savannah and Tybee Island, Ga. 5th. Vevay, Ind.; Atco, N. J.; Carthagena, Ohio; Santa Fé, N. Mex. 6th. Southington, Conn.; Daytona, Fla.; Greencastle, Pa.; Wautoma and La Crosse, Wis. 7th. Davenport, Iowa.; Leavenworth, Kans.; Uvalde, Tex. 8th. Como, Ill.; Oregon, Mo.; Norfolk, Neb.; Linden, N. J.; Louisville, Ky.; Keokuk and Davenport, Iowa; Leavenworth, Kans.; Breckenridge, Minn.; Jacksonburg, Ohio. 9th. Cresco, Dubuque, Keokuk, and Davenport, Iowa; Brookhaven, Miss.; Oregon, Mo.; Carthagena and Jacksonburg, Ohio; Wautoma, Wis.; Morgantown, W. Va.; Louisville, Ky.; North Platte, Neb.; Santa Fé, N. Mex.; Duluth, Minn. 10th. Cresco, Monticello, Dubuque, and Davenport, Iowa; Fall River, Mass.; Norfolk, Neb.; Freehold, N. J.; Waterburgh, N. Y.; Weldon, Greenville, and Cape Lookout, N. C.; Carthagena and Jacksonburg, Ohio; Wautoma and Milwaukee, Wis.; Louisville, Ky.; Denison, Texas; Savannah and Tybee Island, Ga.; Fort Gibson, Ind. Ter.; Saint Louis, Mo.; Duluth, Minn.; Santa Fé, N. Mex.; Visalia, Cal. 11th. Southington, Conn.; Fall River, Mass.; Corning, Mo.; Freehold, N. J.; Carthagena and Jacksonburg, Ohio; Greencastle, Pa.; Hampton, Va.; Santa Fé, N. Mex.; Wautoma and Milwaukee, Wis.; Savannah and Tybee Island, Ga.; Fort Gibson, Ind. Ter.; Dubuque and Davenport, Iowa. 12th. Southington, Conn.; Somerset, Mass.; Philadelphia, Pa.; Hampton, Va.; Savannah and Tybee Island, Ga.; Keokuk, Iowa. 13th. Melissa, Tex.; Keokuk and Davenport, Iowa; Leavenworth, Kan.; Saint Louis, Mo. 14th. Flushing, N. Y.; Saint Louis, Mo.; Melissa, Tex. 15th. Vevay, Ind.; Dubuque and Davenport, Iowa. 16th. Atco, N. J.; Corning, Mo.; Davenport, Iowa. 18th. Monticello, Iowa; Freehold, N. J. 19th. La Crosse, Wis. 20th. Summit, Colo. 21st. Auburn, N. H. 22d. Monticello, Iowa. 23d. Anna, Ill.; Point Pleasant, La. 24th. Independence, Iowa; Weldon, N. C. 25th. Fayette, Miss. 26th. Como, Ill.; Woodstock, Md.; Freehold, N. J.; Philadelphia, Pa.; Dubuque, Iowa. 27th. Southington, Conn.; Woodstock, Md.; Litchfield, Mich.; Weldon, N. C.; Indianapolis, Ind. 28th. Emerson, Neb.; Waterburgh, N. Y.; Leavenworth, Kan. 29th. Anna, Ill.; Woodstock, Md.; Corning, Mo.; Waterburgh, N. Y.; Tybee Island, Ga.; Davenport, Iowa. 30th. Southington, Conn.; Vevay, Ind.; Clear Creek and Emerson, Neb.; Tybee Island, Ga. 31st. Fayette, Miss.; Hulmerville, Pa.; Davenport, Iowa.

*Zodiacal light.*—Monticello, Iowa, 2d, 3d, 4th, 5th, 8th, 9th, 10th, 13th, and 14th; Savannah, Ga., 3d, 6th, 7th, 26th, 27th, 29th, and 31st.

*Earthquakes.*—Michigan, 17th, Detroit, 11 a. m., slight earthquake-shock in western portion of city. Redford, about 10.50 a. m., shock of one minute duration; seemed to come from a southwesterly direction. Greenfield, "shock resembled sound of a double clap of thunder under ground, lasting about one minute, causing houses to tremble, horses plowing stopped immediately, sky perfectly clear and weather hot." Livonia, 11

a. m., lasting about thirty seconds, direction northeast; "at first like a heavy clap of thunder, and then rolled like a heavy train of cars." California, Campo, 17th, 7.30 p. m., heavy shock, lasting fifteen seconds; loud rumbling, pictures thrown from walls. New Jersey, Florence, 10th, shock lasting several seconds, accompanied by dull rumbling sound.

The weather review for May gave a description of the earthquake wave of the 9th and 10th; later advices show that this wave reached New South Wales on the 11th of May. At 5h., 20s., a. m. (Australian time), the tide-gauge at Fort Denison recorded the first of a series of waves. The oscillations continued through the day and reached their maximum at 2 p. m., the height then being 3 feet 6 inches. It is also reported that similar waves were felt at New Zealand, the maximum height being 6 feet.

*Volcanic eruptions.*—Advices from Kilauea, Hawaii, state that the lake, which a few weeks ago was empty, is now full of activity and filled with molten lava.

## SOLAR PHENOMENA.

*Sun spots.*—The following observations, made by Mr. D. P. Todd, upon the spots of the sun, have been kindly communicated by Rear-Admiral John Rodgers, U. S. N., Superintendent of the Naval Observatory:

| August, 1877. | No. of new— | | Disappeared by solar rotation. | | Reappeared by solar rotation. | | Total number visible. | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| | Groups. | Spots. | Groups. | Spots. | Groups. | Spots. | Groups. | Spots. | |
| 3— 2 p. m. | 0 | 0 | 0 | 4 | 0 | 0 | 1 | 1 | |
| 4— 8 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4— 5 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 5—10 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 5— 6 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 6—10 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 8—10 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 8— 6 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 11— 8 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 11— 6 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 12—10 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 14— 2 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 17 9 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 17— 5 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 18— 9 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 19— 2 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 20— 5 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 22— 5 p. m. | 1 | 2 | 0 | 0 | 1 | 2 | 1 | 2 | |
| 24— 4 p. m. | 0 | 6 | 0 | 0 | 0 | 6 | 1 | 8 | |
| 25— 4 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 8 | |
| 26— 5 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 8 | |
| 28— 5 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | |
| 29— 5 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | |
| 30— 5 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | |

## NOTES AND EXTRACTS.

*Winds of the South Atlantic.*—M. Brault announces the publication, by the French Marine, of a series of new meteorological charts, giving the direction and force of the winds of the South Atlantic for each of the four seasons, the charts being similar to those published by M. Brault about two years ago on the winds of the North Atlantic. The new charts contain the result of 189,573 observations of the wind. The general movement of the winds in summer over this portion of the globe resemble an immense whirl, whose center is about 30° to 35° latitude S., and 10° to 20° longitude W. The whirling movement is in a direction contrary to that of the hands of a watch, being thus opposite to the general circulation of the atmosphere over the North Atlantic in summer. Out of this center winds blow in all directions, the more important being the southeast trades, which are deflected to south and south-southwest off the coast of Africa, and to east-southeast and east on approaching the coast of America; these in succession northeast, north, and northwest winds, on advancing southward along the coast of America, merging finally in the westerly winds which blow across the Atlantic from Cape Horn to the Cape of Good Hope. Looking both at the force and direction of the winds, M. Brault concludes that the results establish beyond a doubt the fact that, contrary to the views entertained up to a comparatively recent date, there

does not exist any tropical zone stretching across the South Atlantic characterized by the prevalence of calms and light variable breezes. These results are entirely in accord with recent researches into the atmospheric movements over this region, and are of peculiar interest when viewed in connection with the distribution of atmospheric pressure and its variation, with season, over South America, the South Atlantic, and South Africa.—Nature, August 2.

M. Allnard, director of the observatory at Puy-de-dome, France, has noticed some remarkable differences of pressure as indicated by self-registering barometers. One was placed at the summit of Puy-de-dome and the other at Clermont-Ferrand, distant about seven English miles, and remarkable discrepancies were found on comparing the two records, which could not be satisfactorily explained by differences of temperature nor by Laplace's formula for the barometric determination of heights.

Published by order of the Secretary of War.

ALBERT J. MYER,
*Brigadier-General (Brevet Assigned), Chief-Signal Officer, U. S. A.*

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PAPER 30.

## MONTHLY WEATHER REVIEW, SEPTEMBER, 1877.

### INTRODUCTION.

The present review for the month of September depends upon all data received up to the 14th of October from the Canadian meteorological service, the United States Navy, the Army post surgeons, voluntary observers, and the United States Signal Service. The most interesting features have been: First, the cyclones of the Gulf of Mexico and of the Caribbean Sea. Second, the drought and prairie fires of certain regions. Third, the universal high temperature.

### BAROMETRIC PRESSURE.

*In general.*—The general distribution of atmospheric pressure for the month is shown by the isobars on map No. II, from which it appears that the area of highest pressure, 30.05, covers the Middle Atlantic States and Southern New England. In September, 1871, the area of highest pressure, 30.15, covered the greater part of the region from Missouri to the Alleghanies. In September, 1872, the highest pressure, 30.05, covered the South Atlantic States. In September, 1873 and 1874, the area of 30.05 to 30.10 covered the South Atlantic, East Gulf, and Middle Atlantic States. In September, 1875, the area 30.05 covered the South Atlantic and East Gulf States; but in September, 1876, the pressure of 30.05 is found only in a small portion of Northern Louisiana. On the average, therefore, the pressures for 1877 have been below the normal in the Gulf States and in the extreme northwest, but have agreed with the normals in the Middle Atlantic States.

*Barometric ranges.*—The general range of pressure is shown by the following table, from which it appears that for the whole country a range of 1.06 inches has been recorded:

LOW AREAS.

| No. | Location. | Date. | Minimum pressure. |
|---|---|---|---|
| I | Mouth Saint Lawrence | September 1, 7.35 a. m. | 29.56 |
| II | Southern Minnesota | September 4, 4.35 p. m | 29.75 |
| III | Missouri | September 9, 7.35 a. m., 4.35 p. m | 29.61 |
| IV | Manitoba | September 11, 4.35 p. m | 29.44 |
| V | Manitoba | September 13, 4.35 p. m | 29.37 |
| VI | Louisiana | September 18, 4.35 and 11 p. m | 29.43 |
| VII | Nova Scotia | September 21, 11 p. m | 29.45 |
| VIII | Minnesota | September 21, 4.35 p. m | 29.52 |
| IX | Minnesota | September 24, 11 p. m | 29.70 |
| X | Dakota | September 26, 4.35 p. m | 29.60 |
| XI | Cape Hatteras | September 29, 4.35 p. m | 29.56 |
| XII | Minnesota | September 29, 4.35 p. m | 29.36 |

HIGH AREAS.

| No. | Location. | Date. | Maximum pressure. |
|---|---|---|---|
| I | Lower Missouri Valley | September 2, 7.35 a. m. | 30.26 |
| II | Lower Saint Lawrence Valley | September 7, 7.35 a. m. | 30.42 |
| III | Lower Missouri Valley | September 17, 7.35 a. m. | 30.31 |
| IV | Middle Atlantic States | September 23, 7.35 a. m. | 30.35 |

The local barometric ranges have been as follows: *Large ranges*—Bismarck, 1.01; Breckenridge, 0.95; Boise City, 0.96; North Platte, 1.00. *Small ranges*—Cambridge City, Tex., 0.31; Corsicana, 0.36; Pilot Point, 0.38; San Francisco, 0.34; Santa Fé, 0.29; Shreveport, 0.32; San Antonio, 0.37; Vicksburg, 0.33.

*Areas of high pressure.*—In general but few high areas have been reported, and none of these presented cases of very high pressures.

No. I extended on the 1st, 2d and 3d from the northwest slowly southeastward to the Gulf States, and thence eastward, reaching the South Atlantic coast on the 4th.

No. II covered British America on the 5th, and on the 6th had moved eastward to the Saint Lawrence Valley. On the 7th it moved southward over the Middle States and New England, producing high northeast winds on the coast, while the central highest pressure continued until the 9th to occupy the Saint Lawrence Valley, where the barometer fell on the 10th, and the highest pressure was transferred to the Middle Atlantic coast, where it remained, with slight variations, until the 13th.

No. III.—The pressure continued highest along the Atlantic coast from Florida to Newfoundland until the 16th, on which date an area of rising barometer and cool northerly winds extended rapidly southward from Oregon and Manitoba to California, Arizona, and Kansas, apparently induced by the low barometer and cyclone that then prevailed in the Gulf of Mexico. The highest pressure was on the 17th, 7.35 a. m., central in the Lower Missouri Valley, and on the 18th, 7.35 a. m., central at Saint Louis. The area now extended east and east-northeast, and on the 19th, 7.35 a. m., was central in Pennsylvania, and on the 20th, 7.35 a. m., was central off the Middle Atlantic coast. The path of this area of high pressure was to the northward of and parallel to the path of low barometer No. VI.

Nos. IV and V.—The three depressions that appear upon the map of September 21, 7.35 a. m., were separated by an area of high pressure, then central over Lakes Huron and Michigan, which moved rapidly southeastward over Pennsylvania, and on the 23d, 7.35 a. m., was central in the Middle Atlantic States, off which coast it remained until the 26th, 4.35 p. m., after which it was reinforced by high area No. V, which was then advancing directly southward over the Saint Lawrence Valley, and which was, on the 28th, still further reinforced, so that on the morning of that day almost the entire country was under a pressure exceeding 30.05, the highest, 30.35, being in Nova Scotia, and the whole acting as a feeder to the cyclones XI and XIII that were advancing from the Caribbean Sea northward.

*Areas of low pressure in general.*—Of the barometric depressions recorded during September, six have been attended by violent winds, *i. e.*, Nos. II, VI, VII, IX, XI, and XIII; the others have been characterized only by local winds, and have soon died away. Four severe storms have pursued their paths off our south and east coasts, and have not encroached upon the land so much as in the September of previous years. The other depressions have originated in the heated air of the Rocky Mountains; and of these No. II was the only one which advanced so far as the Atlantic Ocean, where it soon became a severe storm.

*Areas of low pressure.*—No. I was central on the 1st in the Lower Saint Lawrence Valley, and on the 2d over the Gulf of Saint Lawrence, where it developed into a moderate storm; on the 3d, at 11 p. m., it was central over the northern part of the Gulf, and on the 4th was followed by westerly gales.

No. II.—This depression appears in the northwest on the 4th, at 11 p. m.; it was, at 7 a. m. of the 5th, central in Illinois, whence it moved very slowly eastward, and was, at 7 a. m. of the 7th, central over the Chesapeake Bay. During the rest of the 7th it apparently moved eastward, and afterwards, during the 8th and 9th, northeastward; at 7 a. m. of the 10th, the center was apparently east of Nova Scotia. During the 7th, 8th, and 9th, heavy northeast gales prevailed along the Middle Atlantic and New England coasts, doing much damage, and was accompanied by high seas at Long Branch, Martha's Vineyard, and other places. The schooner Addie Fuller, on the 9th off Hatteras, experienced a wind of 40 miles as measured by her anemometer.

No. III.—On the 7th a slight depression existed in New Mexico, while southeast

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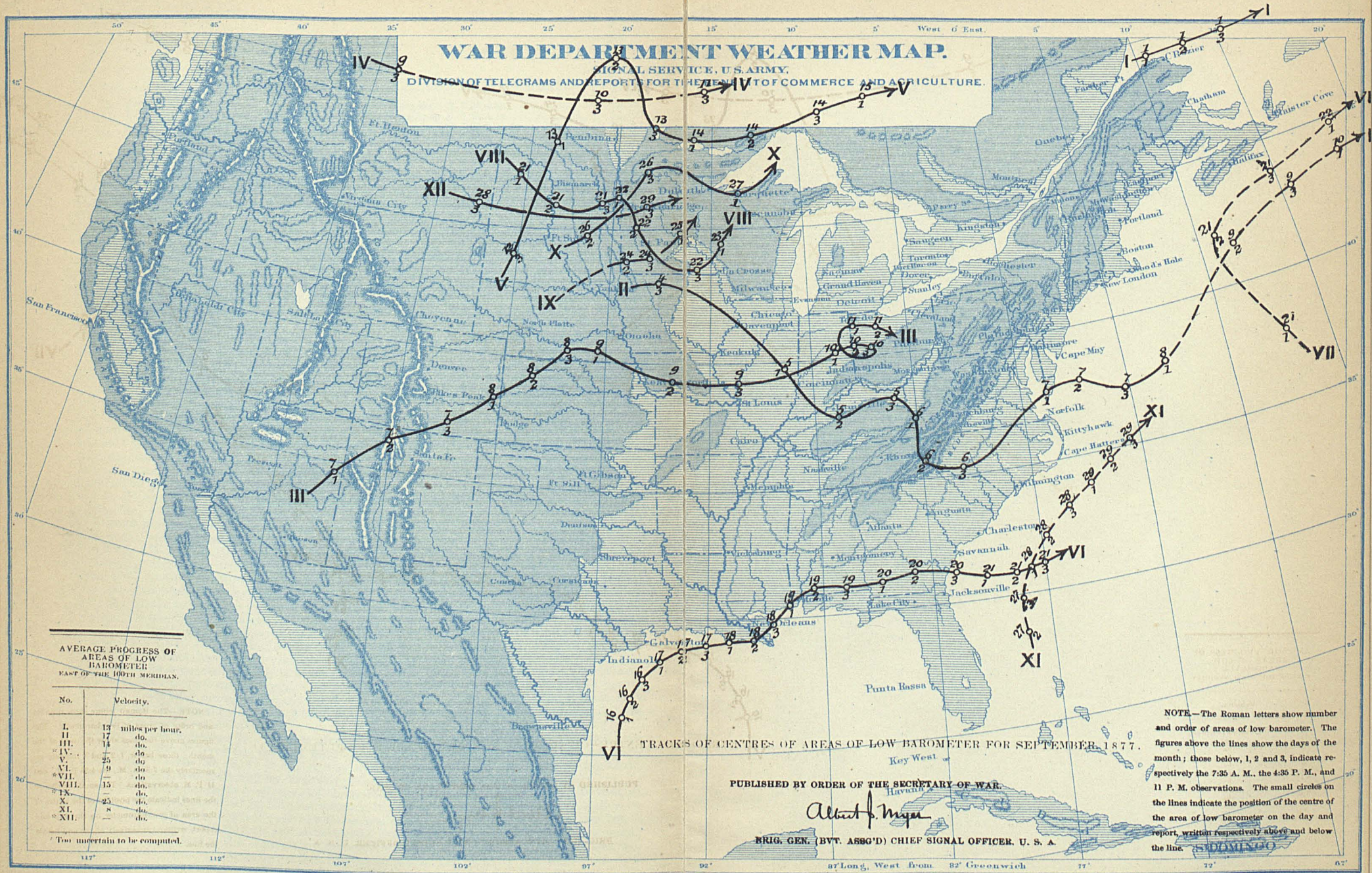
# WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U.S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.




TRACKS OF CENTRES OF AREAS OF LOW BAROMETER FOR SEPTEMBER, 1877.

AVERAGE PROGRESS OF AREAS OF LOW BAROMETER EAST OF THE 100TH MERIDIAN.

| No. | Velocity. |
|---|---|
| I. | 13 miles per hour. |
| II | 17 do. |
| III. | 14 do. |
| *IV. | — do |
| V. | 25 do |
| VI. | 9 do |
| *VII. | — do |
| VIII. | 15 do. |
| *IX. | — do. |
| X. | 25 do. |
| XI. | 8 do. |
| *XII. | — do. |

* Too uncertain to be computed.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

NOTE.—The Roman letters show number and order of areas of low barometer. The figures above the lines show the days of the month; those below, 1, 2 and 3, indicate respectively the 7:35 A. M., the 4:35 P. M., and 11 P. M. observations. The small circles on the lines indicate the position of the centre of the area of low barometer on the day and report, written respectively above and below the line.

97° Long. West from 82° Greenwich

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# WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U.S. ARMY,
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

ISOBARS, ISOTHERMS AND PREVAILING WINDS FOR SEPTEMBER, 1877.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER U. S. A.

AVERAGE TEMPERATURES FOR SEPTEMBER.

| DISTRICTS. | Average for September. Signal Service Observations. For several years. | For 1877. | Comparison of September, 1877, with the average for several years. |
|---|---|---|---|
| St. Lawrence valley | 60°.3 | 62°.5 | 2°.2 above. |
| New England | 60 .0 | 63 .7 | 3°.7 above. |
| Middle Atlantic States | 66 6 | 68 .0 | 1°.4 above. |
| South Atlantic States | 74 .1 | 75 .7 | 1°.6 above. |
| Gulf States | 77 .1 | 77 .8 | 0°.7 above. |
| Lower Lake region | 60 .7 | 63 .7 | 3°.0 above. |
| Upper Lake region | 57 .4 | 61 .6 | 4°.2 above. |
| Ohio valley and Tennessee | 68 .1 | 68 .7 | 0°.6 above. |
| Upper Mississippi valley | 62 .6 | 67 .2 | 4°.6 above. |
| Lower Missouri valley | 65 .4 | 68 .1 | 2°.7 above. |
| Upper Missouri valley | 56 7 | 62 .6 | 5°.9 above. |
| Minnesota | 57 .2 | 60 .5 | 3°.3 above |
| Rocky Mountains stations | 60 .5 | 60 .7 | Normal. |
| Pacific Coast | 62 .3 | 63 .1 | 0°.8 above |

TEMPERATURES OF WATER FOR SEPTEMBER 1877.

| STATIONS. | Temperatures at bottom. Maximum. | Minimum. | Average depth of water. Feet. |
|---|---|---|---|
| Alpena | 68° | 58° | 14 |
| Augusta | 86 | 72 | 6 |
| Baltimore | 81 | 72 | 11 |
| Buffalo | 72 | 66 | 12 |
| Cairo | 82 | 71 | 24 |
| Charleston | 84 | 74.5 | 42 |
| Chicago | 70 | 61 | 10 |
| Cleveland | — | — | — |
| Cincinnati | 79.5 | 69 | 14 |
| Detroit | 72.5 | 64 | 22 |
| Duluth | 66 | 45 | 12 |
| Eastport | 49 | 46 | 20 |
| Escanaba | 65 | 58 | 15 |
| Galveston | 90 | 70 | 8 |
| Grand Haven | 71 | 63 | 19 |
| Jacksonville | 82 | 74 | 12 |
| Keokuk | 75 | 60 | 3 |
| Key West | — | — | — |
| La Crosse | 70 | 64 | 1½ |
| Louisville | 80 | 70 | 3½ & 14* |
| Memphis | 80 | 70 | 20 |
| Marquette | 60 | 56 | 15 |
| Milwaukee | 67 | 51 | 20 |
| Mobile | 86 | 71 | 15 |
| Montgomery | 85.5 | 69.5 | 6 |
| Nashville | 83 | 69 | 12 |
| New London | 69 | 63.5 | 12 |
| New York | 74 | 64 | 15 |
| Norfolk | 80 | 65 | 24 |
| Omaha | 72 | 64 | 10 |
| Pittsburgh | 74 | 68 | 6 |
| Portland, Maine | 61 | 55.5 | 26 |
| Punta Rassa | — | — | — |
| San Francisco | 61 | 59.5 | 23 |
| Sandusky | 73 | 64.5 | 10 |
| St. Louis | 82 | 70.5 | 9 |
| St. Marks | 82 | 72 | 17 |
| St. Paul | 75 | 60 | 2 |
| Savannah | 84 | 73 | [illegible] |
| Toledo | 76 | 69 | 11 |
| Wilmington | 88 | 68 | 15 |
| Wood's Holl | 72 | 66 | 8 |
| Yankton | 76 | 62 | 5 |

* 14 feet after the 17th.

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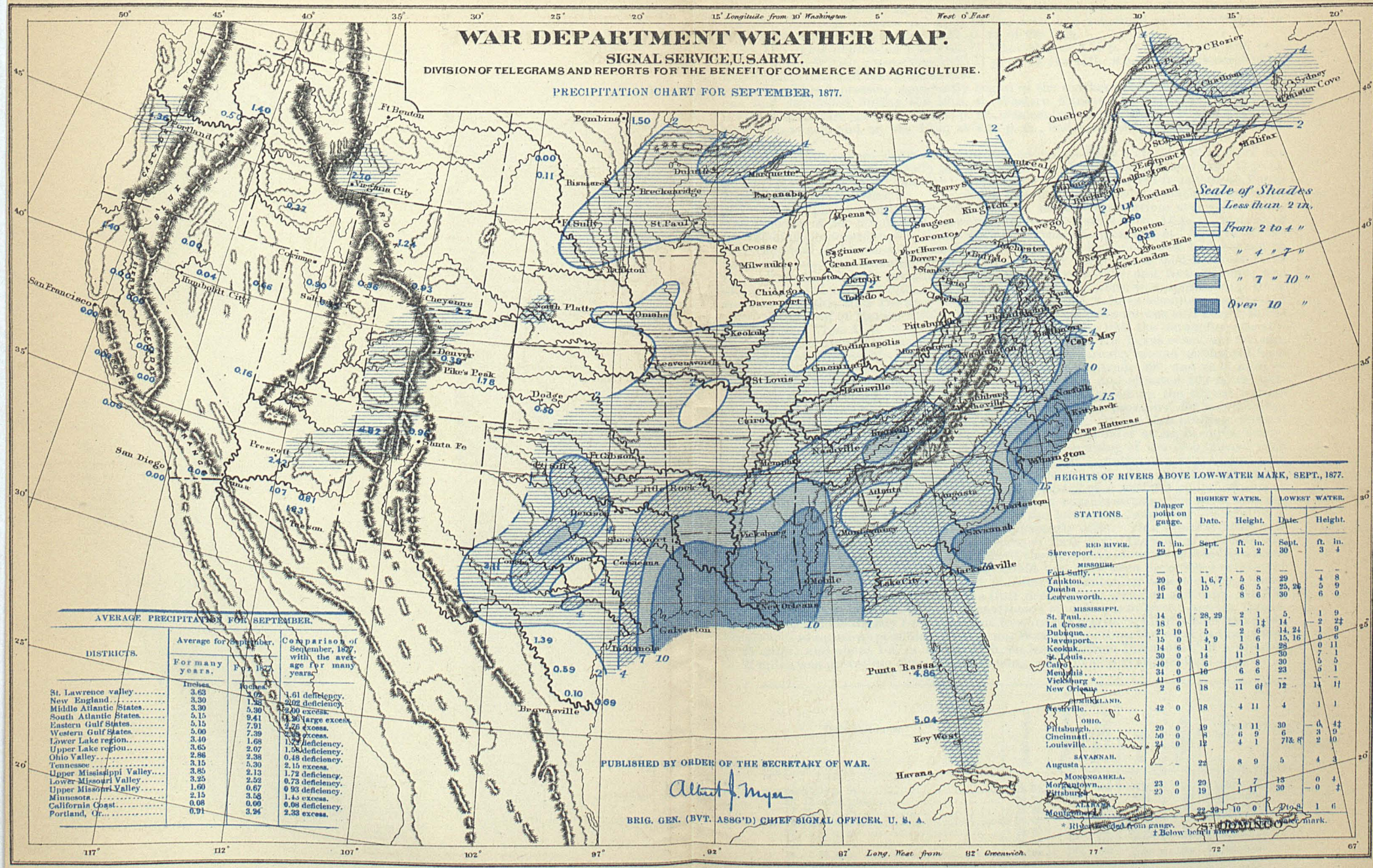
No. 111.

# WAR DEPARTMENT WEATHER MAP.

## SIGNAL SERVICE, U. S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

PRECIPITATION CHART FOR SEPTEMBER, 1877.




PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

### AVERAGE PRECIPITATION FOR SEPTEMBER.

| DISTRICTS. | Average for September. For many years. | Average for September. For 1877. | Comparison of September, 1877, with the average for many years. |
|---|---|---|---|
| | Inches. | Inches. | |
| St. Lawrence valley | 3.63 | 2.02 | 1.61 deficiency. |
| New England | 3.30 | 1.28 | 2.02 deficiency. |
| Middle Atlantic States | 3.30 | 5.30 | 2.00 excess. |
| South Atlantic States | 5.15 | 9.41 | 4.26 large excess. |
| Eastern Gulf States | 5.15 | 7.91 | 2.76 excess. |
| Western Gulf States | 5.00 | 7.39 | 2.39 excess. |
| Lower Lake region | 3.40 | 1.68 | 1.72 deficiency. |
| Upper Lake region | 3.65 | 2.07 | 1.58 deficiency. |
| Ohio Valley | 2.86 | 2.38 | 0.48 deficiency. |
| Tennessee | 3.15 | 5.30 | 2.15 excess. |
| Upper Mississippi Valley | 3.85 | 2.13 | 1.72 deficiency. |
| Lower Missouri Valley | 3.25 | 2.52 | 0.73 deficiency. |
| Upper Missouri Valley | 1.60 | 0.67 | 0.93 deficiency. |
| Minnesota | 2.15 | 3.58 | 1.43 excess. |
| California Coast | 0.08 | 0.00 | 0.08 deficiency. |
| Portland, Or. | 0.91 | 3.24 | 2.33 excess. |

### HEIGHTS OF RIVERS ABOVE LOW-WATER MARK, SEPT., 1877.

| STATIONS. | Danger point on gauge. | | Highest water. Date. | Highest water. Height. | | Lowest water. Date. | Lowest water. Height. | |
|---|---|---|---|---|---|---|---|---|
| | ft. | in. | Sept. | ft. | in. | Sept. | ft. | in. |
| RED RIVER. | | | | | | | | |
| Shreveport | 29 | 9 | 1 | 11 | 2 | 30 | 3 | 4 |
| MISSOURI. | | | | | | | | |
| Fort Sully | — | — | — | — | — | — | — | — |
| Yankton | 20 | 0 | 1, 6, 7 | 5 | 8 | 29 | 4 | 8 |
| Omaha | 16 | 0 | 15 | 6 | 5 | 25, 26 | 5 | 9 |
| Leavenworth | 21 | 0 | 1 | 8 | 6 | 30 | 6 | 0 |
| MISSISSIPPI. | | | | | | | | |
| St. Paul | 14 | 6 | 28, 29 | 2 | 1 | 5 | 1 | 9 |
| La Crosse | 18 | 0 | 1 | — 1 | 1‡ | 14 | — 2 | 2‡ |
| Dubuque | 21 | 10 | 5 | 2 | 6 | 14, 24 | 1 | 9 |
| Davenport | 15 | 0 | 4, 9 | 1 | 6 | 15, 16 | 0 | 6 |
| Keokuk | 14 | 6 | 1 | 5 | 1 | 28 | 0 | 11 |
| St. Louis | 30 | 0 | 14 | 11 | 1 | 30 | 7 | 1 |
| Cairo | 40 | 0 | 6 | 7 | 8 | 30 | 5 | 5 |
| Memphis | 34 | 0 | 10 | 6 | 6 | 23 | 5 | 1 |
| Vicksburg * | 41 | 0 | — | — | — | — | — | — |
| New Orleans | 2 | 6 | 18 | 11 | 6† | 12 | 14 | 1† |
| CUMBERLAND. | | | | | | | | |
| Nashville | 42 | 0 | 18 | 4 | 11 | 4 | 1 | 1 |
| OHIO. | | | | | | | | |
| Pittsburgh | 20 | 0 | 19 | 1 | 11 | 30 | — 0 | 4‡ |
| Cincinnati | 50 | 0 | 8 | 6 | 9 | 6 | 3 | 9 |
| Louisville | 24 | 0 | 12 | 4 | 1 | 7 to 8 | 2 | 10 |
| SAVANNAH. | | | | | | | | |
| Augusta | — | — | 22 | 8 | 9 | 5 | 4 | 3 |
| MONONGAHELA. | | | | | | | | |
| Morgantown | 23 | 0 | 20 | 1 | 7 | 13 | 0 | 4 |
| Pittsburgh | 25 | 0 | 19 | 1 | 11 | 30 | — 0 | ‡ |
| ALABAMA. | | | | | | | | |
| Montgomery | | | 22, 23 | 10 | 0 | 7 to 8 | 1 | 6 |

* River exceeded from gauge. ‡ Below bench mark.

winds prevailed in Texas. On the 8th this had developed into a trough of low pressure, extending from Texas to Montana, while the area of greatest deviation from the normal pressures for the month lay considerably to the northward. At 11 p. m. of the 8th and 7 a. m. of the 9th this trough is replaced by a well-defined area of low pressure, central in Eastern Kansas and Nebraska. This depression now moved slowly eastward, reaching Ohio and Indiana at 7 a. m. of the 10th, and remained nearly stationary in this region until it disappeared at 11. p. m. of the 11th.

No. IV.—This depression was west of Manitoba at 4.35 p. m. of the 9th, and continued in the British possessions until 11 p. m. of the 11th, where it was succeeded by northwest winds and rising barometer.

No. V.—This depression apparently began as the southern portion of the preceding one, and developed, during the 12th, in Western Kansas and Nebraska. It moved northward, and on the 13th, at 4.35 p. m., was central in Manitoba. It now extended slowly eastward, and on the 15th, at 4.35 p. m., had disappeared northeast of Lake Superior.

No. VI.—This severe storm first appeared on our tri-daily maps at 7.35 a. m. of the 16th. There had been a steady fall of pressure at all our Gulf stations from 11 p. m. of the 12th to 11 p. m. of the 15th; the amount of this fall varied from 0.07 at Punta Rassa to 0.14 at Brownsville. The winds had been steady south-southeast and east, with clear or partly cloudy weather, except in the eastern portions occasional rains. The velocity of the winds had, however, increased from 4.35 to 11 p. m. instead of diminishing, in accordance with the normal diurnal changes, and at 7.35 a. m. of the 16th they had still further increased at Galveston and Indianola, and had backed to the northeast, with threatening and rainy weather. The fall of 0.06 in pressure at these stations, while it remained stationary at Brownsville and New Orleans, was additional evidence to indicate that the center of the storm was approaching these stations. At this time the area of 29.80, or less, seems to have occupied the western third of the Gulf of Mexico, while the region of lowest pressure was still nearer to the Texas Gulf. From 11 p. m. of the 15th to 11 p. m. of the 16th the barometer was stationary in Louisiana and the East Gulf States; it fell on the Texas coast, but fell and rose again at Brownsville. The central depression apparently moved northward from latitude 26° to latitude 28°, and thence northeast to latitude 29°, and at 11 p. m. of the 17th the lowest pressure was probably 29.50 or .55, and situated 100 miles east-southeast of Galveston. The following notes were reported by the Signal Service observer at Galveston: "An unusually high temperature prevailed for several days previous to the cyclone of 1875, and to the present one. On the 15th nothing unusual was noticed, except a faint lunar halo in the evening; later at night light, fleecy, cirro-cumulus clouds came up from the south. The morning of the 16th opened with heavy, fitful showers from the east, lasting at first but a quarter of a minute, but soon increased to a nearly continuous rain from the northeast. The peculiarities of the clouds were closely watched. At times they consisted of a uniform veil of stratus or nimbus, apparently calm; at other times of low cumulo-stratus-like scud, moving rapidly from the northeast; through rifts in the latter was frequently discernible a higher veil of stratus or cirro-stratus also apparently calm. This upper stratum was occasionally broken in places, disclosing spots of hazy sky. Increasing northeasterly winds and heavy rains continued throughout the day, with slowly but steadily diminishing pressure. The falling barometer would not have been considered worthy of notice but for the northerly winds and peculiarly threatening aspect of the clouds. The tide was also rising slowly, and the Gulf flecked with breakers and caps. At 7.50 p. m., Washington time, the display of cautionary signals was ordered; but the threatening weather had already been sufficient to warn the mariners, all of whom had made themselves as secure as possible. At 11 p. m., Washington time, the wind had increased to 24 miles; and about 1 a. m. of the 17th, on learning from Indianola that a velocity of 52 miles was prevailing there, the following series of observations was begun:

| Date and hour. | Barometer. | Thermometer. | Relative humidity. | Wind. | Velocity. | Weather. |
|---|---|---|---|---|---|---|
| September 16, 11.30 p. m. | 29.72 | 78 | 95 | NE. | 21 | Light rain. |
| 16, 12 midnight | 29.70 | 76 | 100 | NE. | 19 | Light rain. |
| 17, 12.30 a. m. | 29.67 | 76 | 100 | NE. | 26 | Light rain. |
| 17, 1.00 a. m. | 29.68 | 76 | 100 | NE. | 22 | Heavy rain. |
| 17, 1.30 a. m. | 29.67 | 75 | 100 | NE. | 21 | Light rain. |
| 17, 2.00 a. m. | 29.65 | 76 | 100 | NE. | 21 | Light rain. |
| 17, 2.30 a. m. | 29.64 | 76 | 100 | NE. | 24 | Light rain. |
| 17, 3.00 a. m. | 29.63 | 76 | 100 | NE. | 20 | Light rain. |
| 17, 3.30 a. m. | 29.63 | 76 | 100 | NE. | 23 | Light rain. |
| 17, 4.00 a. m. | 29.61 | 76 | 100 | NE. | 20 | Light rain. |

| Date and hour. | Barometer. | Thermometer. | Relative humidity. | Wind. | Velocity. | Weather. |
|---|---|---|---|---|---|---|
| September 17, 4.30 a. m. | 29.63 | 76 | 100 | NE. | 21 | Light rain. |
| 17, 5.00 a. m. | 29.61 | 76 | 100 | NE. | 24 | Light rain. |
| 17, 5.30 a. m. | 29.60 | 76 | 100 | NE. | 23 | Light rain. |
| 17, 6.00 a. m. | 29.61 | 76 | 100 | NE. | 24 | Light rain. |
| 17, 6.30 a. m. | 29.62 | 76 | 100 | NE. | 24 | Light rain. |
| 17, 7.00 a. m. | 29.60 | 76 | 100 | NE. | 21 | Light rain. |
| 17, 7.30 a. m. | 29.62 | 75 | 100 | NE. | 28 | Heavy rain. |
| 17, 8.00 a. m. | 29.61 | 73 | 100 | NE. | 27 | Light rain. |
| 17, 8.30 a. m. | 29.61 | 73 | 100 | NE. | 28 | Light rain. |
| 17, 9.00 a. m. | 29.60 | 73 | 100 | NE. | 30 | Light rain. |
| 17, 9.30 a. m. | 29.57 | 73 | 100 | NE. | 44 | Heavy rain. |
| 17, 10.00 a. m. | 29.56 | 73 | 100 | NE. | 40 | Heavy rain. |
| 17, 10.30 a. m. | 29.54 | 73 | 100 | NE. | 47 | Light rain. |
| 17, 11.00 a. m. | 29.53 | 73 | 100 | NE. | 39 | Light rain. |
| 17, 11.30 a. m. | 29.52 | 72 | 100 | NE. | 50 | Light rain. |
| 17, 12 noon | 29.49 | 72 | 100 | NE. | 41 | Light rain. |
| 17, 12.30 p. m. | 29.49 | 71 | 100 | NE. | 49 | Light rain. |
| 17, 1.00 p. m. | 29.48 | 71 | 100 | NE. | 53 | Light rain. |
| 17, 1.30 p. m. | 29.49 | 72 | 100 | NE. | 50 | Light rain. |
| 17, 2.00 p. m. | 29.49 | 72 | 100 | NE. | 44 | Light rain. |
| 17, 2.30 p. m. | 29.48 | 72 | 100 | NE. | 49 | Light rain. |
| 17, 3.00 p. m. | 29.50 | 72 | 100 | NE. | 43 | Light rain. |
| 17, 3.30 p. m. | 29.51 | 72 | 100 | NE. | 40 | Light rain. |
| 17, 4.00 p. m. | 29.50 | 72 | 100 | NE. | 44 | Light rain. |
| 17, 4.30 p. m. | 29.50 | 73 | 90 | NE. | 48 | Threatening. |
| 17, 5.00 p. m. | 29.53 | 73 | 90 | NE. | 48 | Light rain. |
| 17, 5.30 p. m. | 29.52 | 74 | 90 | NE. | 48 | Light rain. |
| 17, 6.00 p. m. | 29.52 | 74 | 90 | NE. | 50 | Light rain. |
| 17, 6.30 p. m. | 29.55 | 75 | 85 | NNE. | 48 | Threatening. |
| 17, 7.00 p. m. | 29.57 | 75 | 85 | NNE. | 48 | Threatening. |
| 17, 7.30 p. m. | 29.60 | 74 | 85 | NNE. | 50 | Threatening. |
| 17, 8.00 p. m. | 29.62 | 74 | 90 | NNE. | 48 | Cloudy. |
| 17, 8.30 p. m. | 29.63 | 74 | 90 | NNE. | 48 | Clearing. |
| 17, 9.00 p. m. | 29.65 | 74 | 86 | NNE. | 48 | Threatening. |
| 17, 9.30 p. m. | 29.67 | 73 | 90 | NNE. | 48 | Light rain. |
| 17, 10.00 p. m. | 29.66 | 73 | 90 | NNE. | 50 | Light rain. |
| 17, 10.30 p. m. | 29.66 | 73 | 90 | NNE. | 50 | Light rain. |
| 17, 11.00 p. m. | 29.68 | 73 | 85 | NNE. | 48 | Threatening. |
| 17, 11.30 p. m. | 29.69 | 73 | 81 | N. | 44 | Cloudy. |
| 17, 12 midnight | 29.69 | 72 | 85 | N. | 41 | Threatening. |
| 18, 12.30 a. m. | 29.69 | 71 | 90 | N. | 46 | Threatening. |
| 18, 1.00 a. m. | 29.68 | 71 | 85 | N. | 39 | Cloudy. |
| 18, 1.30 a. m. | 29.68 | 71 | 80 | N. | 43 | Cloudy. |
| 18, 2.00 a. m. | 29.69 | 71 | 80 | N. | 44 | Cloudy. |
| 18, 2.30 a. m. | 29.69 | 70 | 84 | N. | 44 | Cloudy. |
| 18, 3.00 a. m. | 29.71 | 70 | 84 | N. | 38 | Cloudy. |
| 18, 3.30 a. m. | 29.71 | 70 | 79 | N. | 39 | Cloudy. |
| 18, 4.00 a. m. | 29.73 | 70 | 79 | N. | 36 | Cloudy. |
| 18, 4.30 a. m. | 29.73 | 70 | 79 | N. | 37 | Cloudy. |
| 18, 5.00 a. m. | 29.75 | 69 | 79 | N. | 34 | Cloudy. |
| 18, 5.30 a. m. | 29.76 | 69 | 79 | N. | 35 | Cloudy. |
| 18, 6.00 a. m. | 29.77 | 69 | 79 | N. | 34 | Cloudy. |

It is believed that the anemometer would have registered higher but for the presence of a large building on the north side of this office, which has a tendency to deflect the (northerly) winds upwards and over the instrument. The only evidence of atmospheric electricity observed during the storm consisted of a single faint glare of light at 2.35 a. m. on the 18th, visible for an instant in the northern portion of the heavens. The damage done to property in Galveston and the vicinity is estimated at about $100,000. Total rain-fall during storm, 8.76 inches. Highest velocity, 60 miles, on the 7th, 6.45 p. m. Average velocity of the wind 38.8 miles during 48½ hours. The log of the steamship State of Texas furnishes no additional items.

This storm-center passed eastward along the Louisiana coast to the mouth of the Mississippi, thence eastward through the Gulf and South Atlantic States, until it was lost to our view on the 21st over the Gulf stream. The observer at Indianola reports as follows: 15th, tide rose 3 feet. 16th, strong wind and very high tide all day; rain-showers in the morning and afternoon; many inhabitants left the town at 5 p. m. 17th, north wind all day, maximum 72 miles, lowest pressure 29.62, at 4 a. m.; tide had risen 10 feet 6 inches, and then fell 2 feet. 18th, strong north wind; cloudless day. Cautionary signals ordered September 16, 7.50 p. m., whereupon every one left the city,

which was subsequently flooded with the high tide. No great amount of damage reported.

New Orleans reports on the 16th light showers, and on the 17th heavy showers, with increasing winds. Cautionary signal was displayed during the whole of the 17th, and vessels remained in harbor. On the 18th very heavy rain and wind exceeding 25 miles per hour throughout the day. Lowest pressure, 29.40 inches, occurred on the 18th, 7 p. m. Heavy gale prevailed from the 18th, 9 p. m., to 19th, 3 a. m. Maximum wind velocity, northeast, 39 miles, occurred on the 19th.

The observer at Mobile reports signal displayed during the whole of the 17th. Wind exceeded 25 miles per hour after 4.30 p. m. of 18th and up to 11.15 a. m. of 19th. The maximum was 35 miles at 9.15 a. m. The barometer was lowest, 29.45, at 7 a. m. of 19th. Very heavy rain fell from 12.30 a. m. of 18th to 8 a. m. of 19th.

The observer at Montgomery, Ala., reports heavy rain and north to east winds throughout the 18th and 19th. On the 18th the upper stratum of clouds moved slowly from the southeast, while the lower stratum of scud moved rapidly from the northeast. The Black Warrior River rose 63 feet. The loss of crops was very heavy. Key West reports high seas and southwest winds on the 19th.

Tybee Island reports the cautionary signal ordered up 7 p. m. of 18th. Very perfect solar halo visible throughout the day. Northeast gale began at 3 a. m., 19th, continuing until 11 p. m.; highest velocity 38 miles. On the 20th, light showers all day, with very heavy sea. On the 21st, signal ordered down, but another gale set in, accompanied by intense zigzag lightning and culminating in a velocity of 60 miles per hour at 4 a. m. of 22d. Severe northeast gales continued during the 23d, 24th, 25th, 26th, and 27th. No vessels were able to go out, and on the latter date sea captains reported a hurricane outside of harbor. (See No. XI.)

The steamship Saragossa left Savannah on the 20th for Baltimore, and returning reached Savannah on the 30th. Experienced northeast gales during the entire time, and especially on the 20th and 21st. On the 27th to 29th, off Cape Henry, the northeast winds were of hurricane violence. The gale of the 20th and 21st was related to the storm No. V; the hurricane of the 27th to 29th accompanied low No. XI.

No. VII.—While the preceding storm was moving eastward through the Gulf States, a severe storm (No. VII) was moving northward toward Nova Scotia, somewhat as shown by the dotted track given on Chart No. I. Its nearest approach to the coast was apparently 11 p. m. of 21st. Of its previous history, the only report that has as yet come to hand is the loss of the brig Harley John, in latitude 30° 19′, longitude 56° 45′, on September 17, during a hurricane from E. veering W.

No. VIII.—This depression appeared in Western Dakota at 7.35 a. m. of 21st, where it developed rapidly during the hot portion of the day, and was accompanied by high winds in the northwest, but very little rain or cloud; it therefore died away after moving slowly southeastward through Minnesota to Wisconsin, which State it reached on the 23d. This depression appears to have had an earlier origin in the region between Kansas, Nevada, and Washington Territory, over all of which the pressure fell during the hottest portion of the 20th. The deviations from normal pressures show that at 11 p. m. of the 20th this depression covered the whole of our Rocky Mountain stations, and extended northwestward into British America. On the 21st, 11 p. m., the greatest depression was in Nebraska, Dakota, and Minnesota, and was immediately followed by a rapid rise, coming in from the north, and in consequence of which the depression died out without further development.

No. IX.—The western part of area of low barometer, mentioned in the previous section, remained in the Rocky Mountain region, as a nucleus, out of which subsequently developed the present area No. IX. On the 23d, at 4.35 p. m., this area finally advanced from Colorado northward, and on the 24th the map of isobars places the center in Southwestern Minnesota. The depression disappeared on the 25th.

No. X.—During the 25th the barometer suddenly fell in Montana and Idaho, and the depression thus initiated was on the 26th, 7.35 a. m., probably central in Dakota, although extending southwestward to Colorado. Although accompanied by considerable rain, the area of low pressure rapidly filled up, and on the 27th disappeared over Lake Superior.

No. XI.—This storm having every appearance of a cyclone, first appeared on our tri-daily maps on the 27th, at 4.35 p. m., east of Florida, and moving slowly northward. It was preceded by heavy rain and northeast to southeast gales on the North Carolina coast. It was on the 28th, at 7.35 a. m., southeast of Wilmington, where heavy rain was reported, but no wind, owing to its sheltered location. The barometer had for the previous week been highest to the north of Cape Hatteras, and northeast winds, increasing to gales, had prevailed along the South Atlantic coast ever since the disappearance of low barometer No. VI. Owing to its slow progress this storm was very severely felt from Cape Lookout to Cape Henry, where steady northeast gales and high seas continued. On the 21st a cyclone was reported at Saint Vincent and Grenada (about 8° of longitude east of Curacoa), which, therefore, apparently extends the path of this cyclone back into the Atlantic Ocean. The United States steamer Frolic reports

experiencing a hurricane on the 22d and 23d on the routes between Curacoa, Venezuela (latitude 12° N., longitude 69° W.), and Porto Rico. The storm-center was probably then moving northwest and must be identical with the present No. XI. On the 24th the observers at Kingston and Santiago de Cuba reported every appearance of a hurricane at a distance to the northeast.

No. XII.—An area of low barometer appears on the 28th, at 11 p. m., in Western Dakota. On the 29th it moved eastward to Minnesota, and on the 30th extended in a long oval from Iowa northeastward. It was accompanied by little or no rain, and its high winds died away as the depression filled up and disappeared.

No. XIII.—This cyclone existed in the Caribbean Sea on the 27th, and will be described in the October Review.

*Storms at sea.*—The following notes have come to hand relative to storms experienced at sea: 2d, latitude 40° 10′ N., longitude 70° 42′ W., heavy SW. squall; 7th, hurricane passed north of Saint Thomas; a gale off Kent Island Flats, Md.; 9th, latitude 49° 34′ N., longitude 37° 38′ W., NW. gale; 10th, latitude 49° 50′ N., longitude 38° 43′ W., strong gale, NE. to W. by N., high NW. sea; latitude 47° 20′ N., longitude 37° 21′ W., strong gale, NNW. to NNE., head sea; latitude 48° 11′, longitude 44° 14′, NNW. gale; 11th, latitude 49° 34′ N., longitude 24° 33′, WNW. gale; 11th, off Rough and Ready, Cal., strong northwest gale; 12th, latitude 49° 18′ N., longitude 18° 39′ W., fresh W. gale, heavy squalls, and thick rain; latitude 49° 44′ N., longitude 6° 54′ W., fresh S. W. gale; 13th, latitude 49° 32′ N., longitude 39° 10′ W., strong W. gale, very high sea; latitude 47° 25′ N., longitude 37° 42′ W., hard gale and high sea; latitude 49° 18′ N., longitude 22° 19′ W., fresh NNW. gale; latitude 50° 18′ N., longitude 13° 28′ W., fresh SW. gale; Mabow, C. B., gale during night; 14th, latitude 46° 09′ N., longitude 46° 18′ W., strong W. gale, very high sea; latitude 51° 24′ N., longitude 14° 47′ W., fresh SW. to NW. gales; latitude 50° 06′ N., longitude 28° 39′ W., SW. storms, high sea; 14th and 15th, latitude 44° N., longitude 54° W., gale; 17th, latitude 49° 29′ N., longitude 33° 12′ W., strong SW. gale; 16th and 17th, midnight, about latitude 26° 0′ N., longitude 64° 30′ W., hurricane; 17th, 30° 19′ N., longitude 56° 45′ W., hurricane from E. veering to W., with terrific sea, lasting 24 hours and moderating to SW.; 17th, steamship State of Texas, latitude 27° 50′ N., longitude 89° 56′ W., fresh SW. gales and heavy seas; 18th, 2 a. m., steamship State of Texas encountered gale 360 miles from Galveston; noon, latitude 27° 53′ N., longitude 91° 10′ W., heavy SW. gales and seas; 4 p. m., wind hauled to north. On the 19th, lowest barometer was 29.65, about 160 miles SE. of Galveston; 18th and 19th, about latitude 26° 0′ N., longitude 64° 30′ W., hurricane from SW.; 19th, latitude 49° 09′ N., longitude 31° 04′ W., SW. storm; 20th, brig Woodcock, at Halifax, N. S., September 23, from Inagua, reports: 20th, midnight, on northern edge of Gulf Stream, severe ENE. gale veering to NW., lasting 48 hours; latitude 33° N., longitude 50° W., heavy SSW. gale, lasting 24 hours; 21st, Northwest Shoals, off coast of Massachusetts, northerly gale; off Whitehaven, N. S., gale; Saint Paul's Island, C. B., perfect hurricane, lasting 15 hours; Straits of Florida, violent gale; 22d, Barbadoes and Saint Vincent, NE. storms and hurricane; steamer Alhambra, from Charlottetown to Halifax, September 23, off Nova Scotia, severe storm, steward washed overboard, boats smashed, also on the 22d, latitude 40° 22′ N., longitude 70° 52′ W., fresh NNW. gale; latitude 41° 21′ N. longitude 66° 16′ W., fresh NNW. gale; latitude 40° 20′ N., longitude 70° 50′ W., heavy NW. gales and sea; 23d, latitude 43° 13′ N., longitude 57° 08′ W., heavy W. gale; latitude 42° 15′ N., longitude 58° 19′ W., fresh W. to NW. gale; latitude 49° 19′ N., longitude 42° 08′ W., heavy SSW. gale; 23d and 24th, latitude 36° 59′ N., longitude 74° 50′, heavy NE. gale; 24th, Mount Hope Bay, R. I., gale; latitude 46° 48′ N., longitude 39° 49′ W., fresh E. gale; 25th, latitude 45° 38′ N., longitude 41° 56′ W., severe N. gale, lasting 27 hours; latitude 49° N., longitude 17° W., heavy gale; 26th, latitude 45° 36′ N., longitude 50° 35′ W., fresh NE. gale; 28th, off Hog Island, heavy ESE. gale; 29th, off Cape Hatteras, cyclone from NE.

## TEMPERATURE OF THE AIR.

*In general.*—The general distribution of the temperature of the air is shown by the isotherms on chart No. II. The table of comparative temperatures, in the left-hand corner of same chart, shows the temperature of the month to have been higher than usual over the whole country, excepting in the mountainous region of Utah, Colorado, and New Mexico. The excess is greatest in the Northwest and Upper Lake region; somewhat less over the Lower Lakes and New England, and still less along the Middle and South Atlantic States, while in the Gulf States, Tennessee, and Ohio Valley it is only about half a degree above the normal; as is also the case on the Pacific coast.

*Monthly mean temperatures at special points* have been as follows: Mount Washington, 42°.4; Pike's Peak, 30°.9.

*Maximum and minimum temperatures.*—Maximum temperature at Signal-Service stations, above 95°, are reported as follows: 96° at Savannah, Jacksonville, Vicksburg, Indianola, Boerne, Castroville; 97° at Montgomery, Salinas City, Cal.; 98° at Shreve-

port, Fort Sill, Sacramento; 99°, Denison, Fort Griffin; 100°, Brackettville, Corsicana, San Antonio, Campo; 101°, Cambridge, Visalia; 102°, Eagle Pass; 103°, Laredo; 104°, Phœnix, Uvalde; 106°, Red Bluff; 107°, Maricopa Wells; 108°, Fresno, Wickenburg; 112°, Fort Yuma. From stations other than those of the Signal Service, maximum temperatures have also been reported as follows: 96°, Fort Hayes, Kan., Hennepin, Ill.; 98°, Clarksville, Tex.; 99°, Baton Rouge, La.; Fort Richardson, Tex.; Camp Sheridan, Neb.; 100°, Fort McPherson, Neb.; 101°, Fort McKavett, Tex.; 102°, Fort Rice, Dak.; Fort Griffin, Tex.; Fort Clark, Tex.

Minimum temperatures below 35°: 34°, Breckenridge, Minn., Umatilla; 33°, Bismarck and Lower Brulé Agency, Dak.; Hayes' City, Kan.; 32°, Winnemucca, Neb.; Woodstock, Vt.; 30°, Fort Abercrombie, Dak.; Pembina; 29°, Fort Randall, Dak.; Orono, Me.; 28°, Nile, N. Y.; 27°, Cheyenne, Wyo.; Sydney Barracks, Neb.; 26°, Summit, Col.; 25°, Neillsville, Wis.; 23°, Fort Pembina, Dak.; 21°, Coalville, Utah; 20°, Mount Washington, N. H.; 11°, Pike's Peak, Col.

The maximum temperatures of the month may be divided into three periods, the first of which occurred from the 1st to 3d in the West Gulf, South and Middle Atlantic States; the second from the 10th to 16th gradually extending from Colorado, Nebraska, and Minnesota over the Mississippi Valley as far south as Alabama, and thence over the Lake region, New York, and New England; and the third, on the 30th, extending from Lakes Michigan and Huron southward to the Ohio Valley.

The minimum temperatures occurred, almost without exception, from the 17th to the 23d, attending the advance of area of high pressure No. III, first from Utah to Iowa and northward, gradually extending thence to the Atlantic coast.

*Ranges of temperatures.*—The large monthly or diurnal ranges have been, respectively, as follows: Bismarck, monthly, 49°; diurnal, 46°; Pembina, 59° and 47°; Breckenridge, 58° and 44°; Winnemucca, 57° and 50°; Umatilla, 61° and 39°; Campo, 69° and 56°; Fort Griffin, 49° and 44°; Cheyenne, 56° and 43°; North Platte, 55° and 45°; Denver, 55° and 45°; Visalia, 55° and 42°; Red Bluff, 54° and 36°; Marquette, 52° and 35°; Saint Paul, 52° and 32°; Yankton, 51° and 42°. The least monthly and diurnal ranges have been, respectively, as follows: Cape Hatteras, monthly, 20°; diurnal, 11°; Saint Mark's, 27° and 22°; New Orleans, 29° and 15°; Charleston, 29° and 17°; Jacksonville, 29° and 27°; Punta Rassa, 20° and 17°; Key West, 22° and 13°; Cape Henry, 22° and 1°.

*Frosts* were experienced as follows: From the 1st to the 4th, in Iowa, Wisconsin, Illinois, Indiana, Michigan, Ohio, New York, and on Mount Washington; on the 5th and 6th, near Lake Superior; on the 7th and 8th, on Mount Washington and in northern Maine; on the 8th and 9th, Utah and Colorado. From the 17th to 23d, the first general extensive frost of the season was experienced, being felt first in Utah and Colorado, and extending thence eastward over the entire country north of the thirty-seventh degree of latitude to the Middle Atlantic and New England coast. Slight damage was reported to vegetation in Colorado, Dakota, Indiana, Iowa, Massachusetts, Wisconsin.

*Ice* was reported on the 1st and 2d at Detroit; from the 8th to the 10th at Coalville, Utah; 17th, Virginia City, one-eighth of an inch thick; on the 18th, one-sixteenth of an inch at Cresco, Iowa, and Embarrass, Wis.; on the 22d, ice at Strafford, Vt.

## PRECIPITATION.

*In general.*—The general distribution of rain for the month is shown on Chart No. III. The table in the lower left-hand corner gives the average precipitation in the various districts. This table shows a large excess in the Gulf, South and Middle Atlantic coast States, and in Tennessee and Minnesota, and deficiencies from New England westward over the Lake region and Ohio Valley to the Upper Mississippi and Missouri Valleys. This is almost the reverse of the report for August, and is due mostly to the heavy rain-falls attending the storms Nos. II, VI, and XI, shown on Chart No. I. As was the case in August, considerably over the average amount has also fallen this month in Oregon, while in California no rain has been reported.

*Special heavy rains.*—The following are the most notable cases of heavy rains that have been reported: 1st—Wilmington, N. C. (1st and 2d), 5.02 inches; Jacksonville, Fla., 2.00 inches; Anna, Ill., 2.62 inches; Brownsville, Mo., 2.25. 2d—Cheyenne, Wyo., 1.07 inches; Melissa, Tex. (2d to 4th), 3.00 inches; Coleman City, Tex., 2.45 inches; Concho, Tex., 1.34 inches. 3d—Shreveport, La. (3d, 4th, and 5th), 8.59 inches; 6 inches in 8 hours on the 4th; Fort Griffin (3d and 4th), 2.51 inches; Cambridge, Tex. (3d and 4th), 2.12 inches. 4th—Fayette, Miss., 2.10 inches; Coleman City, Tex., Miss., 1.79 inches; Stockton, Tex., 1.94 inches; Concho, Tex. (4th and 5th), 2.02 inches. 5th—Pilot Point, Tex., 3.87 inches; Boerne, Tex., 1.84 inches; Coleman City, Tex., 2.16 inches. 6th—Galveston, Tex., 4.83 inches; Indianola, Tex., 1.62 inches; Green Spring, Ala., 2.08 inches; Milford, Del. (6th to 8th), 5.70 inches; Dover, Del. (6th to 8th), 3.80 inches; Vineland, N. J. (6th to 8th), 3.71 inches; Reading, Pa. (6th to 8th), 3.34 inches. 7th—Atlantic City, N. J. (7th and 8th), 2.00 inches; Norfolk, Va., 2.24 inches; Sandy Hook, N. J.,

1.63 inches; Cape May, N. J. (7th and 8th), 4.71 inches; Barnegat, N. J., 1.74 inches; Cape Lookout, N. C., 1.87 inches. 8th—Cambridge, Tex., 1.01 inches; North Platte, Nebr., 2.52 inches; Mount Ida, Ark. (8th and 9th), 4.00 inches; Fort Wayne, Ind. (8th and 9th), 3.50 inches; Norfolk, Neb. (8th and 9th), 1.96 inches; Nile, N. Y., 1.70 inches; Accotink, Va., 2.10 inches. 9th—Leavenworth, Kans., 1.24 inches; Green Spring, Ala. (9th and 10th), 2.23 inches; Quitman, Ga., 2.02 inches; Kansas City, Mo., 2.28 inches; Saint Joseph, Mo., 4.80 inches; Lexington, Mo., 1,80 inches. 10th—Knoxville, Tenn., 2.27 inches; Savannah, Ga. (10th and 11th), 2.00 inches; Baton Rouge, La., 4.85 inches; 11th—Wilmington, N. C., 2.00 inches; Brackettville, Tex., 1.42 inches. 12th—Wilmington, N. C., 3.05 inches; Accotink, Va., 2.50 inches. 13th—Charleston, S. C., 3.00 inches—2.00 inches in 30 minutes; Keokuk, Iowa, 1.58 inches. 14th—Savannah, Ga., 2.21 inches; Fort Sill, Ind. T., 1.19 inches; Fort Snelling, Minn., 1.74 inches. 15th—Norfolk, Va., 2.15 inches in 3 hours; San Antonio, Tex., 1.76 inches. 16th—Galveston, Tex. (16th and 17th), 8.70 inches. 17th—Knoxville, Tenn., 1.81 inches; Nashville, Tenn., 2.93 inches; Fort Sill, Ind. T., 2.08 inches; Baton Rouge, La. (17th, 18th, and 19th), 12.45 inches; South Orange, N. J., 1.68 inches; Brookhaven, Miss. (17th to 20th), 7.30 inches in 56 hours. 18th—Mobile, Ala. (18th and 19th), 8.07 inches; 6.75 in 10 hours; New Orleans, La. (18th and 19th), 8.40 inches; Carlowville, Ala. (18th, 19th, and 20th), 10.42 inches; Green Spring, Ala. (18th to 20th), 8.20 inches; Fayette, Miss. (18th and 19th), 6.20 inches. 19th—Saint Marks, Fla., 2.26 inches. 20th—Tybee Island, Ga., 2.61 inches; Cape Hatteras, N. C., 3.10 inches; Cape Henry, Va., 2.31 inches; Kittyhawk, N. C., 2.65 inches. 23d—Tybee Island, Ga., 2.20 inches. 25th—Smithville, N. C., 2.33 inches; North Platte, Nebr., 1.93 inches. 26th—Peoria, Ill., 2.01 inches; 27th—Wilmington, N. C., 3.98 inches; Smithville, N. C. (27th and 28th), 3.55 inches; Greenville, N. C. (27th to 29th), 8.30 inches; Chattanooga, Tenn., 2.75 inches. 28th—Norfolk, Va., 2.07 inches; Wilmington, N. C., 2.83 inches; Cape Hatteras, N. C. (28th and 29th) 8.13 inches; Weldon, N. C., 2.06 inches: Capeville, Va., 2.00 inches; Cape Lookout, N. C. (27th, 28th, and 29th) 8.96; Cape Henry, Va. (28th and 29th), 3.54 inches; Kittyhawk, N. C. (28th and 29th), 7.25 inches.

*Small monthly rain-falls.*—The following stations report small monthly rain-falls; San Francisco, Red Bluff, Sacramento, Visalia, Fresno, Salinas City, Los Angeles, San Diego, and Campo, in California; Winnemucca, in Nevada; and Yuma, Ariz., report no rain-fall; Umatilla, Oreg., 0.59 inches; Denver, Colo., 0.38 inches; Bismarck, Dak., 0.11 inches; Dubuque, Iowa, 0.67 inches; Port Huron, Mich., 0.28 inches; Port Stanley, Port Dover, and Toronto, Canada, respectively, 0.58, 0.98, and 0.42 inches; throughout Massachusetts and Rhode Island the rain-fall averaged only about half an inch; and in Texas, Brownsville reports 0.69; Rio Grande, 0.10; Laredo, 0.59; Castroville, 0.02; and Mason, 0.29.

*Large monthly rain-falls.*—Monthly rain-falls of 7 inches or more are reported as follows: Galveston and Coleman City, Tex., respectively, 13.85 and 7.08 inches; Shreveport, Baton Rouge, and New Orleans, La., respectively, 9.93, 18.42, and 13.21 inches; Fayette, Miss., 11.20 inches; Green Spring, Carlowville, and Mobile, Ala., respectively, 14.11, 12.43, and 12.62 inches; Mayport, Fla., 8.30 inches; Savannah and Thatcher's Island, Ga., respectively, 8.92 and 11.24 inches; in North Carolina, Wilmington reports 20.10 inches; Smithville, 11.9 inches; Cape Lookout, 16.32 inches; Cape Hatteras, 15.41 inches; Kittyhawk, 13.39 inches; Goldsboro', 16.70 inches; Weldon, 8.08; and Greenville, 16.46 inches; Norfolk, Cape Henry, Fort Monroe, and Hampton, Va., respectively, 11.90, 10.04. 8.14, and 7.53 inches; Cape May, N. J., 7.22 inches.

*Droughts.*—Extensive droughts have prevailed during the month over New England and Eastern New York, Indiana, Ohio, southern portions of Michigan, Wisconsin, Eastern Iowa, and northern portion of Illinois, and numerous reports of dry springs and injury to vegetation have been received from those districts.

*Floods.*—Destructive floods attended the storm No. VI, on chart No. I, at Indianola, from the 14th to the 17th; at Galveston, on the 17th and 18th; at New Orleans, on the 18th; and the 19th and 20th, in the valleys of the Black Warrior and Alabama Rivers, Alabama. In the last-named districts the crops of cotton, corn, and fodder were entirely swept away. It is estimated that 30,000 bales of cotton were destroyed.

*Hail.*—Hail has been reported as follows: 1st, Pike's Peak, Colo. 2d, Adams', N. Y.; Pike's Peak, Colo. 4th, Lower Brulé Agency, Dak.; Fort Union, N. Mex.; Pike's Peak, Colo. 5th, four miles northeast of Fort Union, N. Mex. (severe). 14th, Portland, Oreg. 15th, Fort Pembina, Dak., and Virginia City, Mont. 19th, Wytheville, Va.; Alpena, Mich. 21st, Gardiner, Me.; Somerset, Mass.; Fort Wingate, N. Mex. 23d, Camp Brown, Wyo. 25th, Emerson and North Platte, Nebr. 27th, Breckenridge, Minn. 30th, Marquette, Mich.

*Snow.*—On the 7th, 12th, and 27th snow-squalls were reported at Virginia City, Mont., and on the 12th at Austin, Eureka, and other places in Nevada. At Summit, Colo., 11½ inches of snow fell in six days, and snow was also reported on Pike's Peak on seven days, but had all melted before the end of month. On the 14th snow fell on Baldy Mountain, N. Mex., on the 3d the first snow-fall of the season occurred on Mount Washington, N. H., and on the 21st a furious snow-storm occurred there.

*Rainy days.*—The number of days on which rain has fallen, as recorded by signal-service observers, ranges as follows: New England, 3 to 12; Middle Atlantic States, 4 to 19; South Atlantic States, 5 to 19; East Gulf States, 14 to 15; West Gulf States, 6 to 14; Tennessee and Ohio Valley, 7 to 13; Missouri Valley, 5 to 8; Upper Mississippi Valley, 6 to 11; Upper Lake region, 8 to 14; Lower Lake region, 8 to 13; Rocky Mountain stations, 0 to 13; California, 0; Oregon, 11.

*Cloudy days.*—The number of cloudy days reported during the month by voluntary observers and Army surgeons ranges about as follows: New England, 0 to 7; Middle Atlantic States, 0 to 16; South Atlantic States, 4 to 16; East Gulf States, 7 to 13; West Gulf States, 3 to 8; Tennessee and Ohio Valley, 1 to 9; Lower Missouri Valley, 0 to 7; Upper Mississippi Valley, 1 to 8; Lake region, 0 to 12; Rocky Mountain stations, 0 to 5; California, 0 to 4.

## RELATIVE HUMIDITY.

The average relative humidity for the month ranges about as follows: New England, 67 to 81; Middle Atlantic States, 67 to 81; South Atlantic States, 71 to 82; East Gulf States, 71 to 82; West Gulf States, 65 to 76; Tennessee and Ohio Valley, 66 to 78; Lower Missouri Valley, 65 to 69; Upper Mississippi Valley, 65 to 67; Upper Lakes, 61 to 74; Lower Lakes, 68 to 75; California, 43 to 71; Oregon, 48 to 76.

High stations not corrected for elevation report as follows: Pike's Peak, 61; Mount Washington, 72; North Platte, 53; Cheyenne, 42; Denver, 36; Santa Fé, 34; Salt Lake City, 31.

## WINDS.

*In general.*—The prevailing winds at signal-service stations are shown by arrows on chart No. II, from which it will be seen that the winds were northeasterly from Virginia; southeastward to Florida; east along the immediate East Gulf coast; south and southeast from Texas northward to Minnesota; south or southwest in the Lake region; southwest along the New England coast, and from southwest to southeast in the Middle Atlantic States.

*Total movements.*—The largest total movements have been as follows: Stockton, Tex., 15,789 miles; Pike's Peak, 13,471 miles; Cape Lookout, 11,648; Kittyhawk, 11,064; Cape Hatteras, 9,625; Cape Henry, 9,542; Tybee Island, 9,513; North Platte, 9,510; Dodge City, 9,064. The smallest movements have been as follows: Salt Lake City, 1,534; Lynchburg, 1,810; Visalia, 1,879; Nashville, 1,950; Indianapolis, 2,752; Cincinnati, 2,858; Knoxville, 2,971; Portland, Oreg., 2,852.

*The highest velocities*, in miles per hour, have been as follows: 3d, Mount Washington, N. W., 60; 7th, North Platte, W., 72, and Barnegat, E., 60; 8th, Dodge City, N. W., 50; 14th, La Crosse, N. W., 60; 16th and 21st, Pike's Peak, W., 56; 17th, Galveston, N. E., 60, and Indianola, S., 72; 18th, New Orleans, N. E., 39; 19th, Mobile, S. E., 35; 21st, Mount Washington, N. W., 72; 22d, Bismarck, N., 72, and Tybee Island, N. E., 60; 27th, Cape Lookout, S. E., 78; 28th, Cape Hatteras, N. E., 48, and Cape Lookout, S., 80; 29th, Cape Lookout, N. E., 86; 30th, Bismarck, ——, 72.

*Local storms, tornadoes, &c.*, have been reported as follows (unless specially noted, it is understood that the following list of high winds includes only local storms, and not such gales as prevailed simultaneously over a large region): 1st, Maysville, Ky., a tornado of terrific violence and short duration, unroofing buildings and damaging shipping to a considerable extent. 2d, Coleman City, Tex., violent storm, with heavy rain. 3d, Yuma, Ariz., terrific sand-storm, during which a large whirlwind passed up north side of Colorado River. 5th, heavy rain and wind-storm at New Orleans, doing considerable damage to shipping on north side of river. 11th, Coleman City, Tex., sand-storm, estimated velocity of wind 40 miles per hour. 12th, Colorado Desert, Cal., during a heavy thunder-storm between Pilot Knob and Cactus a water-spout burst, destroying 400 feet of railroad track. 14th, La Crosse Wis., northwest gale, doing damage to buildings.

## VERIFICATIONS.

*Indications.*—The detailed comparison of the tri-daily weather indications, with the telegraphic reports for the succeeding twenty-four hours, shows a general percentage of omissions of 0.4 per cent., and of verifications of 85.5 per cent. The percentages of verifications for the four elements have been: Weather, 88.6; wind, 83.7; temperature, 88.5; barometer, 81.0. The percentages of verifications by geographical districts have been: New England, 83.0; Middle Atlantic States, 85.5; South Atlantic States, 86.7; East Gulf States, 84.2; West Gulf States, 87.2; Lower Lake region, 86.2; Upper Lake region, 85.9; Tennessee and Ohio Valley, 83.1; Upper Mississippi Valley, 88.0; Lower Missouri Valley, 85.0. Of the 3,588 predictions that have been made, 116, or 3.1 per cent., are considered to have entirely failed; 109, or 3.0 per cent., were one-fourth verified; 422, or 11.8 per cent., were half verified; 444, or 12.4 per cent., were three-fourths verified; 2,497, or 69.6 per cent., were fully verified, so far as can be judged from our weather maps.

*Cautionary signals.*—During the past month 163 cautionary signals have been displayed at 47 stations on the Gulf and Atlantic coasts, and on the lakes, of which 94, or 58 per cent., were reported verified within 100 miles of the station. Thirty-one cases of high winds, where no signals were displayed, have also been reported from these stations.

## NAVIGATION.

*Stages of water in rivers.*—In the table, on Chart No. III, are given the highest and lowest readings on the river gauges for the month, from which it will be seen that the central Mississippi fell from the middle of the month steadily to the end, the fall at Saint Louis and Keokuk being about 4 feet. Similarly the Missouri also fell throughout the month by about 1 foot at Yankton and 2 feet 6 inches at Leavenworth. The water has been at some stations remarkably low.

*Low water*, detrimental to navigation, has been reported as follows: Mississippi, 16th, Keokuk, Iowa, river low, delaying light-draught boats. 22d, river still falling; canal closed. Reports of low water at Saint Louis and Alton. 30th, Shreveport, steady fall in river during month; navigation obstructed. Reports of low water also come in from the Ohio at Evansville and Louisville.

*Special phenomena.*—On the 21st, just before daybreak, a wave 2 feet high, similar to the earthquake waves in the Atlantic and Pacific Oceans, swept across Lake Saint Clair from west to east. On the 24th, at Marquette, Mich., between 10 a. m. and 3 p. m., the wind being light from the S. E., the water in the lake fell 15 inches.

## TEMPERATURE OF WATER.

*In general.*—The temperatures of water, as observed in rivers and harbors, are shown in the table on Chart No. III.

*Maximum and minimum temperatures.*—The highest maxima have been 90° at Galveston, 88° at Wilmington, 86° at Mobile and Augusta, 85° at Montgomery, 84° at Charleston and Savannah; and lowest minima have been, 45° at Duluth, 46° at Eastport, 55° at Portland, Me., 56° at Marquette, 58° at Alpena and Escanaba, 59° at San Francisco.

*Ranges of temperature.*—The least ranges have been: 2° at San Francisco; 3°, Eastport; 4°, Marquette; 6°, Portland, Me., Wood's Holl, New London, Buffalo, and La Crosse; and largest ranges have been 20°, Galveston and Wilmibgton; 21°, Duluth.

## ATMOSPHERIC ELECTRICITY.

*Thunder-storms* were reported at stations in the respective States as follows: 1st, Alabama, Nevada, Connecticut, Illinois, Kansas, Mississippi, Missouri, New Jersey, North Carolina, Pennsylvania, Texas, Virginia, West Virginia, Florida, Tennessee, Georgia, Indian Territory. 2d, Colorado, Wyoming, Florida, Michigan, Mississippi, New York, Texas, North Carolina. 3d, Dakota, Colorado, Kansas, Maine, New York, Texas, Louisiana, Arizona. 4th, Dakota, Colorado, Michigan, Mississippi, Texas, Wisconsin. 5th, New York, Colorado, Iowa, Maine, Mississippi, Nebraska, Texas, Vermont. 6th, Georgia, Iowa, Maine, Mississippi, New York, North Carolina, Texas, Washington Territory. 7th, Dakota, Wyoming, Florida, Iowa, Mississippi, South Carolina, North Carolina, Florida, Georgia, Minnesota. 8th, Colorado, Dakota, Kansas, Missouri, Nebraska, New Jersey, Texas, Indian Territory, Georgia. 9th, Georgia, Illinois, Mississippi, Missouri, Texas, Florida. 10th, Florida, Georgia, Indiana, Michigan, Mississippi, Ohio, Tennessee. 11th, California, Florida, Georgia, North Carolina, Pennsylvania, Texas, West Virginia, Arizona. 12th, Dakota, Wyoming, Maryland, Mississippi, Missouri, New Jersey, North Carolina, Ohio, Pennsylvania, Texas, Utah, Virginia, West Virginia, New York, Louisiana, District of Columbia. 13th, Dakota, Wyoming, Florida, Illinois, Kansas, Maryland, Mississippi, New Jersey, New York, North Carolina, Ohio, Texas, Virginia, West Virginia, South Carolina, Georgia, District of Columbia, Minnesota. 14th, Dakota, Illinois, Iowa, Kansas, Maryland, Mississippi, Missouri, Nebraska, North Carolina, West Virginia, Georgia, Wisconsin, Indian Territory, Texas. 15th, Dakota, Virginia, Illinois, Iowa, Kentucky, Maryland, Mississippi, North Carolina, Pennsylvania, Texas, South Carolina, Georgia, Indiana. 16th, Illinois, Indiana, Maine, Massachusetts, New York, Tennessee, Virginia, Kentucky. 17th, New York, Virginia, Indiana, Maine, Maryland, Mississippi, New Jersey, Ohio, Pennsylvania, Texas, Vermont, West Virginia, Indian Territory, District of Columbia. 18th, Iowa. 19th, Florida. 20th, New York, Georgia, South Carolina, North Carolina, Florida. 21st, Colorado, Maine, Massachusetts, New York, Georgia. 22d, Dakota, Georgia, Maine. 23d, Dakota, Nebraska, Colorado, Georgia. 24th, Nebraska, Iowa, Wisconsin, Michigan, Dakota, New Mexico. 25th, Texas, Illinois, Iowa, Kansas, Michigan, Missouri, Wisconsin, Indian Territory, Nebraska. 26th, Dakota, Iowa, New York, Maine, Michigan, Nebraska, Ohio, Pennsylvania, Vermont, Wisconsin, Missouri, Georgia, Texas. 27th, Connecticut, New York, Wisconsin, Tennessee, Michigan, Alabama.

28th, New York, Pennsylvania, Vermont, North Carolina, Michigan. 29th, Michigan, Wisconsin. 30th, Iowa, Nebraska, Wisconsin.

*Distant thunder and lightning* was reported from stations in the respective States as follows: 1st, Georgia, Kansas, Maryland, Massachusetts, New York, Pennsylvania, South Carolina, Indian Territory, Louisiana, Texas. 2d, Maryland, Massachusetts, North Carolina, Virginia, Georgia, Louisiana, Texas. 3d, Texas. 4th, Iowa, Nebraska, Wisconsin, Dakota, New Mexico, Minnesota. 5th, Maine, Massachusetts, Georgia, Texas. 6th, Georgia, Michigan, North Carolina, Louisiana, Dakota. 7th, Nebraska, South Carolina, Pennsylvania, Georgia. 8th, Maryland, Texas. 9th, Tennessee, Louisiana, Maine, Texas. 10th, North Carolina, Ohio, Texas, Indiana. 11th, North Carolina, Ohio, South Carolina, Georgia, Indian Territory, Texas. 12th, Maryland, North Carolina, South Carolina, Georgia, Iowa, Texas. 13th, Iowa, Nebraska, Ohio, Georgia, Dakota, Minnesota. 14th, Maryland, Virginia, Iowa, Indian Territory, Dakota. 15th, Tennessee, Wisconsin, Georgia. 16th, Illinois, Indiana, Kansas, Missouri, Tennessee, Ohio, Iowa, Indian Territory. 17th, Virginia, Ohio. 19th, Georgia. 20th, Utah. 23d, Florida. 24th, Wisconsin, Wyoming, Nebraska. 25th, Illinois, Iowa, Kansas, New York, Wisconsin, Vermont. 26th, Illinois, Iowa, Kansas, Wisconsin. 27th, Missouri, Georgia. 28th, Maryland. 30th, Illinois, Michigan, Wisconsin.

*Auroras* were observed as follows: 1st, Fort Pembina, Dak. 5th, Louisville, Ky. 7th, (?) Cambridge, Mass. 15th, Escanaba, Mich.; Clarksville, Tenn.; Gardiner, Me.; Rowe, Mass. 17th, Waltham, Mass.; Burlington, Vt. 18th, Rocky Run and Wautoma, Wis.; Portland and Bangor (very fine), Gardiner and Mechanics' Falls, Me.; Plattsburg, N. Y.; Contoocookville and Auburn, N. H.; Woodstock, Vt.; Boston, Mass. 19th, Cambridge, Mass. 21st, Wautoma, Wis. 30th, Starkey, N. Y.

*Ground currents.*—Disturbances on lines of telegraph have been reported as follows: 4th, Pike's Peak, Colo., and Concho, Tex. (during thunder-storms).

### OPTICAL PHENOMENA.

*Solar halos* were observed as follows: 1st, Texas, Kentucky, Indian Territory, Georgia 2d, Maine, Nebraska, Louisiana, New Mexico. 3d, Georgia, Iowa, Kentucky. 4th, Iowa, Ohio, Kentucky, Louisiana, Illinois. 5th, Connecticut, Massachusetts, New Hampshire, New York, Georgia, District of Columbia. 6th, Georgia. 8th, Illinois. 10th, Connecticut, Massachusetts, New Hampshire, New York, Rhode Island, Maine. 11th, Connecticut, Mississippi, New Hampshire, New York, Georgia, Missouri, Louisiana, Florida. 12th, Maine, Rhode Island, Connecticut. 13th, Illinois, Maine, Connecticut. 14th, Illinois, Ohio, Texas. 16th, Iowa, Wisconsin, Louisiana, Texas. 17th, New York, Louisiana. 18th, Florida, Virginia, Georgia, Kentucky. 19th, Connecticut, Indiana, Iowa, Maryland, New York, Ohio, Virginia, Wisconsin, Kentucky, New Jersey, Illinois. 20th, Kentucky, Ohio, Missouri. 22d, North Carolina. 23d, Nebraska, Ohio, Florida, Kansas. 24th, Missouri. 25th, Iowa. 26th, Connecticut, New Jersey, New York, Ohio, Virginia, Rhode Island, Kentucky. 27th, Connecticut, Massachusetts, Ohio, Vermont, Rhode Island, District of Columbia, Florida. 28th, New York. 29th, Florida, Georgia.

*Lunar halos.*—12th, Florida. 13th, Connecticut, Texas. 14th, Illinois, Missouri, Wisconsin, Maine. 15th, Mississippi, New Jersey, Missouri, Louisiana, Texas. 16th, Ohio, Minnesota, Tennessee, Louisiana, Texas, Alabama. 17th, Florida, North Carolina, Virginia, Georgia, Massachusetts, Missouri, Alabama, Minnesota. 18th, Florida, Indiana, Kentucky, Maryland, New Jersey, Pennsylvania, Virginia, West Virginia, Connecticut, Missouri, Wisconsin, Minnesota, North Carolina. 19th, Connecticut, Illinois, Indiana, Iowa, Maryland, Massachusetts, New Jersey, New York, Ohio, Pennsylvania, Virginia, Rhode Island, West Virginia, Kentucky, Missouri, Minnesota, Louisiana. 20th, Florida, Massachusetts, Rhode Island, North Carolina, Missouri, Wisconsin, Minnesota. 21st, Maryland, New Jersey, Connecticut, Missouri, Wisconsin, California. 22d, Maryland, Michigan, South Carolina, Missouri, Minnesota, North Carolina. 23d, Missouri, Connecticut, Minnesota, California. 24th, Minnesota, Ohio, Alabama, North Carolina. 25th, Indiana, Maine, Maryland, Ohio, Tennessee, West Virginia, Michigan, Alabama, Minnesota, Idaho, Kansas. 26th, Delaware, Indiana, Iowa, Maryland, Ohio, Pennsylvania, Utah, New York, West Virginia, Maine, Texas. 27th, Iowa, West Virginia, Virginia, Missouri, New Jersey, District of Columbia. 28th, Florida, New Jersey, Ohio.

*Mirage.*—Tybee Island, Ga., 2d, 3d, and 6th. New London, Conn., 5th, 9th, 10th, 19th, 22d, 23d, and 30th.

### MISCELLANEOUS PHENOMENA.

*Birds.—Ducks:* 3d. Large flocks reported on Lower Fraser River, British Columbia, fully six weeks earlier than usual; Fort Pembina, Dak., S., 22d; Clear Creek, Nebr., and Portland, Oreg., S., 15th; Saint Paul, Minn., S., 24th. *Wild geese:* Fort Randall, Dak., flying S., 18th, 20th; Fort Pembina, Dak., S. 24th; Sedgwick, Kans., S. W., 28th; New Bedford, Mass., S., 26th; Fall River, Mass., S. W., 23d; Corning, Mo., S., 15th and 26th to 30th, moving in various directions from river to corn-fields; Clear

Creek, Nebr., S., 19th; Geneva, Nebr., S., 11th; West Charlotte, Vt., S., 26th; Davenport, Iowa, S., 16th; Visalia, Cal., N., 16th; Bismarck, Dak., S., 14th. *Swallows:* Fall River, Mass., had departed 22d; Contoocookville, N. H., had left on the 2d; Auburn, N. H., 10th, and Starkey, N. Y., 16th. *Martins:* Melissa, Tex., had all disappeared 12th. *Blackbirds and robins:* Congregating before migration on the 18th, at Wappinger's Falls, N. Y. *Wild pigeons:* At Jacksonsburg, Ohio, S., 20th. *Whip-poor-wills:* Fayette, Miss., flying S., 2d, 15th, and 18th; Auburn, N. H., had departed 12th. *Pelicans:* Corning, Mo., appeared in large numbers 25th. *Blue Jays:* 24th, Sedgwick, Kans., flying S. *Blackbirds:* Clear Creek, Nebr., flying S., 8th. *Cat-birds:* Oregon, Mo., 7th. *Yellowbirds:* Oregon, Mo., 20th. *Cranes:* Genoa, Nebr., S., 17th; Wappinger's Falls, N. Y., were seen 2d; Oregon, Mo., S., 6th. *Heron:* Wappinger's Falls, N. Y., E., 27th. *Plover, quail, and partridge:* Wappinger's Falls, N. Y., were seen 2d to 8th. *Bluebirds:* Wappinger's Falls, N. Y., seen flying S. 16th.

*Insects.—Grasshoppers:* Tabor, Iowa, none this fall; 11th, becoming numerous at Starkey, N. Y. *Colorado beetles:* Mendon, Mass., abundant during month.

*Botanical.—Maize (Indian corn):* 5th, Guttenberg, large crop, now ripe; 30th, Oregon, Mo., maturing rapidly. *Buckwheat:* Ripe at Wappinger's Falls, N. Y., 18th. *Cotton:* Leaves being eaten by worms at Melissa, Tex., 22d; Clarksville, Tex., reports worms doing only little damage during early part of month. *Grass:* 30th, Oregon, Mo., immense crop of prairie-grass hay; great quantities of fodder. *Raspberries* ripe at West Charlotte, Vt., 22d.

*Polar bands.*—Gardiner, Me., 2d, 20th, and 23d; Tybee Island, Ga., 3d and 29th; Guttenberg, Iowa, 4th and 6th; Plattsmouth, Nebr., 7th; Wytheville, Va., 9th and 18th; Brookhaven, Miss., 10th; Freehold, N. J., 13th and 26th; Milwaukee, Wis., 14th; Auburn, N. H., 16th; Louisville and Danville, Ky., and Vineland, N. J., 19th; Woodstock, Vt., 20th.

*Sunsets.*—The characteristics of the sky, as indicative of approaching fair or foul weather, have been observed daily at sunset at all regular Signal Service stations. Reports from 105 stations show 76 blank or doubtful cases, and that out of the remaining 3,074 cases, 2,551, or 83.0 per cent., were followed by the expected weather.

*Forest fires.—Smoke* was reported as follows: Morgantown, W. Va., 21st; Detroit, Mich., 28th; Rochester, 7th, 27th, and 28th; Cuffalo, N.Y, 51st; Pittsburgh, Pa., 20th; Cheyenne, Wyo., 12th; Sacramento, Cal., 4th, 8th, 9th, 18th, 20th, 22d, 24th, 26th, 28th, and 29th; Milwaukee, Wis., 13th; Springfield, Mass., 24th and 25th; North Platte, Nebr., 24th. Forest fires of importance were reported: Denver, Colo., heavy fires in mountains, 27th, and 28th; Visalia, Cal., heavy fires in mountains, 17th, 18th, and 20th (fine whirlwind of cloud and smoke observed for 45 minutes). Prairie fires: Bracketsville, 1st, 2d, 3d, 4th, and 5th; Bismarck, Dak., 10th, 12th, and 22d to 29th; at several stations in Dakota, 2d, 6th, 7th, 8th, 11th, 13th, 21st, 27th, 28th, 29th, and 30th; Dodge City, Kans., 16th, 17th, 20th, 21st, 22d, 23d, and 24th.

*Meteors* were observed: 1st, Dubuque, Iowa. 3d, Visalia, Cal.; Boise City, Idaho. 5th, Savannah, Ga. 7th, Boise City, Idaho. 8th, Savannah, Ga. 10th, Dubuque, Iowa; Mount Washington, N. H. 13th, Yankton, Dak. 15th, Savannah, Ga. 16th, Bismarck, Dak. 19th, Indianapolis, Ind. 23d, Burlington, Vt. 26th, Stockton, Tex. 27th, Savannah, Ga. 28th, Bangor, Me. 29th, Eagle Pass, Tex, 7.20 p. m., in the N. altitude 30°; Visalia, Cal., 9.05 p. m., 30° N. of zenith. 30th, Yankton, Dak.; Davenport, Iowa.

*Zodiacal light* was observed at Monticello, Iowa, 1st, 10th, 12th, and 13th; Savannah, Ga., 2d, 3d, 5th, 6th, 8th, 9th, 26th, and 27th; Cambridge, Mass., 30th.

*Earthquakes.*—1st, Maryland: Catonsville, about 11 p. m.; also at Sandy Springs, at 10.45 p. m.; Brookville, Laurel, and other points in Prince George's County, 20th or 21st. Yuma, Ariz., 7th, 10 p. m. 19th, Los Angelos, Cal., 4th, 2 p. m. 10th, a shock, resembling that of an earthquake, was distinctly felt at the following places: In New Jersey at Trenton, Hamilton Square, Allentown, Bordentown, Chester, Burlington, Wrightstown, Pemberton, Mount Holly, Beverly, Riverton; and in Pennsylvania at Bristol, Torresdale, Bustleton, Germantown, Abington, Mount Airy, Manayunk, Ashbourne, and Roxburgh. Nearly all report the time as 9.59 a. m., the shock lasting from 30 to 40 seconds, and having an apparent southwest or southeast direction. Hulmeville, Pa., reports shock lasting 5 to 7 seconds from W. to E. It was accompanied by a rumbling noise like moderate thunder, its intensity gradually increasing, and ranging from a gentle tremor to a force making windows rattle and shaking fruit from trees. The track of country over which it was felt extended from a little north of Trenton to Philadelphia, or about 35 miles long by about 20 miles wide; its longitudinal axis corresponding with its apparent track. Possibly this phenomenon was due to a passing meteor. 29th, Campo, Cal., at 2.30 p. m., shock lasting 5 seconds, accompanied by low rumbling. Advices from Callao, September 1, and Valparaiso, August 18, report earthquake shocks being continuously felt in some of the southern ports. Shocks of an alarming nature were felt, August 23, at Cobija, Bolivia, at 1.40 p. m., and at Iquique at 5 p. m., and a few days earlier at Copiapo, Chili.

*Volcanic eruptions.*—Advices from Kilauea, Hawaii, state that the crater, during the first weeks of September, was very active and brilliant. On the 10th the Old South Lake was about 1,000 feet in length and 600 feet wide, boiling and spouting.

SOLAR PHENOMENA.

*Sun spots.*—The following observations, made by Mr. D. P. Todd, upon the spots of the sun, have been kindly communicated by Rear-Admiral John Rodgers, U. S. N., Superintendent of the Naval Observatory:

| September, 1877. | No. of new— | | Disappeared by solar rotation. | | Reappeared by solar rotation. | | Total number visible. | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| | Groups. | Spots. | Groups. | Spots. | Groups. | Spots. | Groups. | Spots. | |
| 1— 5 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Brilliant faculæ. |
| 2— 5 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 3— 6 p. m. | 1 | 2 | 0 | 0 | 1 | 2 | 1 | 2 | |
| 4— 8 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | |
| 4— 4 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | |
| 8— 6 p. m. | 0 | 4 | 0 | 0 | 0 | 0 | 1 | 6 | |
| 9— 4 p. m. | 0 | 3 | 0 | 0 | 0 | 0 | 1 | 9 | |
| 12— 6 p. m. | 1 | 1 | 0 | 2 | 1 | 1 | 2 | 6 | |
| 15—11 a. m. | 1 | 4 | 1 | 5 | 1 | 2 | 2 | 5 | |
| 16— 3 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | |
| 17—11 a. m. | 0 | 7 | 0 | 0 | 0 | 0 | 2 | 12 | |
| 19— 3 p. m. | 0 | 6 | 0 | 0 | 0 | 0 | 2 | 18 | Many of the spots small. |
| 21—11 a. m. | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 6 | |
| 22—10 a. m. | 1 | 4 | 0 | 0 | 0 | 0 | 2 | 10 | Spots all faint. |
| 24—11 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Large group of faculæ. |
| 25—11 a. m. | 2 | 3 | 0 | 0 | 1 | 2 | 2 | 3 | Faculæ large and bright. |
| 26—11 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | |
| 27— 3 p. m. | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 2 | |
| 29—noon | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | |
| 30— 3 p. m. | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | |

NOTES AND EXTRACTS.

In the "Zeitschrift für Meteorologie," XII, page 312, Dr. J. Hann gives a very clear elucidation of recent progress in our knowledge of the origin of cyclones, and establishes the following conclusions:

"Certain atmospheric conditions must prevail over a large part of the earth's surface before an extensive whirlwind or cyclone can be formed; conditions which must favor an inflow of air from opposite sides toward a place of diminished atmospheric pressure (an extensive though slight barometric depression), and favor a rotary movement. Such conditions often exist in the bay of Bengal at the time of changes of the monsoons, and, in winter, over the North Atlantic Ocean, where, by reason of the general distribution of pressure, the atmosphere has a tendency to a cyclonic movement. An extended, though perhaps slight barometric depression is of itself formed between two areas of high pressure, and as a consequence of the tendency of the air to cyclonic movement. A relatively high temperature and saturation of the air with aqueous vapor can also cause a gradual diminution of atmospheric pressure, which (when the distribution of pressure over a large area favors a convergence of the air from all sides) can give occasion for the formation of a cyclone. The introduction of a sufficient condensation of vapor seems to favor the formation of the whirl, but especially to favor its continuance, and perhaps also its progressive motion, in that it allows an easy upward flow of the air that is streaming in from all sides toward a central space, because it materially increases its ascensional power. But the precipitations in the central portions of cyclones are not their especial cause (even if these latter are, particularly over the sea, constantly accompanied thereby), because the ascent of air cannot take place, except in very rare cases, without a partial condensation of its aqueous vapor.

"The reason why slight differences of pressure give occasion to storms of hurricane violence so soon as an opportunity is offered for the formation of a whirl, is found in the concentration of the living force of a great mass of air set in motion about the axis of the whirlwind. The greater the area over which the air is set in motion, so much greater is the sum total of the living force in the central part of the storm-area; but the growth of this area finds a regulator in the development of the centrifugal force and in the deviation due to the earth's rotation, both of which divert a portion of the actual energy into the potential energy of a steeper gradient.

"The pre-existing opposing winds affect the formation of a cyclone only in this, that they give the impulse toward a cyclonic movement, but their intensity has little or no importance. In conclusion, a few remarks upon the rôle which is played in atmos-

pheric phenomena by the heat of condensation of aqueous vapor: This seems frequently to give occasion to misunderstandings. It is not correct to speak of 'the disengagement of vast quantities of heat into the air.' Nor is it proper to say 'an unknown portion of the heat given off during the process of condensation is undoubtedly radiated off into space. Some portions of it must, however, be absorbed by the surrounding air.' The latent heat of the condensed vapor is by the ascent of the moist air immediately converted into the work of expansion; there is no increase of temperature, neither in the ascending air nor in its neighborhood. The apparent increase of temperature is explained by the fact that ascending moist air cools more slowly than dry air. After the condensation of its vapor the air must, of necessity, be cooler than before. The part which the latent heat of condensation plays consists simply in the diminution of the rate of cooling. Ascending moist air can thus retain up to much higher elevations an excess of temperature above that of its surroundings, which excess retains for it its ascensional power, and increases the intensity of the ascending current."

Published by order of the Secretary of War.

ALBERT J. MYER,
*Brig. Gen. (Brevet Assigned), Chief Signal-Officer U. S. A.*

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PAPER 31.

## MONTHLY WEATHER REVIEW, OCTOBER, 1877.

### INTRODUCTION.

The present review for the month of October depends upon official data received up to the 14th of November from the Canadian meteorological office; the United States Navy; the Army post surgeons; the volunteer and regular observers of the United States Signal Service. The most interesting features of the month have been, first, the severe storms Nos. I and VII; second, the general excess of rain-fall, especially in the Gulf States; third, the continuation of high temperatures and low pressures, except in Canada; fourth, the very low water in the Upper Ohio and Mississippi; fifth, the heavy snows and early winter at Pike's Peak and other high stations in the Rocky Mountains; sixth, infrequency of thunder and lightning and auroras; seventh, the absence of frosts and the remarkably mild autumn weather, allowing second crops to ripen in some localities; eighth, almost entire absence of solar spots.

### BAROMETRIC PRESSURE.

*In general.*—The general distribution of atmospheric pressure for the month is shown by the isobars on map No. II, from which it appears that the area of highest pressure, or that included within the isobar of 30.05, covers the Middle and South Atlantic and interior of the Gulf States, and the area of lowest pressure is in the extreme Northwest. In the Octobers of 1873, 1874, 1875, and 1876, the highest mean pressure existed in the Lower Mississippi Valley, but for October of this year it is found extending over Eastern Tennessee and the Carolinas. On the average the pressures are below the normal in all sections, except in Canada and the northern portions of the Lake region and New England.

*Barometric ranges.*—The general range of pressure (as reduced to sea-level) is shown by the following table, which gives the highest and lowest pressures at the centers of high and low areas, and from which it appears that for the whole country a range of 1.42 inches has been recorded:

LOW AREAS.

| No. | Location. | Date. | Minimum pressure. |
|---|---|---|---|
| I | Saint Lawrence Valley | October 1, 7.35 a. m | 29.73 |
| II | Northern Florida | October 3, 7.35 a. m | 29.19 |
| III | Canada | October 4, 7.35 a. m | 29.35 |
| IV | Lake Huron | October 8, 4.35 p. m | 29.63 |
| V | Lake Huron | October 10, 4.35 p. m | 29.66 |
| VI | Kansas | October 12, 4.35 p. m | 29.50 |
| VII | Cape Breton | October 22, 11 p. m | 29.31 |
| VIII | Dakota | October 23, 4.35 p. m | 29.44 |
| IX | Dakota | October 25, 4.35 p. m | 29.81 |
| X | North Carolina coast | October 26, 11 p. m | 29.61 |
| XI | Saint Lawrence Valley | October 29, 4.35 p. m | 29.32 |
| XII | Canada | October 31, 7.35 a. m | 29.65 |

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No. 1.
WAR DEPARTMENT WEATHER MAP.
SIGNAL SERVICE, U. S. ARMY.
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.
TRACKS OF CENTRES OF AREAS OF LOW BAROMETER FOR OCTOBER, 1877.
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.
AVERAGE PROGRESS OF AREAS OF LOW BAROMETER EAST OF THE 100TH MERIDIAN.
No. | Velocity.
I. | †11 miles per hour.
| ‡7 do.
*II | — do.
III. | 30 do.
IV. | 25 do.
V. | 14 do.
VI. | 18 do.
VII. | 16 do.
VIII. | 20 do.
IX. | 8 do.
*X. | — do.
XI. | 40 do.
* Too uncertain to be computed.
(† Whole course.)
(‡ From 28th to 3d. 7:35 a. m.)
and order of areas of low barometer. The figures above the lines show the days of the month; those below, 1, 2 and 3, indicate respectively the 7:35 A. M., the 4:35 P. M., and 11 P. M. observations. The small circles on the lines indicate the position of the centre of the area of low barometer on the day and report, written respectively above and below the line.
Long. West from Greenwich
San Francisco
Salt Lake City
Cheyenne
Virginia City
Ft. Benton
St. Paul
La Crosse
Milwaukee
Chicago
Davenport
Keokuk
St. Louis
Cairo
Nashville
Memphis
Vicksburg
Shreveport
New Orleans
Mobile
Galveston
Indianola
Brownsville
Montgomery
Atlanta
Augusta
Charleston
Savannah
Jacksonville
Punta Rassa
Key West
Havana
Norfolk
Kittyhawk
Cape Hatteras
Wilmington
Pittsburg
Cleveland
Toledo
Detroit
Buffalo
Rochester
Oswego
Kingston
Montreal
Quebec
Portland
Boston
New London
Marquette
Escanaba
Pike's Peak
Santa Fe
Ft. Gibson
Ft. Sill
Denison
Corsicana
Omaha
Yankton
Ft. Sully
Bismarck
Halifax
Chatham
C. Rozier
San Diego
S. DOMINGO

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**AVERAGE TEMPERATURES FOR OCTOBER.**

| DISTRICTS. | Average for October. Signal Service Observations. For several years. | Average for October. Signal Service Observations. For 1877. | Comparison of October, 1877, with the average for several years. |
|---|---|---|---|
| St. Lawrence valley | 44°.5 | 45°.0 | 0°.5 above. |
| New England | 50 .0 | 51 .4 | 1°.4 above. |
| Middle Atlantic States | 55 .6 | 59 .7 | 4°.1 above. |
| South Atlantic States | 64 .4 | 67 .8 | 3°.4 above. |
| Gulf States | 67 .1 | 68 .9 | 1°.8 above. |
| Lower Lake region | 47 .9 | 52 .5 | 4°.6 above. |
| Upper Lake region | 44 .9 | 48 .7 | 3°.8 above. |
| Ohio valley and Tennessee | 55 .7 | 60 .0 | 4°.3 above. |
| Upper Mississippi valley | 50 .1 | 52 .8 | 2°.7 above. |
| Lower Missouri valley | 54 .5 | 55 .1 | 0°.6 above. |
| Upper Missouri valley | 45 .7 | 44 .5 | 1°.2 below. |
| Minnesota | 42 .1 | 43 .5 | 1°.4 above. |
| Rocky Mountains stations | 45 .0 | 40 .0 | 5°.0 below. |
| Pacific Coast | 59 .6 | 58 .4 | 1°.2 below. |

**TEMPERATURES OF WATER FOR OCTOBER, 1877.**

| STATIONS. | Temperatures at bottom. Maximum. | Temperatures at bottom. Minimum. | Average depth of water. Feet. |
|---|---|---|---|
| Alpena | 64° | 44° | 14 |
| Augusta | 75 | 67 | 6 |
| Baltimore | 73 | 61 | 11 |
| Buffalo | 69 | 53 | 12 |
| Cairo | 76 | 61 | 24 |
| Charleston | 75 | 70 | 40 |
| Chicago | 65 | 49 | 10 |
| Cleveland | 70 | 45 | 14 |
| Cincinnati | 74 | 58 | 14 |
| Detroit | 69 | 51 | 22 |
| Duluth | 57 | 45 | 12 |
| Eastport | 50 | 46 | 20 |
| Escanaba | 60 | 47 | 15 |
| Galveston | 84 | 64 | 8 |
| Grand Haven | 70 | 50 | 19 |
| Jacksonville | 74 | 69 | 12 |
| Keokuk | 75 | 61 | 2½ |
| Key West | 84 | 81 | 17 |
| La Crosse | 66 | 45 | 2 |
| Louisville | 73 | 59 | 3 |
| Memphis | 75 | 60 | 20 |
| Marquette | 59 | 49 | 15 |
| Milwaukee | — | — | — |
| Mobile | 73 | 68 | 15 |
| Montgomery | 75 | 63 | 3 |
| Nashville | 77 | 62 | 11½ |
| New London | 66 | 56 | 12 |
| New York | 66 | 49 | 17 |
| Norfolk | 67 | 58.5 | 24 |
| Omaha | 66 | 46 | 10 |
| Pittsburgh | 70 | 55 | 7 |
| Portland, Maine | 57 | 47.5 | 26 |
| Punta Rassa | — | — | — |
| San Francisco | 61 | 58 | 20 |
| Sandusky | 70 | 53 | 10 |
| St. Louis | 74 | 54 | 8 |
| St. Marks | 76 | 66 | 17 |
| St. Paul | 62 | 48 | 2 |
| Savannah | 74 | 69 | 10 |
| Shreveport | 83 | 65 | 14 |
| Toledo | 72 | 54 | 12 |
| Wilmington | 68 | 63 | 15 |
| Wood's Holl | 67 | 55 | 8 |
| Yankton | 62 | 48 | 5 |

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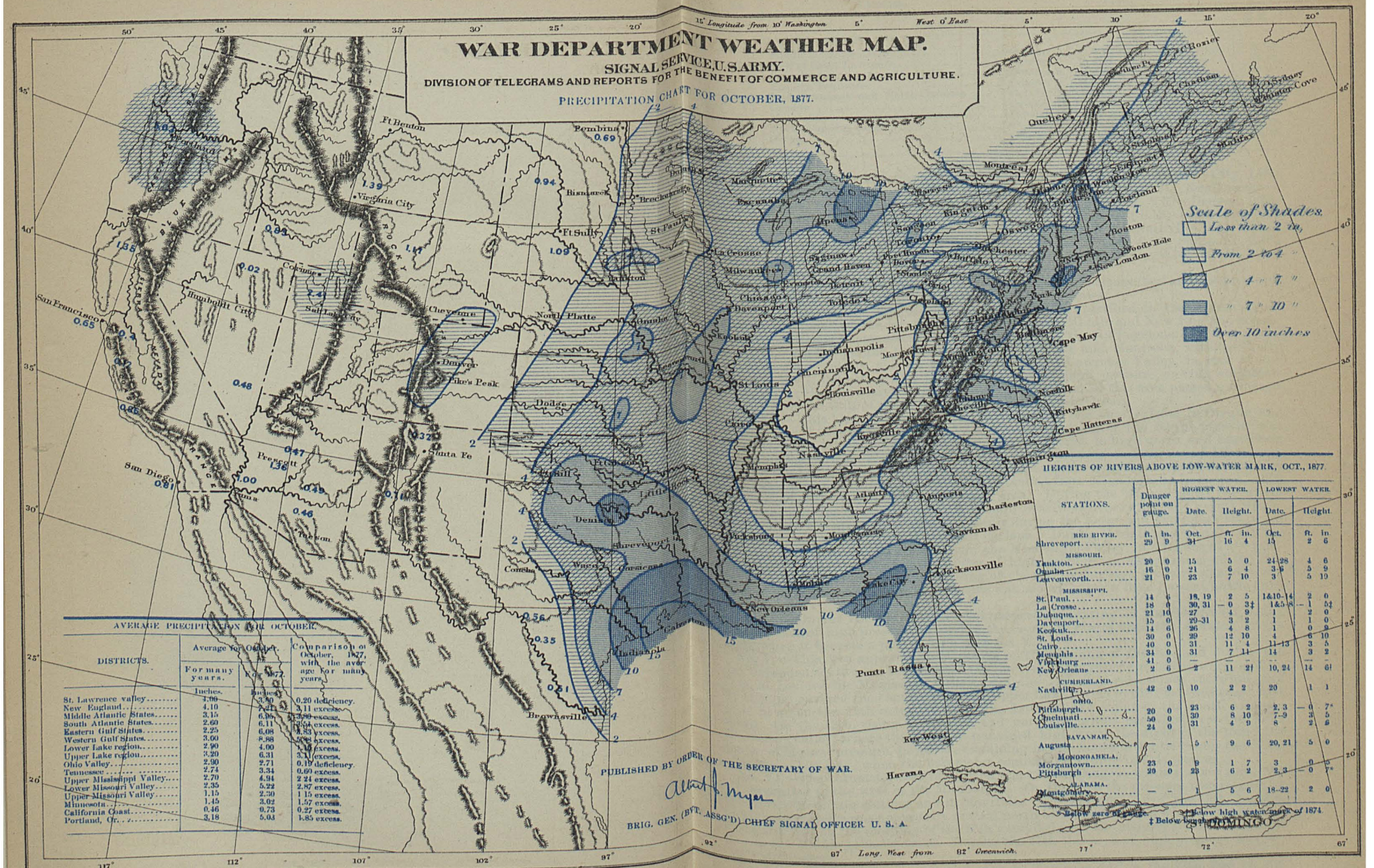
# WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U.S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

PRECIPITATION CHART FOR OCTOBER, 1877.




## AVERAGE PRECIPITATION FOR OCTOBER.

| DISTRICTS. | Average for October. For many years. | Average for October. For 1877. | Comparison of October, 1877, with the average for many years. |
|---|---|---|---|
| | Inches. | Inches. | |
| St. Lawrence valley | 3.00 | 2.80 | 0.20 deficiency. |
| New England | 4.10 | 7.21 | 3.11 excess. |
| Middle Atlantic States | 3.15 | 6.95 | 3.80 excess. |
| South Atlantic States | 2.60 | 6.11 | 3.51 excess. |
| Eastern Gulf States | 2.25 | 6.08 | 3.83 excess. |
| Western Gulf States | 3.00 | 8.88 | 5.88 excess. |
| Lower Lake region | 2.90 | 4.00 | 1.10 excess. |
| Upper Lake region | 3.20 | 6.31 | 3.11 excess. |
| Ohio Valley | 2.90 | 2.71 | 0.19 deficiency. |
| Tennessee | 2.74 | 3.34 | 0.60 excess. |
| Upper Mississippi Valley | 2.70 | 4.94 | 2.24 excess. |
| Lower Missouri Valley | 2.35 | 5.22 | 2.87 excess. |
| Upper Missouri Valley | 1.15 | 2.30 | 1.15 excess. |
| Minnesota | 1.45 | 3.02 | 1.57 excess. |
| California Coast | 0.46 | 0.73 | 0.27 excess. |
| Portland, Or. | 3.18 | 5.03 | 1.85 excess. |

## HEIGHTS OF RIVERS ABOVE LOW-WATER MARK, OCT., 1877.

| STATIONS. | Danger point on gauge. | Highest water. Date. | Highest water. Height. | Lowest water. Date. | Lowest water. Height. |
|---|---|---|---|---|---|
| | ft. in. | Oct. | ft. in. | Oct. | ft. in. |
| RED RIVER. | | | | | |
| Shreveport | 29 9 | 31 | 16 4 | 15 | 2 6 |
| MISSOURI. | | | | | |
| Yankton | 20 0 | 15 | 5 0 | 24-28 | 4 6 |
| Omaha | 16 0 | 21 | 6 4 | 3-6 | 5 9 |
| Leavenworth | 21 0 | 23 | 7 10 | 3 | 5 10 |
| MISSISSIPPI. | | | | | |
| St. Paul | 14 0 | 18, 19 | 2 5 | 14&10-14 | 2 0 |
| La Crosse | 18 0 | 30, 31 | — 0 3‡ | 1&5-8 | — 1 5‡ |
| Dubuque | 21 10 | 27 | 4 9 | 1 | 2 0 |
| Davenport | 15 0 | 29-31 | 3 2 | 1 | 1 0 |
| Keokuk | 14 6 | 26 | 4 8 | 1 | 0 8 |
| St. Louis | 30 0 | 29 | 12 10 | 4 | 6 10 |
| Cairo | 40 0 | 31 | 11 4 | 11-13 | 3 5 |
| Memphis | 34 0 | 31 | 7 11 | 14 | 3 2 |
| Vicksburg | 41 0 | — | — | — | — |
| New Orleans | 2 6 | 2 | 11 2‡ | 10, 24 | 14 6‡ |
| CUMBERLAND. | | | | | |
| Nashville | 42 0 | 10 | 2 2 | 20 | 1 1 |
| OHIO. | | | | | |
| Pittsburgh | 20 0 | 23 | 6 2 | 2, 3 | — 0 7* |
| Cincinnati | 50 0 | 30 | 8 10 | 7-9 | 3 5 |
| Louisville | 24 0 | 31 | 4 9 | 8 | 2 6 |
| SAVANNAH. | | | | | |
| Augusta | — — | 5 | 9 6 | 20, 21 | 5 0 |
| MONONGAHELA. | | | | | |
| Morgantown | 23 0 | 9 | 1 7 | 3 | 0 5 |
| Pittsburgh | 20 0 | 23 | 6 2 | 2, 3 | — 0 7* |
| ALABAMA. | | | | | |
| Montgomery | — — | 1 | 5 6 | 18–22 | 2 6 |

* Below zero of gauge. † Below high water mark of 1874. ‡ Below low water mark of 1874.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER U. S. A.

DIGITIZED BY MIMNGO

HIGH AREAS.

| No. | Location. | Date. | Maximum pressure. |
|---|---|---|---|
| I | Middle Atlantic coast | October 1, 7.35 a. m | 30.25 |
| II | Gulf of Saint Lawrence | October 3, 7.35 a. m | 30.27 |
| III | Cape Breton | October 9, 7.35 a. m | 30.61 |
| IV | Eastern Tennessee | October 9, 7.35 a. m | 30.24 |
| V | East Tennessee and North Carolina | October 15, 7.35 a. m | 30.40 |
| VI | Canada | October 17, 7.35 a. m | 30.32 |
| VII | Manitoba | October 19, 7.35 a. m | 30.58 |
| VIII | North Carolina coast | October 20, 7.35 a. m | 30.28 |
| IX | Oregon | October 29, 7.35 a. m | 30.48 |

*The local barometric ranges* have been as follows: *Large ranges*—Atlantic City, 1.22; Barnegat, 1.23; Bismarck, 1.27; Fort Whipple, 1.25; Washington, 1.21. *Small ranges*—Brackettville, 0.65; Cheyenne, 0.52; Corsicana, 0.70; Denison, 0.69; Denver, 0.59; Eagle Pass, 0.65; Fort Gibson, 0.67; Fort Sill, 0.69; Galveston, 0.52; Indianola, 0.53; Key West, 0.35; La Crosse, 0.69; Memphis, 0.65; Mason, 0.65; Nashville, 0.70; Pike's Peak, 0.63; Red Bluff, 0.36; Saint Paul, 0.68; Salt Lake City, 0.50; Santa Fé, 0.48; Shreveport, 0.61; Sacramento, 0.33; San Antonio, 0.53; Vicksburg, 0.70; Visalia, 0.36; Winnemucca, 0.45.

*Areas of high pressure* have been more numerous than in September, and the pressures somewhat higher. In detail they have occurred as follows:

No. I.—This was the area of high pressure No. IV, described in the September review, and existed on the 1st of the month along the Middle and New England coasts, before the pressure commenced falling in advance of the Gulf cyclone.

No. II.—On the 1st the pressure rose in Minnesota and Manitoba, with northerly winds veering easterly, and on the 2d, in the Saint Lawrence Valley, in rear of low pressure No. I, indicating that there was an area of high pressure moving southeastwardly over Hudson's Bay Territory; during the 2d and 3d this area passed southeastwardly over the Gulf of Saint Lawrence to the Atlantic Ocean.

No. III.—This high-pressure area is probably the one that existed in Oregon and Washington Territory on the 2d and 3d. On the morning of the 3d the pressure was quite high in Idaho and Utah, and during the day brisk to high north and northwest winds prevailed from Wyoming and Kansas northeastward to Dakota and Minnesota. During the latter part of the 3d and early part of the 4th, this area passed rapidly down the Missouri Valley, and by night extended from Minnesota to Louisiana, with diminished central pressure but increased area. During the 5th and until the morning of the 6th, the center appeared to remain nearly stationary in the Central Mississippi Valley, the pressure increasing rapidly during the night and extending eastward to the Atlantic coast in rear of the Gulf cyclone. During the latter part of the 6th the pressure commenced falling throughout the Mississippi Valley, in advance of low pressure No. IV, thus transferring the center of high pressure, on the morning of the 7th, to the Atlantic States. On the morning of the 8th the highest pressure was over the Gulf of Saint Lawrence, and its influence was not withdrawn from Lower Canada until the 11th.

No. IV.—On the 7th the pressure commenced increasing in the Southwest, and a distinct area of high pressure existed in the Southern States until the morning of the 10th, when it became a part of high area No. V.

No. V.—This area appeared in Manitoba on the morning of the 9th, and during the day extended southward to Kansas. On the 10th it progressed southeastward, and by 11 p. m. covered the Mississippi Valley. On the 11th it moved slowly eastward, and by 11 p. m. covered the country from the Upper Lake region to the East Gulf coast, and at 11 p. m. of the 12th extended from the Lower Lake region to the South Atlantic coast. On the 13th, rising barometer and northerly winds prevailed over the Saint Lawrence Valley, where the pressure remained high until the night of the 15th; the center of highest pressure, however, remaining in the South Atlantic States until the morning of the 16th, when the barometer commenced falling in this section.

No. VI.—The barometer rose rapidly on the 13th in Oregon, while the low area, No. VI, prevailed to the west of the Mississippi. On the 15th the pressure rose rapidly at the Rocky Mountain stations and in Manitoba. On the morning of the 16th the area of highest pressure was apparently central north of Lake Superior, whence it extended eastward, and on the morning of the 17th extended over the country from Saint James' Bay to the Middle Atlantic coast. During the 17th this area of high pressure was entirely dissipated.

No. VII.—The barometer continued high in Manitoba during the 17th, and on the

18th began rising rapidly, with northerly winds and clear weather. The pressure was highest in Manitoba on the 19th, at 7.35 a. m., and the central high area moved slowly southeastward, reaching Iowa on the morning of the 21st, at which time the center of low barometer No. VII was in West Virginia. The area of high pressure now moved southward to the Gulf coast, where light "northers" prevailed on the 21st and 22d. The central highest pressure was in Texas on the 22d, at 7.35 a. m.; in Tenessee on the 23d, 7.35 a. m.; in South Carolina on the 24th, 7.35 a. m.; and off the South Atlantic coast on the morning of the 25th.

No. VIII.—On the 25th an area of rising barometer extended southward, giving rise to cold northeast winds, cloudy and rainy weather over the Lake region and Saint Lawrence Valley. On the 26th, at 7.35 a. m., the highest pressure was central, with cold, clear weather in the Saint Lawrence Valley, whence it extended southeastward over New England in rear of low area No. X, which was then off the North Carolina coast. The pressure subsequently rose in the South Atlantic States more rapidly than in New England, and on the 28th, at 7.35 a. m., was highest in North Carolina, where it remained until the 30th.

No. IX.—The pressure rose on the 27th in Oregon, while low No. XI was in the Missouri Valley, and a general depression, as shown by the deviations from normal values, prevailed from the Sierra Nevada Mountains eastward to the Alleghanies. This depression was followed by a rapid rise in the British Possessions, and on the 29th, at 7.35 a. m., an area of high pressure was central in the Lower Missouri Valley, whence it extended slowly southeastward, while the central highest pressure moved southward over the West Gulf States.

*Areas of low pressure in general.*—During the month of October twelve areas of low pressure existed within the limits of our stations, eleven of which followed the courses shown by the tracks on Chart No. II. Seven of these originated or first appeared in the region between the Rocky Mountains and the Mississippi Valley; three of which traveled eastward to the Atlantic, and three others, after moving southward to the Mississippi Valley, moved northeastward into Canada. Two (Nos. VII and X) possibly originated in the Southwest and moved northeastward. No. I was the Gulf cyclone. Three of them (Nos. I, VII, and X) were accompanied by heavy rains, and two (Nos. I and VII) by hurricane winds.

*Areas of low pressure.*—No. I.—From information subsequently received it appears that the hurricane mentioned in the September review as occurring at St. Vincent and Grenada on September 21, and the cyclone of the 27th in the Caribbean Sea, relate to the same storm, whose track was about, approximately, as follows: On the 21st it passed over or near to Barbadoes, St. Vincent, and Grenada; on the midnight of the 22–23d it is reported to have passed about 250 miles south of Porto Rico; on the 23d it passed over Buen Ayre and Curaçoa. The report of the United States consul at the latter place states that the damage to property is estimated at $2,000,000, and that the loss of life was undoubtedly large. In the city of Curaçoa the most solid buildings were swept down by the waves, and throughout the island planters suffered largely. Much damage to shipping is also reported. On the 25th the bark Herald was wrecked at the mouth of Milk River, Jamaica, in a southwest hurricane, at which time the vortex was probably 200 miles distant in a SSW. direction. On September 27 and 28 schooner Alice Vane, at Hog Island, on the coast of Honduras, experienced a hurricane, at which time the vortex was probably passing northwestward about midway between the Honduras coast and the west end of Cuba. (Two reports by the schooners Wm. R. Knighton and Wm. Thompson, of hurricanes experienced by them on the 23d, while they were in harbor, respectively, at Roatan and Bonacco, must refer, if there be no mistake, to a previous hurricane, possibly that numbered XI in the September review.) The present cyclone was encountered by the schooner Wm. Fisher on the 28th, while off Cape San Antonio, Cuba, the wind being from SSE.; she continued within the area of hurricane winds and completely in the power of the storm until the 4th of October, when she was stranded on Anclote Keys, latitude 28°, coast of Florida, by which time, as the track on Chart No. I shows, the center of lowest pressure had passed northward to Chesapeake Bay. On the 2d, at 11 p. m., the vortex of the storm struck the coast of Florida, near Saint Mark's, whence it follows that its progress from the 28th to the 2d had been very slow. Other reports of the storm have been received as follows: The steamship San Antonio, September 29, 200 miles south of New Orleans, reports a northeast hurricane in the evening, and by the evening of the 30th wind had veered to east, but during the whole of October 1 again experienced a northeast hurricane; on October 2, 3 a. m., being about 150 miles south of New Orleans, the wind backed to a violent hurricane from the northwest; the lowest barometer, 29.15, occurred about 5 a. m. Steamship S. B. Souder, September 30, about 20 miles north of Tortugas, reports barometer falling during the day, with a high southeast wind, apparently in the northeast section of a cyclone moving northwestward. Schooner Sarah Hall, from Pensacola, September 26, for Egmont Key Light, reports at noon, September 30, latitude 27° 37′ N., longitude 84° 17′ W., expecting hurricane; at 6 p. m., hurricane commenced, wind ENE., with heavy rain, and

continued until 4 a. m., October 1, when wind moderated; at noon of the same day, latitude 27° 32′ N., longitude 84° 3′ W., and at 5 p. m., terrific hurricane from south, continuing until October 3, noon, latitude 29° 22′ N., longitude 85° 14′ W. Steamship Cochrane (Cedar Key, October 1, for Key West) reports, October 2 to 4, between Egmont Keys and Anclote Keys, heavy SW. cyclone; lowest barometer 29.68. Schooner Georgietta reports struck a cyclone October 1, latitude 26° 30′ N., longitude 84° W., off Egmont Key Light, wind ENE., gradually veering to WSW., blowing heavily until midnight of the 3d. During the 1st and 2d the observations at the Signal-Service stations along the Gulf coast gave decided indications of the approaching cyclone, cloudy, threatening, and rainy weather prevailing in the East Gulf and South Atlantic States, with brisk easterly winds veering to south and southwest in Southern Florida; east and northeast winds from Northern Florida to North Carolina, and northeast and north winds in Alabama and Mississippi. The Signal-Service observer at Saint Mark's reports gale set in at 9.30 p. m. of the 2d, wind SE., heavy rain since morning. At 2 a. m., 3d, the tide rose above the level of the rain-gauge, up to which time over seven inches of rain had fallen since the morning of the 1st. The wind reached a velocity of 66 miles per hour at 5.15 a. m., of the 3d, and the tide rose 12 feet above the mean; considerable damage was done throughout the adjacent country. Barometric readings were taken every fifteen minutes by the observer at Saint Mark's, and show a gradual decline until 6.15 a. m., of the 3d, when the barometer read 29.17, the lowest reading recorded, wind SE.; after this the barometer gradually rose, the wind veering to SW. At Jacksonville, Fla., on the 2d, the tide rose higher than it had been since the flood of 1871. During the 3d the storm passed northeastward over Georgia, the barometer reading 29.35 at 11 p. m., at Augusta, light rain and a calm prevailing. Heavy freshets were reported along the Altamaha and Savannah Rivers, doing considerable damage to rice and cotton crops. Thence, during the night of the 3d and morning of the 4th, it passed over the Carolinas and Virginia, southeast gales prevailing along the coast, during which the steamship Magnolia foundered off Cape Hatteras; the storm is reported as being terrific in the vicinity of Albemarle Sound, the attending floods carrying away all bridges and wharves, and seriously damaging crops there and along the James River. During the afternoon of the 4th it passed centrally northeastward across Chesapeake and Delaware Bays, where several wrecks occurred. Bark Arcturus, off Delaware Breakwater, on the 4th, reports SE. gale, veering at 8 p. m. to NNW. hurricane. From Maryland to Connecticut the rain-fall was specially severe, and very serious damage was done throughout this section of the country. In Southeastern Pennsylvania, Northern New Jersey, and along the Hudson River, passenger trains were wrecked by washouts, resulting in great loss of life and damage to property. On Long Island and in the Sound the storm was also very severe, several wrecks occurring, among which may be mentioned the steamer Massachusetts, which went ashore shortly after midnight, on the 4th, about five miles east of Horton's Point on the north shore of Long Island. On the morning of the 5th the storm-center was probably about two degrees southeast of Cape Cod, and at midnight of the 5th, four or five degrees southeast of Cape Breton.

No. II.—This area appears to have passed eastward, north of the Gulf of Saint Lawrence Valley, during the 1st.

No. III.—This area first appeared in the extreme Northwest on the morning of the 2d, and during the day passed rapidly southward to Kansas; thence on the 3d, northeastward over the Lake region into Canada, followed by brisk and high northerly to westerly winds, during which quite a large number of vessels were driven ashore on Lakes Michigan, Huron, and Erie.

No. IV.—On the 5th the pressure was low in the northwest, and by 4.35 p. m. of the 7th this area had passed rapidly southeastward to Missouri, preceded by rain in the Central Mississippi Valley and Upper Lake region; at 11 p. m. it was central in Southern Illinois; and at 7.35 a. m. of the 8th, had passed northeastward to Lower Michigan, passing thence, during the day, northward into Canada. During its progress over Michigan it produced southeast gales and rain over Lake Erie.

No. V.—This area, very similar to the last in the first part of its course, appeared in the Northwest on the afternoon of the 8th, progressed rapidly southeastward to Kansas by 11 p. m., and thence to Missouri and Iowa by 7.35 a. m. of the 9th. During the 9th and 10th it passed slowly eastward to Lake Erie; brisk to high northerly winds prevailing on Lakes Michigan, Huron, and Erie, doing considerable damage to shipping; thence over New England on the 11th, and over Nova Scotia and Cape Breton on the 12th and 13th. Except in one or two instances, only light rain and winds accompanied this area until the 12th, when heavy rain-falls were reported in the lower Canadian provinces, and a northeast gale prevailed in the Lower Saint Lawrence Valley.

No. VI.—This, like the two preceding areas, first appeared in the Northwest. During the 11th falling barometer and southerly winds prevailed at Bismarck, the wind shifting to northwest by 7.35 a. m. of the 12th. This area then passed rapidly southward to Nebraska and Kansas by 4.35 p. m., where it remained central until 11 p. m. of the 13th, when it passed directly northward over Iowa and Minnesota during the

14th. During the 15th and morning of the 16th the pressures fell over the Lake region and New England, but it is somewhat doubtful if this can be connected with storm-track No. VI.

No. VII.—During the latter part of the 13th, and on the 14th and 15th, cloudy weather and heavy rains prevailed in the Southwest; warm southeast winds in Texas, and cold, brisk northerly winds in Kansas; the latter extended by the afternoon of the 15th over the northwestern portion of Texas and throughout the State, by the night of the 16th; several rain-falls of two to three inches were reported as occurring in this section during the eight hours preceding the 4.35 p. m. observation of the 16th; and at Indianola a heavy northeast gale and intense thunder-storm prevailed, the wind attaining a velocity of ninety-six miles per hour, and over four inches of rain falling. During the 17th and 18th, northerly winds and rains continued to prevail from Texas northward, while southerly winds and heavy rains prevailed in the Lower Mississippi Valley, the barometric trough forming low area No. VII stretching from Louisiana to Missouri at 4.35 p. m. of the 18th. The pressure continued rising in the Southwest, and at 4.35 p. m. of the 19th the central depression was in Illinois, heavy rains having fallen in the Lower Missouri Valley. From this time until 11 p. m. of the 21st the center of this storm progressed very slowly eastward, with decreasing central pressure, over the Ohio Valley, West Virginia, and Middle Atlantic States, with northeast gales and heavy rains on Lakes Superior and Erie. During the evening of the 21st brisk southerly winds and heavy rain prevailed on Chesapeake Bay, and brisk and high easterly winds backing to northwest in New Jersey. The vortex passed northeastward along the Gulf Stream, with brisk northerly winds and rains along the coast of New England and Nova Scotia.

No. VIII.—The pressure commenced falling in the Northwest on the 21st, and on the 23d, 24th, and 25th a slight depression passed eastward to Pennsylvania, attended by light rain in the Lake region.

No. IX.—This area appeared in the Northwest on the morning of the 25th, with southeast winds in Minnesota, passed southeastward to Southern Minnesota, with light rains, by 4.35 p. m., of the 26th, and thence over Lake Superior into Canada.

No. X.—Heavy rains and southeasterly winds prevailed in Texas during the evening of the 24th, nearly five inches of rain falling at Galveston. During the 25th very heavy rains and northerly to easterly winds prevailed along the Gulf coast from Indianola to Mobile, and possibly a slight depression existed in the Gulf of Mexico, which passed northeastward over Northern Florida to the coast of North Carolina by 11 p. m. of the 26th, as indicated by track No. X. Saint Mark's reports on the 26th, in the afternoon, a wind velocity of 40 miles.

No. XI.—This area is first noticed on chart No. II in Colorado at 11 p. m. of the 27th; passed rapidly eastward over Kansas and thence northeastward to Lower Michigan by 11 p. m. of the 28th, and thence to the Gulf of Saint Lawrence, where it was central on the night of the 29th. This depression was remarkable for its rapid progress only until it reached the Lower Saint Lawrence Valley, where a southwest gale prevailed during the afternoon and night of the 29th.

No. XII.—This depression appeared north of Lake Superior on the 30th, progressed eastward, and at 11 p. m. of the 31st was north of the Lower Saint Lawrence Valley, but its track was too far to the north to be charted.

*Storms at sea.*—The following notes have come to hand relative to storms at sea: On the 1st, hurricane at 27° 32′ N. and 84° 3′ W.; also, 26° 30′ N. and 84° W. 2d, hurricane, 29° 22′ N. and 84° 14′ W.; gale, 49° 11′ N. and 37°.48′ W. 3d, gale, 53° 23′ N. and 30° 03′ W.; terrific gale at 34° 53′ N. and 56° 30′ W. 4th, violent gale, 40° 27′ N. and 69° 43′ W.; hurricane at 44° 30′ N. and 69° 20′ W.; gale, 51° 45′ N. and 34° 50′ W. 5th, gale 35° 40′ N. and 69° W. 6th, storm, 40° 32′ N. and 69° 20′ W. 7th, gale, 42° N. and 58° 05′ W. 8th, gale, 41° 36′ N. and 61° 10′ W. 12th, gale, 47° N. and 46° 55′ W. 14th, hurricane off Irish coast. 15th, gale, 55° 29′ N. and 11° 20′ W. 17th, gale, 33° 30′ N. and 50° 57′ W.; hurricane, 39° 14′ N. and 56° 08′ W. 19th, gale, 51° 32′ N. and 40° 36′ W. 20th, violent storm, 45° 14′ N. and 39° 17′ W. 21st, gale, 48° 08′ N. and 34° 10′ W. 22d, gale, 47° 29′ N. and 39° 31′ W. 24th, strong gale, 47° 54′ N. and 45° 06′ W.; gale, 48° 38′ N. and 45° 30′ W. 25th, hurricane, 49° 38′ N. and 39° 42′ W.; furious gale, 48° 35′ N. and 28° 40′ W. 27th, furious gale, 48° 09′ N. and 24° W. 28th, furious gale, 48° 04′ N. and 36° 10′ W. 29th, heavy gale, 49° 31′ N. and 35° 26′ W. 31st, strong gale, 47° 44′ N. and 43° 46′ W.

### TEMPERATURE OF THE AIR.

*In general.*—The distribution of the temperature of the air is shown by the isotherms on chart No. II. The table of comparative temperatures in the left-hand corner of the same chart shows the month to have been warmer than usual over the whole country except Canada, a portion of the Upper Missouri Valley, Pacific coast, and Rocky Mountain stations. Occasional voluntary observers, whose records extend back for many years, report as follows: Geneseo, Ill., mean temperature of the month, 4°.2 above the mean for 16 years; Vevay, Ind., a mild dry month; Martinsville, Ill., one of the warmest and driest on record; Gardiner, Me., the average temperature is 1°.55

below the average for the past 41 years; Plattsmouth, Nebr., monthly average is 0°.7 below the average for many years; Contoocookville, N. H., monthly average is 1°.3 above the average for many years; Cooperstown, N. J., the mildest October in 20 years; Volney, N. J., remarkable autumn; Newark, N. J., monthly mean is 3° above the average for 34 years; Williamsport, Pa., monthly mean is 3°.6 above the average of 5 years; Tioga, Pa., warmest October for 11 years; Woodstock, Vt., warmest October in 10 years. The month was, however, especially notable for the absence of severe frosts and the consequent development of the growth of vegetation.

*Ranges of temperatures.*—Large monthly and diurnal ranges have been respectively as follows: Brackettville, monthly, 68°, diurnal, 40°; Breckenridge, 54° and 42°; Cheyenne, 74° and 58°; Denver, 63° and 44°; Dodge City, 61° and 40°; Eagle Pass, 60° and 39°; Pembina, 49° and 42°; Winnemucca, 65° and 47°; Yankton, 48° and 40°. The smallest ranges have been: Cape Lookout, monthly, 28°, diurnal, 16°; Cape May, 29° and 18°; Charleston, 28 and 18°; Key West, 17° and 12°; New Orleans, 31° and 16°; Pike's Peak, 49° and 19°; Savannah, 33° and 20°; Tybee Island, 31° and 18°.

*Monthly mean temperatures at special points* have been as follows: Mount Washington, 30°.6; Pike's Peak, 17°.0; Pembina, 40°.0.

*Maximum and minimum temperatures.*—Maximum temperatures above 90° are reported as follows: 93° at Indianola; 93, Red Bluff; 95, Dennison; 96, Mason; 98, Corsicana; 99, San Antonio; 101, Eagle Pass; 104, Brackettville.

*Minimum of temperatures* below 25° have been reported as follows: 25° at Salt Lake City; 23°, North Platte; 21°, Boise City; 20°, Santa Fé; 19°, Pembina; 16°, Breckenridge; 14°, Winnemucca; 10°, Mount Washington; 3°, Cheyenne; —6°, Pike's Peak.

*Frosts* were reported by voluntary observers as follows: On the 1st, in New York; 3d, West Virginia; 4th, Dakota, Illinois, Iowa, Kansas, Minnesota, Missouri, Nebraska; 5th, Arkansas, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Maryland, Michigan, Minnesota, Nebraska, North Carolina, Ohio, Pennsylvania, Tennessee, Wisconsin; 6th, Arkansas, Connecticut, Dakota, Delaware, Georgia, Illiniois, Indiana, Iowa, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Nebraska, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Vermont, West Virginia, Wisconsin; 7th, Connecticut, Maine Maryland, Massachusetts, Michigan, Nebraska, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Utah, Vermont, West Virginia; 8th, Connecticut, Kansas, Massachusetts, Missouri, Nebraska, New Hampshire, New Jersey, New York, Utah; 9th, Massachusetts, Ohio; 10th, Iowa, Kansas, Missouri, Nebraska, North Carolina, Ohio, Virginia, California; 11th, Illinois, Indiana, Iowa, Kentucky, Missouri, Wisconsin; 12th, Illinois, Indiana, Kentucky, Michigan, North Carolina, Ohio, Tennessee, Wisconsin; 13th, Maryland, North Carolina, Tennessee; 14th, Maine, Maryland, Massachusetts, New Hampshire, New York, North Carolina; 15th, Ohio; 16th, Utah; 17th, Connecticut, Maine, Massachusetts, New York, Utah Territory, Vermont; 18th, Maine, Massachusetts, Utah Territory, Vermont; 19th, Illinois, Utah Territory; 20th; Dakota, Maine, Nebraska, Utah Territory, Wisconsin; 21st, New York, Illinois, Iowa, Kansas, Missouri, Nebraska, Utah Territory Wisconsin; 22d, Arkansas, Illinois, Indiana, Iowa, Kansas, Michigan, Mississippi, Nebraska, New Hampshire, New York, Ohio, Texas, Wisconsin; 23d, Arkansas, Tennessee, Connecticut, Delaware, Illinois, Indiana, Kansas, Maryland, Massachusetts NewHampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Virginia, West Virginia; 24th, Georgia, Illinois, North Carolina, Ohio, South Carolina, Tennessee; 25th, New Hampshire, New York, North Carolina; 26th, New York, New Hampshire, Pennsylvania, Vermont; 27th New York, Massachusetts, New Hampshire, Utah Territory, Vermont; 28th, Connecticut, Massachusetts, New Hampshire, New York, Vermont; 29th, Illiniois, Iowa, Missouri, Nebraska, New Hampshire, Utah Territory, Wisconsin; 30th, Illinois, Indiana, Iowa, Nebraska, New Hampshire, New Jersey, Ohio, Utah Territory, Wisconsin; 31st, Connecticut, Illinois, Massachusetts, Michigan, Missouri, Nebraska, New Hampshire, New York, Ohio, Wisconsin.

The frosts just enumerated were generally light, and the remarkable lateness of severe frosts is thus commented on by a few observers: At Vail, Iowa, on the 31st, osage orange leaves still green; Fall River, Mass., cherry blossoms picked on the 21st; Freehold, N. J., wild violets in bloom on the 14th; Waterburg, N. Y., second crop of raspberries has been gathered; North Volney, N. Y., no killing frost up to the end of the month; Flushing, N. Y., apple trees in bloom and grass as green as in spring; Murphy, N. C., 31st, nothing injured by frost, beans in full bloom; Ringgold, Ohio, 31st no severe frost as yet, vegetation uninjured; Chambersburg, Pa., no frost during the month, but a severe one November 1; Austin, Tenn., no heavy frost yet; Green Castle, Pa., flowers, tomatoes, pumpkins, and locust trees are in bloom, no injurious frost; Hulmerville, Pa., 24th, tomatoes ripe, and pepper plants in bloom; Lynchburg, Va., no frost during the month, tobacco almost matured for a second crop; Strafford, Vt., raspberries plentiful and ripe on the 15th, and strawberries in bloom, May flowers seen

on the 17th; Woodstock, Vt., colors of autumn foliage at their height one week later than usual; West Charlotte, Vt., red raspberries ripe 14th and 15th, dandelions in bloom on the 18th.

*Ice* was formed generally in connection with severe frost as follows: On the 3d, Idaho; 4th, Dakota, Iowa, and Nebraska; 5th, Minnesota, Dakota, and Illinois; 6th, Iowa, and Wisconsin; 7th, Massachusetts, New York, and Utah Territory; 8th, Utah Territory; 10th Nebraska; 12th, Michigan; 16th, Utah Territory; 19th, Maine; 20th, Iowa and Nebraska; 21st, Iowa, Kansas, Michigan, and Nebraska; 22d, Illinois; 23d, Maine, Connecticut, Massachusetts, New York, and Rhode Island; 26th, Maine; 27th, New Hampshire, Maine, and Vermont; 28th, Connecticut, Massachusetts, New Hampshire, Idaho, Maine, and Vermont; 30th, Nebraska, and Wisconsin; 31st, Massachusetts and Nebraska.

PRECIPITATION.

*In general.*—The general distribution of rain for the month is shown on chart No. III. The table in the lower left-hand corner gives the average precipitation in the various districts, and shows a very large excess in the Gulf and Atlantic States, the Upper Lake region Northwest, and in Oregon. This excess is to a great degree owing to the precipitation attending storms Nos. I, VII, and X.

*Special heavy rains.*—The following notable cases of heavy rains that have been reported: 1st, Jacksonville, Fla., 3.29 inches; Quitman, Ga. (1st, 2d, 3d), 8.90 inches. Saint Mark's, Fla. (1st, 2d, 3d), 7.28 inches. 3d, Charleston, N. C., 1.75 inches; Duluth, Minn., 1.51 inches; Tybee Island, Ga. (2d, 3d), 2.65 inches; Augusta, Ga., 2.13 inches; Savannah, Ga., 2.93 inches; Oglethorpe Barracks., Ga., 2.56 inches; Mount Forest, Canada, 2.33 inches; Mayport, Fla., 6.32 inches; making a total of 11.08 inches in 10 days. 4th, Baltimore, Md., 2.74 inches; Cape Lookout, N. C., 1.85 inches; Lynchburg, Va. (3d. 4th,), 5.43 inches; New Haven, Conn. (4th, 5th), 4.05 inches; New York City, 4.02 inches; Philadelphia, Pa., 2.73 inches; Springfield, Mass. (4th 5th), 3.77 inches; Wilmington, N. C. (3d, 4th), 2.55 inches; Washington, D. C., 3.98 inches; Gainesville, Ga., 2.30 inches; Fort Whipple, Va., 4.30 inches; Sandy Hook, N. J., 3.26 inches; Willets Point, N. Y., 2.17 inches; Accotink, Va., 4.00 inches; Barnegat, N. J., 2.08 inches. 5th, Boston, Mass., 4.00 inches; New London, Conn., 2.77 inches; Newport, R. I., 2.03 inches; Portland, Me., 1.71 inches; Thatcher's Island, Mass., 3.19 inches; Fort Adams, R. I., 2.90 inches; Fort Hamilton, N. Y. (4th, 5th), 4.90 inches. 7th, Denison, Tex., 2.02 inches. 8th, Alpena, Mich., 2.06 inches; Fort Hamilton, N. Y. (8th, 9th), 2.06 inches. 9th, Cape May, N. J., 1.97 inches; Philadelphia, Pa., 2.17 inches; Willet's Point, N. Y., 1.25 inches; Barnegat, N. J., 2.83 inches. 10th, Eastport, Me., 2.05 inches; Alpena, Mich. (10th, 11th), 5.17 inches. 11th, Buffalo, N. Y., 2.03 inches. 13th, in vicinity of San Diego, Cal., first rain of season occurred, being the heaviest rain-fall for twenty years; it seems to have passed from the southeast to northwest over a tract of country thirty to forty miles wide, extending from the coast far beyond the mountains to the northeast. 14th, Breckenridge, Minn., 2.25 inches; Denison, Tex., 4.00 inches. 15th, Fort Gibson, Ind, T., 1.81 inches; Galveston, Tex. (15th 16th), 3.68 inches; Fort Sill, Ind. T., 3.28 inches. 16th, Corsicana, Tex., 2.12 inches; Indianola, Tex., 4.11 inches; Shreveport, La., 2.29 inches; Baton Rouge Barracks, La., 2.05 inches. 18th, Baton Rouge Barracks, 6.70 inches. 19th, Chicago, Ill., 2.19 inches; Detroit, Mich., 2.02 inches; Anna, Ill., 2.88 inches; Sandusky, Ohio, 2.42 inches; Toledo, Ohio (19th and 20th), 3.52 inches. 20th, Fort Porter, N. Y., 2.14 inches. 21st, Norfolk, Va., 2.27 inches; Omaha, Nebr., 2.14 inches; Cape Henry, Va., 2.28 inches. 22d, Wood's Holl, Mass., 2.63 inches. 25th, New Orleans, La., 2.53 inches; Mount Sterling, Ill., 2.20 inches; Galveston, Tex. (24th and 25th), 9.43 inches; Baton Rouge, Barracks, La., 2.50 inches. 26th, Norfolk, Va., 1.97 inches; Smithville, N. C., 2.20 inches. 29th, Vicksburg, Miss., 1.94 inches; Baton Rouge Barracks, La., 2.60 inches. 30th, New Orleans, La., 3.52 inches; Indianola, Tex., 3.24 inches; Galveston, Tex., 2.12 inches; most of the smaller rain-falls here noted fell in the course of a few hours.

*Large monthly rain-falls.*—The following stations report large monthly rain-falls: Galveston, 17.39 inches; Alpena, 13.18 inches; Indianola, 11.75 inches; Denison, 10.74 inches; New Haven, 10.09 inches; Pilot Point, 10.42 inches; Saint Mark's, 10.61 inches; Baton Rouge, 16.75 inches; Quitman, Ga., 13.03 inches; Auburn, N. H., 13.15 inches; White Plains, N. Y., 18.09 inches; Pelham, N. Y., 10.43 inches.

*Small monthly rain-falls.*—The following stations report little or no rain during the month: Camp Verde, 0.43 inch; Eagle Pass, 0.35 inch; Edinburg, 0.32 inch; Florence, 0.49 inch; Phœnix, none; Stanwix, none; Tucson, 0.46 inch; Winnemucca, 0.02 inch; Wickenburg, none; Yuma, none; Alcatraz Island, 0.40 inch; Salinas City, 0.12 inch.

*Droughts.*—The distribution of rain, as given on the accompanying chart, shows slight deficiencies of rain to have occurred in the Ohio and Saint Lawrence Valleys; but no special reports of droughts, as affecting vegetation, have been received, except such notes as are referred to in the chapter on the height of water in rivers.

*Floods.*—Destructive floods attended the heavy rains, of the first four days of the month, in the East Gulf and Atlantic States, but in general the excess of rain has

served only to keep the streams very high and promote vegetation up to the last days of autumn.

*Hail* occurred on the 3d, in Iowa, Missouri; 5th, Nebraska, New York; 14th, North Carolina; 20th, Kentucky, Missouri; 22d, Maine, Massachusetts; 25th, Maine, Texas; 26th, Nebraska, New York.

*Snow.*—Snow-falls during the month occurred as follows: On the 2d, Dakota; 4th, Pennsylvania; 5th, Wyoming, Wisconsin; 6th, New York, Pennsylvania, Wyoming, Vermont; 8th, Michigan; 10th, Indiana; 11th, Colorado; 12th, Colorado, Wyoming; 13th, Colorado, Wyoming; 14th, Dakota, Nebraska, Wyoming; 15th, Wyoming, Nebraska; 18th, Colorado, Nebraska, Wyoming; 19th, Colorado, Nebraska, Wyoming; 20th, Wyoming; 21st, Maine; 22d, Maine, Massachusetts, New Hampshire, New York, Ohio, Rhode Island; 23d, Pennsylvania; 25th, Maine, New York; 26th, Maine, Wyoming; 27th, Colorado, Nebraska; 28th, Colorado, Nebraska, Utah, Wyoming; 29th, Colorado, Wyoming; 30th, Colorado, Minnesota, Wyoming; 31st, Colorado, Nebraska, Wyoming. At the end of the month snow was one to three inches deep in Utah and Nevada, and four inches deep in Vermont. Two feet of snow had fallen on Pike's Peak at the end of the month, where winter had set in unusually early.

*Rainy days.*—The number of days on which rain has fallen as recorded by Signal-Service observers ranges as follows: For New England, 15 to 18; Middle Atlantic States, 11 to 18; Lower Lake region, 15 to 19; Tennessee and the Ohio Valley, 10 to 15; South Atlantic and East Gulf States, 9 to 15; West Gulf coast, 12 to 13; Upper Mississippi and Lower Missouri Valleys, 5 to 13.

*Cloudy days.*—The number of cloudy days is reported by volunteer observers as follows: New England, 5 to 14; Middle States, 13 to 19; South Atlantic States, 6 to 10; East Gulf States, 8 to 20; West Gulf States, 12 to 15; Tennessee and the Ohio Valley, 6 to 10; Lower Lakes, 10 to 12; Upper Lake region, 13 to 18; the Northwest, 10 to 20.

## RELATIVE HUMIDITY.

The average relative humidity for the month ranges about as follows: For New England, 71 to 78; Middle Atlantic States, 70 to 76; South Atlantic States, 63 to 79; East Gulf States, 72 to 79; West Gulf coast, 73 to 81; Western Texas, 54 to 75; Tennessee and the Ohio Valley, 65 to 72; Lower Lakes, 68 to 79; Upper Lakes, 69 to 82; Upper Mississippi Valley, 70 to 75; Lower Missouri Valley, 70 to 74; the California coast, 71 to 74; the Sacramento Valley, 42 to 49. High stations report the following average percentages, not corrected for altitude: Cheyenne, 61; Denver, 50; Mount Washington, 90; Pike's Peak, 66; Salt Lake City, 41; Santa Fé, 48; Winnemucca, 39.

## WINDS.

*In general.*—The prevailing winds at Signal-Service stations are shown by the arrows on Chart No. II, from which it will be seen that they have been southeasterly west of the Lower Mississippi; northerly in the Northwest and Upper Lake region; southerly in the Lower Lake region and Middle States; and northerly in New England, the South Atlantic and East Gulf States.

*Total movements.*—The largest total movements for the month have been as follows: Barnegat, 10,208 miles; Cape Henry, 10,356; Cape Lookout, 10,814; Cape May, 12,212; Dodge City, 10,078; Indianola, 10,181; Pike's Peak, 13,658; Sandy Hook, 11,302; Sandusky, 10,484. The smallest movements have been as follows: Augusta, 2,734 miles; Boise City, 1,942; Knoxville, 2,346; Lynchburg, 2,065; Nashville, 1,971; Visalia, 1,833.

*Highest velocities*, in miles per hour, have been as follows: Barnegat, E., 60, 21st; Cape Henry, NW., 58, 4th; Cape Lookout, SE., 54, 4th; Cape May, NW., 68, 4th; Dodge City, NE., 60, 3d; Fort Gibson, S., 50, 14th; Fort Whipple, SE., 60, 4th; Indianola, NE., 96, 16th; Mount Washington, NW., 102, 23d; North Platte, SE., 60, 2d; Pike's Peak, W., 65, 26th; Philadelphia, SE., 60, 4th; Saint Mark's, SE., 66, 3d; Washington, NW., 55, 4th.

*Local storms, tornadoes, &c.*, as distinct from extended storms, have been reported as follows: 3d, Louisiana, Mo., severe storm of wind and rain. 7th, Mesquite, Tex., at 3 a. m., a local storm lasting nearly one hour, moving toward ESE., 12 miles wide; houses blown down. 13th, Mare Island, Cal., high wind and thunder-storm. 16th, whirlwind in the bay at Wood's Holl. 30th, Farmington, Utah, very high wind.

## VERIFICATIONS.

*Indications.*—The detailed comparison of the tri-daily weather indications, with the telegraphic reports for each succeeding twenty-four hours, shows a general percentage of omissions of 0.3 per cent., and of verifications of 84.6 per cent. The percentages of verifications for the four elements have been: Weather, 91.2; wind direction, 82.4; temperature, 84.8; barometer, 80.1. The percentages of verifications by geographical districts have been: New England, 83.5; Middle Atlantic States, 88.7; South Atlantic States, 86.1; East Gulf States, 89.6; West Gulf States, 83.6; Lower Lake region, 80.8; Upper Lake region, 83.2; Tennessee and Ohio Valley, 86.6; Upper Mississippi Valley, 83.7; Lower Missouri Valley, 80.3. Of the 3,708 predictions that were made, 121, or 3.3 per cent., are considered to have entirely failed; 89, or 2.4 per cent., were one-fourth

verified; 555, or 15.0 per cent., were one-half verified; 378, or 10.3 per cent., were three-fourths verified; 2,565, or 69.0 per cent., were wholly verified.

*Cautionary signals.*—During the past month 213 cautionary signals have been displayed at 47 stations on the coasts of the United States, of which 173, or 81.2 per cent., were reported verified within 100 miles of the station. Thirty-two cases of high winds were reported from these stations, for which signals were displayed too late or not at all.

## NAVIGATION.

*Stages of water in rivers.*—In the table on Chart No. III are given the highest and lowest readings on the Signal-Service river-gauges. It will be seen that the rivers have all been quite low, and the Ohio so low as to impede navigation. The highest stages occurred after the 15th, and up to the close of the month. Special reports as follows: Roanoke River, N. C., very high on the 6th, 7th, and 8th, within 3 feet 9¼ inches of the great freshet of 1873. Muscatine, Iowa, 31st, river at low-water mark. Pittsburgh, river lowest for 30 years. Keokuk, river very low; navigation suspended above this point. Omaha, the channel of the Missouri has approached the Nebraska shore. Shreveport, the Upper Red River and tributaries all very high.

## TEMPERATURE OF WATER.

*In general.*—The temperatures of water, as observed in rivers and harbors, are shown on the Chart No. III.

*Maximum and minimum temperatures.*—The highest maxima have been 84° at Galveston and Key West, 83° at Shreveport, 77° at Nashville, and 76° at Saint Mark's and Cairo. The lowest minima have been 44° at Alpena, 45° at Cleveland, Duluth, and La Crosse, and 46° at Eastport, Omaha, and Yankton.

*Ranges of temperature.*—The least ranges have been: 3° at Key West and San Francisco, 4° at Eastport, and 5° at Charleston, Jacksonville, Wilmington, and Saint Paul. The largest have been 25° at Cleveland, 21° at La Crosse, and 20° at Alpena, Galveston, Grand Haven, Omaha, and Saint Louis.

## ATMOSPHERIC ELECTRICITY.

*Thunder-storms* occurred as follows: On the 1st in Iowa, Michigan, Missouri, Vermont, Wisconsin. 2d, Dakota, Iowa, Kansas, Wisconsin. 3d, Illinois, Iowa, Kansas, Michigan, Missouri, Nebraska, Texas, Wisconsin. 4th, Canada, Wisconsin. 5th, Massachusetts. 7th, Kansas, Texas. 8th, Nebraska. 9th, Illinois, Indiana, Iowa, Ohio, Wisconsin. 10th, Maryland, Virginia. 12th, Illinois, Iowa, Nebraska, Colorado, Washington Territory. 13th, California, Illinois, Iowa, Kansas, Michigan, Nebraska. 14th, Iowa, Michigan, Nebraska, Wisconsin. 15th, Texas, Iowa, Kansas, Nebraska. 16th, Texas. 18th, Louisiana, Canada, Illinois, Texas. 20th, Illinois, Indiana, Kentucky, Maryland, North Carolina, Ohio, Pennsylvania, West Virginia, Missouri, Virginia. 21st, Delaware, Maryland, Massachusetts, New Jersey, Virginia, Pennsylvania. 22d, Connecticut, Massachusetts. 24th, Texas. 25th, Iowa, Texas. 26th, Florida, Iowa, Nebraska. 27th, Iowa. 29th, Canada, Texas, Vermont. 30th, Louisiana.

*Distant lightning* was reported as follows: On the 1st in Illinois, Iowa, Kansas, Michigan, Missouri, New Hampshire, New York, Ohio, Vermont, Wisconsin. 2d, Iowa, Kansas, Nebraska, New York, Vermont, Florida, Tennessee. 3d, Iowa, Michigan, Missouri, Texas. 4th, Texas. 5th, Maine. 6th, Indiana, Kansas, Texas. 7th, Texas. 8th, Dakota, Iowa, Kansas, Nebraska. 9th, Indiana, Wisconsin, Missouri. 10th, Maryland, Pennsylvania, Virginia, Georgia. 11th, North Carolina. 12th, Illinois, Indiana, Iowa, Kansas, Nebraska. 13th, Illinois, Indiana, Iowa, Kansas, Michigan, Texas. 14th, Michigan, Texas. 15th, Kansas, Texas. 16th, Texas. 19th, Texas. 20th, Kentucky, Maryland, Pennsylvania. 21st, Maryland, New Jersey, Pennsylvania, Virginia, Ohio. 25th, Florida. 26th, Nebraska. 27th, Nebraska. 29th, Texas, Louisiana. 30th, Texas. 31st, Florida.

*Auroras* were observed on the 1st in Minnesota; 2d, Illinois; 4th, Michigan; 11th, Connecticut, Illinois, Iowa, Massachusetts, New Jersey, Indiana, Michigan, Minnesota, Virginia, Maine, Wisconsin; 12th, Maine; 15th, Iowa; 16th, Maine; 18th, Dakota; 26th, Wisconsin; 27th, Maine, New Hampshire; 30th, New York; 31st, Wisconsin.

## OPTICAL PHENOMENA.

*Solar halos* were observed on the 1st in Illinois. 2d, Ohio. 4th, Missouri, Rhode Island. 6th, Kentucky. 7th, New York. 8th, New Hampshire, Rhode Island. 11th, Nebraska. 12th, Michigan, Ohio. 13th, Ohio, Kentucky. 14th, South Carolina. 15th, Iowa, New York. 16th, Illinois, New York. 17th, Indiana, New York, Ohio, Kentucky. 18th, Ohio. 20th, Maine. 21st, Iowa, Maine. 23d, Iowa, New York. 24th, Illinois, Indiana, Iowa, Michigan, New Hampshire, New York, Kentucky, Rhode Island. 25th, Indiana, New York, Ohio, Rhode Island. 28th, Illinois. 29th, Illinois, Michigan, Ohio. 30th, Illinois, Indiana, Ohio, Kentucky. 31st, Rhode Island.

*Lunar halos* were observed as follows: On the 10th in Maryland. 12th, Virginia.

13th, Missouri, New Jersey, Virginia, Georgia, South Carolina. 14th, Indiana, Missouri, Nebraska, New York, Virginia, Pennsylvania. 16th, Illinois, Iowa, Kansas, Virginia, Pennsylvania. 17th, Illinois, Indiana, Maine, Nebraska, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Virginia, Maryland, Kentucky. 18th, Massachusetts, North Carolina, Pennsylvania, Tennessee. 19th, New Jersey, New York, North Carolina, Pennsylvania, Virginia, Wisconsin. 20th, Iowa, Virginia, South Carolina. 21st, Michigan. 23d, Illinois, Iowa, Missouri, Nebraska, Texas, Wisconsin, Michigan. 24th, Indiana, Kentucky, Maryland, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Texas, Virginia, Georgia, South Carolina, West Virginia. 25th, Kansas, Kentucky, West Virginia. 26th, Utah, Kentucky. 27th, Virginia. 29th, New York, Pennsylvania. 30th, Indiana, Ohio. 31st, New York.

*Mirage* was observed on the 8th in Kansas. 9th, South Carolina. 21st, Dakota, 22d, Kansas. 29th, Dakota. At New London, 14th to 18th, and 25th to 28th.

MISCELLANEOUS PHENOMENA.

*Birds.—Blackbirds* were seen on 7th at Oregon, Mo.; 11th, last seen, Contoocookville, N. H.; flying S., 6th, Palermo, N. Y.; 3d, Wappinger's Falls, N. Y.; 10th, Jacksonburg, Ohio; flying W., on 21st, Austin, Tenn. *Bluejays* going south, 11th, Creswell, Kans.; first seen 21st, Belmont Farm, Tex. *Bluebirds and ground sparrows* last seen on 31st, Contoocookville, N. H. *Bluebirds*, 27th, Palermo, N. Y.; 31st, flying S., Kensico, N. Y.; first seen, 22d, Belmont Farm, Tex. *Buffalo birds*, large flocks going S., 5th, Creswell, Kans. *Crows*, flying S.; 11th, 12th, Genoa, Nebr.; 26th, Palermo, N. Y. *Cranes*, flying S.; 29th, Baxter Springs, Kans.; 21st, Sedgwick, Kans.; 20th, Emerson, Nebr.; 11th, Clear Creek, Nebr.; 21st, Belmont Farm, Tex.; flying S. W., 20th, Creswel, Kans. *Ducks*, flying N.; 12th, Lower Brulé Agency; plentiful, 20th, Farmingdale, N. Y.; flying S., 29th, 30th, 31st, Daytona, Fla.; 2d, Frankford, Mo.; 29th, 31st, Belmont Farm, Tex.; 22d, Morgantown, West Va.; numerous, 10th, Oregon, Mo. *Wild ducks* seen on 25th, New Bedford, Mass. *Eagles*, flying S., 5th Sedgwick, Kans. *Geese*, flying S., daily, 3d to 31st, Lower Brulé Agency; 31st, Milford, Del.; 21st, Hennepin, Ill.; 29th, Louisville, Ill.; 2d, Elmira, Ill.; 8th, 20th, Milford, Ind.; 31st, Laconia, Ind.; 1st, 20th, Afton, Iowa; 10th, Guttenburg, Iowa; 26th, Cresco, Iowa; 10th, Nora Springs, Iowa; 22d, Tabor, Iowa; 1st, Boonsboro, Iowa; 29th, Baxter Springs, Kans.; 2d, 17th, 19th, 24th, 26th, 28th, 29th, Creswell, Kans.; 18th, 19th, Sedgwick, Kans.; 17th, Independence, Kans.; 26th, Lawrence, Mass.; 23d and 24th, Detroit, Mich.; 22d, Northport, Mich.; 2d, Frankford, Mo.; 20th, Emerson, Nebr.; 1st, Plattsmouth, Nebr.; 5th, 24th, 28th, 29th, and 31st, and very numerous at Clear Creek, Nebr.; 24th, Contoocookville, N. H.; 29th, Oregon, Mo.; 21st, Freehold, N. J.; 27th, Ardemia, N. Y.; 13th, Palermo, N. Y.; 23d, Penn Yan, N. Y.; 21st, 26th, Farmingdale, N. Y.; 26th, Wappinger's Falls, N. Y.; 11th, Bellefontaine, Ohio; 29th, Westchester, Pa.; 22d, Tioga, Pa.; 13th, Franklin, Pa.; 24th, Hulmeville, Pa.; 21st and 26th, Austin, Tenn.; 21st, 28th, 31st, Belmont Farm, and numerous 21st, 22d; 27th, Embarrass, Wis.; 21st, 29th, Corsicana, Tex.; 10th, Breckenridge, Minn.; 22d, Leavenworth, Kans.; 23d, Vicksburg, Miss.; 29th, Cincinnati, Ohio; 20th, Morgantown, West Va.; flying S. W., 24th, Laconia, Ind.; flying W., 23d, Northport, Mich.; flying W. S. W., 13th, and N. W. 18th, North Volney, N. Y.; numerous 25th, Olivet, Dakota; flying N., 22d, 23d, Waterburg, N. Y.; 3d, Corsicana, Tex.; flying N. W., 11th, Montana, Wis.; flying S. E., 2d, Green Castle, Pa.; flying S. S. W., 20th, and S. E. 21st, at Alto Vista, Va. *Humming-birds*, last seen on 1st and 3d, Oregon, Mo. *Pelicans*, flying S., 27th, Oregon, Mo. *Robins*, last seen 16th, Creswell, Kans.; 24th, Contoocookville, N. H.; 18th, Palermo, N. Y.; 24th, Penn Yan, N. Y.; departing 7th at West Charlotte, Vt., and entirely disappeared, together with phœbes and sparrows, after the 24th. *Swallows*, last seen 13th, Wappinger's Falls, N. Y. *Chimney-swallows*, leave Jacksonburg, Ohio, 14th. *Snow-birds*, first seen 20th, Bellefontaine, Ohio; 24th, Bethel, Ohio; 24th, Jacksonburg, Ohio; 25th, Ringgold, Ohio.

*Insects.—Bees* and *butterflies*, flying about, 23d, Louisville, Ill.; first seen, 21st, Belmont Farm, Tex. *Frogs, grasshoppers*, and *crickets*, singing on 13th and 24th, Oregon, Mo. *Katy-dids*, singing on the 29th, Freehold, N. J.; last heard, 25th, Wappinger's Falls, N. Y. *Hessian fly*, has injured the wheat worse than ever before at Martinsville, Ill.

*Botanical.—Osage orange*, still green, 31st, Vail, Iowa. *Morello Cluny tree*, in bloom on the 14th, Oregon, Mo. *Rose bush*, full bloom, 31st, Belmont Farm, Tex. *Wild mustard*, in blossom, on the 31st, Vail, Iowa.

*Polar bands.*—15th, Southington, Conn.; 2d, 28th, and 30th, Saint Mary's Home, Ind.; 1st and 24th, Iowa City, Iowa; 6th, 8th, 27th, 29th, and 30th, Tabor, Iowa; 24th, Danville, Ky.; 30th, Gardiner, Me.; 17th, Contoocookville, N. H.; 19th, Auburn, N. H.; 14th, Jacksonburg, Ohio; 30th, Cannonsburg, Pa.; 24th, Woodstock, Vt.; 9th, 17th, and 21st, Wytheville, Va.

*Sunsets.*—The characteristics of the sky, as indicative of approaching fair or foul weather, have been observed daily at all regular Signal-Service stations. Reports

from 108 stations show 69 blank or doubtful cases; for the remaining 3,112 cases, 2,616 (or 84.2 per cent.) were followed by the anticipated weather.

*Prairie and forest fires or smoke*, daily, from the 6th to the 31st, at Pembina and Lower Brulé Agency, Dak.; 28th, Fort Larned, Kans.; 22d and 23d, Olivet, Dak.; 4th and 26th to 31st, daily, Creswell, Kans.; 24th and 25th, Somerset, Mass.; 24th, Waltham, Mass.; 12th, 22d, 23d, 24th, and 31st, Clear Creek, Nebr.; 23d, Genoa, Nebr.; 27th, 29th, 30th, and 31st, Oregon, Mo.; 17th, Westville, Ohio; 20th to 31st, very extensive near Bismarck, Dak.

*Meteors* were observed on the 1st in Connecticut, Maryland, Massachusetts, New York; 2d, Maryland, Massachusetts, New Jersey, New York, Ohio, Pennsylvania; 3d, New York, Pennsylvania; 5th, Maryland, Massachusetts, New York; 6th, Maine, South Carolina; 7th, Maryland, New York, Idaho; 9th, Massachusetts; 11th, Maryland, Massachusetts, New Jersey; 13th, Indiana, Iowa, New Jersey; 13th, Maryland; 15th, Indiana, Pennsylvania; 16th, Indiana, New York, Pennsylvania; 17th, New York, Vermont; 18th, Minnesota; 22d, Iowa, New York; 23d, Connecticut, Kansas, Minnesota, Texas; 24th, New Jersey, Georgia; 27th, Ohio; 28th, Indiana; 29th, Iowa; 30th, Connecticut, Louisiana, Maine, Maryland, Pennsylvania; 31st, Illinois, Indiana, New York, Ohio.

*Zodiacal light.*—30th and 31st, Southington, Conn.; 18th and 19th, in mornings, Daytona, Fla.; 6th, 9th, 11th, 13th to 17th, at Saint Mary's Hospital, Indiana, and 1st, 5th, 6th, 7th, and 28th at Cambridge, Mass.

*Earthquakes* have been noted as follows: On the 12th, quite severe shocks were felt in Oregon, occurring at Portland, at 1.53 p. m.; at Marshfield, Clackamas County, at 1.45 p. m., and at Cascade City, at 9 a. m. and 1.52 p. m. Shocks were also felt at Hubbard and at points down the Columbia River. The vibrations were from north to south at Portland; several windows were broken and two chimneys thrown down. 3.26 a. m., slight earthquake shock felt all over the Isthmus of Panama. October 9, 2 a. m., earthquake shocks felt at Lima and Callao; vibrations from north to south, lasting one minute, and at 2.20 a. m., two shocks were felt in Pisco, Ica, and Chincha.

## SOLAR PHENOMENA.

*Sun-spots.*—The following observations, made by Mr. D. P. Todd, upon the spots of the sun, have been kindly communicated by Rear-Admiral John Rodgers, U. S. N., Superintendent of the Naval Observatory:

| October, 1877. | No. of new— | | Disappeared by solar rotation. | | Reappeared by solar rotation. | | Total number visible. | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| | Groups. | Spots. | Groups. | Spots. | Groups. | Spots. | Groups. | Spots. | |
| 2—Noon | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 5—11 a. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Large group of faculæ. |
| 6—11 a. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 7—2 p. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 10—11 a. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Extensive mottling over the solar surface. |
| 10—3 p. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 10—5 p. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 11—3 p. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 12—11 a. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 13—3 p. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 14—3 p. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 15—11 a. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Surface somewhat mottled—"veiled spots." |
| 15—4 p. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 16—4 p. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 17—4 p. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 18—4 p. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 22—3 p. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Faculæ and mottling. |
| 23—11 a. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 23—4 p. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 31—3 p. m | 2 | 30 | 0 | 0 | 0 | 0 | 2 | 30 | Largest spot about 25″ in diameter; readily visible to the unassisted eye. |

Professor Hinrichs, of Iowa City, reports that the sun was almost free from spots until the 27th, when a spot of very large size appeared, followed by smaller ones in two distinct groups.

NOTES AND EXTRACTS.

Mr. J. H. C. Coffin, of the United States steamer Monocacy, reports disturbances of the ocean at Nagasaki, Japan, on August 21, 1877, as follows:

"The flood-tide had been making some time, and at 4.45 p. m. it was nearly high water. At this time it was noticed that the water was rapidly running out, carrying with it a number of small junks and boats, at the rate of six or seven knots; it continued to run out for twenty minutes, the water in this time falling six feet. At 5.05 p. m. the water returned with a much greater velocity than it had run out, the water rising to its former height. At 5.13 p. m. the second recession commenced and continued for twenty minutes, the water falling as before. At 5.33 it came in again with about the same velocity as before, and rose a foot higher than before. At 5.45 p. m. the third recession commenced, the water falling about three feet, and then seemed to stop for a few moments and fall again, about two feet more. At 6.05 p. m., commenced to run in again, strong at first but slower afterwards. At 6.30 the water was about a foot lower than the former wave, and it remained at this height. The weather had been warm and calm, the barometer steady at 29.80 until 4.30 p. m., when it dropped slightly. There was no damage done in the harbor, the vessels at anchor swinging as the recessions took place. It is generally believed to have been caused by the breaking out of some volcano in the vicinity; it is a very unusual thing for Nagasaki, although they have experienced slight tidal waves in the harbor. Vessels outside noticed nothing unusual."

From a paper by Mr. G. J. Symons, F. M. S., "On the Climates of the Various British Colonies," the following very interesting table is taken:

*Annual climatological data for the principal British colonies.*

| Name of colony and station. | Temperature. | | | | | Mean humidity. | Average rain-fall. |
|---|---|---|---|---|---|---|---|
| | Mean. | Absolute maximum. | Absolute minimum. | Absolute range. | Mean daily range. | | |
| | ° | ° | ° | ° | ° | *Per ct.* | *Inches.* |
| London | 49.0 | 95.0 | 5.0 | 90.0 | 15.6 | 82 | 25 |
| St. Helena, Longwood | 61.4 | 77.6 | 52.0 | 25.6 | 5.6 | 87 | 40 |
| Cape of Good Hope | 61.2 | 97.4 | 37.7 | 59.7 | 10.3 | 75 | 24 |
| Natal | 64.6 | 97.8 | 29.0 | 68.8 | 18.3 | 72 | 30 |
| Mauritius | 77.1 | 90.0 | 62.8 | 27.2 | 6.7 | 71 | 50 |
| Bengal, Calcutta | 79.0 | 106.0 | 52.7 | 53.3 | 13.2 | 76 | 66 |
| Bombay | 79.0 | 93.5 | 58.0 | 34.5 | 9.7 | 76 | 71 |
| Madras | 80.0 | 110.0 | 57.6 | 52.4 | 16.6 | ..... | 48 |
| Ceylon | 80.7 | 95.0 | 68.3 | 26.7 | 9.0 | 83 | 76 |
| Straits Settlements | 79.8 | 93.0 | 65.0 | 28.0 | 12.8 | ..... | 95 |
| Queensland, Brisbane | 70.0 | 108.0 | 34.5 | 73.5 | 20.9 | 76 | 51 |
| New South Wales, Sydney | 62.4 | 107.0 | 36.0 | 71.0 | 14.7 | 72 | 50 |
| Victoria, Melbourne | 57.5 | 111.2 | 27.0 | 84.2 | 18.8 | 72 | 26 |
| South Australia, Adelaide | 63.1 | 113.5 | 34.2 | 79.3 | 20.6 | 60 | 21 |
| Tasmania, Hobart Town | 54.4 | 105.0 | 29.0 | 76.0 | 17.9 | 75 | 23 |
| New Zealand, Wellington | 55.6 | 83.0 | 30.0 | 53.0 | 12.0 | 68 | 47 |
| British Guiana | 79.0 | 89.0 | 68.0 | 21.0 | 10.0 | ..... | 94 |
| Barbadoes | 75.0 | 85.0 | 64.0 | 21.0 | 6.8 | 83 | 67 |
| British Honduras, Belize | 80.0 | 88.0 | 58.0 | 30.0 | 3.0 | ..... | 71 |
| Bermuda | 71.0 | 95.0 | 46.0 | 49.0 | 14.0 | 80 | 48 |
| Canada, Newfoundland | 40.0 | 92.5 | —21.0 | 113.5 | 14.4 | ..... | 55 |
| Canada, Toronto | 44.1 | 99.2 | —26.5 | 125.7 | 16.6 | 77 | 36 |
| Canada, Manitoba | 31.3 | 95.0 | —43.1 | 138.1 | 23.2 | 84 | 22 |
| Canada, British Columbia | 40.3 | 100.0 | —29.0 | 129.0 | 19.3 | 62 | ..... |

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ALBERT J. MYER,
*Brig. Gen. (Bvt. Assgd.), Chief Signal Officer, U. S. A.*

PAPER 32.

# MONTHLY WEATHER REVIEW, NOVEMBER, 1877.

## INTRODUCTION.

The present review for the month of November depends upon all official data received up to the 15th of December from the Canadian meteorological office; the United States Navy; the Army post surgeons; and the voluntary and regular observers of the United States Signal Service. The most interesting features of the month have been: first, the three severe storms that occurred the first nine days of the month; second, the excess in pressure in the Middle States, Lower Lake region, and New England; third, the general excess of rain-fall, except in the Northwest; fourth, the general continuation of high temperature, except in the Gulf States; fifth, the unusually large number of cautionary signals displayed; sixth, the unusually large number of earthquakes.

## BAROMETRIC PRESSURE.

*In general.*—The general distribution of atmospheric pressure for the month is shown by the isobars on Chart No. II, from which it appears that the area of highest pressure, or that included within the isobar of 30.10, includes Gulf, South Atlantic and Middle Atlantic States. The area of lowest pressure on the chart lies in Dakota. The general distribution of pressure agrees very nearly with the mean since 1872, with the exception of a marked excess in the Middle and New England States. The pressure on the Pacific coast has been about the mean.

*Barometric ranges.*—The general range of pressure (as reduced to sea-level) is shown by the following table, which gives the highest and lowest pressures at the center of high and low areas respectively, and from which it will appear that for the whole country a range of 1.76 inches has been recorded:

LOW AREAS.

| No. | Location. | Date. | Minimum pressure. |
|---|---|---|---|
| I | Father Point | November 3, 7.35 a. m | 28.92 |
| II | Saint Paul | November 1, 11 p. m | 25.50 |
| III | Cape Breton | November 6, 4.35 p. m | 29.48 |
| IV | Bismarck | November 6, 11 p. m | 29.50 |
| V | Toledo and Detroit | November 8, 4.35 p. m | 29.47 |
| VI | Parry Sound | November 15, 4.35 p. m | 29 83 |
| VII | Cape Breton | November 19, 7.35 a. m | 29.33 |
| VIII | Lynchburg | November 23, 11 p. m | 29.64 |
| IX | Bismarck | November 20, 4.35 p. m | 29.55 |
| X | Bismarck | November 23, 4.35 p. m | 29.31 |
| XI | Escanaba | November 27, 4.35 p. m | 29.22 |
| XII | Halifax | November 29, 11 p. m | 29.11 |

HIGH AREAS.

| No. | Location. | Date. | Maximum pressure. |
|---|---|---|---|
| I | Nova Scotia | November 2, 7.35 a. m | 30.15 |
| II | Middle States | November 4, 7.35 a. m | 30.43 |
| III | Lower Missouri Valley | November 5, 7.35 a. m | 30.02 |
| IV | Indian Territory | November 10, 7.35 a. m | 30.60 |
| V | New England | November 20, 11 p. m | 30.08 |
| VI | Indian Territory | November 29, 11 p. m | 30.59 |

The *local barometric ranges* have been as follows: *Large ranges*—Albany, 1.51; Burlington, 1.54; New Haven and Eastport, 1.46; Rochester, 1.44; Buffalo, 1.45; Boston, 1.42. *Small ranges*—Sacramento, 0.52; Santa Fé, 0.51; San Francisco, 0.56; Los Angeles, 0.45; Denver, 0.66; Jacksonville, 0.61.

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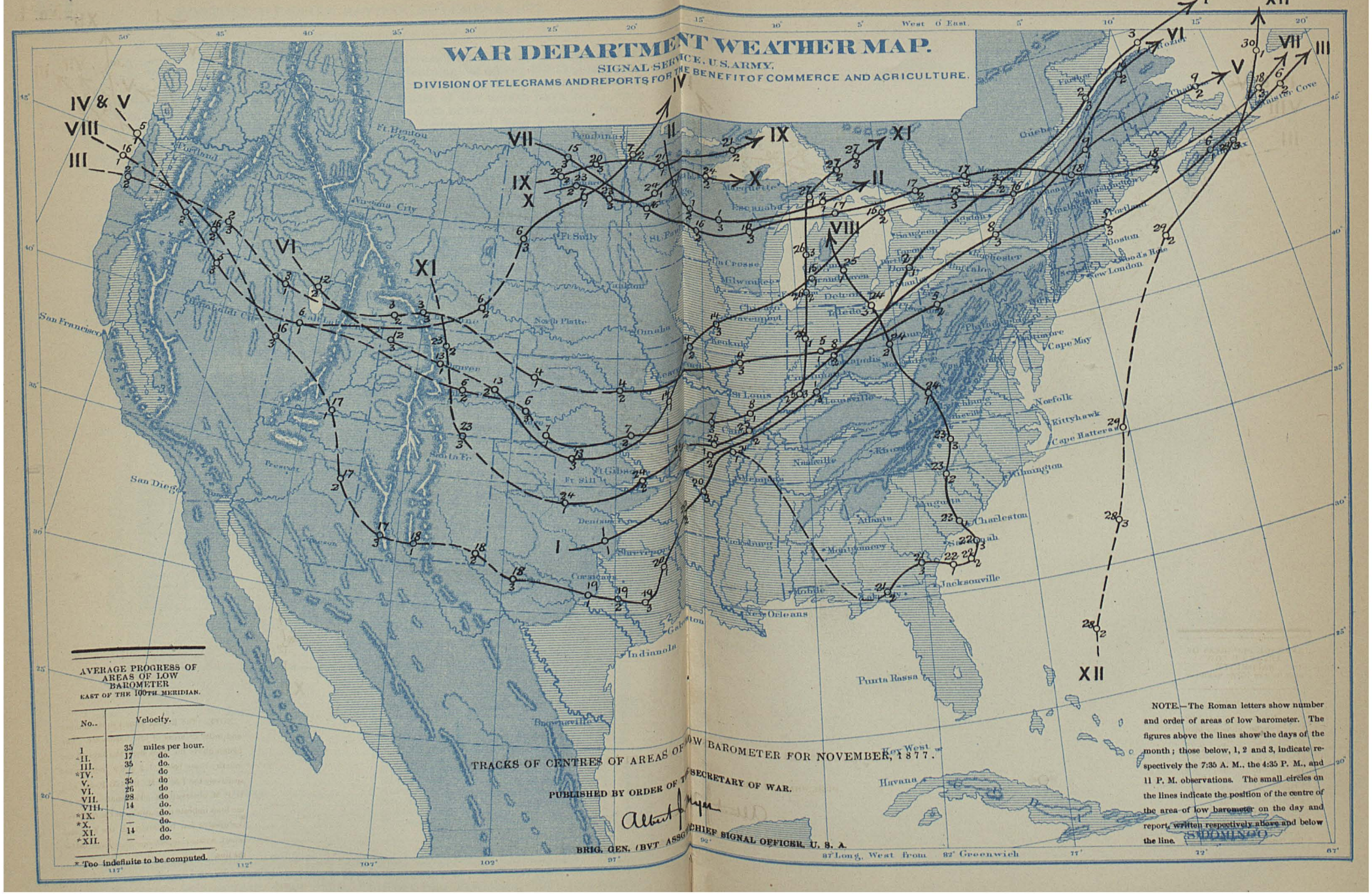
No. I.

# WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U. S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.




AVERAGE PROGRESS OF AREAS OF LOW BAROMETER EAST OF THE 100TH MERIDIAN.

| No.. | Velocity. | |
|---|---|---|
| I | 35 | miles per hour. |
| II. | 17 | do. |
| III. | 35 | do. |
| *IV. | — | do |
| V. | 35 | do |
| VI. | 26 | do |
| VII. | 28 | do |
| VIII. | 14 | do. |
| *IX. | — | do. |
| *X. | — | do. |
| XI. | 14 | do. |
| *XII. | — | do. |

* Too indefinite to be computed.

TRACKS OF CENTRES OF AREAS OF LOW BAROMETER FOR NOVEMBER, 1877.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. ASSG.) CHIEF SIGNAL OFFICER, U. S. A.

NOTE.—The Roman letters show number and order of areas of low barometer. The figures above the lines show the days of the month; those below, 1, 2 and 3, indicate respectively the 7:35 A. M., the 4:35 P. M., and 11 P. M. observations. The small circles on the lines indicate the position of the centre of the area of low barometer on the day and report, written respectively above and below the line.

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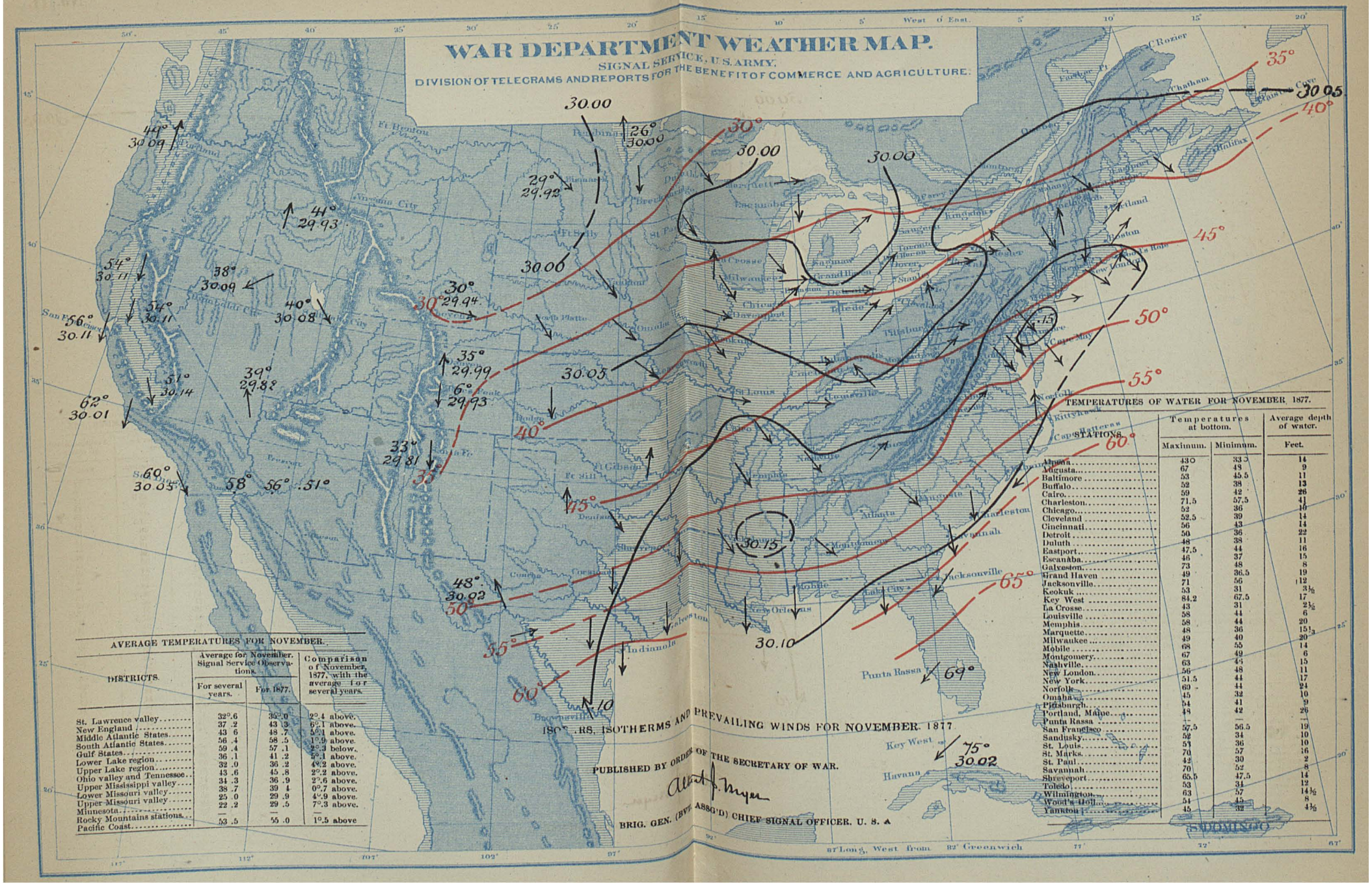
# WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U.S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.




ISOTHERMS AND PREVAILING WINDS FOR NOVEMBER, 1877.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

87 Long's West from 82° Greenwich

## AVERAGE TEMPERATURES FOR NOVEMBER.

| DISTRICTS. | Average for November. Signal Service Observations. For several years. | For 1877. | Comparison of November, 1877, with the average for several years. |
|---|---|---|---|
| St. Lawrence valley | 32°.6 | 35°.0 | 2°.4 above. |
| New England | 37 .2 | 43 .3 | 6°.1 above. |
| Middle Atlantic States | 43 .6 | 48 .7 | 5°.1 above. |
| South Atlantic States | 56 .4 | 58 .5 | 1°.9 above. |
| Gulf States | 59 .4 | 57 .1 | 2°.3 below. |
| Lower Lake region | 36 .1 | 41 .2 | 5°.1 above. |
| Upper Lake region | 32 .0 | 36 .2 | 4°.2 above. |
| Ohio valley and Tennessee | 43 .6 | 45 .8 | 2°.2 above. |
| Upper Mississippi valley | 34 .3 | 36 .9 | 2°.6 above. |
| Lower Missouri valley | 38 .7 | 39 .4 | 0°.7 above. |
| Upper Missouri valley | 25 .0 | 29 .9 | 4°.9 above. |
| Minnesota | 22 .2 | 29 .5 | 7°.3 above. |
| Rocky Mountains stations | — | — | — |
| Pacific Coast | 53 .5 | 55 .0 | 1°.5 above |

## TEMPERATURES OF WATER FOR NOVEMBER, 1877.

| STATIONS. | Temperatures at bottom. Maximum. | Minimum. | Average depth of water. Feet. |
|---|---|---|---|
| Alpena | 43O | 33.5 | 14 |
| Augusta | 67 | 48 | 9 |
| Baltimore | 53 | 45.5 | 11 |
| Buffalo | 52 | 38 | 13 |
| Cairo | 59 | 42 | 28 |
| Charleston | 71.5 | 57.5 | 41 |
| Chicago | 52 | 36 | 10 |
| Cleveland | 52.5 | 39 | 14 |
| Cincinnati | 56 | 43 | 14 |
| Detroit | 50 | 36 | 22 |
| Duluth | 48 | 38 | 11 |
| Eastport | 47.5 | 44 | 16 |
| Escanaba | 46 | 37 | 15 |
| Galveston | 73 | 48 | 8 |
| Grand Haven | 49 | 36.5 | 19 |
| Jacksonville | 71 | 56 | 12 |
| Keokuk | 53 | 31 | 3½ |
| Key West | 84.2 | 67.5 | 17 |
| La Crosse | 43 | 31 | 2½ |
| Louisville | 58 | 44 | 6 |
| Memphis | 58 | 44 | 20 |
| Marquette | 48 | 36 | 15½ |
| Milwaukee | 49 | 40 | 20 |
| Mobile | 68 | 55 | 14 |
| Montgomery | 67 | 49 | 6 |
| Nashville | 63 | 45 | 15 |
| New London | 56 | 48 | 11 |
| New York | 51.5 | 44 | 17 |
| Norfolk | 60 | 44 | 24 |
| Omaha | 45 | 32 | 10 |
| Pittsburgh | 54 | 41 | 9 |
| Portland, Maine | 48 | 42 | 26 |
| Punta Rassa | — | — | — |
| San Francisco | 57.5 | 56.5 | 19 |
| Sandusky | 52 | 34 | 10 |
| St. Louis | 54 | 36 | 10 |
| St. Marks | 70 | 57 | 16 |
| St. Paul | 42 | 30 | 2 |
| Savannah | 70 | 52 | 8 |
| Shreveport | 65.5 | 47.5 | 14 |
| Toledo | 53 | 34 | 12 |
| Wilmington | 63 | 57 | 14½ |
| Woods Holl | 54 | 42 | 8 |
| Yankton | 45 | 32 | 4½ |

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# WAR DEPARTMENT WEATHER MAP.

## SIGNAL SERVICE, U.S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

PRECIPITATION CHART FOR NOVEMBER, 1877.

### AVERAGE PRECIPITATION FOR NOVEMBER.

| DISTRICTS. | Average for November. For many years. | For 1877. | Comparisons: November, 1877, with the average for many years. |
|---|---|---|---|
| | Inches. | Inches. | |
| St. Lawrence valley | 3.10 | 4.70 | 1.60 excess. |
| New England | 4.15 | 6.15 | 2.00 excess. |
| Middle Atlantic States | 3.45 | 6.33 | 2.88 excess. |
| South Atlantic States | 2.90 | 5.29 | 2.39 excess. |
| Eastern Gulf States | 3.45 | 5.02 | 1.57 excess. |
| Western Gulf States | 4.10 | 6.16 | 2.06 excess. |
| Lower Lake region | 2.95 | 4.45 | 1.50 excess. |
| Upper Lake region | 2.30 | 4.53 | 2.23 excess. |
| Ohio Valley | 3.68 | 4.23 | 0.55 excess. |
| Tennessee | 3.86 | 5.82 | 1.96 excess. |
| Upper Mississippi Valley | 1.75 | 2.96 | 1.21 excess. |
| Lower Missouri Valley | 2.15 | 2.52 | 0.37 excess. |
| Upper Missouri Valley | 0.85 | 0.47 | 0.38 deficiency. |
| Minnesota | 1.10 | 0.78 | 0.32 deficiency. |
| California Coast | 1.90 | 0.81 | 1.09 deficiency. |
| Portland, Or | 7.95 | 12.45 | 5.50 excess. |

### HEIGHTS OF RIVERS ABOVE LOW-WATER MARK, NOV., 1877.

| STATIONS. | Danger point on gauge. | HIGHEST WATER. Date. | Height. | LOWEST WATER. Date. | Height. |
|---|---|---|---|---|---|
| | ft. in. | Nov. | ft. in. | Nov. | ft. in. |
| RED RIVER. | | | | | |
| Shreveport | 20 9 | 17, 18 | 23 3 | 1 | 17 5 |
| MISSOURI. | | | | | |
| Yankton | 20 0 | 9 | 4 10 | 23 24 | 4 3 |
| Omaha | 16 0 | 2 | 6 1 | 29 30 | 5 6 |
| Leavenworth | 21 0 | 6 | 6 8 | [illegible] | 5 8 |
| MISSISSIPPI. | | | | | |
| St. Paul | 14 0 | 1 | 2 6 | 11 to 13 | 2 2 |
| La Crosse * | 18 0 | 8, 10 | 6 1 | 19 to 26 | 6 5 |
| Dubuque | 21 10 | 1, 2 | 4 3 | 20 to 24 | 3 5 |
| Davenport | 15 0 | 2 | 3 4 | 18 to 22 | 2 4 |
| Keokuk | 14 6 | 23 | 3 10 | 4 | 2 10 |
| St. Louis | 30 0 | 24 | 13 10 | 15 | 9 9 |
| Cairo | 40 0 | 30 | 19 1 | 4 | 10 4 |
| Memphis | 34 0 | 30 | 12 6 | 6 | 7 11 |
| Vicksburg | 41 0 | 30 | 20 1 | 1 | 10 11 |
| New Orleans † | 2 6 | 20 | 11 1 | 6 | 13 2 |
| CUMBERLAND. | | | | | |
| Nashville | 42 0 | 30 | 14 4 | 1 | 1 5 |
| OHIO. | | | | | |
| Pittsburgh | 20 0 | 25 | 18 2 | 2 | 2 1 |
| Cincinnati | 50 0 | 29 | 31 9 | 6–7 | 5 11 |
| Louisville | 24 0 | 30 | 11 8 | 8 | 4 0 |
| SAVANNAH. | | | | | |
| Augusta | — — | 23 | 23 10 | 19 | 5 6 |
| MONONGAHELA. | | | | | |
| Morgantown | 23 0 | 25 | 14 6 | 1 | 0 8 |
| Pittsburgh | 20 0 | 24 | 18 2 | 2 | 2 2 |
| ALABAMA. | | | | | |
| Montgomery | — — | 23 | 12 0 | 16 | 3 6 |

* Below zero of gauge. ‡ Below bench mark.

† U.S. COAST SURVEY Bench of 1874

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Albert J. Myer

BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

*Areas of high pressure in general.*—The areas of high pressure occurring during the month of November have most frequently first appeared on the Pacific coast, and then been transferred over the Rocky Mountains. A few seem to have entered the United States in the plateau east of the Rocky Mountains, and west of the Mississippi River, in rear of depressions moving over the Northwest. In detail, they are as follows:

No. I.—On the morning of the 1st the highest pressure was in the Middle States. This high area moved slowly in a northeasterly direction into Nova Scotia, and disappeared on the 2d beyond that coast, in advance of depression No. I, then moving over the Lake region.

No. II.—The pressure rose on the Pacific coast during the last days of October. On the morning of the 1st of November the barometer was the highest above the normal pressure in Oregon. This high area moved rapidly, with northwesterly winds, in a southeasterly direction, closing up the rear of depression No. I; and on the 2d the highest barometer was transferred to Texas, giving rise to a light "norther." It then moved slowly over the Atlantic coast States, accompanied by northerly winds, veering to southerly, in advance of depression No. III, until the 5th instant, when it disappeared beyond Nova Scotia.

No. III.—The barometer rose slowly in the Northwest and Manitoba on the 2d and 3d, in the rear of low area No. II, but it remained nearly stationary in position until depression No. III, then entering the Lower Missouri Valley, had advanced east of the Mississippi River. On the 5th the barometer rose rapidly, with cold northwesterly winds, from Minnesota to the Gulf, giving rise to a severe "norther" in Texas on that and the succeeding day. This high area was slowly transferred to the East, and on the 6th and 7th occupied the Middle States and New England. On those days clear and cold weather prevailed in the Atlantic States, with northerly winds. On the 8th the highest pressure moved into Nova Scotia, where it rapidly disappeared, with southerly winds, in advance of depression No. V, then progressing in a northeasterly direction over the Lake region.

No. IV.—On the 6th and 7th the pressure rose on the Pacific coast, in rear of the depression charted as Nos. IV and V. On the 8th the rise covered the region east of the Rocky Mountains and west of the Mississippi River, giving rise in Texas to a light "norther." On the 8th and 9th the highest pressure was slowly transferred from the Northwest to the West Gulf States. On the 9th and 10th the prevailing winds were northerly, except in the Upper Lake region and Northwest, where they were southerly. On the 10th, 11th, and 12th, the highest pressure, in the mean time slowly diminishing, was transferred from the West Gulf States to the Southern States. On the 13th and 14th this high area extended itself along the Atlantic States, giving rise to northerly winds veering to southerly, as it moved beyond the coast, in advance of depression No. VII. On the 15th the highest pressure was again found in the South and Southwest, in consequence of the movement of the storm, mentioned above, over the Lake region. On the 16th this area remained central in the Gulf States, and on the 17th it was merged into high area No. V.

No. V.—On the 16th the barometer rose rapidly in Manitoba and the Northwest, in rear of depression No. VII. On the 17th the rise extended, with cold northerly winds, from Minnesota to the Gulf and South Atlantic States. On the 18th the highest pressure appeared in the Lake region, and northerly winds, with clear weather, prevailed to the Atlantic and Gulf coast. On the 19th and 20th this high area moved, with rising barometer, into the Saint Lawrence Valley and New England, this region being nearly circumscribed by the remarkably high isobar of 30.60. On the 21st the highest barometer was transferred to Nova Scotia. The barometer remained highest in Nova Scotia, with slowly diminishing pressure, until the 26th, attended in New England and the Middle States by high northeasterly winds. On the 27th and 28th this high area slowly disappeared, with southeasterly winds, in advance of depression No. XI, then moving from the Lake region into Canada.

No. VI.—On the 25th and 26th the barometer rose rapidly on the Pacific coast, and on the 26th and 27th this high pressure extended over the country west of the Mississippi River, giving rise on the 28th and 29th to a severe "norther" in Texas. On the 29th and 30th the highest barometer was transferred from the Northwest to the Gulf States, where, on the midnight of the 30th, unusually cold northerly winds and clear weather prevailed.

*Areas of low pressure in general.*—Twelve areas of low pressure, with their charted tracks, are described in the following list; one of which (No. XII), occurring during the last days of the month, probably originated in the tropics near the Leeward Islands and curving near latitude 30° pursued a track nearly parallel to the Gulf Stream. Of the other depressions the great majority have first appeared on the Pacific coast, seemingly entering the United States in either Oregon or Washington Territory, and have then been traced, approximately, in this office, over the Rocky Mountain region by means of charts of normal pressures. Depressions Nos. VI, X, and XI are not charted to the Pacific coast, but they were preceded by a remarkable fall of pressure on the North Pacific slope, which fall was traceable into the plateau east of the Rocky Mountains,

but so many reports were missing from that region that it was not considered expedient to attempt to chart their tracks. In examining the chart of the tracks of areas of low barometer for this month, it is noticeable that of the three depressions that entered the Pacific coast near Oregon, all apparently pursued a southeasterly course over the Pacific slope until east of the Rocky Mountains, where warm and moist southerly winds were blowing from the Gulf of Mexico; the same features belong to depressions Nos. VI and XI, as far as charted. Attention was directed to this subject, because in Europe it has been noted that storm-centers moving from the ocean, frequently enter that continent with a track to the north of east, but as they progress into the interior, and as the country becomes more arid or destitute of moisture, there is a tendency for storm-centers to be diverted to the south of east, with southerly winds blowing from the Black and Caspian Seas. In two instances there appear to have been formed east of the Rocky Mountains double, independent depressions from the single depressions entering the Pacific slope. (See Nos. IV and V, and Nos. X and XI.) Of these Nos. IV and X moved over the Northwest, encountering the moist, southerly winds blowing up the Missouri and Upper Mississippi Valleys, and Nos. V and XI entered the Indian Territory, and there met the moist, south winds from the Gulf.

No. I.—On the morning of the 1st the pressure was lowest in Texas, where the mercury had been falling rapidly for twenty-four hours. The center of the depression was then situated in a trough of low pressure, extending from the West Gulf to Manitoba, while, at the same time, there was a high pressure central in the Middle States, and another high barometer in the Rocky Mountain region, advancing in a southeasterly direction, with brisk and cold northwest winds; heavy rain was falling in Texas and the Indian Territory. On the 1st the storm-center moved rapidly in a northeasterly track, traversing the Ohio Valley, and on the morning of the 2d occupied the Lower Lake region. The storm had developed by this time remarkable energy, and was the severest that has visited the lakes this autumn. The general pressure in the Lower Lake region was below 29.20, and the winds nearly reached hurricane violence. On the 2d, the storm-center moved up to the Saint Lawrence Valley, and on the 3d disappeared beyond the limits of the map in the Gulf of Saint Lawrence, the pressure at Father Point falling below 29.00. Abundant rain fell in the east and south quadrants, which was rapidly followed by colder, clearing weather after the wind veered to westerly.

No. II.—In the description of the previous storm, it was stated that on the morning of the 1st a trough of low pressure extended from the West Gulf to Manitoba. In this trough a secondary storm-center was developed in Minnesota, which moved in an easterly path over Wisconsin, and on the 2d became merged in the depression charted as No. I; regarded as an independent storm, it displayed little energy, and its influence was slight beyond the region of the track charted for its center.

No. III.—On the 2d the pressure fell in Oregon and Washington Territory. The center of the depression, moving in a southeasterly path, crossed the Rocky Mountains on the 3d. On the morning of the 4th, the lowest pressure was in Kansas and Nebraska; it then pursued an easterly track and by midnight of that day a trough of low barometer extended from Western Texas to Michigan. At that time there was a high barometer on the Atlantic coast, and a high and rapidly rising pressure in Manitoba and Dakota: into the trough referred to above were blowing warm southerly and cold northerly winds; the thermometric gradient from the middle line of this trough to the northern boundary being quite "steep." On the 5th the storm traversed with an easterly path the Lake region and then crossed to the New England coast. In its progress the barometer continually fell at the center of the depression, and the storm developed increasing energy. On the afternoon of the 6th it moved out to sea beyond Nova Scotia. This storm, though not in general so energetic as No. I, still was more severe on the North Atlantic coast. Copious rain fell during its passage, most abundantly in the south quadrant, and after the veering of the winds to colder westerly. This storm was followed by rapidly clearing weather, and colder northwest winds.

Nos. IV and V.—On the 5th, the barometer fell in Oregon and Washington Territory, and on that day there seems to have been a severe gale on that coast; the center of the depression moved in a northeasterly track, and on the morning of the 6th appears to have been in Utah; during the day, this low area seems to have divided into two separate depressions, for at the afternoon report there appears a center of low barometer in Wyoming Territory north of Cheyenne, and another in Colorado, southeast of Denver. The north track is charted as No. IV. This depression moved on the 6th and 7th over Minnesota and entered Canada north of Lake Superior. It possessed no special features worth describing. The south track is charted as No. V. On the 6th and 7th, the depression moved slowly to the south of east, and at midnight of the latter date the lowest barometer was central in Missouri. At that time there was a high barometer on the Middle Atlantic coast, and the mercury was rising rapidly in the extreme Northwest. By the afternoon of the 8th, the storm had moved with greatly increased energy into the Lower Lake region. At this time the barometer was falling rapidly in the Middle and New England States, and rising fast in the North

west; during the night the lowest pressure remained nearly central in the Lower Lake region, while the storm slowly extended itself to the east. On the 9th, the center of the depression moved over New England and Nova Scotia, and then passed beyond the Atlantic coast. In the Lake region the rainfall and dangerous winds appear about equally in all the quadrants of the depression; but along the Atlantic coast, the rain and high winds are generally confined to the east and south quadrants. The 9th was remarkable for the high temperature that prevailed in the Middle Atlantic States after the passage of the storm to the east. The detention of the center of the depression in the Lower Lake region during the night of the 8th and 9th appears to have prevented that sudden fall of temperature that is so marked a feature of the storms of the United States, after the passage of the lowest pressure over any place. In this connection it is noted that at the morning report of the 9th an unusually "steep" thermometric gradient is shown in the Saint Lawrence Valley and Lower Lake region. On the south side the temperatures were Rochester, 52°; Oswego, 54°; Burlington, Vt., 59°; Chatham, N. B., 55°; and on the north side Toronto, 39°; Kingston, 39°; Montreal, 39°; Quebec, 36°; Father Point, 34°. During the day of the 9th the weather in the Middle States was mild and fair, but as the cold wave moved slowly to the south, entire cloudiness was caused by the sudden fall of temperature in a moist atmosphere, and at the afternoon report of the 10th threatening rainy weather and high northerly winds prevailed over the Middle Atlantic States, with a general fall in temperature, exceeding 15° in twenty-four hours.

No. VI.—On the 10th there was a marked fall of pressure on the Pacific coast near Oregon, with a rise on the 11th, but so many reports of that date are missing that the track of this depression cannot be charted until the afternoon of the 12th, when the lowest pressure was in Utah, to the north of Salt Lake. The center of the depression moved slowly to the southeast until the midnight of the 13th, when the lowest barometer was in the Indian Territory, nearly south of Fort Dodge, Kans. On the 14th the depression moved into the Upper Mississippi Valley, showing only slight energy. On the 15th the low area moved slowly to the northeast with diminishing energy and with the barometer continually rising at the center of the depression. On the 16th it moved into the Gulf of Saint Lawrence. This depression was accompanied by light precipitation and the winds were seldom high.

No. VII.—While the low area just described was central near Lake Huron, there appeared on the afternoon of the 15th a slight depression in Dakota, which on the 16th moved in an easterly track over the Northwest and Wisconsin, and on the 17th and 18th, pursuing the same course, passed north of the Lower Lakes and thence moved over New England into Nova Scotia. This storm, which continually increased in energy, had for a great part of its track its center north of our stations; it was accompanied by light precipitation, but the winds in the Lake region and on the Atlantic coast were in general dangerous. It was followed by rapidly rising barometer.

No. VIII.—On the 15th the pressure fell in Oregon and Washington Territory, and the reports of disasters show that the storm must have been very severe on that coast. On the 16th the center of the depression moved in a southeasterly track into Utah. On the 17th, inclining more to the south, the course of the center was into New Mexico, west of the Rio Grande. On the 18th the depression moved slowly to the east, into Western Texas. On the 19th, the storm increasing very rapidly in energy, moved into Middle Texas. On the 20th the storm-center moved to the northeast into Arkansas. At the end of this day the depression was situated in a trough of low pressure extending from Manitoba to the Gulf. On the 21st, there were two distinct depressions formed from this trough, one situated in Minnesota (No. IX), and the other, the one now being described, being in the South Atlantic States. On the 22d the storm remained nearly stationary, the center of lowest pressure being "out at sea" a short distance east of the Georgia and South Carolina coast. On the 23d the storm moved in a northerly track over the Carolinas. On the 24th the depression moved in a path slightly to the west of north. At the morning report of the 25th the center of low barometer was in Southern Michigan, and after this report this storm seems to have been merged in the new storm-center, No. XI, then entering Missouri and Illinois. It was during the night of the 23d and 24th, when the center of this storm was in West Virginia, that the United States steamer Huron was wrecked on the North Carolina coast, at Nag's Head, fifty miles north of Cape Hatteras. A southeasterly wind was blowing, with a heavy southeast swell, at the scene of this disaster.* This storm de-

* None of the life-saving stations on this coast are manned until December 1. The nearest sea-coast station of the Signal Service was at the life-saving station Kittyhawk, eight miles distant from the disaster. Information of the wreck was received there, through two fishermen, between ten and eleven a. m. A dispatch as follows was received at this office, at 11.35 a. m.: "To the Chief Signal Officer, Washington, D. C.: U. S. steamer Huron struck two miles north of No. 7 Station, at 1.30 a. m.; foremast and main-topmast gone; steamer a total wreck; assistance needed immediately. The sea is breaking over her and several have already washed ashore drowned. Number on board, 135. No cargo." (Signed) Naylor, Sergeant. A copy of this dispatch was immediately furnished for the information of the Secretary of the Navy and the Chief of the Life-Saving Service, by whom orders were at once telegraphed to the proper authorities. Instructions were sent from this office, between 12 and 1 p. m., to keep open telegraphic communications, day and night, between Norfolk and Kittyhawk, and that a

veloped more energy on the 23d and 24th than at any other part of its course; from the morning of the 22d until it becomes merged with low area No. XI, the direction of its charted track slightly to the west of north is very remarkable. An examination of the weather charts of this office shows that during this period the barometer was unusually high in the Middle States, New England, and Nova Scotia, and that in general the center of highest pressure was to the northeast of the center of depression, while at no time does the barometer to the west and north of the storm appear to have been very high or to have risen rapidly, or to have shown the usual diminution of temperature after the passage of the lowest pressure.

No. IX.—While the low area just described was in the West Gulf States another depression was entering Dakota and Minnesota. The center of low barometer moved in an easterly track over Minnesota, and on the 21st passed beyond the northern limit of our reporting stations; it possessed no special features.

Nos. X and XI.—On the 20th and 21st there was an unusual fall of the barometer on the Pacific slope, and on the 22d there appears to have been an area of low pressure of great extent over the region north of latitude 35° N. and west of the Missouri River, and thence extending to the Pacific coast. On the afternoon of the 23d there appears to have been developed, from the low area just noted, two distinct centers of depression. The northerly depression, then central near Bismarck, has its track charted as No. X, and the southerly depression, then central in Northern Colorado, has its track charted as No. XI. Low area No. X pursued on the 23d and 24th an easterly track over Dakota and Minnesota, and on the 24th disappeared beyond and to the north of Lake Superior. Depression No. XI was, at midnight of the 23d, central in Southern Colorado; on the 24th it moved with an easterly course into Western Arkansas, developing, during the day, increased energy; on the 25th the storm had advanced in a northeasterly direction into Southern Indiana, the barometer continuing to fall at the center of the depression. At the end of this day an unusually high barometer in Nova Scotia barred the path of this storm to the northeast, while to the west and north the pressure was below the mean; under these circumstances, on the 26th, the storm-center pursued a northerly path into the Upper Lake region. This was the second time during the month that a storm had been diverted to the north when a very high pressure stood to the northeast of the storm-center, there being, at the same time, a deficiency in pressure to the north and west of the storm-center (see description of No. VIII). On the 27th, the depression moved in a northeasterly track, beyond Lake Huron into Canada; during the progress of this storm, dangerous winds prevailed along the Atlantic coast, north of Cape Hatteras, and in the Lake region.

No. XII.—This is probably the storm reported by the Princess Beatrice as being near the Leeward Islands on the 23d, 24th, and 25th. On the afternoon of the 28th, in the South Atlantic States, there was a decided fall of pressure, and this fall taken in connection with the wind directions on that coast indicated a storm-center of considerable energy in or near the Gulf Stream and east of Florida. The fall of the barometer, and the backing of the wind along the Atlantic coast, shows that on the 28th and 29th this storm pursued a track slightly to the east of north until it is found at midnight of the 29th central near Halifax. The next day it disappeared beyond Nova Scotia.

## INTERNATIONAL METEOROLOGY.

*Storms at sea.*—The following notes of storms have come to hand: Sept. 13th, 26° 22′ N., 58° 54′ W., hurricane. 15th, 27° 02′ N., 31° W., hurricane lasting until 7 a. m. of the 16th. 16th, 27° N., 52° W., hurricane. 22d, Haiton Island, Formosa Channel, China, typhoon. 28th, NE. to SE. hurricane, 34° 02′ N., 76° 20′ W. Oct. 6th, off Cape Finisterre, SW. hurricane. Nov. 2d, W. hurricane 50° 05′ N., 21° 45′ W. 6th, terrific northwest to southeast gale, 41° N., 64° W.; northwest hurricane, 49° 02′ N., 32° 01′ W. 7th, hurricane, 49° 33′ N., 36° 47′ W. 8th, violent gales with hurricane squalls, 49° 15′ N., 39° 02′ W.; 47° 21′ N., 43° 34′ W.; 46° 23′ N., 35° 18′ W.; 47° 45′ N., 33° 35′ W.; 49° 38′ N., 39° 53′ W. 9th, violent gales with hurricane squalls, 49° 04′ N., 29° 48′ W.; 47° 19′ N., 33° 38′ W.; 49° 18′ N., 41° 19′ W. 10th, hurricanes, 46° 56′ N., 43° 19′ W.; 49° 33′ N.,

flag-man should be sent immediately to the scene of the wreck to open communication with the ship, or vessels aiding, and promptly forward all information to this office. Sergeant Naylor—who had gone to scene of wreck in person, carrying medicines, &c.—returned to Kittyhawk at 6 p. m., and forwarded to this office a report, giving all information he had obtained, number of officers and men saved, &c. A telegraph station was opened, before daylight of next day, abreast of wreck, where, during the day, flag-communication was had with the aiding vessels.

From that time there has been a telegraphic station open at the scene of the wreck, where the number of messages received, relative to the wreck, up to December 11, was two hundred and fifty-seven, and sent three hundred and four. During the severe storm then experienced on that coast, and since, the telegraph lines of the Signal Service, from Norfolk to the wreck, continued to work. The sea-coast telegraph of the Signal Service is used for the purpose of transmitting meteorological observations, for connecting life-saving stations or light-houses, for giving notice of apprehended storms, by the display of signals, and information of shipwrecks. The line is constructed near the beach, so that a telegraph-station may be opened abreast of any wreck. All the stations are equipped with all that is required to open communication with ships in danger, in either the Signal Service or International code.

22° 32′ W.; 48° 28′ N., 33° 26′ W. 11th, gales with hurricane squalls, 49° 14′ N., 25° 37′ W.; 47° 43′ N., 36° 10′ W.; 54° 36′ N., 30° 08′ W.; 49° 50′ N., 16° 41′ W.; 50° 45′ N., 19° 12′ W.; 49° 13′ N., 16° 25′ W. (fire-ball exploded close to ship with loud report); 48° N., 26° W. 14th, hurricane, 37° 30′ N., 18° 40′ W. 22d, British Isles, gales, high tides, and floods. 25th, British Isles, strong NE. gale and floods.

TEMPERATURE OF THE AIR.

*In general.*—The general distribution of the temperature of the air is shown by the isotherms on chart No. II. The table of comparative temperatures in the left-hand corner of same chart shows the temperature of the month to have been unusually high over the northern section of the country, especially in Minnesota, the Lake region, Middle States, and New England; about normal in the Lower Missouri Valley, and below normal in the Gulf States and Texas.

*Monthly mean temperatures at special points* have been as follows: Mount Washington, 21° and Pike's Peak 6°.

*Maximum and minimum temperatures.*—Maximum temperatures at Signal Service stations above 80° are reported as follows: 89° at Key West; 86° at Los Angeles and Fort Griffin; 85° at Laredo; 84° at Jacksonville; 83° at Wilmington; 82° at Indianola and Stockton; 81° at Savannah, Saint Mark's, Eagle Pass, and 80° at Charleston, Tybee Island, and Brackettville. Other stations than those of the Signal Service have reported as follows: 82° Fort Barrancas, Fla., Baton Rouge Barracks, La.; 85° Saint Augustine, Fla.; 87° Houston, Fla.

*Minimum temperatures*, at Signal Service stations, below zero: —28° at Pike's Peak; —18° at Denver; —12° at Cheyenne; —10° at North Platte; —6° at Bismarck; —5° at Yankton; —4° at Breckenridge and Pembina; —2° at Omaha; —1° at Mount Washington.

At stations other than those of the Signal Service: —2°, Fort Larned and Great Bend, Kans., Guttenburg and Tabor, Iowa; —3°, Fort Lyon and Golden, Colo., Norfolk and Plattsburg, Nebr.; —4°, Fort Pembina, Dak., Boonsboro', Iowa; —5°, Fort Hartsuff, Nebr.; —6°, S. Pueblo, Colo., Neillsonville, Miss.; —7°, Fort McPherson, Nebr., Vail, Iowa; —8° Fort Rice; —9°, Fort Lincoln, Dak., Colorado Springs, Colo., and Nora Springs, Iowa; —10°, Fort Hayes, Kans., Byron and Cresco, Iowa; —12°, Fort Union, N. Mex., Camp Sheridan, Nebr.; —14°, Camp Brown, N. Y., Fort Randall, Dak.; —16°, Sydney Barracks, Nebr.; —18°, Fort Steele, N. Y.; —22°, Fort Sanders, N. Y., and at Fort Garland, Colo.

*Ranges of temperature.*—Large monthly and diurnal ranges have been respectively as follows: Denver, monthly, 85°, diurnal, 38°; North Platte, 78° and 42°; Dodge City, 71° and 40°; Fort Griffin, 71° and 39°; Stockton, 68° and 44°; Mason, 63° and 38°; Yankton, 62° and 30°; Bismarck, 62° and 37°; Pembina and Breckenridge, 58° and 38°; Winnemucca, 50° and 45°; Knoxville, 51° and 39°.

The smallest ranges have been, San Francisco, 20° and 14°; Key West, 35° and 12°; San Diego, 31° and 23°; Sacramento, 33° and 27°; Red Bluff, 34° and 26°; Thatcher's Island, 31° and 22°; Eastport, 27° and 26°; Alpena, 36° and 19°, and Escanaba, 31° and 21°. Small daily ranges have also occurred at Galveston, 19°, and New Orleans, Tybee, Sandy Hook, and New York, 21°.

Frosts were reported on nearly every day during the month in the following sections: Rocky Mountain region, Northwest, Lake region and Ohio Valley, Middle States, and New England. In the following States frosts were reported as follows: 1st, Texas, South Carolina; 3d, North Carolina, Tennessee; 4th, Alabama, Georgia, South Carolina, North Carolina, Tennessee; 5th, Texas, North Carolina; 6th, Georgia, North Carolina, Tennessee; 7th, Louisiana, Mississippi, Georgia, North Carolina, Tennessee, Texas; 9th, Texas; 10th, Texas, Louisiana, Georgia, North Carolina, Tennessee; 11th, Texas, Louisiana, Alabama, Mississippi, Georgia, Florida, South Carolina, North Carolina, Tennessee; 12th, Texas, Louisiana, Alabama, Mississippi, Georgia, Florida, South Carolina, North Carolina, Tennessee; 13th, Alabama, Mississippi, Georgia, Florida, South Carolina, North Carolina, Tennessee; 14th, North Carolina; 19th, North Carolina, Tennessee; 22d, Texas, Louisiana; 23d, Louisiana; 24th, Mississippi, Florida; 25th, Texas, Mississippi, Georgia, Florida; 26th, Texas, Louisiana, Mississippi, Georgia; 27th, Texas, Mississippi, Tennessee; 28th, Texas, Mississippi, Georgia, North Carolina; 29th, Texas, Louisiana, Mississippi, Georgia, North Carolina, Tennessee; 30th, Texas, Louisiana, Alabama, Mississippi, Georgia, Florida, North Carolina, Tennessee.

*Ice.*—Under the head of navigation will be found the freezing over of rivers. In Dakota and Minnesota the surface of water has continued frozen throughout most of the month; elsewhere ice has occurred as follows: 1st, Louisiana, Michigan, Ohio, Virginia, New Jersey; 2d, Kansas; 3d, Kansas, Missouri, Illinois, Indiana, Ohio, one-third inch; 4th, Kansas, Michigan, West Virginia, Maryland, Pennsylvania, New Jersey, New York, Massachusetts; 5th, Nebraska, Kansas, New York; 6th, Kansas, 1 inch; Indian Territory, Texas, one-eighth inch; Missouri, Illinois, Michigan, Indiana, Ohio, Kentucky, Tennessee, Virginia, Maryland, one-half inch, Pennsylvania, one-half

inch, New York; 7th, Kentucky, Tennessee, South Carolina, North Carolina, one-tenth inch, Virginia, one-fourth inch, New Jersey, New York, one-eighth inch, Connecticut, Rhode Island; 8th, New York, Connecticut; 9th, Kansas, Ohio; 10th, Indian Territory, Texas, Illinois, Indiana, Ohio; 11th, Kansas, Texas, Louisiana, Indiana, Ohio, Tennessee, Mississippi, Georgia, North Carolina; 12th, Texas, Ohio, North Carolina, Pennsylvania, New Jersey, New York, one-eighth inch, Connecticut; 13th, Illinois, Michigan, Georgia, North Carolina; 14th, Maine; 19th, Pennsylvania, Connecticut; 20th, Pennsylvania, Connecticut, New Hampshire; 21st, South Carolina, New Hampshire; 23d, Texas; 27th, Kansas, Texas; 28th, Texas, Iowa, Illinois; 29th, Nebraska, Kansas, Texas, one-half inch, Iowa, Louisiana, 2 inches, Wisconsin, Mississippi, Alabama; 30th, Nebraska, Kansas, 1½ inches, Texas, one-eighth inch, Iowa, Wisconsin, Indiana, 2½ inches, Ohio, Alabama, one-half inch, Georgia, Florida, three-sixteenths inch, North Carolina, Virginia, Connecticut.

### PRECIPITATION.

*In general.*—The general distribution of rain for the month is shown on chart No. III. The table in the lower left-hand corner gives the average precipitation in the various districts, and shows a large excess over the November mean in the Gulf and Atlantic States, Lake region, and Saint Lawrence Valley and a deficiency in the extreme Northwest, where most of the precipitation has occurred as snow. In Oregon there has also been a large excess. Most of the precipitation fell as heavy rains, as will be seen by the following list, and during the passage of the storms Nos. I, V, and VIII.

*Special heavy rains.*—The following notable cases of heavy rains have been reported: 1st, Belmont Farm, Tex., 7 inches; Point Pleasant, La., 3.95 inches. 8th, Point Pleasant, La., 6.80 inches; Carlisle, Pa., 3 inches; Charleston, S. C., 4.17 inches. 9th, Mystic, Conn., 3.20 inches; Fall River, Mass., 3 inches; Garrison, N. Y. (8th, 9th), 3.64 inches; Mount Washington, N. H. (8th, 9th), 4.74 inches; Colebrook, Conn. (8th, 9th), 3.60 inches. 11th and 12th, San Luis Rey Valley, 2.50 to 3.50 inches; Temecula, 3 inches; on the Cajon, 3 inches. 17th, Belmont Farm, Tex. (16th, 17th), 4 inches. 20th, New Orleans, La. (19th, 20th), 3.06 inches; Fort Barrancas, Fla., 4.30 inches in 7½ hours; Point Pleasant, La., 7.10 inches; Fort Sill, Ind. T. (19th, 20th), 3.85 inches. 21st, Augusta, Ga., 3.07 inches. 23d, Spartanburg, S. C. (21st, 23d), 3 inches; Statesville, N. C. (23d), 4.50 inches; Wytheville, W. Va. (22d, 23d), 4.30 inches; Smithville, N. C. (22d, 23d), 4.10 inches. 24th, Mount Solon, Va., 4.65 inches; Sandy Springs, Md. (23d, 24th), 5 inches; Boonsboro', Va., 4.50 inches; Dover, Del. (23d, 24th), 3.30 inches; Owing's Mills, Md. (23d, 24th), 3.81 inches; Carlisle, Pa., 3.20 inches; Snowville, Va. (21st, 24th), 3.50 inches; Atlantic City, N. J., 3.09 inches; Lynchburg, Va. (22d to 24th), 6.07 inches. 25th, New Market, Md., Emmittsburg, Md., 3.78 inches (22d, 25th), 5.62 inches; Fallston, Md. (24th, 25th), 4.50 inches; Barnegat, N. J. (24th, 25th), 5.33 inches; Milford, Del. (23d, 25th), 3.50 inches; 26th, Mechanics' Falls, Me., 3.47 inches; Woodstock, Md., 3.51 inches; Lawrence, Mass. (26th, 27th), 3.47 inches; Somerset, Mass. (25th, 26th), 2.99 inches; Green Castle, Pa. (22d, 26th), 3.92 inches; Fort Preble, Me. (25th, 26th), 3.25 inches; New Bedford, Mass., 2.98 inches; Boston, Mass. (25th, 26th), 3.95 inches; Portland, Me. (25th, 26th), 4.16 inches; Wood's Holl, Mass. (25th, 26th), 3.55 inches; Fall River, Mass. (25th, 26th), 2.98 inches; Auburn, N. H. (25th, 26th), 4 inches. 27th, West Waterville, Me., 3 inches; Waltham, Mass. (25th, 27th), 4.46 inches; Orono, Me. (26th, 27th), 2.60 inches; Cornish, Me., 4.08 inches; Gardiner, Me. (26th, 27th), 3.80 inches; Mount Washington, N. H. (26th, 27th), 4.80 inches; Standish, Me. (25th, 27th), 4.41 inches; Milton, Mass. (26th, 27th), 3 inches.

*Large monthly rainfalls.*—The following stations report large monthly rainfalls: Point Pleasant, La., 20.89 inches; Mount Washington, 17.56 inches; Cape Lookout, N. C., 12.23 inches; Portland, Oreg., 12.45; New Market and Fallston, Md,, over 10 inches; Boston and Lynchburg, 9.65 inches; Woodstock, Md., 9.83 inches; Emmitsburg, Md., 9.94 inches; Sandy Springs, Md., 9.75 inches.

*Small monthly rainfalls.*—The following stations report little or no rain: Pioche, Nev., none; Sidney Barracks, Nebr., none: San Diego, Cal., .06 inch; Fort Wallace, Kans., .06 inch; Fort Sanders, N. Y., .09 inch; Camp Brown, N. Y., .18 inch; Fort Lyon, Colo., .14 inch; Fort Larned, Kans., .20 inch; Rio Grande, Tex., .13 inch; Eagle Pass, Tex., .25 inch; Breckenridge, Minn., .29 inch; North Platte, Nebr., .30 inch; Bismarck, Dak., .40 inch.

*Floods.*—Special heavy floods followed the rains of the 24th and 25th, accompanying storm No. VIII, on Chart No. I, during its northward course from South Carolina to West Virginia. The following items will serve to give some idea of the severity of these floods: The Savannah River reached its maximum height, 23 feet 10 inches, at Augusta, about 7 p. m. of the 23d, when the lower portion of the city was flooded; Chervis and Horn's Creeks were higher than ever before recorded. Fishing Creek, York County, South Carolina, "highest water ever known"; train wrecked. The Roanoke River, at Weldon, N. C., rose 6 feet 9 inches higher than highest water-mark known, sweeping away two railroad-bridges. The Dan River, at Danville, Va.,

"within one foot of highest water-mark ever known"; Little and Big Sandy Rivers "higher than ever known." In Pittsylvania and Henry Counties, Virginia, and Caswell and Rockingham Counties, North Carolina, the streams all overflowed, doing immense damage; in Fall Creek, "every bridge swept away." The James River, at Buchanan, rose 6 feet higher than during the freshet of 1842; the railroad lumber-house, which was several feet above the high water of 1842, was swept away; immense damage was done to the James River and Kanawha Canal. At Lynchburg, the water reached within 3 feet of the great freshet of 1870, the maximum of flood being 33 feet; the Amherst and two other bridges were swept away. At Richmond, at 10 p. m. of the 25th, the river rose 24 feet 7 inches above ordinary high tide, or 2 feet 1 inch above high-water mark of 1870; the river, which is here usually about 200 yards wide, was now from 2 to 3 miles wide, flooding the whole river-front of the city to the house-tops. The city of Manchester, opposite Richmond, was nearly half under water. The Rivanna, North Anna, and Jacksons Rivers "all as high as 1870," the Rivanna causing great damage at Charlottesville. The Rappahannock, at Fredericksburg, rose 22 feet above ordinary water. The North Branch of the Potomac, at Piedmont, was stated to be higher than since 1810; along the course of the South Branch immense damage was done. At the junction of the Potomac and Shenandoah, on the 25th, at 3 p. m., both rivers were 26 feet above low-water mark, or 3 feet higher than in 1870. Considerable damage was done in all these valleys. Conococheague Creek, rising in South Mountain, Franklin County, Pennsylvania, rose 4 feet higher than highest water-mark known, or 15 feet above ordinary level, at Chambersburg, at midnight of the 24th, doing considerable damage. In Washington, Baltimore, and Philadelphia, the wharves and streets along the river-banks were submerged. In Georgetown, D. C., at 7 p. m. of the 24th, the Potomac was 3 feet and 9 inches below level of wharf at foot of Washington street; and at 1 a. m. of the 26th, when the highest point was reached, it was 6 feet and half an inch above the wharf. In Maine, severe freshets also occurred on the 26th, in the Passumpsic, Androscoggin, and Kennebec Rivers.

*Hail* occurred on the 1st, Illinois; 2d, Ohio; 3d, New York, Iowa; 6th, Idaho Territory; 10th, Connecticut; 13th, Kansas; 15th, Alabama; 16th, Illinois, Massachusetts, Texas; 17th, Massachusetts, Pennsylvania; 23d, Kansas, Idaho Territory; 24th, Kansas; 26th, Tennessee; 27th, Massachusetts, Indiana; 28th, Pennsylvania; 30th, Nebraska.

*Snow.*—During the month, snow fell as follows: From the 1st to the 10th, 16th to 19th, and 27th to 30th, snow fell over the entire country from Wyoming and Colorado eastward over the Northwest and Lake region to New England. From the 5th to the 11th, occasional snow fell in Nevada, Utah, New Mexico, Texas, Indian Territory, Missouri, North Carolina, Maryland, and New Jersey; from the 13th to the 18th in Nevada, New Mexico; from the 21st to 27th, in Idaho, Nevada, and New Mexico; and from 29th to 30th, in Indian Territory, Tennessee, Kentucky, West Virginia, North Carolina, Virginia, Maryland, New Jersey. At the end of the month, the depth of snow was reported as follows: Summit of Mount Washington, 18 inches; Pike's Peak, 12 inches; in Wisconsin, from 1 to 13 inches; in New York and New Jersey, from ½ to 8 inches; in Michigan and Pennsylvania, ½ to 5 inches; in Nebraska, Dakota, Minnesota, Iowa, and Illinois, 1-10 to 4 inches; in Wyoming, Colorado, Kansas, Indiana, Vermont, and Maine, 1-10 to 2 inches; in Ohio, 1-20 to ½ inch; West Virginia, 1-10; Virginia, ½ inch.

*Rainy days.*—The number of days on which rain has fallen, as recorded by the Signal-Service observers, ranges as follows: New England, 11 to 17; Middle Atlantic States, 11 to 14; South Atlantic States, 9 to 14; East Gulf States, 12 to 16; West Gulf States, 7 to 10; Tennessee and Ohio Valley, 12 to 18; Missouri Valley, 11 to 17; Upper Mississippi Valley, 13 to 19; Upper Lake region, 11 to 20; Lower Lake region, 16 to 22; Rocky Mountain stations, 3 to 9; California, 0 to 8; Oregon, 13 to 23.

*Cloudy days.*—The number of cloudy days reported during the month by voluntary observers and Army surgeons ranges about as follows: New England, 5 to 21; Middle Atlantic States, 5 to 22; South Atlantic States, 3 to 11; East Gulf States, 7 to 16; West Gulf States, 2 to 18; Tennessee and Ohio Valley, 2 to 19; Lower Missouri Valley, 2 to 17; Upper Mississippi Valley, 2 to 19; Upper Lake region, 7 to 18; Lower Lake region, 5 to 19; Rocky Mountain stations, 4 to 12; California, 1 to 17.

### RELATIVE HUMIDITY.

The average relative humidity for the month ranges about as follows: For New England, 67 to 77; Middle Atlantic States, 59 to 77; South Atlantic States, 71 to 77; East Gulf States, 68 to 76; West Gulf States, 65 to 72; Tennessee and the Ohio Valley, 64 to 73; Lower Lakes, 63 to 78; Upper Lakes, 70 to 82; Upper Mississippi Valley, 67 to 80; Lower Missouri Valley, 67 to 74; California coast, 55 to 75; Sacramento Valley, 70 to 74. High stations report the following average percentages, not corrected for altitude: Cheyenne, 65; Denver, 49; Mount Washington, 88; Pike's Peak, 63; Salt Lake City, 55; Santa Fé, 49; Winnemucca, 64.

## WINDS.

*In general.*—The prevailing winds at Signal Service stations are shown by the arrows on Chart No. II, from which it will be seen that northwesterly or northerly winds have generally prevailed over the entire country, except in the Lake region, where they have been westerly or southerly, along the South Atlantic and East Gulf coasts, where they have been more northeasterly, and in Oregon and Idaho, where they have been southerly.

*Total movements.*—The largest total movements have been as follows: Pike's Peak, 18,131 miles; Cape May, 14,360; Sandy Hook, 13,619; Cape Lookout, 13,298; Kitty-hawk, 12,239; Barnegat, 11,958; Cape Hatteras, 11,099; Cape Henry, 11,026; Dodge City, 11,060; Indianola, 11,081; Thatcher's Island, 11,670; Breckenridge, 10,713; North Platte, 10,365; Sandusky, 10,130. On Mount Washington the total movement is not recorded, but hurricane winds prevailed continuously from the 2d to the 9th, from the 12th to the 19th, and again on the 26th and 27th, velocities of 120 miles per hour being frequently recorded.

The least movements have been as follows: La Mesilla, N. M., 1,146 miles; Roseburg, Oreg., 2,006; Visalia, Cal., 1,301; Boisé City, Idaho, 2,793; Lynchburg, 2,633; and Augusta, 3,233.

*The highest velocities* in miles per hour have been as follows: Mount Washington, N.W., 132 miles on the 12th; Pike's Peak, N., 80, 29th; Wood's Holl, S., 64, and New London, S.W., 63, on the 2d; Bismarck, N., 60, 26th; Buffalo, W., 60, 2d; Cape Lookout, S.E., 60, on the 8th and 24th; Escanaba, N., 60, 8th; North Platte, N.W., 62, 8th; Philadelphia, E., 60, 24th.

*Local storms, tornadoes, &c.*, as distinct from extended storm-areas, have occurred as follows: November 2, at Mattewan, on the Hudson, buildings were blown down; at Winslow, Seaside, Heightstown, and Coney Island, N. J., and Brooklyn, N. Y., considerable damage was done to buildings; a southeast tornado was reported at Long Branch; almost a hurricane at Newport; Fall River, Mass., violent cyclone; Trenton, N. J., at 2 p. m., a "terrific squall occurred, which swept before it trees, fences, telegraph wires, &c., and did considerable damage to buildings; several houses were blown down, and others unroofed." Hamilton Square, N. J., shortly after 3 o'clock in the afternoon, the wind, which had been severe all day, terminated in a hurricane; it struck the village in the southwest and passed to the northeast, scattering destruction in its path; it seemed to be only a few hundred yards in width, and lasted only a few minutes; considerable damage was done to buildings, &c. 18th, Burton, Washington County, Texas, severe wind-storm at 7 p. m.; a two-story frame building blown into fragments. On the 16th, at Red Bluff, Cal., after a severe thunder-storm attended by hail, a water-spout was observed, preceded by a low, rumbling noise; the stream of water was distinctly visible and continued for about 15 minutes, when it gradually disappeared. This occurred over the open country, and caused a stream of water 10 to 15 feet deep in a ravine where water is unknown except during heavy rains.

## VERIFICATIONS.

*Indications.*—The detailed comparison of the tri-daily weather indications, with the telegraphic reports for the succeeding twenty-four hours, shows a general percentage of omissions of 0.3 per cent. and of verifications of 87.2 per cent. The percentages of verifications for the four elements have been: Weather, 90.9; wind, 83.3; temperature, 89.2; barometer, 85.3. The percentages of verifications by geographical districts have been: New England, 90.0; Middle Atlantic States, 86.8; South Atlantic States, 85.0; East Gulf States, 86.7; West Gulf States, 87.6; Lower Lake Region, 85.7; Upper Lake Region, 87.6; Tennessee and the Ohio Valley, 88.6; Upper Mississippi Valley, 86.7; Lower Missouri Valley, 87.2.

Of the 3,588 predictions that have been made, 77, or 2.2 per cent., are considered to have entirely failed; 105, or 2.8 per cent., were one-fourth verified; 387, or 10.8 per cent., were half verified; 397, or 11.0 per cent., were three-fourths verified; 2,622, or 72.8 per cent., were fully verified, so far as can be judged from the weather maps.

*Cautionary signals.*—During the past month 251 cautionary signals have been displayed at 47 stations on the Gulf and Atlantic coasts and on the lakes, of which 219, or 87.2 per cent., were reported verified within 100 miles of the station. Two signals were ordered up "late" and one was ordered down too soon. Forty-eight cases of high winds, where no signals were displayed, have also been reported from these stations.

*Sunsets.*—The characteristics of the sky, as indicative of approaching fair or foul weather, have been observed daily at all regular Signal Service stations. Reports from 102 stations show 63 blank or, doubtful cases; for the remaining 2,997 cases, 2,515, or 83.9 per cent., were followed by the anticipated weather.

## NAVIGATION.

*Stages of water in rivers.*—In the table on chart No. III are given the highest and lowest readings on the Signal Service river-gauges, and dates of same, from which it

will be seen that the rivers generally rose towards the end of the month, the highest readings occurring from the 23d to the 30th. With regard to the close of navigation on rivers and lakes, the following notes are to hand: Red River of the North was frozen over at Pembina on the 5th, and navigation north of Pembina was generally closed after the 9th, but at end of month the river was reported still open at several places. Lake Superior, November 12, steamer Ontario sailed from Duluth on her last trip; 28th, Marquette, last vessel of season left. Missouri River, Bismarck, 8th, heavy ice in river, navigation about closed on the Upper Missouri; 28th, navigation closed at Bismarck; 29th, river frozen over; Yankton, 11th, ice in river, 29th, frozen over; Omaha, 30th, floating ice commenced to gorge above bridge; Atchison, Kans., 30th, ice gorge—river closed; Leavenworth, 29th, river filled with floating ice, partially frozen over. Upper Mississippi, Saint Paul, 6th, floating ice, 27th, closed, 30th, frozen over; La Crosse, 26th, floating ice, navigation closed; Dubuque, 29th, floating ice, 30th, river gorged; Davenport and Burlington, 29th, floating ice first of season, 30th, navigation closed; Keokuk, 29th, floating ice, canal frozen over, 30th, river full of floating ice. Illinois River, La Salle, 30th, river and canal frozen over. Rock River, Ill., at Rockford, 6th, frozen over. Lake Ontario, Rochester, 21st, navigation closed. Red River, Shreveport, navigation during entire month good for largest boats.

*Special high tides* have prevailed throughout the month along the Atlantic coast. November 2, Ocean Beach, N. J., inundated and high tides were reported generally from New Jersey to Maine; at Providence, R. I., and New London, Conn., trains were delayed and damage done to shipping; at Eastport, Me., the wharves were damaged. Portsmouth, N. C., reports remarkably high tides throughout the month. Buffalo, November 2, high tide, flooding lower portion of city. Chicago, November 8, lake front much damaged by high tides; boat-houses demolished and several schooners wrecked.

*Special river reports.*—The channel of the Missouri River at Omaha still continues to approach the Nebraska shore.

### TEMPERATURE OF WATER.

*In general.*—The temperatures of water, as observed in rivers and harbors, are shown on the chart No. III.

*Maximum and minimum temperatures.*—The highest maxima have been: 84°.2 at Key West; 73° at Galveston; 71°.5 at Charleston; 71° at Jacksonville; 70° at Saint Mark's and Shreveport. The lowest minima have been: 30° at Saint Paul; 31 at Keokuk and La Crosse; 32° at Yankton and Omaha; 33° at Alpena; 34° at Sandusky and Toledo; 36° at Chicago, Detriot, Grand Haven, Marquette, and Saint Louis.

*Ranges of temperature.*—The least ranges have been: 3°.5 at Eastport; 4°.5 at Baltimore; 6° at Wilmington and Portland, Me., 7°.5 at New York. The largest ranges have been: 25° at Galveston; 22° at Keokuk; 19° at Toledo and Augusta; 18° at Sandusky and Savannah.

### MISCELLANEOUS PHENOMENA.

*Birds.—Blackbirds* were seen at Mount Sterling, Ill., 6th, flying at New Smyrna, Fla., 23d; millions made their appearance at Decatur, Ala., from 14th to 17th; seen at Oregon, Mo., 5th, 8th, 12th, flying NE. 9th, *Swallows*, last seen at Somerset, Mass., 8th. *Snow-birds*, seen flying about New Bedford, Mass., 6th. *Crows*, flying S. Bellefontaine, Iowa, 10th. *Pelicans*, flying SW. Indianola, 10th. *Blue-birds*, were seen at New Bedford, Mass., 4th. *Cranes*, flying S., Baxter Springs, Kan., 5th; Clear Creek, Neb., 2d; Fayette, Miss., 10th; Fayette, Miss., 2d. *Robins*, last heard, Fort Madison, Iowa, 12th; flying N., Belmont Farm, Tex., 22d; first seen at Fayette, Miss., 16th. *Ducks*, plentiful at Milford, Ind., 10th to 22d; flying S., Monticello, Iowa, 23d; Cairo, Ill., 29th; Vicksburg, Miss., 9th; flying NE. Oregon, Mo., 4th. *English sparrows*, seen at Fall River, Mass., 26th. *Geese*, flying S., Empire City, Kan., 1st; Boonsboro, Iowa, 3d; Cresswell, Kan., 3d; Guttenburg, Iowa, 5th; Baxter Springs, Kan., 5th; Monticello, Iowa, 23d; large flocks, New London, Conn., 10th; Springfield, Mass., 16th; Cape Lookout, N. C., 20th; Davenport, Iowa, 4th; Vicksburg, Miss., 9th; Corsicana, Tex., 9th; Mechanics' Falls, Me., 7th; Fall River, Mass., 14th; Clear Creek, Nebr., 2d, 5th, 8th, 14th, 29th; Hulmesville, Pa., 26th; Chepachet, R. I., 17; Belmont Farm, Tex., 10th; Woodstock, Ver., 10th; New Bedford, Mass., 14th; N. Southington, Conn., 10th; Waldo, Tex., 28th; Oregon, Mo., 18th; plentiful at Milford, Ind., 10th to 22d; flying about Mount Desert, Me., 10th. *Geese*, flying NW., Mount Sterling, Ill., 16th; NE., Oregon, Mo., 4th; E., Nashville, Tenn., 26th; SE., Visalia, Cal., 5th.

*Insects.—Butterflies*, flying about 3d, Saint Meinrad, Ind. *Butterflies*, seen at Alto Vista, Va., 15th. *Grasshoppers*, seen at Hulmeville, Pa., 15th. *Frogs*, singing at Milford, Ind., 10th to 22d.

*Botanical.—Dandelions* in bloom, Freehold, N. J., 29th; Tioga, Pa., 29th. *Hedges* green at Independence, Kan., 5th. *Strawberries* in bloom, Independence, Kan., 5th.

*Sweet corn* matured planted August 5, New Bedford, Mass., 5th. *Roses* in bloom in the garden, New Bedford, Mass., 16th. *Violets* in bloom, New Bedford, Mass., 29th. *Bean* and *pear* in bloom the second time. *Lettuce* the second crop, Wappinger's Falls, N. Y., 3d. *Strawberries* in bloom, 5th, and *violets* and *whortleberries* on the 15th, Alto Vista, Va.

*Polar bands* on the 24th, Nashville, Tenn.; 11th, 17th, Guttenburg, Iowa; 3d, 16th, 17th, 23d, 26th, Tabor, Iowa; 5th, 13th, 17th, 28th, Gardiner, Me.; 9th, Northport, Mich.; 4th, 23th, Wytheville, Va.; 18th, Vicksburg, Miss.

*Smoke.*—7th, New London, Conn.; 18th, Augusta, Ga.; 17th, Rochester, N. Y.; 1st, Detroit, Mich.; 11th, 12th, 13th, and 14th, Bismarck, Dak.; 23d, Saint Paul, Minn.; 2d and 10th, Salt Lake City, Utah; 14th and 16th, Fort Gibson, Ind. T.; 13th, 14th, 15th, 16th, 17th, and 23d, Fort Sill, Ind. T.; 1st, 8th, 24th, and 30th, Sacramento, Cal.

*Prairie fires.*—9th, Bismarck, Dak.; 5th, 9th, 26th, 27th, and 28th, Dodge City, Kan.; 5th, 7th, 9th, 10th, 12th, 14th to 18th, 22d and 23d, Fort Sill, Ind. T.; 16th, Fort Lyon, Cal.; 6th, Fort Pembina, Dak.; 11th, Fort Larned, Kans.; 1st to 12th, 14th to 17th, 21st to 27th, Creswell, Kans.; 26th, 27th, Eagle Pass, Tex.

*Earthquakes* have been reported as follows: on the 4th, earthquake shocks were felt over an extensive area, including New York, New England, and a portion of Canada, as follows: In New York, at Albany, 1.55 to 2 a. m., two distinct shocks, noise quite loud, ceilings cracked; Palermo, 2 a. m., severe shock; Adams, 2 a. m., shock lasting one minute; Geneva, 2 a. m., light shock; Dudley Observatory, 1.53 a. m., several shocks lasting 40″, first shook lasted 10″ and after an interval of 30″ another lighter one was felt; Antwerp, shock buildings, and was accompanied by a roaring sound, movement from SW.; Saratoga, shock most severe on west side of village, dishes, windows, and mirrors broken; previous to shock wind blowing almost a gale; it then suddenly ceased, and for several seconds the silence was painfully quiet, similar to that which usually precedes a cyclone; after the shock the wind rose again; Auburn, vibrations lasting several seconds; damage done to window panes and china; ceiling of house cracked; Troy, atmosphere after the shock became very close, with slight sulphurous odor; Watertown, 2 a. m., shock accompanied by low rumbling sounds; Plattsburg Barracks, 1.55 a. m., slight shock, lasting 15″, W. to E.; Madison Barracks, 2 a. m., shock lasting 15″ N. to S.; Cambridge, 1.55 a. m., slight shock, lasting a few seconds; people awakened and buildings shaken; Glen's Falls, Lake George and Schuylerville, 2 a. m., slight shock, with loud rumbling noise, shaking buildings and breaking crockery; at Utica, and along the Utica and Black River Railroad, 2 a. m., distinct shocks; Whitehall, 2 a. m., severe shock; many ceilings were cracked; Ogdensburg, 2 a. m., heavy shock, passing W. to E., lasting over one minute; Cape Vincent, windows and glasses shaken; at Port Henry, Au Sable Forks, Clayton, Morristown, Carthage, and Louisville, shocks were distinctly felt. Canada, Montreal, 1.49 a. m., severe shock, lasting 20″; motion W. to E.; buildings trembled violently; monuments swayed perceptibly; Saint John's, Quebec, 1.55 a. m.; several shocks, lasting 10″, course W. to E., shaking buildings and upsetting furniture; Bay of Quinte district, shock distinctly felt. Connecticut: New London, vibrations lasting 40″ to 1′, from W. to E.; Hartford, 1.56 a. m., waves ran E. and W.; vibrations were about two in a second, and continued 4 or 5″; Windsor, 1.55 a. m., vibrations continuing several seconds; waves longitudinally N. and S. Vermont: Burlington, 2 a. m., three distinct shocks, lasting 2½″, accompanied by sound like distant thunder; direction a little N. of NE. The water in Mallet's Bay, Lake Champlain, is said to have risen 2 feet during the night; Woodstock, 1.50 a. m., light shock; Montpelier, people awakened by several shocks, lasting 15″. New Hampshire: Lebanon, shock lasted 40″; buildings shaken and bells rung. Massachusetts: Springfield, shock felt at 2 a. m., lasting several seconds from NE. to SW.; Northampton, glass and furniture broken, and people awakened; Amherst, 1 a. m., slight shock. Nebraska: 14th, Kearney Junction, 11.40 a. m., distinct shock lasting 15″. On the 15th, in Colorado, at Julesburg, 1.50 a. m., shock causing buildings to tremble, and accompanied by a low rumbling sound, lasting one minute. Dakota: Yankton 11.38 a. m., severest earthquake ever felt in the valley, some buildings tipped perceptibly and glass was broken, lasting 20″. Morristown, 11.45 a. m., slight shock N. to S. Olivet, 11.45 a. m., slight. Fort Randall, 11.40 a. m., shock lasting one minute, and Springfield, severe shocks. Nebraska: Plattsmouth, 11.57 a. m., earthquake shock lasting 20″, vibrations E. to W.; Wisner, shock at 10.45 a. m., lasting 10″. Omaha, 11.45 a. m. three distinct earthquake shocks, lasting 45″, motion N. and S., shaking buildings; Grand Island, slight shock, lasting a few seconds; North Platte, 11.15 a. m., two distinct shocks, lasting 20′, having an interval of 5″, houses rocked perceptibly, school-house shook so badly as to cause a stampede, one wall was cracked, also wall of court-house, printing cases were overturned; Lincoln, 11.30 a. m., two distinct shocks about 10″ apart, buildings rocked perceptibly, shock produced a peculiar sickening sensation; West Point, 11.40 a. m., two distinct shocks, seemed to be from NW. to SW., buildings swayed, windows rattled, &c.; Sutton, 11.40 a. m., shock very sensibly felt; Alkali, 11.50 a. m., slight shock, lasting about one minute, motion N. to S.; Clarks, 11.36 a. m., shock

plainly felt, lasting nearly one minute, rocked buildings quite perceptibly; Tremont, 11.45 a. m., severe shock, rocked court-house and hotel quite perceptibly; Columbus, 11.40 a. m., severe shock, lasting 30″, from N. to S., court-house split in nine places, school-house walls badly rent, causing a panic among the occupants, clock at the depot stopped at 11.40 a. m.; Big Springs, shock lasted about thirty seconds, from N. to S.; Potter, 11.35 a. m., shock lasted two minutes, shook windows and doors of depot; Ogalalla, about noon, distinct shock, lasting two minutes; Sidney, bet. 11 and 12 a. m., slight shock, causing buildings to tremble; Fort McPherson, 11.34 a. m., shock lasting 10″; Fort Hartsuff, shock lasting 15″, SW. to NE.; De Sota, 12.30 p. m., accompanied by rumbling sound; Genoa, 11.30 a. m., shock. Kansas: Topeka, 12.10 p. m., severe shock, a building seemed to move from N. to S.; Atchison, noon, several distinct shocks. Iowa: Iowa City, 12.30 p. m., severe earthquake shock. Council Bluffs, about 11.45 a. m., quick, successive shocks from NW. to SE.; lasting two minutes; brick buildings threatened; people ran into the streets for safety. Boon, 12.30 p. m., slight shock, lasting a few seconds. Ogden, 2.20 p. m., slight shock. Denison, Ford County, 12.11 p. m., two vibrations from NE. to SW.; felt mostly in brick buildings; chandeliers vibrated several inches. Sioux City, about 11.30 a. m., severe shocks, lasting 15 seconds, creating a panic among the people in Saint Mary's Church and the High School building; one of the walls in the High School building was cracked. Dubuque, 11 a. m., slight shock. Logan, lasting several seconds and shaking buildings. Tabor, 11.45 a. m., 30″ to 40″; shaking buildings. Boonsboro', 12.08 a. m., slight shock. Monticello, noon, slight shock. Missouri: Saint Joseph, about noon, slight but distinct shock. Wisconsin: La Crosse, 11.10 a. m., slight earthquake shock; felt by persons in upper rooms; lasting 3″. Albert Lea and Winnebago City, 3 p. m., slight earthquake shock felt. On the 16th, in Nebraska, at Camp Sheridan, 11.19 a. m., lasting 20″, wave N. and S. Tennessee: Knoxville, 2.38 a. m., violent earthquake shock from SW. to N.; lasting about one minute. North Carolina: Murphy, 2.45 a. m., shock, lasting 15″, from W. to E. Independence, 10.50 a. m., shock lasting 40″; shaking buildings. On the 24th, California, Red Bluff, two shocks, 6.30 and 6.50 a. m.; the first one lasting 20″ and having a motion from E. to W. San Francisco, 6 a. m., slight shock.

*Zodiacal light* was observed as follows: 4th, 25th, and 30th, Savannah, Ga.; 26th, Tybee Island, Ga.; 3d, 6th, 7th, 11th, 12th, 16th to 20th, Saint Mary's Home, Indiana; 3d, 4th, 6th, 7th, 30th, Cambridge, Mass.; 14th, Waterburg, N. Y.

*Meteors* were observed on the 1st, Connecticut, Maryland, Massachusetts, New York, Vermont; 2d, California, Kansas, Maryland, Missouri, New York, Pennsylvania; 3d, Illinois, Iowa, Maryland, Missouri, Ohio; 4th, Maryland, Massachusetts; 6th, Maryland, Massachusetts, New Jersey; 7th, Pennsylvania, Maine; 9th, Massachusetts; 10th, Illinois, New York, Georgia; 11th, Massachusetts, Dakota; 12th, Maryland; 13th, Connecticut, Maryland, Mississippi, New Jersey, New York, Indiana, Idaho; 14th, New York; 15th, Missouri, New Jersey; 16th, Missouri; 17th, Mississippi; 19th, Maryland; 20th, Maryland, North Carolina; 22d, Missouri; 23d, Illinois, Virginia; 25th, Louisiana, New York; 26th, Maryland; 27th, Georgia; 28th, Iowa, Missouri, New Jersey, New York, Idaho; 30th, Kansas, New York, California.

At Richmond, Va., on the 21st, 4.35 p. m., local time, a large and brilliant meteor, pear-shaped in form, about one-eighth the size of a full moon, and resembling a large drop of melted iron, made its appearance. It was first seen in the southwest, at an elevation of about 45°; it then moved downward about 25°, and disappeared. After leaving its first position, it appeared as a thin, straight, and brilliant line, subsequently expanding into a zigzag cloud. At Flushing, N. J., on the 15th, 3 a. m., local time, 70 meteors appeared in 30 minutes.

## OPTICAL PHENOMENA.

*Solar halos* were observed as follows: 1st, Delaware, Maryland; 2d, Texas, California; 3d, Nebraska; 4th, Indiana, Maryland, Massachusetts, New Jersey, Ohio, Rhode Island; 5th, California; 6th, Florida, California; 7th, Indiana, Michigan, Ohio; 8th, Maine, Massachusetts, Rhode Island, California; 9th, California; 10th, Ohio; 11th, Illinois, Texas, California; 12th, Louisiana; 13th, Illinois, Iowa, Mississippi, Connecticut; 14th, Indiana, Maine, New Jersey, Ohio, Connecticut, Virginia, Kentucky, West Virginia, California; 15th, Connecticut, Delaware, Massachusetts, New Hampshire, New Jersey, North Carolina, Texas, Rhode Island, Georgia; 16th, Illinois, Indiana; 17th, Maine, New Hampshire; 18th, Illinois, Nebraska; 19th, Connecticut, New York, Tennessee, Rhode Island, South Carolina; 20th, Illinois, Indiana, Ohio, California; 21st, Maryland, Pennsylvania, Virginia, Colorado, California; 22d, Iowa, Louisiana, Mississippi, New Jersey, Alabama, New Hampshire, California; 23d, California; 24th, Dakota, Rhode Island, Connecticut; 25th, Kansas, South Carolina, Georgia; 27th, Nebraska, Rhode Island, Connecticut, Colorado; 28th, Connecticut, Dakota; 29th, Dakota, Illinois, Iowa, Kansas, Nebraska; 30th, California.

*Lunar halos.*—9th, Minnesota, Nebraska; 10th, Minnesota; 11th, Minnesota, Missouri, California, Texas, Louisiana; 12th, Connecticut, Minnesota, Missouri, Nebraska, Texas, Iowa; 13th, Maine, Connecticut, Michigan, Ohio, Minnesota, West Virginia, Texas, California, Idaho, Louisiana, Illinois, New Jersey, Pennsylvania; 14th, Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New Jersey, Pennsylvania, Maryland, Virginia, New York, Minnesota, Dakota, West Virginia, Texas, California, Louisiana, Alabama, Delaware, North Carolina, Ohio; 15th, Massachusetts, Rhode Island, Connecticut, New Jersey, Pennsylvania, Virginia, North Carolina, South Carolina, Georgia, Wisconsin, Minnesota, California, Texas, Louisiana, Alabama, Florida, Delaware, Iowa, Maryland, Nebraska; 16th, Maine, New Hampshire, Massachusetts, Florida, Ohio, Minnesota, Missouri, California, Nebraska, Texas, Indiana, Michigan, New Jersey, Ohio; 17th, California, Maine, Connecticut, Pennsylvania, North Carolina, Kentucky, Missouri, Nebraska, Texas, Alabama, Illinois, Iowa; 18th, Connecticut, North Carolina, Ohio, Dakota, California, Texas, Idaho, Louisiana, Alabama, Illinois, Iowa, Utah; 19th, Maine, Connecticut, North Carolina, Virginia, Georgia, Florida, Tennessee, Texas, California, Illinois, Massachusetts, New Jersey, New York, Ohio, Pennsylvania, Utah; 20th, North Carolina, South Carolina, Michigan, Ohio, Texas, California, Idaho, Indiana, Massachusetts, Utah, Virginia, Wisconsin; 21st, Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, Virginia, Kansas, Nebraska, New Mexico, Idaho, Louisiana, Alabama, California, Delaware, Indiana, Iowa, Maryland, Missouri, New York; 22d, Maine, Massachusetts, Rhode Island, Minnesota, Dakota, Iowa, Missouri, Nebraska, Kansas, California, Texas, Iowa; 23d, Maine, New Hampshire, Massachusetts, Connecticut, New Jersey, Iowa, Nebraska, Kansas, Iowa, Vermont; 24th, Iowa, Dakota, Texas, Idaho, Kansas, New Jersey; 25th, Virginia, Illinois; 26th, Iowa, New York; 27th, Georgia, Nebraska, Indiana, New Jersey; 29th, Idaho.

*Mirage* was observed on the 3d, Connecticut; 7th, Connecticut; 9th, Georgia; 11th, Connecticut; 13th, Connecticut; 15th, North Carolina; 17th, Massachusetts; 20th, Connecticut; 21st, Connecticut; 26th, Georgia.

## SOLAR PHENOMENA.

*Sun spots.*—The following observations, made by D. P. Todd, upon the spots of the sun, have been kindly communicated by Rear-Admiral John Rodgers, U. S. N., Superintendent of the Naval Observatory:

| November, 1877. | No. of new— | | Disappeared by solar rotation. | | Reappeared by solar rotation. | | Total number visible. | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| | Groups. | Spots. | Groups. | Spots. | Groups. | Spots. | Groups. | Spots. | |
| 1—11 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 30 | |
| 3— 2 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 20 | |
| 4— 3 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 12 | |
| 7— 3 p. m. | 0 | 0 | — | — | 0 | 0 | 0 | 0 | |
| 11— 3 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 12—11 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 13— 4 p. m. | 1 | 6 | 0 | 0 | 0 | 0 | 1 | 6 | |
| 14— 2 p. m. | 0 | 8 | 0 | 0 | 0 | 0 | 1 | 14 | |
| 16—noon | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 8 | |
| 18— 3 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 29— 2 p. m. | 1 | 9 | 0 | 0 | — | — | 1 | 9 | |
| 30—noon | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 9 | |

Professor Hinrichs, of the Iowa weather service, states that at Iowa City "large sun spots were seen on the 3d, 15th, and 23d."

Published by order of the Secretary of War.

ALBERT J. MYER,
*Brigadier General (Brevet Assigned), Chief Signal Officer, U. S. A.*

PAPER 33.

# MONTHLY WEATHER REVIEW, DECEMBER, 1877.

## INTRODUCTION.

In compiling the present review the following data, received up to January 14th, have been made use of, viz, the regular tri-daily weather charts, containing the data of the simultaneous observations taken at one hundred and twenty-eight Signal-Service stations and twelve Canadian stations; monthly journals and means from one hundred and thirty-four of the former, and means from thirteen of the latter; two hundred and thirty eight monthly reports from volunteer observers; forty-two monthly reports from United States Army post-surgeons; marine records; reliable newspaper extracts; special reports. The most noticeable features for the month are, the severe storms Nos. II and XV; the small number of high-pressure areas; the high average temperatures for all the districts; the heavy rains accompanying storms Nos. II, XI, and XV; few auroras; frequency of lunar halos during the middle of the month.

## BAROMETRIC PRESSURE.

*In general.*—A comparison of the isobarometric curves on Chart No. II with the average for December, for a number of years, shows the following, viz, for the present month the pressure, as reduced to sea-level, has averaged slightly below that for a number of years along the Pacific coast, in Utah, at Key West, in the Upper Mississippi and Lower Missouri Valleys, and at Breckenridge 0.11 of an inch. For the Upper Lake region, Ohio Valley, Tennessee and West Gulf States, it varies from slightly below to slightly above. In the East Gulf and Atlantic States and Lower Lake region, it averages above, at Oswego and Burlington, about 0.11 of an inch.

*The local barometric ranges* for the month have been as follows: *Large*—Norfolk, 1.50 inch; Eastport, 1.47; Cape Henry, 1.45; Atlantic City, Cape May, and Cape Lookout, 1.41; Wood's Holl, 1.40; Newport, 1.35; Boston and New London, 1.34; Barnegat, 1.33; Portland, Me., Thatcher's Island, Wilmington, and Smithville, 1.30; and from New England to Eastern Tennessee and northern portions of Alabama, Georgia, and South Carolina, the range has exceeded 1.20. *Small*—Los Angeles, 0.61 inch; Visalia, Cal., 0.62; Santa Fé, 0.63; Pioche, Nev., 0.65; San Francisco, 0.66; Salt Lake City, 0.68; Key West, 0.70; Sacramento and Pike's Peak, 0.73; Cheyenne, 0.76; Denver, 0.79; Red Bluff, Cal., 0.80; Winnemucca, Nev., and Boise City, Idaho, 0.81; Jacksboro', Tex., 0.82; Fort Gibson and Toledo, 0.86; Shreveport, 0.88; Indianapolis and Chicago, 0.89.

*Areas of high pressure.*—Of these six have been traced and are described. This number is smaller than is usual for the month of December, and to which fact can be partly attributed the high average temperatures in the different districts. Two, Nos. IV and V, crossed the country north of the lakes, and were accompanied in New York and New England by severe, cold weather. Four took a southerly path, producing high northwesterly winds and gales as they advanced south and eastward from the Rocky Mountain region, and in the Gulf States "northers."

No. I.—At 7.35 a. m., Washington time, of the 1st, this high-pressure area (described as No. VI in the November review), covered the Southwest; barometer, 30.48 inches at Shreveport, and 0.41 inch above the normal at Indianola. Excepting the southern portions of Texas and Florida, and from California to the western part of Washington Territory, the minimum temperature had fallen below freezing the preceding night over the whole country, and below zero from Southeastern Dakota to the Red River of the North Valley. During the day clear weather generally prevailed over the country east of the Rocky Mountains, excepting light snows from the Ohio and Upper Mississippi Valleys to the lakes. A second high-pressure area advanced southeastward toward New York and New England, and united with it at night. Morning of the 2d the barometer was highest, 30.54 inches at Cairo, with the barometric ridge extending from Louisiana northeastward over the Middle States to Northern New England. Brisk to high northerly winds were produced from the New Jersey to the North Carolina coasts during the day, but with generally clear weather. By morning of the 3d the central highest pressure had moved to the North Carolina coast, 30.60 at Norfolk, and 0.48 inch above the normal at Kittyhawk, N. C., with continued cold and clear weather in the Middle and New England States, but rising temperature thence south and westward. During the 3d and 4th it gradually disappeared off the North Carolina coast, in advance of storm No. II.

No. II.—During the 3d it was observed along the Pacific coast, succeeding low pressure No. I. By morning of the 4th the barometer at Portland, Oreg., was reported as 30.55 and 0.42 above the normal. Moving south and eastward during the day, it reached from Arizona and New Mexico to Eastern Washington Territory and Montana

on the morning of the 5th, 0.32 above the normal at Salt Lake City. Northerly gales extended southward on the 4th and 5th from Wyoming and Dakota to the West Gulf States; maximum velocities, Cheyenne, NW. 34; Pike's Peak, NE. 55; North Platte, NW. 72; Denver, N. 60; Dodge City, N. 44; Fort Sill, NW. 42; Omaha and Denison, NW. 36; Indianola, N. 46; and Galveston, NW. 43 miles per hour. At 7.35 a. m. of the 6th it was central in Western Texas; highest 30.65 at Brownsville, with temperatures below freezing, except on the immediate coast. Morning of the 7th isobar 30.50, included the Gulf States, Tennessee, and the larger portion of the South Atlantic States. During the 7th, as low-pressure area No. III passed eastward, this high area moved westward, united with a second, and the following morning reached from Southern Dakota to Louisiana and Mississippi. At 7.35 a. m. of the 9th the highest covered Tennessee, 30.51 at Knoxville, but 0.37 above the normal at Detroit and Cleveland. Brisk to high northerly winds were produced from the New Jersey to the North Carolina coasts; at Kittyhawk, N. 40; Cape May, NW. 36; and Sandy Hook, NW. 35. In advance of low pressure No. IV, it moved eastward, and later southward. It was central over South Carolina on the morning of the 10th, over the central Gulf States on the 11th, 12th, and 13th, after which it lost its identity. It is quite probable that during the nights of the 7th and 10th its effect was increased by high-pressure areas, which advanced from the west or northwest and united with it, as shown by the barometric deviations from the normals.

No. III.—Apparently advanced southeastward over Montana and Dakota, during the 12th, toward New Mexico and Texas. On the morning of the 13th the highest reached from Dakota to Northern Texas and New Mexico, 0.41 inch above normal at North Platte, with cold, clear weather. At 7.35 a. m., 14th, isobar 30.50 included the Ohio Valley region, with very generally cold, clear weather in the districts east of the Rocky Mountains, excepting occasional light rains in Southern Texas. In connection with storm No. VI, north to west gales were produced the 13th and 14th from the Lower Lakes to the Atlantic coast, as far south as North Carolina. Morning of the 15th the highest, 30.50, was central in the Carolinas. As low pressure No. VII progressed eastward, it moved southwestward over the East Gulf States by the following morning, and with diminished pressure. During the 16th, 17th, and 18th, it gradually disappeared in that district.

No. IV.—It first became perceptible on the afternoon of the 16th in Manitoba by a sudden rise in the barometer and winds shifting to cold northerly. It rapidly extended southeastward on the 17th, with cold northerly winds, NE. 32 miles at Duluth, and generally clear weather. By the morning of the 18th it was central north of New York; highest barometer 30.73 at Kingston, Canada, and 0.60 above the normal at Burlington. In the Saint Lawrence Valley the temperature fell to about 10° Fahr., and the isotherm 20° included Nova Scotia and the larger portion of New England and New York. Afternoon of the 18th the pressure rose 0.74 above the normal at Eastport. Brisk and high northerly winds accompanied its advance in the Lower Lake region, Saint Lawrence Valley, and New England, and high northwest veering to northeast winds from New Jersey to North Carolina; maximum velocities, Oswego, N. 32; Quebec, NW. high; Eastport, N. 33; Thatcher's Island, NE. 36; Sandy Hook, NE. 33; Cape May, NE. 32; Cape Henry, NE. 34; and Kittyhawk, NE. 31 miles. Morning of the 19th isobar 30.50 reached from the Middle Atlantic coast to Nova Scotia. During the day it apparently progressed southwestward along the coast, but with decreased pressure, under the influence of a minor depression passing eastward north of the Saint Lawrence Valley.

No. V.—At midnight of the 19th the pressure was observed increasing at the stations along Lake Huron. Morning of the 20th it was central northeast of that lake; highest 30.43 at Rockliffe, Canada. By midnight isobar 30.60 included the Ottawa and Saint Lawrence Valleys, and northern portion of New England. At 7.35 a. m., 21st, the barometer at Father Point, Canada, read 30.74, and the minimum temperature at 0°. Brisk to high northerly winds accompanied its advance in the Saint Lawrence Valley and New England in conjunction with low pressure No. X, and extended as northeasterly winds to the Middle Atlantic and North Carolina coasts. The barometer at Eastport was 0.70 inch above the normal afternoon of the 21st. During the night the temperature fell below zero in New Brunswick. The pressure continued highest over the Saint Lawrence Valley on the 22d, 23d, and 24th, but decreased in advance of storms Nos. XII, XIII, and XIV.

No. VI.—During the 24th the pressure rose somewhat above the normal from Montana and Dakota to Utah and Western Kansas. By morning of the 25th the highest was probably north of Dakota, and continued so during the 26th and 27th. A storm was crossing the Rocky Mountain region from California, and Nos. XII and XIII were in the Southern States. At 7.35 a. m. of the 28th the barometer was high and considerably above the normal from the Saint Lawrence Valley to Lake Superior, and from Dakota to Utah, Oregon, and Washington Territory, but still highest in Manitoba, and increasing to 30.46 at Fort Garry by midnight. As storm No. XV advanced northeastward, this high area moved southward. It was central over Dakota and

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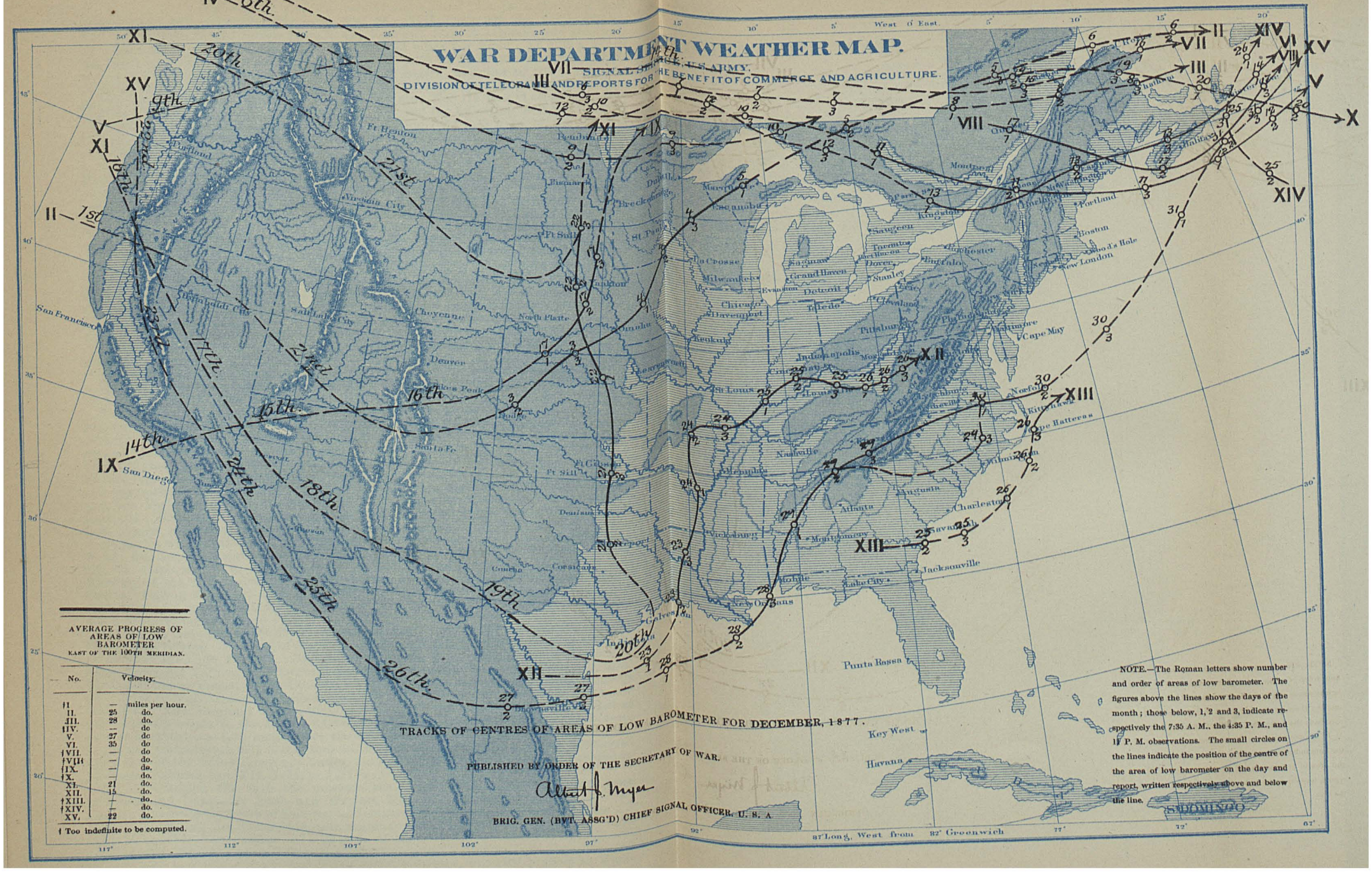
WAR DEPARTMENT WEATHER MAP.
SIGNAL SERVICE, U.S. ARMY.
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.
AVERAGE PROGRESS OF AREAS OF LOW BAROMETER EAST OF THE 100TH MERIDIAN.
No. | Velocity.
I — miles per hour.
II. 25 do.
III. 28 do.
IV. — do
V. 27 do
VI. 35 do
VII. — do
VIII — do.
IX. — do.
X. — do.
XI. 21 do.
XII. 15 do.
XIII. — do.
XIV. — do.
XV. 22 do.
† Too indefinite to be computed.
TRACKS OF CENTRES OF AREAS OF LOW BAROMETER FOR DECEMBER, 1877.
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
Albert J. Myer
BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.
NOTE.—The Roman letters show number and order of areas of low barometer. The figures above the lines show the days of the month; those below, 1, 2 and 3, indicate respectively the 7:35 A. M., the 4:35 P. M., and 11 P. M. observations. The small circles on the lines indicate the position of the centre of the area of low barometer on the day and report, written respectively above and below the line.
West 0 East.
87° Long. West from 32° Greenwich

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No. II.

AVERAGE TEMPERATURES FOR DECEMBER

| DISTRICTS. | Average for December. Signal Service Observations. For several years. | Average for December. Signal Service Observations. For 1877. | Comparison of December 1877, with the average for several years. |
|---|---|---|---|
| St. Lawrence valley | 18°.1 | 25°.7 | 7°.6 above. |
| New England | 26 .8 | 35 .1 | 8°.3 above. |
| Middle Atlantic States | 35 .2 | 43 .2 | 8°.0 above. |
| South Atlantic States | 49 .1 | 52 .9 | 3°.8 above |
| Gulf States | 51 .9 | 53 .9 | 2°.0 above. |
| Lower Lake region | 26 .7 | 37 .0 | 10°.3 above. |
| Upper Lake region | 21 .6 | 36 .1 | 14°.7 above. |
| Ohio valley and Tennessee | 36 .3 | 47 .7 | 11°.4 above. |
| Upper Mississippi valley | 24 .6 | 41 .7 | 17°.1 above. |
| Lower Missouri valley | 28 .5 | 43 .8 | 15°.3 above. |
| Upper Missouri valley | 17 .1 | 31 .6 | 14°.5 above. |
| Minnesota | 10 .2 | 30 .4 | 20°.2 above. |
| Rocky Mountains stations | 24 .5 | 25 .3 | 0°.8 above. |
| Pacific Coast | 49 .5 | 50 .5 | 1°.0 above |

TEMPERATURES OF WATER FOR DECEMBER, 1877.

| STATIONS. | Temperatures at bottom. Maximum. | Temperatures at bottom. Minimum. | Average depth of water. Feet. |
|---|---|---|---|
| Alpena | 39° | 32° | 14 |
| Augusta | 55 | 45 | 9 |
| Baltimore | 51 | 36 | 11 |
| Buffalo | 42 | 35 | 13 |
| Cairo | 49 | 39 | 29 |
| Charleston | 56 | 52 | 41 |
| Chicago | 41 | 35 | 9 |
| Cleveland | 43 | 30 | 14 |
| Cincinnati | 46 | 36 | 14 |
| Detroit | 41 | 35 | 22 |
| Duluth | 39 | 36 | 12 |
| Eastport | 44 | 39 | 17 |
| Escanaba | 37 | 35 | 15 |
| Galveston | 62 | 49 | 8 |
| Grand Haven | 38 | 34 | 19 |
| Jacksonville | 61 | 51 | 12 |
| Keokuk | 49 | 33 | 4 |
| Key West | 73 | 62.5 | 17 |
| La Crosse | — | — | — |
| Louisville | 44 | 33 | 8 |
| Memphis | 50 | 39 | 20 |
| Marquette | 38 | 34 | 15 |
| Milwaukee | 42 | 37 | 29 |
| Mobile | 58 | 48 | 16 |
| Montgomery | 57 | 45 | 8 |
| Nashville | 53 | 37 | 16 |
| New London | 48.5 | 42 | 12 |
| New York | 42 | 37 | 16 |
| Norfolk | 41 | 42 | 24 |
| Omaha | 38 | 32 | 14 |
| Pittsburgh | 43 | 35 | 9 |
| Portland, Maine | 43.5 | 36.5 | 26 |
| Punta Rassa | — | — | — |
| San Francisco | 56 | 53.5 | 20 |
| Sandusky | 42 | 33 | 10 |
| St. Louis | 51 | 32 | 11 |
| St. Marks | 63 | 53 | 16 |
| St. Paul | — | — | — |
| Savannah | 57 | 43 | 8 |
| Shreveport | 57.5 | 45.5 | 15 |
| Toledo | 43 | 32 | 11 |
| Wilmington | 57 | 50 | 15 |
| Wood's Hall | 45 | 33 | 8 |
| Yankton | — | — | — |

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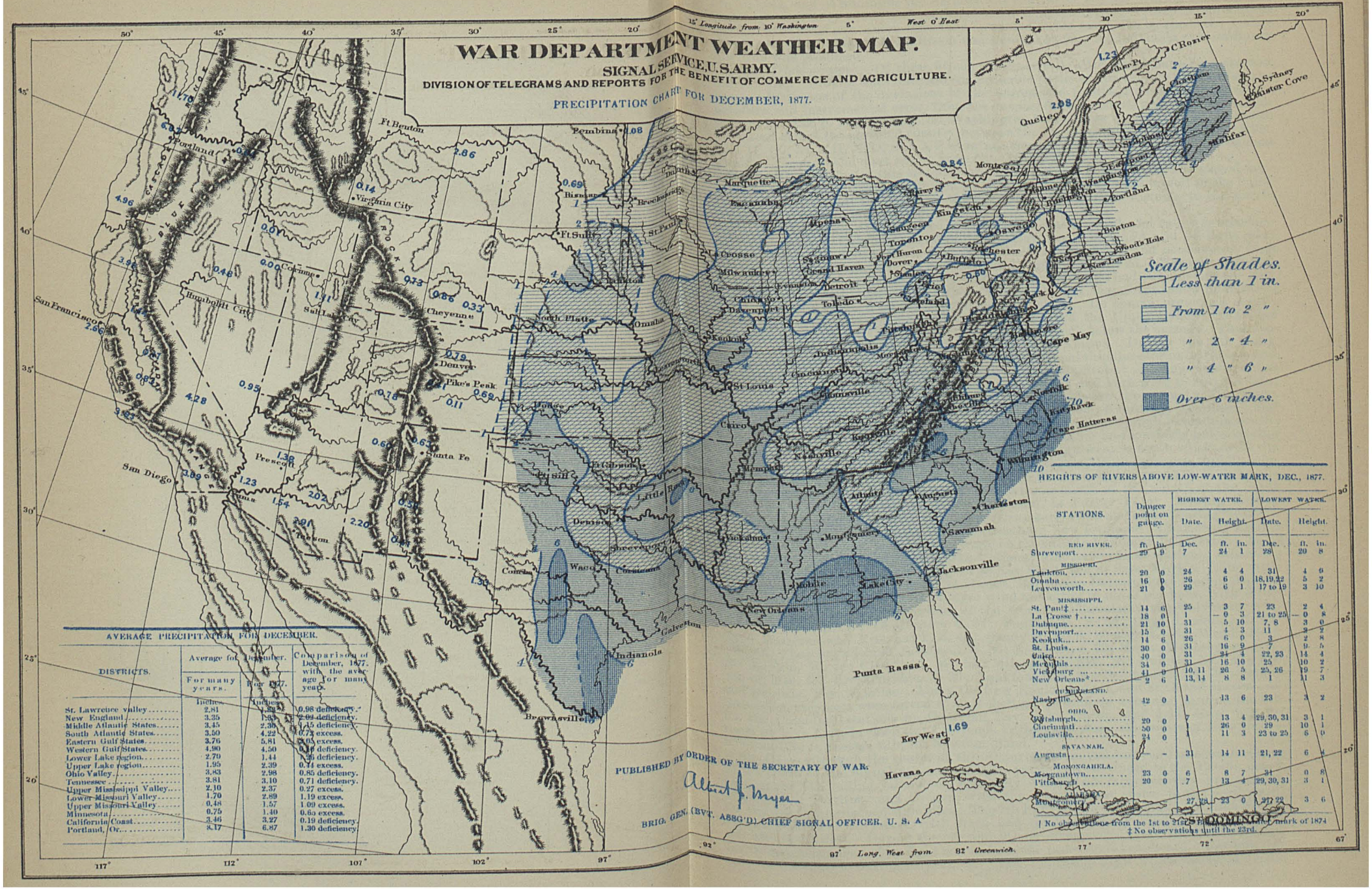
# WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U.S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

PRECIPITATION CHART FOR DECEMBER, 1877.




## AVERAGE PRECIPITATION FOR DECEMBER.

| DISTRICTS. | Average for December. For many years. | Average for December. For 1877. | Comparison of December, 1877, with the average for many years. |
|---|---|---|---|
| | Inches. | Inches. | |
| St. Lawrence valley | 2.81 | 1.83 | 0.98 deficiency. |
| New England | 3.35 | 1.26 | 2.09 deficiency. |
| Middle Atlantic States | 3.45 | 2.30 | 1.15 deficiency. |
| South Atlantic States | 3.50 | 4.22 | 0.73 excess. |
| Eastern Gulf States | 3.76 | 5.81 | 2.05 excess. |
| Western Gulf States | 4.90 | 4.50 | 0.40 deficiency. |
| Lower Lake region | 2.70 | 1.44 | 1.26 deficiency. |
| Upper Lake region | 1.95 | 2.39 | 0.44 excess. |
| Ohio Valley | 3.83 | 2.98 | 0.85 deficiency. |
| Tennessee | 3.81 | 3.10 | 0.71 deficiency. |
| Upper Mississippi Valley | 2.10 | 2.37 | 0.27 excess. |
| Lower Missouri Valley | 1.70 | 2.89 | 1.19 excess. |
| Upper Missouri Valley | 0.48 | 1.57 | 1.09 excess. |
| Minnesota | 0.75 | 1.40 | 0.65 excess. |
| California Coast | 3.46 | 3.27 | 0.19 deficiency. |
| Portland, Or. | 8.17 | 6.87 | 1.30 deficiency. |

## HEIGHTS OF RIVERS ABOVE LOW-WATER MARK, DEC., 1877.

| STATIONS. | Danger point on gauge. | HIGHEST WATER. Date. | HIGHEST WATER. Height. | LOWEST WATER. Date. | LOWEST WATER. Height. |
|---|---|---|---|---|---|
| | ft. in. | Dec. | ft. in. | Dec. | ft. in. |
| RED RIVER. | | | | | |
| Shreveport | 29 9 | 7 | 24 1 | 28 | 20 8 |
| MISSOURI. | | | | | |
| Yankton | 20 0 | 24 | 4 4 | 31 | 4 6 |
| Omaha | 16 0 | 26 | 6 0 | 18,19,22 | 5 2 |
| Leavenworth | 21 0 | 29 | 6 1 | 17 to 19 | 3 10 |
| MISSISSIPPI. | | | | | |
| St. Paul‡ | 14 6 | 25 | 3 7 | 23 | 2 4 |
| La Crosse † | 18 0 | 1 | — 0 3 | 21 to 25 | — 0 8 |
| Dubuque | 21 10 | 31 | 5 10 | 7, 8 | 3 0 |
| Davenport | 15 0 | 31 | 4 3 | 11 | 2 2 |
| Keokuk | 14 6 | 26 | 6 0 | 3 | 2 8 |
| St. Louis | 30 0 | 31 | 16 9 | 7 | 9 5 |
| Cairo | 40 0 | 31 | 24 4 | 22, 23 | 14 4 |
| Memphis | 34 0 | 31 | 16 10 | 25 | 10 2 |
| Vicksburg | 41 0 | 10, 11 | 26 5 | 25, 26 | 19 7 |
| New Orleans* | 2 6 | 13, 14 | 8 8 | 1 | 11 3 |
| CUMBERLAND. | | | | | |
| Nashville | 42 0 | 1 | 13 6 | 23 | 3 2 |
| OHIO. | | | | | |
| Pittsburgh | 20 0 | 7 | 13 4 | 29, 30, 31 | 3 1 |
| Cincinnati | 50 0 | 1 | 26 0 | 29 | 10 1 |
| Louisville | 24 0 | 1 | 11 3 | 23 to 25 | 6 0 |
| SAVANNAH. | | | | | |
| Augusta | — — | 31 | 14 11 | 21, 22 | 6 4 |
| MONONGAHELA. | | | | | |
| Morgantown | 23 0 | 6 | 8 7 | 31 | 0 8 |
| Pittsburgh | 20 0 | 7 | 13 4 | 29, 30, 31 | 3 1 |
| Monongahela | | 27, 28 | 23 0 | 1, 22 | 3 6 |

† No observations from the 1st to 21st. Height of mark of 1874

‡ No observations until the 23rd.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR:

Albert J. Myer

BRIG. GEN. (BVT. A.S.S.G'D) CHIEF SIGNAL OFFICER, U. S. A.

ST. DOMINGO

Nebraska on the morning of the 30th, with temperatures below zero in Wyoming, Utah, and Western Nebraska, and below freezing as far southward as the interior of Texas. The following morning isobar 30.30 included the country from Texas to Southern Dakota, and at midnight the highest was central in Texas. During the 28th and 29th high northerly winds and gales extended southward from Nebraska and Kansas to the Texas coast as a severe "norther," and to Florida and Cuba by the 30th; Dodge City N. 36; North Platte, Fort Gibson and Denison N. 28. At Indianola extraordinary low tide was produced.

*Areas of low pressure.*—Of these fifteen are described, all of which have been charted but the first. Broken lines indicate the probable paths of the centers of the disturbances. By means of the deviations of the barometric readings as corrected for temperature and instrumental error, from the means for the month and the observation (7.35 a. m., 4.35 p. m., and 11 p. m., Washington time), these areas of low pressure can be traced across the elevated country between the Pacific coast and Mississippi Valley. Nos. II, IX, XI, XII, XIII, and XV were accompanied by heavy rains and occasional thunder-storms. The most severe were Nos. II and XV.

No. I.—During the 1st this low-pressure area appeared in Manitoba, and passed eastward to the north of the Lake region on the 2d. The 3d light snows fell in the Saint Lawrence Valley, but the center of the depression was at some distance to the northward, and therefore not charted.

No. II.—The storm can be traced to the Pacific coast. On the 1st rain was occasionally reported from California to Washington Territory. On the 2d and 3d light rains and snow fell in Arizona, Utah, and New Mexico, with brisk and occasionally high winds; on Pike's Peak, SW. 56, and at San Diego, N. 30, the 2d. Morning of the 3d it was central north of Santa Fé. By midnight the rain area had extended to the Mississippi Valley, with increasing southeasterly winds, but changing to snow in Western Nebraska and Kansas, with high northwesterly winds. Its course, previously southeastward, during the day was northeastward toward the Upper Lakes. At Dodge City and North Platte, the barometer fell 0.40 of an inch below the normal. Thunder-storms occurred in Texas, Indian Territory, and Kansas. During the 4th rainy weather extended to the Atlantic coast, with occasional thunder-storms in Illinois and Michigan; snow fell from Nebraska to Dakota and Manitoba; clearing weather was reported from Texas to Southern Nebraska, with brisk and high west to north winds; the central pressure continued diminishing, falling 0.72 below the normal at La Crosse. The 5th occasional thunder-storms were reported from Kentucky, Tennessee, and Florida. The center passed into Canada, with a barometric trough extending southward to the Gulf, to the eastward of which rainy weather and southerly gales veering to westerly prevailed; to the westward, brisk and high west to north winds, with the rain turning into light snow as far south as Tennessee. High pressure rapidly succeeding it, a "norther" was produced along the Gulf coast, reaching Key West on the 6th. By morning of the 6th it was central over or north of the mouth of the Saint Lawrence, with still lower central pressure, 29.07, at Father Point. During the day it moved to Newfoundland, followed by northwesterly gales and cold, clearing weather, except frequent snows from the Lakes to Northern New England. Cautionary signals were ordered to be displayed in its advance on the 2d at Indianola and Galveston; 3d, at Mobile, New Orleans, and Upper Lake stations; 4th, Lower Lake stations; 5th, along the entire Atlantic coast from Eastport to Key West, and at Saint Mark's. They were justified at all stations except Saint Mark's, Baltimore, Detroit, Port Huron, Alpena, and Chicago. The following maximum wind velocities in miles per hour, with direction, show the dangerous character of the storm: Indianola, N. 46; Galveston, NW. 43; Key West, N. 30; Charleston, S. 34; Smithville, S. 50; Cape Lookout, S. 60; Cape Hatteras and Kittyhawk, S. 44; Sandy Hook, S. 36 and W. 48; Wood's Holl, SW. 55; Thatcher's Island, S. 40 and W. 36; Eastport, S. 39; Mount Washington, NW. 96; Buffalo, W. 48; Cleveland, W. 35; Milwaukee, SW. 36; Duluth, NE. 40; Bismarck, NW. 48; Breckenridge, N. 36; Yankton, NW. 35; Saint Louis, W. 36; Omaha and Denison, NW. 36 miles. Along the New England coast, and at Grand Haven and Galveston, steamers were forced to seek shelter. Warnings were also sent on the 4th for the Canadian stations on Georgian Bay, Lake Huron, and Lake Erie; 5th, for those on lake Erie, in the Saint Lawrence Valley, and along the coasts of New Brunswick and Nova Scotia; 6th, for Newfoundland.

No. III.—Although the center of this disturbance moved eastward at some distance to the north of the Signal-Service stations, yet it can be traced to the Pacific coast. During the 5th falling barometer, southerly winds and rainy weather prevailed in Washington Territory and Oregon, with the center of the storm to the northward. On the 6th it approached Manitoba. The 7th light snows occasionally fell from Northeastern Dakota to the Lakes, with fresh and brisk southerly winds veering to westerly and northwest. During the 8th and 9th it disappeared over the Gulf of Saint Lawrence, accompanied by light snows from the Lake region eastward. Not any signals were displayed during its progress. The following high winds occurred on the

7th: Bismarck, NW. 36 miles; Milwaukee, SW. 27; Grand Haven, NW. 36; Sandusky W. 28; Buffalo, SW. 32; 8th, Sandy Hook, W. 28; Thatcher's Island, W. 32.

No. IV.—Like the preceding this was first felt in Washington Territory and Oregon on the 8th, where rainy weather prevailed, with the pressure slightly below the normal. In the Northwest the barometer fell quite rapidly, and was lowest on the afternoon of the 9th in Northeastern Dakota, with high southerly winds in the Upper Mississippi Valley. Its progress was then eastward and northeastward into Canada on the 10th. A barometric trough formed toward the New England coast. Frequent light snows fell in the Lake region and New England, with fresh to brisk southerly winds veering to westerly, except northeasterly in Maine, but it lost its identity as the following storm approached. Cautionary signals were ordered on the 10th at Cape May, Sandy Hook, and along the New England coast, but not justified, except at Eastport, N. 28; Thatcher's Island, NW. 36.

No. V.—After the preceding had passed eastward, the pressure again began to diminish in Washington Territory and Oregon, with continued rain, on the 9th. Afternoon of the 10th it was central in Manitoba, with rain. By referring to the chart it will be seen that its movement was very rapid and southeastward to the coast of Maine during the 10th and 11th, thence northeastward. From Southern New England to Lake Ontario light rains and fresh to brisk southerly, veering to westerly, winds accompanied it, but thence north and eastward snow and brisk to high easterly winds, backing to northerly and westerly. Cautionary signals were continued on the 11th along the New England coast, and warning sent for the Canadian stations midnight of the 10th.

No. VI.—During the night of the 9th the pressure nearly recovered the normal in Oregon after the last storm had progressed to the eastward, but with continued rain. On the following day it again diminished, falling 0.38 below the normal at Portland during the afternoon, with heavy rains. The 11th frequent light rains fell from Washington Territory to Northern California, and the pressure regained the normal. Falling barometer and warm southeasterly winds indicated its approach toward Dakota and Manitoba. At 7.35 a. m. of the 12th it was central in Manitoba. As it passed southeastward a barometric trough reached to Texas. Rainy weather prevailed in the southern half of Texas, with easterly to southerly winds. During the 13th the center of the storm passed over Maine, with the central pressure diminishing, and the barometer falling 0.65 below the normal at Eastport. From the Ottawa and Saint Lawrence Valleys to New Brunswick easterly gales, backing to northerly and northwest, with heavy snow, prevailed; but in Nova Scotia, the larger portion of New England, New York, and the Lower Lakes, brisk and high southerly winds, veering to westerly and northwest, with generally light rains. In Southern Texas rainy weather continued, with occasional thunder-storms. Morning of the 14th the barometer at Sidney, Cape Breton, read 28.09, and northwesterly gales, with cold, clear or clearing weather were reported from thence to North Carolina. During the day it disappeared to the eastward. Cautionary signals were ordered to be displayed on the night of the 12th at the Lower Lake stations, and those along the New Jersey and New England coast; afternoon of the 13th along the North Carolina coast. Warnings were also sent night of the 12th for the Canadian stations on Lakes Erie and Ontario, and in the Saint Lawrence Valley, and the 13th for those in Nova Scotia and New Brunswick. All were fully justified. Maximum velocities: Alpena, NW. 30; Erie, NW. 38; Buffalo, SW. 36; Toronto, NW. 31; Oswego, NW. 32; Father Point, NE. 40; Eastport, NW. 50; Thatcher's Island, NW, 52; Boston, NW. 48; New York, NW. 43; Sandy Hook and Cape May, NW. 48; Kittyhawk, N. 54; Cape Hatteras, NE. 34; and Mount Washington, NW. 120 miles.

VII.—After high pressure area No. III had passed eastward from the Rocky Mountain region, the barometer fell below the normal along the Pacific coast on the 12th and 13th, and in Northern Dakota and Manitoba, with brisk southerly to westerly winds, night of the 13th. Rainy weather was reported from Washington Territory the 14th; the barometer at Pembina 0.49 below the normal in the afternoon, with the center of the disturbance probably in Manitoba; and high southerly winds in Western Kansas and Nebraska. During the 15th it moved to the Saint Lawrence Valley quite rapidly; lowest barometer 29.36 at Quebec, with southerly winds veering to westerly and increasing to brisk and occasionally to high along the Middle Atlantic and New England coasts; light rains were occasionally reported from the Ohio Valley and New Jersey to the Lower Lakes, New England, and Saint Lawrence Valley, partly turning into snow in last district. The 16th it disappeared eastward over the Gulf of Saint Lawrence. Signals were displayed night of the 15th along the New Jersey and New England coasts, only a portion of which were justified. Maximum velocities: Cape May, SW. 28 (late); Sandy Hook, SW. 32 (late); Eastport, NW. 30; and Mount Washington, NW. 108 miles.

No. VIII.—At midnight of the 16th a disturbance apparently central north of Lake Superior. During the 17th it rapidly passed over the Saint Lawrence Valley, Maine, and Nova Scotia, accompanied by occasional light snow or rain; lowest barometer,

29.69 at Sydney; high pressure area No. IV rapidly followed it. The barometric gradient between the two became quite steep, resulting in frequent high northerly winds from the Saint Lawrence Valley to Nova Scotia and New England, which extended during the night southward along the coast to North Carolina, but with generally clear weather except rain on the North Carolina coast. Signals were ordered to be displayed, night of the 17th, along the New England and New Jersey coasts, and the 18th, as far south as Charleston. The majority were justified: Eastport, N. 32; Thatcher's Island, NE. 36 (late); Sandy Hook, NE. 33; Atlantic City, NE. 32; Cape Hatteras, NE. 28; Cape Henry, NE. 34 (late); and Cape Lookout, NE. 30 miles.

No. IX.—This storm can be traced to the Pacific coast. In California the barometer fell to about 0.30 below the normal the 14th, with rainy weather and increasing easterly winds in the southern portion; at Los Angeles, NE., high. The 15th the rain area extended eastward to Southern Nevada and New Mexico, and frequent light rains fell in Central and Southern Texas, with a high SW. wind on Pike's Peak. On the 16th occasional light rains were reported from Nevada, Utah, Wyoming, New Mexico, and from Texas to Kansas, Missouri, Illinois, and the Ohio Valley, with thunder-storms in Kansas. At midnight a barometric trough extended from Northwestern Texas to Lake Superior. It is quite probable that low-pressure No. VIII was formed or separated from this by high pressure No. IV. At 7.35 a. m. of the 17th it was central in Kansas and Nebraska; during the day generally light rains fell from Texas to the Ohio, Upper Mississippi, and Lower Missouri Valleys, with thunder-storms in Kansas, Nebraska, Iowa, Illinois, Missouri, and Indian Territory; its northward progress was due to the pressure being high and decidedly above the normal to the eastward, and below the normal thence westward to the Pacific coast. The 18th it passed northward into Canada. Frequent rains were reported from Texas, Indian Territory, and from the Lower Missouri Valley to the Lakes, with thunder-storms in Kansas, Indian Territory, and at Key West. The signals displayed at Milwaukee and Grand Haven were not justified. Although the track cannot be charted after the morning of the 18th, yet, from a study of the tri-daily maps of this office, there is little doubt but that this disturbance is the same as the following.

No. X.—On the 19th rainy weather extended from the Lakes to New England and the Eastern British provinces, partly turning into snow in the Saint Lawrence Valley; high winds were reported from Wood's Holl, W. 28, and from Father Point, S. 30. During the 20th high pressure No. V rapidly succeeded it, producing a steep gradient, and, in consequence high winds at places. Signals were displayed night of the 20th along the North Carolina and New Jersey coasts. Maximum velocity: Cape Lookout, NE. 36; Kittyhawk, NE. 30; Barnegat, NE. 29 (late); Boston, NW. 36; Eastport, N. 29; Father Point, N. 36; and Halifax, N. 28.

No. XI.—During the 15th, after storm No. IX had left the Pacific coast on its eastward march, the pressure began diminishing in Oregon. The 16th rainy weather was reported from Northern California to Washington Territory, with the barometer 0.43 below the normal at Portland. The 17th frequent rains continued in the Pacific States, with the central disturbance advancing toward Southern California; at San Diego high SE. wind. During the 18th clearing weather prevailed in the Pacific States; threatening and rainy weather in Arizona; frequent light rains and increasing southerly to easterly winds in Texas; SE. 28 at Camp Stockton. The 19th the center passed into Texas, with a barometric trough extending to Iowa; it was followed by clearing weather in Arizona and New Mexico, and accompanied by rain and occasional thunder-storms from Texas to Iowa and Nebraska. The 20th rainy weather prevailed from Texas and Louisiana to Nebraska, with high winds and gales at places, severe thunder-storms in Texas, and with lower pressure—0.38 below the normal at Galveston. During this same day a second disturbance passed eastward over Washington Territory and Oregon, producing light rains; 21st it crossed Montana, with snow or rain; thence to Northern California, Oregon, and Washington Territory. The pressure being below the normal at the Rocky Mountain stations, and decidedly above in the Atlantic States, this storm took a northward course on the 21st, with threatening or rainy weather from the Gulf and South Atlantic States to Nebraska, but gradually clearing away in the Southwest; pressure 0.43 below the normal at Fort Gibson. During the 22d the two apparently combined in the Missouri Valley, with continued threatening and rainy weather, and frequent high winds, mostly easterly or southerly, from the East Gulf and South Atlantic States to the Northwest and Lake region, except high northerly winds and occasional snow in the western portions of Nebraska and Kansas; lowest barometer, 29.60, at Omaha. The 23d it apparently disappeared northward over Manitoba, with frequent rains from Minnesota to the Lakes. Cautionary signals were displayed on the 19th at Indianola, Galveston, and Key West; 20th, at New Orleans, Mobile, and Saint Mark's; 21st, along the South Atlantic coast; 22d, at Milwaukee and Grand Haven. For Key West, Saint Mark's, Milwaukee, and Grand Haven they were not justified. Maximum velocities: Indianola, E. 28 (late) and N. 40 miles; New Orleans, SE. 33 (late); Mobile, SE. 28; Tybee Island, NE. 36; Cape Lookout, NE.

35; Duluth, NE. 32; Saint Paul, E. 35; Saint Louis and Cairo, SE. 25; Dodge City, NW. 33; North Platte, S. and NW. 28.

No. XII and XIII.—During the 22d the wind shifted to easterly in Southern Texas, with threatening weather and light rains, and a thunder-storm at Indianola. By 7.35 a. m. of the 23d the storm was central off the Texas coast, with brisk to high northerly winds. During the day threatening and rainy weather prevailed thence to the Ohio Valley, Virginia, and South Atlantic States, occasional thunder-storms in Texas, Louisiana, and Alabama, and clearing away in Texas at night. The 24th rainy weather was reported from the East Gulf and South Atlantic States and Maryland to Eastern Indian Territory, Missouri, and the Upper Lake regions, with thunder-storms from Florida and Alabama to Southern Illinois. While at midnight it was central in Southeastern Missouri, and barometer 29.87 at Cairo, a barometric trough was traced to the southeastward toward Florida, with a tendency to form a secondary depression in that direction, and which latter, No. XIII, was completed and central off the South Carolina coast by the following midnight, as shown on the chart; barometer at Charleston 0.39 below normal. During the 25th threatening and rainy weather continued from the Upper Mississippi Valley and Lake region to the South Atlantic States and Maryland, and clear or clearing weather in the Gulf States. The 26th No. XII gradually lost its identity, while No. XIII increased very much in severity but not in extent. By midnight the barometer at Kittyhawk fell to 29.47, and at Cape Hatteras 0.62 below the normal. Along the North Carolina and Virginia coasts severe northeast, backing to northwest, gales and very heavy rains prevailed. Frequent rains also fell on the 26th from the South Atlantic States to Missouri and the Lake region. The 27th this storm disappeared northeastward into the Atlantic, followed by clearing weather. Signals were ordered on the 26th along the North Carolina, Virginia, and New Jersey coasts, all of which were justified, except in Northern New Jersey. Maximum velocities: Cape Lookout (late), E. 30; Cape Hatteras, NE. 58; Kittyhawk, NE. 60; Cape Henry, NE. 56; and Cape May, NE. 26.

No. XIV.—During the 24th and 25th the pressure diminished quite rapidly in Nova Scotia, with northerly winds and light snow. At midnight of the 25th the barometer at Sydney read 29.52, with easterly winds, and the center of the storm to the south of that station. The 26th it disappeared to the northeastward. During the night of the 25th signals were ordered for Eastport, but not justified, and warnings sent for Halifax and Sydney, but too late to be of service.

No. XV.—This storm has been traced from the Pacific coast. On the 22d southeasterly winds, rainy weather, and rapidly falling barometer were reported from Washington Territory and Oregon—0.33 below the normal at Portland by midnight. The 23d barometer 0.43 below the normal at San Francisco, and 0.32 at Salt Lake City. Threatening weather and frequent rains prevailed from California to Washington Territory, with high southerly winds at San Diego, Mare Island, and Red Bluff, Cal., and Pioche, Nev. During the 24th clearing weather was reported from the Pacific States, and rain areas from Arizona, partly turning into snow thence to Southern Nevada. The 25th a barometric trough was traced from Montana southward over Arizona, being probably lowest south of latter, with snow or rain from Nevada, Utah, Wyoming, and Dakota to Arizona and New Mexico, high southeast winds at Santa Fé, and S. 40 miles on Pike's Peak. The 26th the trough moved eastward, with occasional light rains in Western Texas, and light snows from Utah and Colorado to Dakota and Nebraska, and northeast gale on Pike's Peak. The 27th the storm-center advanced into Southern Texas, accompanied by thunder-storms, with increasing southeast to northeast winds and rainy weather in Texas, Indian Territory, and Kansas, and with northerly winds and snow from Colorado and Wyoming to Minnesota, partly changing into rain toward the Upper Lake region. During the 28th it advanced to the coast of Alabama with increasing severity and diminishing central pressure; at Mobile barometer 29.43 and 0.77 below the normal; the rain area extended to the East Gulf States and Tennessee, with thunder-storms in Florida at night, and clearing weather in Southern Texas, with high northerly winds. The 29th it developed into two distinct depressions, central in Eastern and Western North Carolina; the central pressure continued diminishing—29.34 at Wilmington, and 0.83 below the normal. The storm increased in extent and severity; the rain area advanced to the South Atlantic States, Virginias, Ohio and Upper Mississippi Valleys, with easterly to northerly winds, and turning into snow from Northern Texas to Dakota and Western Minnesota, with frequent high northerly winds. A severe "norther" prevailed on the Texas coast, and extended eastward to Florida as high northwesterly winds. At 7.35 a. m. of the 30th the storm was central to the southwest of Norfolk, where the barometer fell to 29.16 and 1.01 below the normal. During this day the rainy weather extended north and eastward, generally changing to very light snows along the New England coast, and in the Lower Lake region clearing but cloudy weather, with brisk to high northwesterly winds, succeeded it in the Southern States and Ohio Valley. The 31st heavy snows fell in Nova Scotia, with northerly gales, and at midnight the barometer fell to 28.99 at Sydney. High northwest and northerly gales, with very generally clear weather, prevailed from North Carolina to Maine,

and with occasional light rains in Southern Florida. In North Carolina and Virginia the rains were very heavy, producing destructive floods. Along the East Gulf and Atlantic coast, especially from the Carolinas to Nova Scotia, this storm was unusually severe, resulting in much damage to shipping. Quite a number of cases have been reported where coastwise steamers were obliged to seek shelter or delay sailing. Cautionary signals were ordered to be displayed the 27th at Indianola (late) and Galveston; 28th, *from New Orleans to Key West, and thence to Norfolk*; 29th, *as far north* at Wood's Holl; 30th, thence to Eastport. Warnings were also sent for the Canadian stations, Saint John's, Halifax, Sydney, and those along Lakes Erie and Ontario, on the 29th. The following maximum velocities are given, from which it will be seen that this storm was the most severe of the month: Indianola, E. 28 and N. 43; Mobile, E. 33; Key West, S. 33 and W. 40; Cape Lookout, E. 65 and W. 48; Cape Hatteras, NE. 52; Cape Henry, NE. 74; Cape May, NE. and NW. 48; Barnegat, NE. 70; Thatcher's Island, NE. 48; Eastport, N. 36; Vicksburgh, W. 36; Montgomery, W. 28; Knoxville, NE. 30; Washington, NE. 27; and Philadelphia, NE. 38 miles.

## INTERNATIONAL METEOROLOGY.

*Storms at sea.*—September 2 and 3, 200 miles west of Cape Horn, NW. hurricane, lasting 8 hours, then shifting to SE., and lasting 36 hours; 11th, off Cape Horn, fearful gale from WSW.; 28th, *latitude* 17° 15′ N., *longitude* 85° 25′ W., N. *hurricane* and very high sea from E. October 13, off Cape of Good Hope, W. gale, lasting 30 hours; latitude 49° 40′ N., longitude 15° 30′ W., terrific SW. to NW. gale; 14th, 36° 30′ N., 53° 20′ W., SE. to NW. hurricane, lasting 12 hours; 49° 39′ N., 11° 7′ W., S. to NW. hurricane, lasting 12 hours, barometer 28.70; 16th, 43° 36′ N., 45° 8′ W., W. hurricane, barometer 29.45; 44° 30′ N., 54° W., NNW. and W. hurricane, lasting three days; 17th, 39° 14′ N., 56° 8′ W., ESE. hurricane, lasting 4 hours; 42° N., 52° W., gale; 45° 30′ N., 38° 22′ W., WSW. hurricane, barometer 29.47; 40° N., 54° W., NW. hurricane; 41° 50′ N., 49° W., SW. hurricane, continuing during the 18th and 19th, barometer at 4 p. m., 18th, 28.4; 18th, 48° 30′ N., 42° 40′ W., S. to NW. *hurricane, lasting* 19 hours; 19th, St. Lawrence Bay, Arctic Ocean, heavy gale; 47° N., 29° W., very heavy N. by E. gale; 21st, 45° N., 179° 30′ W., W. gale, barometer 29.15; 29th, 47° 40′ N., 36° W., very severe SW. gales. Nov. 10, coast of Honduras, hurricane; 11th, 55° N., 15° W., hurricane; 12th, 41° 48′ N., 53° W., strong NNE. gale, very heavy sea; 15th, 50° 40′ N., 13° 20′ W., heavy SW. to WNW. gale, very heavy squalls and high seas; 16th, Orkney Islands, S. to W. hurricane; 17th, North Uist, Scotland, NW. gale; 18th, 50° N., 18° W., *strong gale*; 35° 37′ N., 60° 40′ W., very heavy sea, sweeping decks; 19th, Crooked Island Passage, Bahama Islands, heavy N. gale; about 40° N., 50° W., strong hurricane; 21st, 48° 46′ N., 36° 17′ W., heavy NW. to NNE. *gale and sea, lasting* 24 hours; 25th, 36° N., 74° 50′ W., fearful wind, with heavy squalls; 8° N., 44° W., very heavy thunder-storm from E. Dec. 2, 30° N., 77° W., and 48° 30′ N., 39° 54′ W., NW. gales; 48° 11′ N., 45° 12′ W., SW. strong gales; 3d, 19° 03′ N., 105° 18′ W., heavy squals, rain, thunder, and lightning; 35° 5′ N., 58° 15′ W., strong NE. gale; 4th, 24° 30′ N., 80° 26′ W., heavy SE. gale; 5th, 33° N., 73° 30′ W., heavy S. gale, lasting 24 hours, followed by violent NW. gales; 28° 42′ N., 72° 56′ W., heavy SSE. gale, *lasting until the* 7th, barometer 29.80; 6th, 48° 08′ N., 36° 44′ W., and 51° 20′ N., 13° 07′ W., NW. gales; 32° 35′ N., 76° 42′ W., and 37° N., 69′ W., heavy SE. and SSE. gales; 7th, 43° 03′ N., 60° 02′ W., and 46° 45′ N., 43° 16′ W., *strong* westerly gales; 47° 17′ N., 42° 18′ W., SW. storm; 51° 07′ N., 19° 42′ W., strong NW. gale; 8th, 49° 37′ N., 47° 42′ W., heavy west gale; 46° 42′ N., 46° 28′ W., and 50° 51′ N., 26° 36′ W., strong NW. gales; 9th, 48° 08′ N., 33° 51′ W., very heavy NW. squalls and tremendous sea; 10th, 51° 18′ N., 18° 34′ W., strong WSW. gale; 48° 10′ N., 39° 12′ W., heavy NW. to SW. hurricane-like gale; 49° 24′ N., 15° 42′ W., NW. storm. 11th, 50° 48′ N., 20° 10′ W., and 49° 23′ N., 22° 39′ W., strong W. and NW. gales; 47° 03′ N., 44° 58′ W., N. gale; 41° 30′ N., 65° 32′ W., NW. gale; 50° 44′ N., 19° 35′ W., strong SW. gale. 12th, 50° 12′ N., 24° 46′ W., strong NW. gale; 32° 50′ N., 71° W., heavy SW. gale, lasting 12 hours. 13th, 49° 33′ N., 28° 32′ W., strong NW. to S. gale. 14th, 48° 56′ N., 32° 35′ W., strong SW. to W. gale; 45° 59′ N., 58° 15′ W., SW. hurricane, lasting 5 hours; 41° 45′ N., 62° 25′ W., strong NW. gale. 15th, 40° 32′ N., 68° W., N. gale. 18th, 49° 28′ N., 34° 45′ W., and 47° 40′ N., 44° 18′ W., heavy west gales. 22d, 40° 46′ N., 63° 23′ W., NW. gale, with hail and snow squalls.

*Earthquake shocks* were felt, October 9, in Peru; October 12, Isthmus of Panama; November 18, Bermuda Islands, at 5 a. m.

## TEMPERATURE OF THE AIR.

The isothermal lines and figures upon chart No. II illustrate the general distribution of the temperature of the air for the present month. A reference to the table upon the same chart will show that the average is above that for many years in all the districts,

and decidedly so from the Missouri Valley to the Lakes, Ohio Valley, and Tennessee, being 20° above the average in Minnesota. Along the Pacific coast and at the Rocky Mountain stations it has been only slightly above the average. Under the heads of Ice, Navigation, and Miscellaneous Phenomena will be seen the effect of these high averages.

*Minimum and maximum temperatures*, respectively, for the month are: in Maine, at Cornish, 1°, 48°; Surrey, 8°, 55°. New Hampshire: Mount Washington, —13°, 39°; Auburn, 7°, 56°. Vermont: Woodstock, —2°, 51°; West Charlotte, 13°, 55°. Massachusetts: Boston, 4°, 59°; Rowe, 10°, 46°. Rhode Island: Chepachet, 12°, 60°; Newport, 19°, 57°. Connecticut: Colebrook, 7°, 53°; New Haven, 15°, 60°. New York: Palermo, —4°, 49°; Rochester, 16°, 58°; New York City, 22°, 61°. New Jersey: Vineland, 19°, 61°; Atlantic City, 18°, 64°; Salem, 22°, 70°. Pennsylvania: Franklin, 14°, 54°; New Castle, 27°, 68°; Philadelphia, 22°, 63°. Delaware: Milford, 19°, 66°; Dover, 21°, 64°. Maryland: Woodstock, 15°, 63°; New Market, 20°, 68°. District of Columbia: Washington, 21°, 66°. Virginia: Snowville, 12°, 64°; Wytheville, 13°, 73°; Capeville, 29°, 65°. West Virginia: Helvetia, 13°, 64°. North Carolina: Franklin, 10°, 67°; Weldon, 21°, 77°; Wilmington, 25°, 73°. South Carolina: Spartanburg, 18°, 67°; Aiken, 20°, 70°. Georgia: Atlanta, 10°, 73°; Forsyth, 23°, 74°; Tybee Island, 31°, 72°. Florida: Fort Barrancas, 18°, 72°; Houston, 22°, 77°; Key West, 54°, 81°. Alabama: Green Spring, 15°, 70°; Mobile, 26°, 73°. Mississippi: Brookhaven, 20°, 72°; Vicksburg, 23°, 73°. Louisiana: Shreveport, 22°, 74°; Baton Rouge Barracks, 28°, 78°. Texas: Mason, 14°, 69°; Denison, 23, 68°; Indianola, 33°, 77°. Indian Territory: Fort Gibson, 14°, 69°; Fort Sill, 20°, 72°. Arkansas: Mount Ida, 10°, 68°. Tennessee: Austin, 14°, 70°; Spring Garden, 16°, 72°. Kentucky: Danville, 12°, 68°; Louisville, 26°, 67°. Ohio: Westerville, 12°, 66°; Toledo, 24°, 59°; Jacksonburg, 27°, 72°. Indiana: Saint Mary's Home, 12°, 72°; Saint Meinrad, 17°, 74°. Michigan: Escanaba, 10°, 45; Alpena, 12°, 50°; Grand Haven, 25°, 61°. Wisconsin: Neillsville, —4°, 55°; Beloit, 13°, 64°. Illinois: Elmira, 10°, 62°; Chicago, 23°, 66°; Martinsville, 26°, 75°. Missouri: Corning, 3°, 66°; Saint Louis, 21°, 69°. Iowa: Vail, —11°, 60°; Keokuk, 21°, 65°. Minnesota: Breckenridge, —10°, 49°; Saint Paul, 10°, 56°. Dakota: Fort Pembina, —4°, 49°; Bismarck, 2°, 56°; Yankton, —1°, 52°. Nebraska: Sydney Barracks, —17°, 69°; Emerson, 6°, 64°. Kansas: Fort Hays, 4°, 62°; Leavenworth, 13°, 67°; Stanley, 20°, 76°. New Mexico: Fort Union, —6°, 57°; Santa Fé, 2°, 52°. Colorado: Pike's Peak, —26°, 30°; Fort Lyon, —10°, 63°; Colorado Springs, —2°, 69°. Wyoming Territory: Fort Sanders, —38°, 60°; Cheyenne, —10°, 64°. Montana, Idaho, Oregon, Washington Territory, and Arizona reports missing. Utah: Salt Lake City, 8°, 51°. Nevada: Winnemucca, —1°, 57°. California: Fresno, 28°, 69°; Visalia, 31°, 68°; Red Bluff, 32°, 66°; Alcatraz Island, 40°, 69°; Salinas City, 33°, 69°.

*Ranges in temperature.*—The *monthly* ranges will appear from an inspection of the minimum and maximum temperatures just given. The smallest ranges are found at the stations along the immediate coasts and lakes; the largest, in the interior, especially from Colorado and Wyoming to Western Minnesota. *Daily:* In New England, they vary from 19°, least, at Wood's Holl, to 31°, greatest, on Mount Washington. Middle Atlantic States, from 19° at Sandy Hook to 32° at Lynchburg. South Atlantic States, from 22° at Charleston to 37° at Augusta. East Gulf States, from 27° at Mobile to 33° at Saint Mark's. West Gulf States, from 17° at Galveston to 38° at Jacksboro', Tex. Ohio Valley and Tennessee, from 24° at Memphis and Louisville to 32° at Nashville. Lower Lake region, from 21° at Buffalo to 26° at Cleveland. Upper Lake region, from 17° at Escanaba to 25° at Duluth. Upper Mississippi Valley, from 21° at Saint Louis to 27° at Dubuque. Breckenridge, 31°. Lower Missouri Valley, from 25° at Leavenworth to 35° at Yankton. Indian Territory and plains of Kansas and Nebraska, from 31° at Fort Sill to 44° at North Platte. Rocky Mountain stations, from 31° at Santa Fé to 41° at Denver. California, from 13° at San Francisco to 33° at Visalia.

*Frost in ground.*—The following reports show the conditions generally: New England: Cambridge, and Westboro', Mass., ground generally free from frost. Lake region: Embarrass, Wis., frost out of ground at end of month; Rocky Run, Wis., plowing through month. Middle Atlantic States: Sandy Springs, Md., plowing every day, excepting 1st; Cazenovia, N. Y., farmers plowing through the month; Palermo, N. Y., farmers plowing 28th; Wappinger's Falls and Farmingdale, N. Y., farmers plowing and harrowing; Hector, N. Y., farmers plowing through month; Carlisle, Pa., farmers plowing through month. The Northwest: Vail, Iowa, plowing 18th to 31st; Monticello, Iowa, plowing 30th; Booneboro', Iowa, plowing throughout month; Minneapolis, plowing 21st to 29th; Clear Creek, Nebr., plowing 18th to 30th; Pembina, plowing during month.

*Ice.*—1st, ice reported as having formed at Vicksburg, Galveston, Mobile, Tybee Island, and Quitman, Ga., and New London; river frozen over at Toledo; sufficiently strong to bear teams at Bismarck. 2d, formed at Quitman Ga.; Mobile, one-half inch; Houston, Fla., one-half inch; Point Pleasant, La., till 3d; Mesilla, Tex.; Baxter

Springs, Kans., 2½ inches; Independence, Kans., till 9th; Standish, Me. 3d, formed at Galveston; Rochester, canal frozen over; Wappinger's Falls, N. Y., 1½ inch; Flushing, N. Y., 2 inches. 6th, Austin, Tex., formed till 8th; Point Pleasant, La., till 11th. 8th, Wappinger's Falls N. Y., lake open. 9th, formed at Wilmington, N. C. 10th, formed at West Waterville, Me.; at Brookhaven, Miss., one-half inch. 20th, Auburn, N. H., lake closed. 23d, formed at Sandy Hook. 24th, Cazenovia, N. Y., lake frozen over. 25th, at Pembina, ice in river honey-combed by thaw. 26th, formed at Sandy Hook; Visalia, Cal., one-eighth inch. 27th, Standish, Me. 29th, Salem, N. J.; Wappinger's Falls, lake frozen over. 30th, Independence, Kans.; near Melissa, and at Austin, Tex. 31st, Wappinger's Falls, 2 to 3 inches thick; West Charlotte, Vt., no ice on lake; Embarrass, Wis., ice disappeared; Alpena Bay and river, free from ice.

PRECIPITATION.

*In general.*—The general distribution of rain and melted snow for the month is shown on chart No. III. The table in the lower left-hand corner gives the average precipitation in the various districts, for December, for several years, and for the present month. From the Missouri Valley to the Upper Lakes and in the South Atlantic and East Gulf States the rain-fall has been greater than the average for December; in the remaining districts it has been less.

*Special heavy rains.*—3d, Clarksville, Tex., 2.75 inches; Galveston, 2.19 inches; Fort Barrancas, Fla. (3d and 4th), 5.36 inches. 4th, Quitman, Ga. (4th and 5th), 4.70 inches; Point Pleasant, La., 1.80 inches; Saint Mark's (4th and 5th), 4.29 inches. 5th, Jacksonville, Fla., 1.28 inches; Saint Mary's, Ga. (5th and 6th), 2 inches; Cape Lookout, N. C., 1.62 inches; Helvetia, W. Va., 1.25 inches; Cape Hatteras (5th and 6th), 3.58 inches. 6th, Mount Washington N. H. (5th and 6th), 3.87 inches. 7th, Lawrence, Mass., 1.70 inches. 9th and 10th Eagle Pass, Tex., 2.43 inches. 12th and 13th, San Antonio Tex., 1.72 inches. 17th and 18th, Fort Sill, Ind. T., 3.79 inches; Los Angeles, Cal., 2.21 inches. 19th, Cape Hatteras, 4.17 inches. 20th, San Antonio, Tex. (19th and 20th), 2.58 inches; New Ulm, Tex., 2.63 inches; Mason, Tex. (19th and 20th), 3.34 inches; Fort McKavett, Tex., 2.03 inches; Fort Griffin, Tex. (19th and 20th), 3.90 inches; Fredericksburg, Tex., 3.40 inches; Uvalde, 2.12 inches. 21st, Belmont Farm (Melissa), Tex. (20th and 21st), 3.00 inches; Baton Rouge Barracks, La., 1.90 inches. 22d, Dodge City (19th to 22d), 4.30 inches; Olivet, Dak., 1.02 inches. 23d, Quitman, Ga., 1.30 inches: Shreveport, 1.25 inches; Red Bluff, Cal., 2.58 inches. 24th, Mount Ida, Ark. (23d and 24th), 2.80 inches; San Diego (23d to 25th), 1.41 inches. 26th, Cape Hatteras, 3.72 inches; Kittyhawk, N. C., 4.40 inches. 27th, Mason, Tex., 2.12 inches; Uvalde, Tex. (27th and 28th), 2.10 inches. 28th, San Antonio, Tex. (27th and 28th), 2.18 inches; Belmont Farm (Melissa), Tex. (27th and 28th), 5.00 inches. 29th, Wilmington, N. C., 2.98 inches; Smithville, N. C., 2.86 inches; Green Springs, Ala. (28th and 29th), 2.48 inches; Point Pleasant, La. (28th and 29th), 2.30 inches; Brookhaven, Miss. (28th and 29th), 1.80 inches; Cape Lookout, N. C., 3.24 inches. 30th, Weldon, N. C., 1.25 inches; Goldsboro', N. C. (29th and 30th), 3.00 inches; Wilmington, N. C. (29th and 30th), 2.34 inches; Lenoir, N. C. (29th and 30th), 2.70 inches; Statesville, N. C. (29th and 30th), 2.20 inches; Cape Henry, Va., 2.73 inches. 31st, Accotink, Va. (30th and 31st), 1.50 inches.

*Large monthly rainfalls.*—At Cape Hatteras, N. C., 13.38 inches; Olympia, Wash., 11.70 inches; Belmont Farm (near Melissa), Tex., 9.10 inches (?); Lenoir, N. C., 8.70 inches (?); Kittyhawk, N. C., 8.45 inches; Coleman City, Tex., 8.42 inches; Cape Lookout, N. C., 8.14 inches; Fort Barrancas (near Pensacola), Fla., 8.02 inches; Saint Mark's, Fla., 7.79 inches; San Antonio, Tex., 7.27 inches; Fort Sill, Ind. T., 6.97 inches; Mount Washington, 6.01 inches.

*Small monthly rainfalls.*—At Fort Boise, Idaho, 0.01 inch; Carlisle, Pa., 0.05 inch; North Argyle, N. Y., 0.07 inch; Colorado Springs, Colo., 0.08 inch; Sydney Barracks, Nebr., 0.10 inch; South Pueblo, Colo., 0.11 inch. At Winnemucca, Nev., there was not any precipitation during the month, except a very slight fall on the 1st, which was not sufficient to obtain a measurement.

*Floods.*—Special heavy floods followed the rains of the 29th, 30th, and 31st, accompanying storm No. XV on Chart No. I, during its course northeastward from Alabama to Southern Virginia. The tide rose higher at Norfork than since last April, the lower portion of the city becoming flooded, with much loss to property. On the coast of New Jersey heavy northeast gales prevailed during the 30th, producing high tides, washing away from two to four miles of railroad track at Atlantic City.

*Hail* fell, on the 4th, at Grand Haven, Mich.; 5th, at Vevay, Ind., and McMinnville, Tenn.; 8th and 9th, at Embarrass, Wis.; 13th, at Gardiner, Me., and New Bedford, Mass.; 28th, at Vevay, Ind.; 30th, at West Chester, Pa.

*Snow.*—At Pembina, Dak., there was not sufficient snow on the ground at any time to permit the use of sleds or sleighs.

*Depth of snow on ground at close of month.*—In New England it varies from 0.25 inch to 10 inches; northern portions of New York and Pennsylvania, from 0.01 to 0.50 inch;

West Virginia, 0.15 inch; Virginia, 12 inches at Wytheville; Northern Illinois, 0.20 to 0.50 inch; Eastern Kansas, 0.25 to 2 inches; Northwestern Iowa, 2.50 inches; Nebraska, 1 to 3 inches; Northern Minnesota, 0.25 to 0.50 inch; Dakota, 0.02 to 1.50 inches; New Mexico, at Santa Fé, 1.50 inches; Colorado, 4 to 12 inches; Wyoming, 3 inches at Cheyenne; Montana, Virginia City, some snow on mountains; Utah, Salt Lake City, 3 inches; Nevada, Pioche, 0.05 inch; California, San Gorgonio, 2 inches. On the 31st, at Starkey, N. Y., the ground is reported as very dry, and a scarcity of water.

*Rainy days.*—The number of days on which rain or snow has fallen varies as follows: New England, from 1 to 12; Middle Atlantic States, 1 to 19; South Atlantic States, 5 to 14; Lower Lake region, 1 to 22; Tennessee and Ohio Valley, 5 to 19; East Gulf States, 5 to 14; West Gulf States, 2 to 16; Upper Lake region, 7 to 17; the Northwest, 5 to 16; Rocky Mountain region, 1 to 9; California, 2 to 8.

*Cloudy days.*—The number reported by the voluntary observers is as follows: New England, 0 to 16; Middle States, 5 to 13; South Atlantic States, 6 to 14; East Gulf States, 4 to 15; West Gulf States, 4 to 14; Tennessee and Ohio Valley, 9 to 16; Lower Lakes, 3 to 23; Upper Lake region, 5 to 17; the Northwest, 4 to 19; Rocky Mountain region, 1 to 9; California, 7 to 22.

*Precipitation from cloudless skies.*—At Santa Fé, on the 4th, as snow; Bangor, Me., 12th, snow; New Haven, Conn., 13th, rain.

### RELATIVE HUMIDITY.

The average relative humidity for the month ranges about as follows: For New England, 60 to 74; Middle Atlantic States, 59 to 78; South Atlantic States, 69 to 81; East Gulf States, 71 to 78; West Gulf States, 60 to 83; Tennessee and the Ohio Valley, 68 to 74; Lower Lake region, 76 to 86; Upper Lake region, 72 to 83; Upper Mississippi Valley, 70 to 79; Lower Mississippi Valley; 70 to 78; California coast, 56 to 73; Sacramento Valley, 74 to 75. High stations report the following: Mount Washington, 78; Pike's Peak, 56; Cheyenne, 48; Denver, 54; Santa Fé, 60; Salt Lake City, 68; Virginia City, 68; Boise City, Idaho, 68; Winnemucca, Nev., 59; Pioche, Nev., 57.

### WINDS.

*In general.*—The prevailing winds at the Signal-Service stations are shown by the arrows on Chart No. II. The *maximum* hourly velocities have been given in the description of the movements of high and low pressure areas.

*Total movements of the air.*—The following are the largest, as recorded at the Signal-Service stations, viz: Kittyhawk, 12,987 miles; Cape Lookout, N. C., 12,751; Cape May, 12,541; Pike's Peak, 12,491; Sandy Hook, 12,107; Cape Henry, 11,917; Thatcher's Island, 11,358; Cape Hatteras, 10,556; Sandusky, Ohio, 10,525; Key West, 10,454; Barnegat, 10,272; Indianola, 10,101; Dodge City, 9,217; Eastport, 9,159; Breckenridge, 8,705; New York, 8,618; Grand Haven, 8,448; Cleveland, 8,462; Tybee Island, 8,163. The smallest are: La Mesilla, N. Mex., 1,115 miles; Visalia, Cal., 1,164; Boise City, 1,370; Virginia City, 1,600; Augusta, 2,445; Lynchburg, 2,606; Nashville, 2,832; Springfield, 2,873; Salt Lake City, 2,978; Shreveport, 3,172; Sacramento, 3,187; Eagle Pass, 3,230; Knoxville, 3,248; Brackettville, 3,325; San Antonio, 3,501; Los Angeles, 3,705; Laredo, 3,969; Pioche, 4,048; San Francisco, 4,058; Mobile, 4,064.

### VARIFICATIONS.

*Indications.*—As worked up three times daily, they have been carefully compared with the actual conditions during the succeeding twenty-four hours, and the following result obtained, viz: The percentage verified averages 85.9 for New England; 86.5 for the Middle Atlantic States; 87.7 for the South Atlantic States; 82.9 for the East Gulf States; 84.2 for the West Gulf States; 84.9 for the Ohio Valley and Tennessee; 88.2 for the Lower Lake region; 83.5 for the Upper Lake region; 80.0 for the Upper Mississippi Valley; 78.0 for the Lower Missouri Valley. For all the districts the average verified is 84.2 per cent. By elements the percentage verified averages 87.1 for the weather; 82.8 for the wind direction; 85.7 for the temperature; 80.8 for barometric changes. There were 32 omissions to predict (5 for weather, 9 for wind direction, 12 for temperature, and 6 for barometer), out of 3,720, or 0.9 per cent. Of the 3,688 predictions that have been made, 129, or 3.5 per cent., are recorded as having completely failed; 137, or 3.7 per cent., as one-fourth verified; 436, or 11.8 per cent., as one-half verified; 544, or 14.8 per cent., as three-fourths verified; 2,442, or 66.2 per cent., as completely verified.

*Cautionary signals.*—The display of signals was discontinued at the Lake stations, excepting Milwaukee and Grand Haven, on the 16th instant, on account of the close of navigation. Out of 187 signals ordered, 155, or 82.9 per cent., were reported justified

by subsequent hourly velocities of 25 miles and over, but of these 6 were late. There were 32 reported as not justified. From scattered stations there are 54 reports of the wind having obtained an hourly velocity of 25 miles and over without the display of signals; excepting on 2d, brisk to high northerly winds from Southern New Jersey to the North Carolina coast; on the 7th and 8th, southerly to westerly winds along Lake Erie.

*Sunsets.*—The characteristics of the sky, as indicative of fair or foul weather for the succeeding 24 hours, have been observed at all Signal-Service stations. Reports from 111 stations show 3,414 observations to have been taken. Of these 63 were reported doubtful; 2,823 cases, or 84.2 per cent., were followed by the anticipated weather, and 588 were not.

NAVIGATION.

*Stages of water in rivers.*—In the table on Chart No. III are given the highest and lowest readings on the Signal-Service river-gauges, from which it will be seen that at no time has the danger line been reached. The following reports of the effect of ice upon navigation have been received, viz: Missouri River: at Yankton, 1st to 24th, channel closed by ice; 24th, river opened; 31st, shore ice. Upper Mississippi River: from Lake Pepin to Saint Paul, 20th, ice broke up and disappeared; at Saint Paul, 22d, ice in river moved at 4 p. m. La Crosse, 1st, ice in river; 2d, frozen over, and navigation closed; 20th, ice thawing rapidly; 21st, 11.30 a. m., ice broke up; 2 p. m., river open to navigation, ferries commenced running. Dubuque, 1st, navigation closed; 6th and 10th, floating ice in river; 15th, main channel free of ice; 20th, ice disappeared. Davenport, 1st to 11th, floating ice in river; 12th, river clear and navigation opened. Burlington, 1st, floating ice in river. Keokuk, 1st, floating ice in river; 5th, river free of ice. Saint Louis, 2d, floating ice in river; 4th, noon, ice disappeared. Upper Lakes: Port Huron, 10th, navigation closed on Lake Huron. Sault Canal, 1st, closed. Duluth, 7th, navigation was virtually closed on Lake Superior, but on the 22d the last boat is reported as arriving from Buffalo. Lower Lakes: Buffalo, 13th, navigation closed. Cleveland, 19th, navigation closed. North Volney, N. Y., navigation on Lake Ontario open throughout month. Red River of the North: Pembina, 1st, partially frozen over. Dakota: Morristown, 26th, river full of floating ice. Illinois: Rockford, 1st to 3d, 7th and 8th, river frozen over; 6th and 11th, river clear. Ohio: Ringgold, 1st, Miami Canal closed with ice; 4th, free from ice. New York: Albany and Rochester, 7th, canal navigation closed. Canastota, 29th, Erie canal free from ice. Rome, 2d, canal frozen over. Hudson River, 14th, Albany and New York boats withdrawn for season. Maine: Bangor, 30th, Penobscot River frozen, navigation closed. Gardiner, 10th, Kennebec River closed. Massachusetts: Lowell, Merrimac and Concord Rivers closed by ice.

*Special river report.*—At Omaha the channel of the Missouri River is reported to be regaining its former position between piers 9 and 10, the river-bed filling up between piers 7 and 9, counting from the Nebraska shore.

ATMOSPHERIC ELECTRICITY.

*Thunder-storms* occurred, on the 3d, Indian Territory, Texas, Kansas; 4th, Michigan, Illinois; 5th, Kentucky, Florida, Tennessee, Indiana; 8th, Florida; 13th, Texas, Illinois; 16th, Kansas; 17th, Kansas, Indian Territory, Illinois, Iowa, Nebraska, Missouri; 18th, Indian Territory, Kansas; 19th, Texas, Kansas, New Mexico; 20th, Texas, "most severe thunder-storm ever known"; 21st, Texas; 22d, Alabama; 23d, Texas, Alabama, Louisiana; 24th, Alabama, Florida; 27th, Texas; 28th, Indian Territory, Texas, Florida; 29th, Indian Territory, Florida, Texas; 30th, Indian Territory.

*Distant lightning* was reported as follows: 3d, Indian Territory, Texas; 4th, Illinois; 17th, Kansas; 18th, New Mexico; 22d, Texas; 24th, Alabama, Georgia; 26th, Texas, and electricity intense on Pike's Peak.

*Auroras* were observed, on the 3d, in Dakota; 4th, Georgia, Dakota; 5th, Dakota; 7th, Iowa, New York; 8th, Iowa; 9th, Connecticut, Iowa; 12th, Dakota; 28th, Maine.

OPTICAL PHENOMENA.

*Solar halos* were observed, on the 2d, in Illinois; 3d, Connecticut, Illinois, Maine, Kentucky, Vermont, Wisconsin; 4th, Louisiana, Florida, New Jersey, Connecticut; 5th, California, Vermont, Nebraska; 6th, California; 7th, Ohio, Florida, Georgia, Vermont; 8th, Texas, Iowa, South Carolina; 9th, Illinois, Iowa, Louisiana; 10th, New York, Illinois, Indiana, Iowa, Ohio, Kentucky, Connecticut, Wisconsin; 11th, New York, Ohio, Connecticut, Wisconsin; 12th, Iowa, New York, Connecticut; 13th, California, Ohio, Connecticut; 15th, Colorado, Maine, Nebraska, Louisiana; 16th, California, Nebraska, Connecticut; 17th, California, Connecticut; 18th, Texas, Kentucky, New

Hampshire; 19th, Colorado, Ohio; 20th, California, Alabama, Maine; 22d, Connecticut; 23d, Iowa, Ohio; 24th, Ohio, Connecticut; 25th, Connecticut; 28th, California, Georgia; 29th, Maryland, Michigan, New York, Pennsylvania, Ohio, New Jersey; 30th, Illinois, Indiana, Iowa, New Hampshire; 31st, Minnesota, South Carolina.

*Lunar halos.*—8th, Texas, California, Iowa, Nebraska, Missouri; 9th, Illinois, Indiana, Pennsylvania, Tennessee, Florida, New Jersey, Connecticut, Minnesota; 10th, Dakota, Nebraska, Illinois, Indiana, Iowa, Maryland, Ohio, Pennsylvania, Virginia, New Jersey, Florida, Missouri, California, Idaho, Nebraska, Minnesota, Wisconsin; 11th, Nebraska, Indiana, Iowa, Maryland, New York, Virginia, New Jersey, Louisiana, Missouri, Ohio, Michigan, Connecticut, Nevada, Minnesota; 12th, Maryland, Massachusetts, Michigan, New York, New Jersey, Missouri, Wisconsin, Ohio, Pennsylvania, Rhode Island, Connecticut, California, Idaho, Nevada; 13th, California, New York, Virginia, Missouri, Wisconsin, North Carolina, Nevada, Minnesota, Texas; 14th, California, Nebraska, Dakota, Iowa, Maine, Maryland, Massachusetts, Michigan, New York, Vermont, New Jersey, Louisiana, Missouri, Minnesota, North Carolina, Rhode Island, Connecticut, California, Minnesota, Wisconsin; 15th, Nebraska, Illinois, Iowa, Massachusetts, Minnesota, New York, Vermont, Louisiana, Michigan, Tennessee, North Carolina, Rhode Island, Idaho, Nevada, Minnesota, Missouri, Wisconsin; 16th, Nebraska, Indiana, Ohio, Vermont, Minnesota, New York, Connecticut, Idaho, Nevada, Wisconsin; 17th, California, Nebraska, Michigan, Pennsylvania, Virginia, Ohio, New York, New Jersey, Maine, Wisconsin; 18th, Colorado, Wyoming Territory, Alabama, Texas, Maine, New York, Ohio, Vermont, Virginia, Pennsylvania, Iowa, Massachusetts; 19th, Colorado, Indian Territory, Alabama, Ohio, Virginia, New Jersey, Louisiana, Iowa, Connecticut, Idaho, Nevada; 20th, Colorado, Alabama, Georgia, Illinois, Iowa, Nebraska, New York, Missouri, Tennessee, Indiana, Florida, Connecticut, Maine; 21st, Illinois, Indiana, Iowa, Maine, Nebraska, Ohio, New Jersey, Massachusetts; 22d, Colorado, Indiana, Kansas, Virginia, Ohio, Connecticut; 23d, Iowa, Kansas; 24th, Indiana, Iowa, Minnesota; 25th, Indiana, Kansas; 26th, New York; 27th, New York; 30th, Georgia.

*Mirage* was observed on the 2d in Dakota and Connecticut; 3d, Georgia; 6th, Minnesota, Nebraska; 7th, Nebraska; 8th, Kansas, Nebraska; 12th, Georgia; 15th, Nebraska, Georgia; 18th, Kansas, Georgia, Connecticut; 20th, Connecticut; 21st, Massachusetts, Connecticut; 23d, Connecticut; 24th, Kansas, Connecticut.

### MISCELLANEOUS PHENOMENA.

*Botanical.*—Connecticut: New London, dandelions, daisies and dahlias, grass fresh and green 26th; honeysuckle, pansies, and quince in bloom 28th; Suffield, dandelions in bloom. Dakota: Pembina, willows and poplars budding during month. Iowa: Dubuque, 20th, lilies sprouting and grass growing; Nora Springs, pansies blooming, 10th; dandelions in bloom 22d; trees budding 23d; Monticello, grass, rhubarb, and corn growing during the month. Indiana: Logansport, 31st, rose bushes and maple trees budding; Vevay, 28th, japonicas blooming, roses and lilacs leafing; Milford, 18th, wild flowers in bloom. Illinois: Anna, strawberries in bloom 15th; quince and lilac buds showing color 31st; Martinsville, trees budding and leafing 26th; shrubs and plants beginning to sprout 31st; Sterling, lilacs budding at the end of the month. Kansas: Creswell, 20th, winter wheat growing nicely, and looking green as in spring. Maryland: Sandy Springs, flowers blooming throughout the month; Fallston, 28th, mountain pinks in bloom. Massachusetts: Fall River, flowers in bloom during the month; New Bedford, 6th, violets in bloom; Fitchburg, dandelions blooming; Conway, sap running and sugar made. Michigan: Litchfield, dandelions and peach trees in bloom. Missouri: Troy, 7th, seeds of asters, hemp, mustard, &c., observed germinating in open ground; Lexington, rose, peach, lilac, and other buds unfolding; Clinton, rose, peach, and lilac budding, strawberries in bloom; Oregon, dandelions and crocus growing 22d, rose bushes budding 23d, wheat and rye growing rapidly 25th. New Hampshire: Contoocookville, 30th, blossom buds of the trailing arbutus swelling; Carroll County, trailing arbutus and lilacs in bloom. Nebraska: Emerson, 21st, horseradish sprouting; Plattsmouth, 20th, fruit trees budding. New Jersey: Freehold, 23d, magnolia, lilac, spirea, elm, apple, and maple trees budding, rose bushes leafing, and dandelions in bloom throughout the month; Salem, 30th, peach trees in leaf, pear trees blooming, and rose bushes in leaf and budding; Newark, 20th, elm and maple trees budding and leafing; Moorestown, 22d, dandelions and japonicas in bloom. North Carolina: Murphy, pansies, English daisies, forsythia, and wild flowers in bloom during last of month. New York: Waterburg, 31st, dandelions in bloom; Flushing, 29th, flowers in bloom; Farmingdale, 25th to 31st, dandelions in bloom and lilac buds swollen as in spring. Ohio: Bellefontaine, 31st, grass growing and fruit trees budding; Urbana, 23d, grass green and lilacs budding; 21st, dandelions in bloom; Ruggles, wheat sprouting. Oregon: Salem, grass and pasturage in excellent condition. Pennsylvania: Green Castle, 16th, dandelions in bloom; Tioga, 25th, dandelions in bloom; Chambersburg, 28th to 31st, pansies, dandelions, and honeysuckle

in bloom; Hulmesville, 8th, dandelions in bloom. Rhode Island: Newport, roses, honeysuckle, and pansies blooming, and grass green. South Carolina: Aiken, 16th, jonquils in bloom. Texas: Clarksville, wheat and oats look well; cotton-picking nearly finished. Tennessee: Nashville, 28th, grass green and growing rapidly. Virginia: Alto Vista, 31st, strawberries in bloom; Prospect Hill, 28th, strawberries in bloom; Wytheville, 29th, lilac buds ready to burst, leaflets visible. Wisconsin: Embarrass, 31st, buds of the lilac and currant swollen as in spring; grass starting; fall grain looks as forward as that of last fall did the first of June.

*Meteors* were observed on the 1st, Missouri, Georgia; 2d, Connecticut, Indiana, Iowa, Kansas, Maryland, New York; 3d, Maryland, Missouri, New York, Ohio; 6th, Illinois; 7th, Indiana, Louisiana, Massachusetts, New Jersey, Missouri; 8th, Connecticut, Iowa, Maryland, New York; 9th, Indiana, Iowa, Maryland; 10th, Iowa, New Jersey, Pennsylvania; 11th, Indiana, Iowa, Kansas, Louisiana, Maryland, Massachusetts, New York, Pennsylvania, Missouri, Nebraska; 12th, Indiana, Iowa, Louisiana, Maryland, Missouri, Idaho; 13th, Indiana, Kansas, Missouri; 15th, Missouri; 16th, Kansas, Massachusetts; 17th, California; 18th, Georgia, West Virginia; 23d, Massachusetts; 24th, Massachusetts; 25th, Kansas, Maine; 26th, New York; 27th, New York; 28th, New York, Vermont, Maine; 29th, Maryland, New Jersey; 31st, Connecticut, Illinois, Massachusetts, New Jersey, Pennsylvania. Emerson, Nebr., meteors nearly every night during the month. Clear Creek, Nebr., 10th, several bright meteors during evening. Indianapolis, Ind., 12th, between 3 and 4 a. m., 51 meteors in 30 minutes. Tybee Island, Ga., 1st, large numbers of faint meteors appeared, 8 to 11 p. m., from east.

*Prairie fires* were reported as follows: On the 2d, Indian Territory; 6th, Kansas; 7th, Kansas; 8th, Kansas; 9th, Dakota, Indian Territory, Kansas; 11th, Indian Territory, Kansas; 12th, Dakota, Kansas; 13th, Kansas; 14th, Dakota, Kansas; 15th, Dakota, Kansas; 16th, Dakota; 19th, Dakota; 28th, Kansas.

*Earthquake.*—Canada: 18th, Beachburg, Ont., between 5 and 6 a. m., two shocks; last one quite severe.

*Zodiacal light* was observed at Savannah, Ga., on the 1st, 2d, 3d, and 5th; Southington, Conn., 2d, 3d, 7th, 8th, 23d, 24th to 29th, and 31st; Saint Mary's Home, Ind., 2d, 3d, 7th, 8th, 9th, 11th to 14th; Great Bend, Kans., 7th, 11th; Somerset, Mass., 23d to 29th, and 31st; Rowe, 28th; Cambridge, Mass., 1st to 3d, 7th, 23d to 31st; Oregon, Mo., 15th; Ateo, N. J., 31st; Monticello, Iowa, 31st.

## SOLAR PHENOMENA.

*Sun spots.*—The following observations, made by Mr. D. P. Todd, upon the spots of the sun, have been kindly communicated by Rear-Admiral John Rodgers, U. S. N., Superintendent of the Naval Observatory:

| December, 1877. | No. of new— | | Disappeared by solar rotation. | | Reappeared by solar rotation. | | Total number visible. | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| | Groups. | Spots. | Groups. | Spots. | Groups. | Spots. | Groups. | Spots. | |
| 1—12 m | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 9 | |
| 2— 3 p. m | 0 | 0 | 0 | 5 | 0 | 0 | 1 | 4 | |
| 3— 3 p. m | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 2 | |
| 6— 1 p. m | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | |
| 7—11 a. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 8—noon | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 9— 3 p. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 13— 2 p. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 14—11 a. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 15— 1 p. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 16— 3 p. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 17—11 a. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 18—11 a. m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 20— 2 p. m | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | |
| 31—11 a. m | 0 | 3 | — | — | — | — | 1 | 4 | Two large groups of faculæ. |

At the Cincinnati Observatory the following observations were taken by Mr. John Given, and communicated by Ormond Stone, director of observatory: December 20, at noon—new groups, 1; new spots, 1. December 21, at noon—visible, groups, 1; spots, 1.

Published by order of the Secretary of War.

ALBERT J. MYER,
*Brigadier-General (Brevet Assigned), Chief Signal-Officer, U. S. A.*

PAPER 34.

# MONTHLY WEATHER REVIEW, JANUARY, 1878.

## INTRODUCTION.

In compiling the present review the following data, received up to February 14, have been made use of, viz: The regular tri-daily weather charts, containing the data of the simultaneous observations taken at one hundred and twenty-eight Signal Service stations and twelve Canadian stations; monthly journals and means from one hundred and thirty-four of the former, and means from thirteen of the latter; two hundred and forty monthly reports from volunteer observers; thirty-five monthly reports from United States Army post-surgeons; marine records; international simultaneous reports; monthly reports of the weather services of Canada and of the States of Iowa and Missouri; reliable newspaper extracts; special reports. The most prominent events of the month have been: the high temperatures of the Missouri and Upper Mississippi Valleys and the Lake region; the high pressures over the same region; the severe storms of the 11th and the 31st on the Atlantic coasts, and of the 14th to the 16th and the 24th to the 28th on the Pacific coasts; the excessive rain-fall in Northern California; the remarkable measured wind-velocities of 120 miles per hour at Cape Lookout and 186 at Mount Washington; the forward state of vegetation in the western and northern sections; the aurora of the 23d.

## BAROMETRIC PRESSURE.

*In general.*—The general distribution of atmospheric pressure is shown by the isobars on Chart No. II. A comparison with former years shows that pressures have been normal over Lakes and Upper Canada, but above the mean on the Pacific and Atlantic coasts, and 10 or 15 hundredths of an inch above the mean in the Gulf States.

*Barometric ranges.*—The largest and smallest monthly ranges have been as follows: California: Red Bluff, 0.98; Los Angeles, 0.42. Rocky Mountains: Denver, 0.56; Pike's Peak, 0.49. Northwest: Yankton, 1.07; Deadwood, 0.64. The Southwest: Jacksborough, 1.08; Uvalde, 0.60. Upper Mississippi Valley: Saint Paul, 1.03; Davenport, 0.95. Upper Lakes: Chicago, 0.07; Escanaba, 0.80. Lower Lakes: Oswego, 1.17; Detroit, 0.89. Ohio Valley: Cincinnati, 1.22; Pittsburgh, 1.11. East Gulf States: Vicksburg, 1.05; Key West, 0.55. South Atlantic States: Cape Lookout, 1.36; Jacksonville, 0.87. Middle States: Albany, 1.54; Baltimore, 1.23. New England: Portland, 1.85; New Haven, 1.54; and Mount Washington, 1.13.

*Departures from normal pressures.*—The following synopsis of the tri-daily map of departures from normal values of the pressures observed, but not reduced to sea-level (inasmuch as the normal annual and diurnal periodicities, and the normal geographical distribution, of the pressure are thereby eliminated), will, in connection with the subsequent history of areas of low and high pressure, as defined by the isobars for sea-level, give a complete view of the pressure during the month. The month began with a depression of −50 hundredths of an inch over Nova Scotia, and an excess +30 over Manitoba and Oregon; the line of no departure extended from Minnesota to Louisiana. On the 2d the pressure rapidly fell in the Northwest, and a depression developed along the east slope of the Rocky Mountains, being greatest, −59, at Dakota at 11 p. m., while +23 was reported from Oregon and +19 from the Lower Lakes. The 3d began with a depression of −40 in Dakota and Texas, and an excess, +30, in the Saint Lawrence Valley, and +13 in California. The depressions extended eastward, and, at 11 p. m., were, respectively, in the Upper Mississippi Valley and in Tennessee; pressure rapidly rose to +24 in Oregon and +44 in Maine. The 4th began with −50 on the North Carolina coast, +46 at Eastport, +10 in Texas, +25 in Manitoba, and +30 in Oregon. The depression moved northeastward, followed by rapid rise in the Mississippi Valley and the Southwest. A second depression, however, developed in Manitoba and Montana. The 5th began with +35 in the Lower Mississippi Valley and +26 in Manitoba, but −18 in Wisconsin and −70 at Eastport. The depression moved eastward, and, by 11 p. m., an area of about +30 extended from Manitoba to the Gulf of Mexico, while a slow fall resulted in a depression of −10 on the Pacific coast. The 6th began with −10 or −12 on the Pacific coast, +35 in the Northwest and Mississippi Valley, and −5 over the Lower Lake Region. During the day the barometer fell slowly west of the Rocky Mountains, but steadily rose from Manitoba southward, so that, at 11 p. m., −16 prevailed on the Pacific coast, and +40 in the Upper Mississippi Valley. The 7th began with an area of excess over the entire country east of the Rocky Mountains; the highest, +48, in the Ohio Valley. A slight depression prevailed in Colorado, and a decided one, −25 to −30, in Manitoba and Oregon. The depression rapidly developed during the day, and, at 11 p. m., there were reported −46 in Oregon, −30 in Manitoba, 0 from Nevada to Indian Territory, and thence to Lake Superior, and +50 on the Middle Atlantic coast. During the 8th the 0-line remained

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| No. | Velocity. | |
|---|---|---|
| I | 30 | miles per hour. |
| II. | 33 | do. |
| III. | 35 | do. |
| IV. | 13 | do |
| V. | — | do |
| VI. | 28 | do |
| VII. | 25 | do |
| VIII. | 21 | do. |
| IX. | 25 | do. |
| X. | 25 | do. |
| XI. | 33 | do. |
| XII. | 21 | do. |

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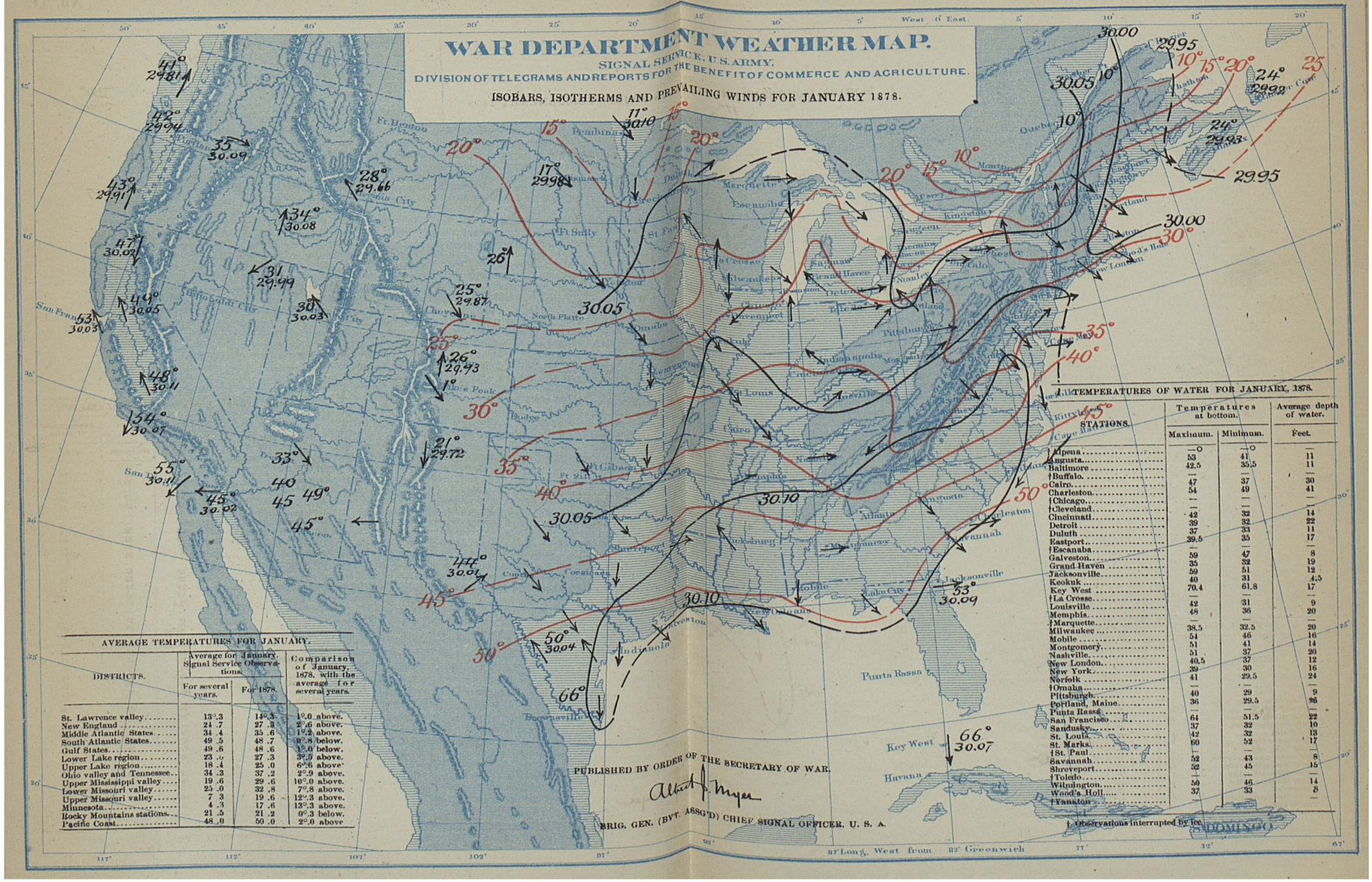
# WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U. S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

ISOBARS, ISOTHERMS AND PREVAILING WINDS FOR JANUARY 1878.




PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

## AVERAGE TEMPERATURES FOR JANUARY.

| DISTRICTS. | Average for January. Signal Service Observations. For several years. | For 1878. | Comparison of January, 1878, with the average for several years. |
|---|---|---|---|
| St. Lawrence valley | 13°.3 | 14°.5 | 1°.0 above. |
| New England | 24 .7 | 27 .3 | 2°.6 above. |
| Middle Atlantic States | 34 .4 | 35 .6 | 1°.2 above. |
| South Atlantic States | 49 .5 | 48 .7 | 0°.8 below. |
| Gulf States | 49 .6 | 48 .6 | 1°.0 below. |
| Lower Lake region | 23 .6 | 27 .3 | 3°.5 above. |
| Upper Lake region | 18 .4 | 25 .0 | 6°.6 above. |
| Ohio valley and Tennessee | 34 .3 | 37 .2 | 2°.9 above. |
| Upper Mississippi valley | 19 .6 | 29 .6 | 10°.0 above. |
| Lower Missouri valley | 25 .0 | 32 .8 | 7°.8 above. |
| Upper Missouri valley | 7 .3 | 19 .6 | 12°.3 above. |
| Minnesota | 4 .3 | 17 .6 | 13°.3 above. |
| Rocky Mountains stations | 21 .5 | 21 .2 | 0°.3 below. |
| Pacific Coast | 48 .0 | 50 .0 | 2°.0 above |

## TEMPERATURES OF WATER FOR JANUARY, 1878.

| STATIONS. | Temperatures at bottom. Maximum. | Minimum. | Average depth of water. Feet. |
|---|---|---|---|
| | —° | —° | — |
| †Alpena | 53 | 41 | 11 |
| Augusta | 42.5 | 35.5 | 11 |
| Baltimore | — | — | — |
| †Buffalo | 47 | 37 | 30 |
| Cairo | 54 | 49 | 41 |
| Charleston | — | — | — |
| †Chicago | — | — | — |
| †Cleveland | 42 | 32 | 14 |
| Cincinnati | 39 | 32 | 22 |
| Detroit | 37 | 33 | 11 |
| Duluth | 39.5 | 35 | 17 |
| Eastport | — | — | — |
| †Escanaba | 59 | 47 | 8 |
| Galveston | 35 | 32 | 19 |
| Grand Haven | 59 | 51 | 12 |
| Jacksonville | 40 | 31 | 4.5 |
| Keokuk | 70.4 | 61.8 | 17 |
| Key West | — | — | — |
| †La Crosse | 42 | 31 | 9 |
| Louisville | 48 | 36 | 20 |
| Memphis | — | — | — |
| †Marquette | 38.5 | 32.5 | 20 |
| Milwaukee | 54 | 46 | 16 |
| Mobile | 51 | 41 | 14 |
| Montgomery | 51 | 37 | 20 |
| Nashville | 40.5 | 37 | 12 |
| New London | 39 | 30 | 16 |
| New York | 41 | 29.5 | 24 |
| Norfolk | — | — | — |
| †Omaha | 40 | 29 | 9 |
| Pittsburgh | 36 | 29.5 | 26 |
| Portland, Maine | — | — | — |
| Punta Rassa | 64 | 51.5 | 22 |
| San Francisco | 37 | 32 | 10 |
| Sandusky | 42 | 32 | 13 |
| St. Louis | 60 | 52 | 17 |
| St. Marks | — | — | — |
| †St. Paul | 52 | 43 | 8 |
| Savannah | 52 | 45 | 15 |
| Shreveport | — | — | — |
| †Toledo | 50 | 46 | 14 |
| Wilmington | 37 | 33 | 8 |
| Wood's Holl | — | — | — |
| †Yankton | — | — | — |

† Observations interrupted by ice.

87° Long. West from 82° Greenwich

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# WAR DEPARTMENT WEATHER MAP.

## SIGNAL SERVICE, U.S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

PRECIPITATION CHART FOR JANUARY, 1878.

### AVERAGE PRECIPITATION FOR JANUARY.

| DISTRICTS. | Average for January. For many years. | Average for January. For 1878. | Comparison of January, 1878, with the average for many years. |
|---|---|---|---|
| | Inches. | Inches. | |
| St. Lawrence valley | 3.50 | 3.78 | 0.28 excess. |
| New England | 3.10 | 5.27 | 2.17 excess. |
| Middle Atlantic States | 3.25 | 4.71 | 1.46 excess. |
| South Atlantic States | 3.15 | 5.28 | 2.13 excess. |
| Eastern Gulf States | 4.50 | 4.47 | 0.03 deficiency. |
| Western Gulf States | 3.85 | 4.38 | 0.53 excess. |
| Lower Lake region | 2.60 | 4.11 | 1.51 excess. |
| Upper Lake region | 2.25 | 1.26 | 0.99 deficiency. |
| Ohio Valley | 3.66 | 3.25 | 0.41 deficiency. |
| Tennessee | 4.44 | 3.43 | 1.01 deficiency. |
| Upper Mississippi Valley | 1.75 | 0.86 | 0.89 deficiency. |
| Lower Missouri Valley | 1.20 | 1.94 | 0.74 excess. |
| Upper Missouri Valley | 0.65 | 0.10 | 0.55 deficiency. |
| Minnesota | 0.65 | 0.43 | 0.22 deficiency. |
| California Coast | 2.95 | 6.71 | 3.76 excess. |
| Portland, Or | 6.76 | 6.77 | normal. |

### HEIGHTS OF RIVERS ABOVE LOW-WATER MARK, JAN., 1878.

| STATIONS | Danger point on gauge. | Highest water. Date. | Highest water. Height. | Lowest water. Date. | Lowest water. Height. |
|---|---|---|---|---|---|
| | ft. in. | Jan. | ft. in. | Jan. | ft. in. |
| **RED RIVER.** | | | | | |
| Shreveport | 29 9 | 31 | 25 11 | 11 | 21 3 |
| **MISSOURI.** | | | | | |
| Yanktonl | 20 0 | — | — | — | — |
| Omaha† | 16 0 | 1 | 5 7 | 4 | 5 2 |
| Leavenworth | 21 0 | 29 | 5 7 | 10 | 3 7 |
| **MISSISSIPPI.** | | | | | |
| St. Paul† | 14 6 | 1 | 3 1 | 23 | 2 10 |
| La Crosse† | 18 0 | 3 | — 0 1 | 1 | — 0 3 |
| Dubuque | 21 10 | 19 to 22 | 6 11 | 6 | 5 2 |
| Davenport | 15 0 | 4 to 8 | 5 0 | 14 | 2 2 |
| Keokuk | 14 6 | 3 | 5 9 | 12 | 3 6 |
| St. Louis | 30 0 | 1,2 | 17 4 | 14 | 8 4 |
| Cairo | 40 0 | 3 | 27 0 | 15 | 15 6 |
| Memphis | 34 0 | 6 | 21 8 | 18 | 11 10 |
| Vicksburg | 41 0 | 10, 11 | 33 0 | 1 | 24 4 |
| New Orleans* | — 2 6 | 12 | — 6 4 | 1 | — 10 1 |
| **CUMBERLAND.** | | | | | |
| Nashville | 42 0 | 31 | 18 3 | 10 | 6 9 |
| **OHIO.** | | | | | |
| Pittsburgh | 20 0 | 15 | 11 10 | 6 | 0 9 |
| Cincinnati | 50 0 | 18 | 28 9 | 11 | 8 2 |
| Louisville | 24 0 | 18 | 11 4 | 13 | 5 5 |
| **SAVANNAH.** | | | | | |
| Augusta | — — | 1 | 21 6 | 9 | 8 9 |
| **MONONGAHELA.** | | | | | |
| Morgantown | 23 0 | 15 | 7 11 | 5 | 0 9 |
| Pittsburg | 20 0 | 15 | 11 10 | 6 | 0 9 |
| **ALABAMA.** | | | | | |
| Montgomery | | 1 | 21 0 | 27, 28 | 8 0 |

*Below the extreme low mark of 1874. †Frozen over throughout month. ‡STEAMBOATING Oct. 31st.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. A.S.G'D) CHIEF SIGNAL OFFICER, U. S. A

in the Mississippi Valley, but the pressure increased to +67 at Eastport, and diminished to +20 in the South Atlantic States. The low pressure on the Pacific coast was followed by a steady rise up to +4 in Oregon at 11 p. m., at which time a 0-line trended southeast from Vancouver's Island to Northern Texas, and the greatest depression, —60, was in Manitoba and Northern Dakota. The 9th began with rapidly-falling barometer in the Pacific States, and a depression of —10 in Oregon, but an excess over California and the Rocky Mountain region; a depression from Colorado to the Mississippi, which amounted to —40 throughout Minnesota, and to —20 throughout the eastern part of the Gulf of Mexico, and an excess over the Middle States and New England, amounting to +45 on the coast of Maine. During the day the depression decidedly increased, and the excess in the Middle States and New England diminished. The 10th began with the depression —85 at Cape Hatteras, which had moved thither from the eastern portion of the Gulf of Mexico, a general depression of —35 prevailed from Ohio to Illinois, and the depression in Oregon had extended southward over California and eastward over Dakota. The former passed slowly northeastward to —100 at Cape Cod, and the latter during the day became central as —60 in Dakota, while the pressure rose on the Pacific coast and over the Gulf of Mexico and Southern States. The 11th began with —119 at Portland, Maine, —40 in Manitoba, 0 in Oregon, where pressure was highest, whence it appears that the pressure was below the normal over the entire country. During the day the barometer fell in Texas, but elsewhere rose, and at 11 p. m. was at or above normal west of Utah and Manitoba, as also over portions of Tennessee, Ohio, and Lake Superior. The greatest depressions were —78 at Eastport, and —45 over Western Texas. The 12th began with depressions of —32 at Boston, —55 in Eastern Texas, but elevations of +12 Lake Saint Clair, and +16 Salt Lake City. Pressure was then falling in the Southwest, but elsewhere rising. During the day pressure fell east of the Mississippi, and less so in Oregon; it rose at most Rocky Mountain stations, and in Manitoba, as also over New England. At 11 p. m. the depression —55 prevailed over Arkansas, the excess +20 over Wyoming Territory, Manitoba, &c. The 13th began with —52 at Cairo, —15 on the Pacific coast, +30 in Manitoba, +10 Middle Atlantic coast. Pressure was falling at Rocky Mountain stations. During the day pressure rose, but fell again from the Mississippi westward, and at 11 p. m. a depression of —45 prevailed on the California and Oregon coasts, a slight excess prevailed from Manitoba to Colorado and Southern Texas, as also in New England; the principal depression, —47, was central along the Ohio Valley. The 14th began with —58 at Philadelphia, and —44 at Portland, Oregon; from Dakota to Texas pressure was slightly above the normal, as also in Nova Scotia and New Brunswick, but elsewhere extensive depressions existed. Pressure was rising in Nevada and California, the Gulf States, and Ohio Valley, but during the day continued falling to —50 and —52 in California and Oregon, and probably to a less extent in Montana and British Possessions; it rose to +15 in Texas, and also east of the Mississippi, but again fell in Maine to —73. The 15th began with —50 at San Francisco, —64 at Eastport, and +10 at Indianola. During the day pressure rose at San Francisco, but fell in Oregon and westward to Manitoba. On the 16th and 17th telegraphic reports from the Pacific coast were not received, but the pressure appears to have continued very low north of San Francisco, and the depression in British America extended southward into Minnesota and Dakota, where the departure was —25 at 11 p. m. of the 16th, while +20 prevailed over Northern New York. During the 17th pressure rose on the Pacific coast, but fell from the Rocky to the Alleghany Mountains, and rose to +27 in Nova Scotia. The 18th began with depressions —30 in Texas and —23 in Dakota, but elevations of +14 at San Francisco and +29 at Eastport. Pressure varied during the day east of the Mississippi, but rose to the westward, and at 11 p. m. elevations of +20 or more prevailed in Oregon and New England, but a depression of —30 existed in Texas, the depression in the Northwest appeared to die out. During the 19th the depression in the Gulf States moved slowly northeastward, and at 11 p. m. was central (—35) at Cairo, while the elevations were +17 in Oregon and +9 at New London. The 20th began with an elevation of +26 at Virginia City, but pressure had fallen rapidly on the Pacific coast, and also very generally in the Mississippi Valley and Atlantic States. The greatest depression was —39 at Knoxville. During the day the area of rising barometer extended eastward to the Alleghanies, and the depression —30 extended from Georgia to Ohio. The 21st began with depressions —30 to —35 over the South Atlantic States, Ohio, and portion of the Lower Lakes, but elevation +25 over the Rocky Mountain region and the Gulf of Saint Lawrence. During the day pressure fell on the Pacific coast, and was stationary at Rocky Mountains, but fell in Middle and Eastern States to —45 in the Saint Lawrence Valley. The 22d began with a rapid rise to +45 in Manitoba, but fell to —29 in Oregon and to —55 in the Saint Lawrence Valley and Nova Scotia. The fall on the Pacific coast was followed by a rapid rise. The rise in Manitoba extended southeastward to Lake Huron. The depression in the Saint Lawrence Valley was —53 at 11 p. m. The 23d began with a continued rise on the Pacific coast, but fell in the Northwest and Southwest. The depressions were —31 Bismarck, —57 Boston, —61 Quebec. The elevations were +33 Escanaba, +8 San

Diego. During the day the depressions rapidly developed, and the 11 p. m. map showed +24 San Diego, —45 Bismark, —75 Gulf of Saint Lawrence, +30 to +35 Virginia to Upper Canada. The 24th began with a rapid fall on the Pacific coast to —21 at San Francisco, and a rise from Colorado northward. The depressions were —35 from Minnesota to Missouri, and —54 at Sydney, C. B. The elevations were +35 to +40 over the Middle Atlantic States. During the day the pressure fell to —44 at Portland, Oreg., but elsewhere rose to +9 at Santa Fé, —24 in Upper Mississippi Valley, and +25 at Halifax. During the night the depression in Oregon extended eastward to Utah, where, on the morning of the 25th, —30 was reported, while in Oregon +22, and in the Upper Mississippi —19, but at Sydney +27 prevailed. During the day the pressure rose on the Pacific coast and over New England and the Gulf of Saint Lawrence, but fell from the Rocky Mountains eastward to the Middle and South Atlantic coasts, so that at 11 p. m. there were reported in Indian Territory —31, and at Port Huron —26. The 26th began with —48 in Indian Territory and Northern Texas, but +47 at Sydney, and +10 at San Francisco and Virginia City. By midnight the depressions were —43 Cairo and Memphis, and —37 Eastport, while the pressure had also fallen in Oregon and Montana to —22 and —24, but had risen to +1 Pembina, and +13 Salt Lake City. The 27th began with —53 at Cairo and —41 Sydney (no reports from Oregon), +26 Pembina. The depression moved rapidly eastward, and at 11 p. m. was —57 at Washington, but had risen to —10 over the Canadian Provinces, and fallen to —18 at Virginia City, but risen to +19 at Duluth. The 28th began with a depression of —74 at New London and an excess of +24 at Pembina. The depression moved northeastward and a second one formed in the Rocky Mountains and the Lower Mississippi Valley, so that at 11 p. m. there were reported —90 Sydney, +18 Escanaba, —48 Texas, +7 San Diego. The 29th began with a decided fall to —61 in Indian Territory and to 0 at San Francisco, but a rise over the Lakes, Middle and Eastern States. By 11 p. m. these had become —66 at Shreveport, —22 San Francisco, and —56 Portland, Oreg., +43 Collingwood and +13 Cheyenne. The 30th began with —66 at Vicksburg, and pressure still very low in Oregon, where, however, it rose during the day, so that at 11 p. m. the departures were —42 Portland, Oreg., —67 Savannah, +54 Quebec. The 31st began with another fall on the Pacific coast, and the departures were —8 Kittyhawk, +55 Chatham. The pressure, however, again rose from the Pacific to the Lake region, and at 11 p. m. the departures were +2 to +8 on the Pacific coast, —49 in Texas, —72 Cape May, +42 Chatham.

*Areas of high barometer in general.*—These have been but few and unimportant, furnishing a great contrast to the conditions for January of former years. The consequent absence of cold northerly gales has given the country generally a month of remarkably mild weather, especially from the Missouri Valley northward.

No. I.—This area covered Texas during the 1st.

No. II advanced southward on the 2d, and eastward over the Lower Lake region. On the 3d it covered the Middle States and New England, and then retreated northeastward, being over the Gulf of Saint Lawrence on the 4th.

No. III.—Extended for a short time along the east slope of the Rocky Mountains on the 3d; extended eastward on the 5th over the Gulf States, and was at night-time reinforced by high barometer No. IV.

Nos. IV and V advanced southward on the 5th over Manitoba, and at 11 p. m. of the 6th was central over Missouri and Iowa; then it moved eastward, and at 11 p. m., the 7th, was central over Maryland, at which time pressure was increasing to the northward, so that during the 8th the barometer rose over New England and Nova Scotia, where it was highest at 11 p. m., after which the area of highest barometer moved eastward, and at 11 p. m. of the 9th was south of Newfoundland.

No. VI.—The barometer rose from California to Texas on the 8th and 9th; on the 10th the highest pressure was over the Gulf of Mexico, and on the 11th it advanced northeastward until at 11 p. m., when it was central in Eastern Kentucky and Northern Georgia; on the 12th, at 11 p. m., it had advanced to Eastern Virginia and Pennsylvania, and on the 13th, at 11 p. m., was central in Maine.

No. VII.—The pressure rose on the 12th in Manitoba, and on the 13th in the Southwest, forming a high area, which, at 11 p. m. of the 14th, was central in Texas, and at 11 p. m. of the 15th, in Tennessee, with equal pressure in the Lake region. The combined areas were central at 11 p. m. of the 16th and during the whole of the 17th, from the Middle Atlantic States to Canada. On the 18th the pressure had fallen over Canada and the Gulf States, and at 11 p. m. the highest was over New Jersey, but at 11 p. m. of the 19th was off the North Carolina coast.

No. VIII.—On the 20th the pressure rose from Manitoba to Texas, and on the 21st, at 11 p. m., high areas existed in both these sections. Both continued developing during the 22d, but on the 23d the pressure fell in the Southwest, and the other area moved southeastward from Minnesota to Maryland, after which it moved more slowly, and was, at 11 p. m. of the 24th, off the North Carolina coast.

No. IX.—Pressure rose on the 25th over the Gulf of Saint Lawrence and New

England. It remained high over these regions preceding the advance of low area No. X.

No. X.—Pressure rose on the 27th in Manitoba and the Northwest, extending eastward on the 28th and 29th, and at 11 p. m. of the 29th was central over Upper Canada and the Middle States, but at 11 p. m. of the 30th, over the Saint Lawrence Valley, and on the 31st, at 11 p. m., was central over the mouth of that river.

*Areas of low barometer in general.*—Twelve areas of low pressure are traced upon chart No. I. These seem to be naturally divisible into three groups, viz: Nos. I, III, V, VI, and X originated in or northwest of Dakota, moved southeast to the Lake region, thence northeast to the Gulf of Saint Lawrence. Nos. VII, VIII, XI, XII originated in or northwest of Indian Territory, moved southeast to Arkansas, and thence east and northeast to Maine and Nova Scotia. Nos. II and IV originated in Southern Texas or Northern Mexico, and moved northeast to North Carolina and Nova Scotia. So far as our maps show, the first two of these groups originated on the east slope of the Rocky Mountains, as subsidiary areas, induced by the presence of extensive depressions, either west of the mountains or over the Gulf of Mexico, precisely as the subsidiary areas of Nos. XI and XII were formed on the southeast slope of the Alleghanies.

No. I.—The barometer rose in Oregon on the 2d, while this depression was developing to the west of Manitoba; it moved southeastward over the Lake region on the 3d, thence eastward on the 4th, and was dissipated during that evening under the influence of the more important depression No. II.

No. II.—An area of calms or northerly winds and cold, clear weather prevailed over Southern Texas on the morning of the 1st. But by the morning of the 2d, although higher pressure and cooler clear weather prevailed in the interior of Texas, yet on the southern coast warmer cloudy weather and falling barometer were reported. During the day the winds at Indianola and Galveston shifted to southeast, with warmer cloudy weather, although everywhere else north winds continued, and at 11 p. m. of the 2d the convergence of the winds toward a point west of Indianola allows us to place an incipient storm-center as on Chart No. I. During the night the area of snow extended northward over Eastern Texas and Indian Territory. The storm-center moved northeastward over Louisiana to Alabama at 11 p. m., and then very rapidly to and along the Middle Atlantic coast, reaching Boston by 11 p. m. of the 4th and disappearing on the 5th beyond the northern part of the Gulf of Saint Lawrence.

No. III.—This depression developed during the evening of the 3d, in Eastern Dakota and Western Minnesota, where warm southeast winds with cloud and snow quickly succeeded the clear, cool, northerly winds of the early morning. In the southeastward movement to Lake Erie this depression gradually filled up, and after moving more slowly eastward over New York, disappeared on the 6th, in the advance southward of an area of high barometer.

No. IV.—During the 4th and 5th an area of northerly winds and high pressure moving southward over the Gulf of Mexico, seems to have given rise to cloudy and rainy weather over the southern half of the Gulf, which was apparently followed by falling barometer on the 6th in the West and Southwest, and a special depression is located south of the Rio Grande. At Indianola on the 7th the steamers arriving from Havana reported heavy weather during the last twelve days in the Gulf; 7th, 3.20 a. m., bark McDowell wrecked during strong gale, 7 miles south of San Louis Pass, near Galveston. During the next three days, this depression moved slowly eastward and on the 9th at 11 p. m. was off the coast of Georgia; at this time the pressure was quite high over the Middle and East Atlantic States, and the slight depression subsequently developed into a severe storm, which was on the 10th, 7.35 a. m., central a little southwest of Cape Hatteras. 10th, schooner Torry wrecked 65 miles off mouth of Brazos River; reports having encountered terrible weather, during voyage of 13 days from Tuxpan, Mexico. Among the numerous disasters to shipping in connection with this storm we note the following: wrecks on shore, at Nashawan Island, steamer A. Strong; at Beaufort, S. C., ship Marcia Greenleaf; at Cape Cod, schooner Harriet Fuller parted cable and went ashore; near Cape Lookout, Schooner Price. During the 10th, the storm-center moved along and close to the Middle Atlantic coast, and was at 11 p. m. near Cape Cod, and at 7.35 a. m. of the 11th, near Portland, Me.; after deflecting northwest into Maine, it again turned eastward, and at 7.35 a. m. of the 12th was east of Halifax. While delayed over New England this storm was characterized as one of the severest ever known on the coast, along the whole extent of which innumerable wrecks occurred, notwithstanding that every precaution had been taken. The hitherto unheard of wind-velocity of 186 miles per hour was measured on Mount Washington, and the following record of that station is believed to be unique. The possible error of the Robinson anemometer and the local peculiarities of its exposure on this occasion have not yet been investigated, but there is no doubt the velocities were actually recorded by the instruments, and measured as follows: 10th, 9 p. m., east, 96 miles, heavy sleet; 11.22 p. m., east, 112 miles, heavy sleet (window stove in and storm-shutters put up); 11.40 p. m., east, 144 miles, light snow; 12 m. (midnight), east, 144 miles, heavy snow. 11th, 1

a. m., east, 150 miles, heavy snow (the roar of the wind is deafening and the building rocks and trembles); 2 a. m., east, 159 miles, heavy snow (another window stove in); 3 a. m., east, 168 miles, heavy snow; 4 a. m., northeast, 186 miles, heavy snow; 5 a. m., northeast, 171 miles, heavy snow; 6 a. m., northeast, 132 miles, heavy snow. At Camden, Me., during the night of the 10th–11th the wind blew with destructive hurricane force.

No. V.—This was the southern extremity of a depression, visible only in the north of Dakota on the 7th, and disappearing north of Lake Superior on the 8th. It was apparently the eastern extension of the very low pressure prevailing in Dakota.

No. VI.—The barometer having fallen on the Oregon coast, where it was quite low on the morning of the 8th, was followed by southerly winds and falling barometer at our stations on the east slope of the Rocky Mountains, which culminated in a well defined center of low pressure in Northern Dakota on the morning of the 9th. After moving southeastward to Lake Erie, this depression was dissipated during the 10th, its last position being in Western New York, at 11 p. m. of the 10th, at which time the severe storm No. IV was central at Cape Cod.

No. VII.—This depression began on the 11th in the Southwest, where cool northerly winds were blowing towards an extensive area of falling barometer in Texas and the Gulf of Mexico. After moving southeastward into Arkansas, the center turned northeastward to Indiana, where it was at 4.35 p. m. of the 13th. Here the area of low pressure expanded irregularly, owing to the formation of a subsidiary depression in the Middle Atlantic States and the Lower Lake region, both of which appear to have united in New Brunswick on the 14th.

Nos. VIII and IX.—A large and well-defined area of low pressure had, during the 17th and 18th, existed between the Upper Mississippi Valley and the Rocky Mountains, and appears to have induced the rise in pressure on both the Pacific and Atlantic coasts, while the depression itself extended southward until on the morning of the 19th it can be approximately located in Eastern Texas. It passed thence northeastward to the Saint Lawrence Valley, but covered so large an area and was attended with such slight gradients and winds that it would not be recorded here, were it not that after existing for two days over New England and Canada, it was finally followed by such an influx of air from north and west as to give rise to a deep depression and severe storm. The central low pressure thereafter moved on the 23d eastward over Maine and Nova Scotia, while northwest gales prevailed along the Middle Atlantic and New England coast. (The severe gale of the 23d was marked by disasters on the coasts as follows: Sandy Hook, NW. gale, schooner Eva Holmes ashore; off Absecom, schooner Freeman damaged; Fort Point Cove, N. H., schooner Pilgrim destroyed.)

No. X.—This depression is first apparent north of Montana on the 22d, whence it evidently moved southeastward until it was in Southern Minnesota at 7.35 a. m. of the 24th. There is a strong probability that it originated on the east slope of the Rocky Mountains in British America, after the arrival there of the high pressure induced by the low barometer that had prevailed over Oregon and British Columbia from 11 p. m. of the 21st to 11 p. m. of the 22d. The path of this depression was southeastward to the northern portion of Illinois, then eastward over Lake Ontario, and northeast over Cape Breton, which it passed on the 26th.

No. XI.—Southerly winds and falling barometer, increasing cloudiness and higher temperature prevailed on the 25th over the Southwest. This was followed by the formation of low No. XI, central on the 26th, 7.35 a. m., in Southeast Kansas, whence it moved south-southeast and east over Missouri into the Ohio Valley, and at 11 p. m. of the 27th was central in Central Pennsylvania. At this time the tendency to the formation of a new center in the Middle Atlantic States was very strong, as shown by the winds, and it is very possible that the center located for 7.35 a. m. of the 28th represents this new depression, and that the old one had disappeared. The depression moved rapidly northeast during the 28th over and beyond Cape Breton. In its passage eastward on the 25th across the State of Missouri, this storm was accompanied by thunder and lightning, and sometimes heavy hail, as reported by Professor Nipher, of the Missouri Weather Service, at ten of his stations.

No. XII.—The pressure having been high during the 27th over the Southwest, with cool northerly winds, it fell on the 28th along the entire east slope of the Rocky Mountains, and on the afternoon the incipient central low pressure was in Western Texas and Kansas. By 4.35 p. m. of the 29th this had moved southeastward into Eastern Texas, while an extensive area of high barometer prevailed over the Lake region. This depression moved slowly eastward, and at 4.35 p. m. of the 30th a subsidiary center was apparent in Southern Georgia, while the main depression was over Tennessee. This subsidiary center rapidly grew in importance, as is usual on the east slope of both the Appallachian and the Rocky Mountain chains. At 7.35 a. m. of the 31st it was in Eastern North Carolina, while the original center seemed to still remain in Tennessee. During the rest of the 31st the original center disappeared, and the new one on the coast of North Carolina was attended by increasing winds, which, among other disasters, wrecked the steamer Metropolis. The northeast gale of the 31st caused very high tides on the

Middle Atlantic coast, from some points of which the following reports have been received: Coney Island and Rockaway, Long Island, tide 20 feet high, wooden buildings swept away. Greenport, Long Island, violent gale and very high tide, much damage to shipping. At Plumb Island, Long Island Sound, the schooner Ella Haynes was wrecked. Long Branch, N. J., many houses damaged and portions of the New Jersey Central Railroad washed away. Near Boston, Mass., the average snow-fall was 18 inches, with drifts of 10 feet deep. The monthly journal just received from Cape Lookout while this review was about going to press, shows that during the 31st the barometer remained vibrating between 29.45 and 29.49 during the whole day, from 7 a. m. to 4 p. m., while the hurricane moderated in severity from its extreme velocity of 120 miles per hour at 2.20 a. m., and veered from ESE. to S. and SW., with a tremendous sea.

The following order, issued to the signal offices in principal cities, explains itself:

"WASHINGTON, D. C., *February* 5, 1878.

"SERGEANT: By direction of the Chief Signal Officer, the Signal Service station at the wreck of the Metropolis will be called in at noon to-morrow (Wednesday, February 6, 1878), the men on duty rejoining their proper stations at Kittyhawk and Cape Henry. This station was established as follows: A mounted messenger from near the wreck of the Metropolis, leaving there about noon, reached Kittyhawk signal station, distant about twenty miles, at 6.55 p. m., January 31. The corporal in charge, mounting his assistant, Private William Davis, on the messenger's horse, ordered him, fully equipped, to the wreck, at the same time reporting wreck and facts to this office. The facts were at once communicated to the Life-Saving Service and naval authorities, the wrecking companies, Seaman's Aid Association, and others at Norfolk, and to the higher authorities at Washington. Active measures and assistance were taken at both cities. Private Davis, leaving Kittyhawk within fifteen minutes after the arrival of the messenger, going on horseback twenty miles to one of the worst sea-beaches of the coast, in a dark night, through a storm, reached the wreck at 3.20 a. m., forwarded a report to the office at 4 a. m., and at 5 a. m. sent a condensed report of the facts. By noon a more complete statement, giving also names of saved known up to that hour, had been received and furnished to the press, with many other telegrams. From the time at which Private Davis reached the wreck he remained steadily at his station on the open beach, without shelter, until 9 o'clock p. m. of Friday, a duty of twenty-six hours without rest, and in which twenty miles had been ridden on horseback. On Friday night assistance, with extra instruments, &c., which had been ordered from Cape Henry, reached the wreck station. Cape Henry station being in turn reinforced from Norfolk, all of these stations, as well as Kittyhawk, were open all night the night of the wreck, the ensuing day, and until all the survivors had left the wreck on Friday night. It was by the agency of these stations that all telegraphic information which appeared in the journals throughout the country reached the press, and that by which the action of the authorities was guided. The station has since been maintained to aid the friends of the lost and others interested. The highest wind-velocity of the Metropolis storm was, at Cape Henry, 60 miles; at Kittyhawk, 39 miles; and at Cape Hatteras, 50 miles per hour. The Cautionary Signal had been displayed at Cape May 13 hours in advance, and at Norfolk 19¼ hours in advance, before the wind attained a velocity of 25 miles per hour.

"C. E. KILBOURNE,
*"First Lieutenant Second Artillery, Acting Signal Officer and Assistant."*

The Chief Signal Officer thereupon issued the following commendatory order:

"The Chief Signal Officer commends the prompt and zealous action, during the 'Metropolis storm,' of the non-commissioned officers in charge, and their assistants, at the stations Kittyhawk, Norfolk, Cape Henry, and Cape Hatteras, of Privates T. B. Harrison and F. E. Seegelken, sent respectively to reinforce Cape Henry and the Metropolis wreck station, and especially of Corporal A. T. Sherwood, who notified this office the instant the report was received by messenger from the wreck at 6.50 p. m., January 31, and Private William Davis, Signal Service, U. S. A., who, under immediate direction of Corporal Sherwood, starting on horseback, fully equipped, within fifteen minutes after the receipt of the notice of the wreck at Kittyhawk station, rode through the night and storm twenty miles to the scene by 3.20 a. m., opened station on the Signal Service sea-coast telegraph line, and reported for service at the wreck, sending a condensed report at 4 a. m., and there remained continuously on duty on the open beach, keeping constant telegraphic communication along the line and with this office, acting thus with faithful accuracy and intelligence for an uninterrupted tour of duty of twenty-six hours. By this action of the soldiers and stations named, all telegraphic information from the wreck which reached the superior authorities or appeared in the press, and on which steps for relief were taken, was secured.

"For prompt and soldierly action, fidelity, and good service, Private William Davis is promoted to be corporal, Signal Service U. S. A., to date from January 31, 1878."

## INTERNATIONAL METEOROLOGY.

*Storms at sea.*—September 27, 1877, Old Providence Island, Caribbean Sea, very destructive hurricane. November 24, United States Naval Hospital, Yokohama, reports gale at that place; barometer, 29.39; rain-fall, 1.63 inch. 30th, latitude 19° N., longitude 130° E., heavy NE. gale. December 3, latitude 24° 41′ N., longitude 66° 42′ W., heavy WSW. gale, lasting 20 hours. 6th, latitude 36° N., 61° W., brig Florence May reports "very heavy sea, sweeping everything." 10th, latitude 36° N., longitude 71° 35′ W., hurricane, lasting several hours. 17th, off Oahu, Sandwich Islands, heavy N. gales. 18th, latitude 30° S., longitude 32° W., severe squalls from NNW. and SE., in which the brig Flora lost sails, &c.; Honolulu, Sandwich Islands, severe and destructive storm of three days' duration. 20th, terrific gale off the coast of Portugal. 22d and 23d, off northern coast of Hayti, heavy gale and seas. 28th, midnight, Florida Reefs, SE., cyclone. 29th, latitude 35° 10′ N., longitude 74° 50′ W., NE. to SW. hurricane, lasting 15 hours; 60 miles S. of Cape Hatteras, NE. hurricane, lasting 10 hours. 31st, Murray's Anchorage, Bermuda, violent NE. gale; latitude 38° 19′ N., longitude 69° 23′ W., heavy NW. gale. January 1, 1878, latitude 41° 56′ N., longitude 65° 15′ W., and latitude 39° N., longitude 40° W., severe SSE. and S. gales. 2d, latitude 47° 25′ N., longitude 47° 15′ W., strong SW. gale; Straits of Gibraltar, heavy E. gale. 3d, latitude 45° 53′ N., longitude 59° 20′ W., heavy NW. gale working round to NE. 4th, latitude 42° 05′ N., longitude 62° 08′ W., strong N. gale; latitude 50° 58′ N., 40° 39′ W., hard NW. gale, lasting 3 hours; latitude 37° 25′ N., 67° 20′ W., revolving hurricane from NE. to SW.; latitude 37° N., longitude 73° W., SE. to NW. hurricane, lasting several hours. 5th, latitude 40° 44′ N., longitude 68° 28′ W., strong S. to W. gale; latitude 31° 17′ N., 76° 45′ W., heavy WSW. gale; Bermuda Islands, 7 p. m., severe whirlwind, accompanied by torrents of rain; roofs of several houses in Hamilton much injured. 8th, latitude 28° N., longitude 72° W., severe W. and NW. gale; off Sable Island, N. gale, lasting several hours. 9th, latitude 47° 36′ N., longitude 44° 28′ W., heavy N. gale; latitude 31° 50′ N., longitude 74° 54′ W., heavy ESE. gale; barometer 29.60; terrific gale off E. coast of Florida. 10th, latitude 37° 44′ N., longitude 73° 20′ W., noon, ENE. gale, by 3.30 p. m., NW. hurricane, barometer 29.15; latitude 38° N., longitude 70° W., SE. to N. hurricane, lasting 6 hours; latitude 33° 30′ N., longitude 75° 10′ W., SE. gale, lasting 12 hours, then SW. to NW., terrific hurricane, barometer 29.30; latitude 37° 20′ N., longitude 74° W., heavy ESE. to N. gale, "hove to 4 hours under bare poles"; latitude 35° 20′ N., longitude 71° W., hurricane from S. to N., lasting 4 hours; latitude 34° 03′ N., longitude 75° W., 2 a. m., WSW. almost hurricane, barometer 29.40. 11th, latitude 41° N., longitude 67° 20′ W., SE. to SW. gale; latitude 34° N., longitude 69° W., heavy SE. to SW. gale, lasting 3 days. 12th, latitude 41° 52′ N., longitude 63° 42′ W., strong NW. gale; latitude 33° 22′ N., longitude 72° 12′ W., heavy SE. gale, 14 hours; latitude 35° 47′ N., longitude 71° 30′ W., heavy SE. and SW. gale. 13th, latitude 40° 38′ N., longitude 68° 52′ W., strong WNW. gale. 14th, latitude 55° 05′ N., longitude 15° 51′ W., heavy W. gale. 16th, Fortune Island, Bahamas, severe N. and NNW. gale, lasting from 16th to 19th; latitude 33° 57′ N., longitude 61° 36′ W., tremendous NW. hurricane. 18th, latitude 48° 15′ N., longitude 43° 40′ W., strong W. gale, hard squalls with hail; latitude 49° 59′ N., longitude 41° 28′ W., hard W. gale. 19th, latitude 45° 27′ N., longitude 47° 37′ W., and latitude 48° 12′ N., longitude 44° 15′ W., WNW. gales. 20th, latitude 46° 07′ N., longitude 50° 15′ W., strong NW. winds, with hard hail squalls. 22d, latitude 51° 01′ N., longitude 19° 59′ W., strong WNW. gale. 23d, latitude 40° 09′ N., longitude 70° 42′ W., heavy NW. gale, barometer 30.65, terrific sea; latitude 50° 48′ N., longitude 21° 47′ W., strong WNW. gale. 24th, latitude 40° 06′ N., longitude 72° 19′ W., heavy NW. gale, with snow; latitude 40° 35′ N., longitude 72° 33′ W., hard W. to WSW. gale. 25th, latitude 41° 31′ N., longitude 65° 34′ W., heavy WNW. gale and snow. 31st, latitude 40° 20′ N., longitude 72° 40′ W., furious E. gale, with heavy snow, lasting 12 hours; latitude 40° N., longitude 64° W., heavy NE. gale, with heavy snow, lasting 24 hours.

## TEMPERATURE OF THE AIR.

*In general.*—The general distribution of the temperature of the air is shown by the isotherms on Chart No. II. The table of comparative temperatures, in the left-hand corner of same chart, shows the temperature of the month to have been unusually high in the Upper Mississippi and Upper Missouri Valleys and Minnesota, considerably above normal in the Lower Missouri Valley and Lake region, and about normal along the Atlantic, Gulf, and Pacific coasts.

*Monthly mean temperatures at special points* have been as follows: Bismarck, 17°.5 Breckenridge, 14°.7; Pembina, 11°.2; Mount Washington, 5°.7; Pike's Peak, 1°.4.

*Maximum and minimum temperatures.—Maximum* temperatures, at Signal Service and volunteer stations, above 70° are reported as follows: 88° at Key West; 82° at Houston, Fla.; 77° at Brownsville; 76° at Castroville, Brackettsville, and Eagle Pass; 75°.

at Baton Rouge Barracks, La., and San Antonio; 74° at Jacksonville, Savannah, and Fort Concho, Texas.

*Minimum temperatures*, at Signal Service and volunteer stations, were —20° at Strafford, Vt.; —21° at Breckenridge; —22° at Sidney Barracks; —23° at Plattsmouth, N. Y., and Neilsville, Wis.; —24° at Fort Garland, Cal.; —25° at Fort Pembina, Dak., and Lunenberg, Vt.; —26° at Pembina, Dak., and Madison Barracks, N. Y.; —27° at Mechanics Falls, Me.; —28° at Newport, Vt.; —29° at West Waterville, Me.; —30° at Dumbarton and Auburn, N. H.; —32° at Fort Sanders, Wyo. Ter: —34° at Fort Fred Steele, Wyo. Ter.; —35° at Mount Washington; —36° at Orono, Me.; —38° at Woodstock, Vt.

*Ranges of temperature.*—Large monthly and diurnal ranges have been respectively as follows; Visalia, monthly, 45°, daily, 25°; Cheyenne, 67° and 50°; North Platte, 63° and 41°; Fort Griffin, 58° and 44°; Fort McKavett, 61° and 52°; San Antonio, 52°, 33°; Pembina, 65°, 32°; La Crosse, 53°, 34°; Milwaukee, 58°, 27°; Cleveland, 51°, 32°; Pittsburgh, 58°, 33°; Vicksburg, 47°, 24°; Savannah, 48°, 27°; Washington, 60°, 28°; Burlington and Mount Washington, 68° and 44°; Winnemucca, 62° and 43°.

*Small monthly and diurnal ranges* have been as follows: San Francisco, 23° and 12°; Pike's Peak, 35° and 27°; Leavenworth and Denison, 50° and 24°; Galveston, 35° and 22°; Davenport and Saint Louis, 49° and 22°; Grand Haven, 36° and 21°; Erie, 45° and 22°; Key West, 28° and 16°; Charleston, 39° and 21°; Cape Henry, 38° and 22°; Portland, 54° and 32°.

*Frosts* were reported as follows: California, 1st, 2d, 3d, 4th, 5th, 6th, 12th, 13th, 18th, 19th, 20th, 23d, and 30th. Nevada, 1st, 2d, 3d, 4th, 5th, 6th, 11th, 12th, 15th, 18th, and 26th. Colorado, nearly every day; at Pike's Peak, on the 3d; the first decade was the coldest in the history of the Pike's Peak station. Kansas, 1st, 4th, 5th, 6th, 7th, 8th, 10th, 13th, 14th, 15th, 23d, 25th, and 28th. Indian Territory, 1st, 2d, 3d, 4th, 5th, 6th, 7th, 8th, 14th, 15th, 16th, 17th, 22d, and 23d. Texas, 1st, 2d, 4th, 5th, 11th, 14th, 15th, 21st, 22d, 23d, and 24th; Galveston, 14th, 22d, 23d, and 24th. Cairo, 1st. Norfolk, 17th. Indianola and Key West, none.

*Ice* formed on several nights as follows: 2d, at Visalia; 3d, ¼ inch thick on the Bay of Oakland, Cal.; 3d and 4th, at Sacramento; 5th, at Vicksburg; 6th, 7th, and 16th, Saint Mark's; 5th and 6th, Mobile; 4th, Keokuk and Escanaba; 5th, Alpena; 12th, Indianapolis; 7th, Knoxville; 1st, Logansport; 6th and 7th, Tybee Island; 2d, Sandy Hook.

## PRECIPITATION.

*In general.*—The general distribution of rain and melted snow for the month is shown in Chart No. III. By reference to the table in the lower left-hand corner of this chart it will be seen that the amount of precipitation has been considerably above the normal in the Atlantic Coast States and California, and about normal in the East Gulf States and Oregon, while a considerable deficiency occurs in the interior of the country; areas of no precipitation are shown on the chart in Northern Missouri and Southern Iowa, in Western Nebraska, and in Dakota and Montana.

*Special heavy rains.*—3d, Fort Barrancas, Florida, 2.50 inches. 7th, Santa Cruz, Cal., 1.83 inches; Brownsville, Tex. (6th and 7th), 3.26 inches. 8th, Santa Cruz, Cal., 1.46 inches. 9th, Mendon, Mass., 2.02 inches; Jacksonville, Fla. (8th and 9th), 2.04 inches; Mayport, Fla. (8th and 9th), 3.72; Saint Mary's Ga. (8th and 9th), 2.20 inches; Daytona, Fla., 4.00. 10th, Smithville, N. C. (9th and 10th), 3.20 inches; Charleston, S. C. (9th and 10th), 2.85 inches; Wilmington, N. C. (9th and 10th), 3.19 inches; Auburn, N. H., 3.12 inches; Lenoir, N. C. (8th to 10th), 3.00 inches; Goldsborough, N. C. (9th and 10th), 2.00 inches; Cape Henry, Va., 2.18 inches; Key West, Fla. (9th and 10th), 3.01 inches. 11th, Rochester, N. Y. (10th and 11th), 3.62 inches; New London, Conn. (10th and 11th), 2.00 inches; Boston, Mass. (10th and 11th), 2.67 inches; Waltham, Mass., 4.20 inches; New Haven, Conn. (10th and 11th), 2.53 inches; Thatcher's Island, Mass. (10th and 11th), 2.20 inches. 12th, Fort Sill, Indian Territory, 1.68 inches. 14th, Mystic, Conn., 1.80 inches. 16th, Sacramento, Cal. (15th and 16th), 3.91 inches; Red Bluff, Cal. (14th to 16th), 9.12 inches; Los Angeles, Cal. (14th to 16th), 2.14 inches. 18th, Corsicana, Tex., 1.85. 19th, New Orleans, La., 1.80 inches; Galveston, Tex. (18th and 19th), 1.65 inches. 22d, Sacramento, Cal., 1.34 inches in six hours; Red Bluff, Cal. (21st and 22d), 2.98 inches. 24th, Daytona, Fla., 3.00 inches; San Francisco, Cal., 1.60 inches; Red Bluff, Cal., 1.81 inches. 25th, Santa Cruz, Cal., 2.30 inches. 27th, Lebanon, Mo. (26th and 27th), 2.37 inches; Red Bluff, Cal., 2.92 inches. 29th, Fort Barrancas, Florida (29th and 30th), 2.40 inches; Baton Rouge Barracks, Louisiana, 1.55 inches in two hours. 30th, Montgomery, Ala., 1.91 inches; Daytona Fla., 3.30 inches. 31st, Charleston, S. C. (30th and 31st), 3.08 inches; Wilmington, N. C., 2.51 inches; Cape May, N. J., 2.09 inches.

*Large monthly rainfalls.*—At Red Bluff, Cal., 20.71 inches; Santa Cruz, Cal., 12.06 inches; San Francisco, Cal., 11.97 inches; White Plains, N. Y., 11.10 inches; Olympia, Wash., 9.82 inches; Cape Hatteras, N. C., 9.43 inches; Waltham, Mass., 9.43 inches; Sacramento, Cal., 9.26 inches; Okahumpka, Fla., 9.25 inches; Cape Lookout, N. C.,

9.20 inches; Point Pleasant, La., 8.71 inches; Roseburg, Cal., 8.70 inches; Mount Washington, N. H., 8.54 inches; Auburn, N. H., 8.30 inches; Rochester, N. Y., 8.05 inches; Fall River, Mass., 7.80 inches; Daytona, Fla., 7.63 inches; Somerset, Mass., 7.60 inches; Boston, Mass., 7.60 inches; Trenton, N. J., 7.55 inches; Wilmington, N. C., 7.52 inches; Mill Village, N. H., 7.11 inches; Newport, R. I., 7.06 inches; Eastport, Me., 7.05 inches.

*Small monthly rainfalls.*—At Bismarck, Dak., North Platte, and Sidney Barracks, Nebr., Ames, Iowa, Fort Keogh, Mont., Grant City and Unionville, Mo., none; Colorado Springs, Colo., 0.02 inches; Fort McPherson, Nebr., and Fort Griffin, Tex., 0.04 inches; Fort Pembina, Dak., Hopkins, Mo., Concho, and McKavett, Tex., 0.05 inches; Phœnix and Florence, Ariz., and Breckenridge, Minn., 0.06 inches; Cheyenne, Wyo., 0.08 inches; Denver, Colo., and Olivet, Dak., 0.10 inches; Norfolk, Nebr., Pembina, Dak., and Fort Sanders, Wyo., 0.12 inches.

*Floods and high tides.*—11th, freshets along the Staunton and Roanoke Rivers; bridges carried away. California, 16th, Los Angeles and Red Bluff, railroad bridges washed away and much damage done throughout the country. At San Buenaventura, Santa Barbara, and More's Landing, wharves were carried away. Santa Cruz, Cal., 25th, San Lovenza River rose five feet, surf higher than for six years; a heavy west sea-swell occurred along the California coast. 31st, high tides along the Atlantic seaboard, doing considerable damage on the New Jersey and Long Island coasts. Sandusky, Ohio, water in bay rose three feet during high northeast winds; at Kelly's Island, the water rose higher than for eleven years, the bank protection being badly washed away.

*Hail.*—3d, McPherson Barracks, Ga. 4th, Accotink, Va. 8th, Fort Gibson, Ind. T. 9th, Rupert, Pa. 10th, Detroit, Mich. 13th, Fort Wayne, Mich. 14th, Cornish, Me. 22d, Sacramento, Cal. 25th, Colorado Springs, Col.; Guttenburg, Iowa; Neosho, Mo. 26th, Fort Gibson, Ind. T.; Lawrence, Kans.; Great Bend, Kans.; Cornish, Me.; Standish, Me.; Springfield, Mo.; Cincinnati, Ohio; Hillsboro', Ohio. 30th, Vevay, Ind.; Asheville, N. C.; Red Bluff, Cal. 31st, Willet's Point, N. J.; Sandy Springs, Md.; Freehold, N. J.; Linden, N. J.; White Plains, N. Y.; Flushing, N. Y.; Westchester, Pa.; Philadelphia, Pa.; Accotink, Va.

*Sleet.*—1st, Rochester; Cresco, Iowa; Chicago. 2d, Rochester; Cresco, Iowa. 3d, Corsicana and Fredericksburg, Tex. 4th, West Point, N. Y.; Fayette, Miss.; Springfield, Mass.; Wood's Holl. 6th, Galveston. 7th, Jacksboro', Fredericksburg, Tex. 8th, Fort Gibson; McPherson Barracks, Ga.; Augusta; Fort Sill. 9th, Davenport; Detroit; Pembina; Guttenburg, Iowa; Cleveland; Westchester, Pa.; Baltimore. 10th, Detroit; Indianapolis; Louisville; Fort Preble, Me.; Burlington, Vt.; Mount Washington; Winnemucca, 11th, Erie; Fort Preble, Me.; West Waterville, Me.; Mount Washington. 13th, Saint Louis; Cleveland, Tenn. 14th, Toledo; Rochester; Fort Preble, Me.; Bangor, Me. 17th, Camp Douglas, Utah. 18th, Camp Douglas, Utah; Galveston. 20th, Milwaukee. 22d, Madison Barracks, N. Y.; Detroit. 23d, New Bedford, Mass. 25th, Fort Preble, Me. 26th, Sandusky; Fort Preble, Me.; Madison Barracks, N. Y.; Albany. 27th, Oswego; Fort Preble, Me. 28th, Oswego; Indianapolis. 29th, Leavenworth; Keokuk. 30th, Spartanburg, S. C.; Indianapolis; Louisville; Macon, Ga.; New Harmony, Ind.; Vevay, Ind.; Statesville, N. C.; Mount Auburn, Ohio. 31st, Morgantown; Louisville; New Bedford, Mass.; Baltimore; Wood's Holl.

*Depth of snow at close of month.*—In New England, from 1 to 36 inches; in the Middle Atlantic States, 1.5 to 18; in the Upper Lakes, 0.5 to 11; in the Lower Lakes, 7 to 18; in Tennessee and the Ohio Valley, 2 to 8; in Kansas, 0.25 to 4.5; in Nebraska, 1.5 to 3; in Missouri, 1 to 2; in Minnesota, 0.5 to 6; at Pike's Peak, Colo., 12; at Salt Lake City, a trace; at Yankton, 1.

*Rainy days.*—The number of days on which rain or snow has fallen averages as follows: New England, 7 to 20; Middle Atlantic States, 5 to 22; South Atlantic States, 2 to 12; East Gulf States, 3 to 17; West Gulf States, 4 to 11; Lower Lake region, 12 to 25; Upper Lake region, 9 to 18; Upper Mississippi Valley, 2 to 15; Lower Missouri Valley, 0 to 10; Tennessee and the Ohio Valley, 7 to 21; Northwest, 0 to 6; Rocky Mountain region, 0 to 7; California, 7 to 23.

*Cloudy days.*—The number reported by the volunteer observers is as follows: New England, 7 to 13; Middle Atlantic States, 6 to 24; South Atlantic States, 3 to 14; East Gulf States, 5 to 14; West Gulf States, 3 to 11; Lower Lake region, 10 to 23; Upper Lake region, 9 to 15; Upper Mississippi Valley, 6 to 19; Lower Missouri Valley, 5 to 13; Tennessee and the Ohio Valley, 14 to 22; the Northwest, 3 to 17; Rocky Mountain region, 0 to 7; California, 1 to 6.

*Precipitation from a cloudless sky.*—At Bangor, Me., on 3d.

## RELATIVE HUMIDITY.

The average percentages of relative humidity for the month range about as follows: New England, 64 to 81; Middle Atlantic States, 62 to 84; South Atlantic States, 66 to 80; East Gulf States, 75 to 80; West Gulf States, 63 to 74; Lower Lake region, 73 to 83; Upper Lake region, 70 to 86; Tennessee and the Ohio Valley, 66 to 75; Upper Missis-

sippi Valley, 66 to 80; Lower Missouri Valley, 65 to 84; California coast, 61 to 75; Sacramento Valley, 74 to 80. High stations report the following monthly average percentages, uncorrected for elevation: Mount Washington, 84.7; Pike's Peak, 61.4; Cheyenne, 52.1; Denver, 52.7; Salt Lake City, 64.8; Virginia City, 62.5; Boise City, 66.2; Winnemucca, 58.0.

### WINDS.

*In general.*—The prevailing winds, at the Signal Service stations, are shown by arrows on chart No. III. The prevailing direction is there seen to be northwest, except in the Ohio Valley, Lake region, and west of the Rocky Mountains, where southerly or westerly winds predominate.

*Total movements of the air.*—The following are the largest monthly movements, as recorded at the Signal Service stations, viz: Pike's Peak, 15,734 miles; Cape Lookout, 13,602 miles; Sandy Hook, 13,494 miles; Thatcher's Island, 13,038 miles; Cape May, 12,510 miles; Barnegat, 10,595 miles; Cape Henry, 10,322 miles; Cape Hatteras, 10,287 miles; Indianola, 10,006 miles; Sandusky, 9,758 miles; Eastport, 9,340 miles; Breckenridge, 9,290 miles; Boston, 9,152 miles; Wood's Holl, 9,146 miles; Philadelphia, 9,005 miles; Cheyenne, 8,981 miles; New York, 8,717 miles. The smallest are: Visalia, 1,869 miles; Deadwood, 2,198 miles; Salt Lake City, 2,569 miles; Lynchburg, 2,657 miles; Augusta, 2,916 miles; Eagle Pass, 2,928 miles; Boise City, 3,134 miles; San Antonio, 3,108 miles; Brucketts ville, 3,010 miles; Nashville, 3,249 miles; Shreveport, 3,310 miles; Springfield, 3,441 miles; San Diego, 3,521 miles; Dubuque, 3,812 miles; Los Angeles, 3,923 miles. At Mount Washington a continuous record has not yet been accomplished, but velocities of 100 miles and over were recorded on nine days, and the total monthly movement may be estimated at about 35,000 miles.

*Special severe winds.*—2d, Blue Blanket Plains, Dak., terrible north "blizzard."* 3d, Galveston, NW., 49 miles. 9th, Pike's Peak, NW., 90 miles; Denver, NW., 52 miles. 11th, Thatcher's Island, NE., 70 miles; Eastport, E., 64 miles; Mount Washington, NE., 186 miles. 16th, Mare Island, Cal., SSE., 45 miles. 22d, Sandusky, NW., 50 miles. 23d, Sandy Hook, NW., 64 miles. 27th, Red Bluff, Cal., SE., 44 miles. 28th, Mare Island, 46 miles. 31st, Sandy Hook, NE., 76 miles; Cape Lookout, ESE., 120 miles; Toledo, W., 49 miles; Atlantic City, NE., 64 miles; Barnegat, E., 72 miles.

### VERIFICATIONS.

*Indications.*—The published tri-daily weather indications have been carefully compared with the reports of the succeeding 24 hours, with the following results: The general average percentage of verifications is 83.7, that of omissions to predict, 0.3. The percentages by districts are: New England, 81.6; Middle Atlantic States, 84.7; South Atlantic States, 83.9; East Gulf States, 86.4; West Gulf States, 86.5; Tennessee and the Ohio Valley, 83.8; Upper Mississippi Valley, 82.0; Lower Missouri Valley, 82.5; Upper Lake region, 80.9; Lower Lake region, 84.9. The percentages by elements are: Weather, 88.2; wind, 82.1; temperature, 82.1; barometer, 82.6. Out of 3,720 cases there were 10 omissions; 132 failures; 124 one-fourth verified; 545 one-half verified; 422 three-fourths verified; 2,487 wholly verified.

*Cautionary signals.*—There have been received reports as to the verification of 176 of the "cautionary" and "off-shore" signals that have been displayed during the month. Of these 111, or 63 per cent., were verified at the stations themselves, and about 121, or 69 per cent., within 100 miles. Two of these orders were a few minutes late. Twenty-three cases are reported in which signals would have been justified if ordered, though in but few cases did the wind exceed 30 miles.

### NAVIGATION.

*Stages of water in rivers.*—In the table on chart No. III are given the highest and lowest readings on the Signal Service gauges, from which it will be seen that at no time has the danger line been reached on any of the rivers there mentioned. The highest waters in the Mississippi occurred generally from the 1st to the 12th, and the lowest from the 12th to the 18th; and in the Ohio and tributaries, the highest from the 15th to the 18th, and the lowest from the 5th to the 13th.

*Ice in rivers* is reported as follows: Floating ice in the Arkansas at Shreveport on the 5th; Dakota River, 31st, froze over—ice 9 inches thick; Platte River froze over on the 4th; Makoqueta River, Iowa, 6th, frozen over first time this season; James River, Dak., closed with ice 4 inches thick throughout the month. The Missouri froze over on the 5th at Omaha, and has since remained closed; floating ice at Plattsmouth, 1st to 3d, and at Leavenworth from the 5th to the 8th. The Mississippi froze over at Saint Paul and La Crosse on the 4th, and navigation closed; at Dubuque, 7th, ice gorged; 10th,

*On the Western plains storms of wind, with driving snow, are popularly styled "blizzards."

broke up; 12th, ferries commenced running again; 23d, main channel froze over; at Davenport floating ice was reported on the 4th and 5th; river gorged and ferries withdrawn on the 6th; ice broke up on the 7th, and floating ice continued in the river until the 17th; 18th, channel clear; 23d to 25th, floating ice; 26th, channel clear; 28th to 31st, floating ice; at Keokuk, floating ice from the 8th to 17th, and 23d, 29th, and 31st; at Saint Louis, floating ice from 7th to 13th. The Monongahela, Alleghany, and Upper Ohio Rivers froze over on the 7th; broke up on the 10th; clear on the 12th; floating ice was reported at Cincinnati on the 7th, and on the 8th navigation was nearly suspended; on the 9th, river clear; ice in Licking River 7 inches thick. At Logansport, 4th, river frozen over 1½ inches thick. Illinois River, 6th, frozen over solid. The Schuylkill River frozen over on the 6th, but opened on the 11th. Floating ice was reported in the Delaware, at Philadelphia, 7th to 9th. The Connecticut River, at Newbury, frozen over, 8th to 30th. The Shetucket River frozen over, 7th to 28th—floating ice in the Thames, at New London, on the 28th. The Hudson was full of floating ice on the 4th, and froze over on the 7th; broke up from the 12th to the 26th. Otsego Lake, New York, 31st, partly open. Lake Champlain, 30th, thin ice, which broke up on the 31st. Wappinger's Lake frozen over on the 1st, and again on the 28th. Sebago Lake, 31st, ice in lower bay 16 inches thick, upper bay and lake open. New Bedford, Mass., 6th, harbor frozen over; 9th, ice breaking up. The James River froze over at Richmond on the 7th. On the Lakes ice occurred as follows: Marquette Harbor, 16th, ice formed; 17th, frozen over; 21st, clear. Escanaba, 4th and 10th, shore ice. Alpena, 5th, bay and river frozen over first time this season; 14th, clear; 16th, frozen over. On Lake Michigan navigation continued uninterrupted throughout the month. Detroit, 31st, floating ice in the river. Toledo, 3d, 6th to 21st, shore ice in the river; 23d, river frozen. Buffalo, 7th, the river frozen over; some ice in harbor.

### TEMPERATURE OF WATER.

*In general.*—The temperatures of water, as observed in rivers and harbors, are shown on the chart No. III.

*Maximum and minimum temperatures.*—The highest maxima have been 70°.4 at Key West; 64° at San Francisco; 60° at Saint Mark's, and 59° at Jacksonville and Galveston. The lowest minima have been: 29° at Pittsburg; 29°.5 at Portland, Me., and Norfolk; 30° at New York, and 31° at Louisville and Keokuk. At Alpena, Buffalo, Chicago, Cleveland, Escanaba, La Crosse, Marquette, Omaha, Saint Paul, Toledo, and Yankton, the observations have been interrupted by ice.

*Ranges of temperature.*—The least have been 3° at Grand Haven and New London; 4° at Wood's Holl, Wilmington, Duluth; and 5° at Sandusky, Eastport, and Charleston. The largest, 14° at Nashville, 12° at Augusta, Galveston, Memphis, San Francisco, and Norfolk.

### ATMOSPHERIC ELECTRICITY.

*Thunder-storms* were of rare occurrence. They are reported as follows: 12th, Florida, Louisiana, Texas; 13th, Delaware, North Carolina, Virginia; 17th, Kansas; 18th, Texas; 19th, Florida, Louisiana, Mississippi, Alabama; 20th, Ohio; 21st, North Carolina; 22d, California; 25th, Colorado, Louisiana; 26th, Arkansas, Kansas, Indian Territory; 27th, Illinois, North Carolina, Ohio, Virginia, Georgia; 28th, South Carolina; 29th, Louisiana, Mississippi; 30th, Georgia, Alabama. An interesting series of thunder-storms was reported by Professor Nipher, of the Missouri weather service, as occurring in Missouri. (See the account of low barometer, No. XI.) At Visalia, on the 16th, a severe sand and rain storm, with intense electricity, occurred, and the telegraph line to Modeska, 133 miles north, was worked without battery.

*Distant lightning* was reported as follows: 9th, Georgia; 12th, Mississippi; 13th, Georgia, North Carolina; 16th, California, Kansas; 17th, Kansas; 19th, Mississippi; 20th, Florida; 21st, Virginia; 22d, California; 26th, Kansas; 27th, Georgia, North Carolina.

*Auroras.*—1st, Massachusetts; 3d, Ohio; 17th, Iowa, Louisiana; 22d, New York; 23d, Nebraska, Minnesota, Iowa, New York, Ohio, West Virginia, New Jersey, Pennsylvania, Massachusetts, Connecticut, Maine, Rhode Island, Vermont, Maryland, Michigan, New Hampshire, Dakota; 24th, Iowa, Maine, Missouri, Wisconsin; 25th, Nebraska; 30th, Iowa, North Carolina.

*Magnetic phenomena.*—The average diurnal magnetic range in declinations is reported by Professor Hinrichs, of Iowa City, as 4½ minutes.

### OPTICAL PHENOMENA.

*Solar halos.*—1st, 2d, 3d, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 17th, 18th, 19th, 20th, 21st, 22d, 23d, 24th, 25th, 26th, 27th, 28th, 29th, 30th, and 31st.

*Lunar halos.*—5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th, 20th, 21st, 22d, 23d, 24th, 25th, 26th, 27th, and 30th.

*Mirage.*—Great Bend, Kans., 14th, 17th; New Bedford, Mass., 17th, 29th; Moorhead, Minn., 2d, 21st, 28th; Genoa, Nebr., 14th, 15th; Galveston, 4th; Smithville, N. C., 7th; Savannah, 18th; Tybee Island, 5th, 6th, 11th, 12th; New London, 1st, 2d, 3d, 8th, 16th, 24th, 30th. At Key West, Fla., on the 12th, an optical phenomenon occurred, caused by the sun's rays falling obliquely upon a stratum of condensed vapor resting upon the surface of the ocean, the temperature of the water being about 15° below that of the air; the surface of the sea appeared raised to the upper surface of this stratum, the vessels in the harbor seeming to sink, their hulls gradually disappearing, while their masts and rigging stood out in bold relief.

MISCELLANEOUS PHENOMENA.

*Botanical.*—Okahumpka, Fla., 5th, roses blooming; Monticello, Iowa, 1st, pansies blooming; Independence, Kans., wheat growing rapidly since the 15th; Great Bend, Kans., 31st, wheat looking fine; Kinsley, Kans., wheat growing throughout month; Owing Mills, Md., lilacs budding; Fayette, Miss., 8th, daisies blooming; 20th, daffodils in bloom; 30th, peach and plum trees blooming; Kensico, N. Y., 28th, transplanting seedlings; Ringgold, Ohio, 31st, wheat very green; McMinnville, Tenn., violets bloom ing all winter; 18th, hyacinths in bloom; Clarksville, Tex., 31st, wheat looks well, some cotton yet unpicked; Visalia, Cal., 31st, grain and grass growing luxuriantly, almond trees in bloom; Nashville, 29th, lilac buds swelling, sap rising in rose bushes; Louisiana, Mo., 28th, fruit buds of apples, peach, and apricots were pronounced safe and very abundant. The volunteer observer at Brookhaven, Miss., reports the following botanical notes: 18th, hyacinths in bloom; 20th, strawberries in bloom; 25th, narcissus in bloom; 26th, pansies in bloom and spiræa budding; 27th, jonquils in bloom, woodbine leafing and lilac budding; 28th, dogwood and peach buds swelling. Communication from Mr. A. Story, Salem, Mass., states that in that portion of the State nothing is more common than to find dandelions in bloom in mild winter weather, and the trailing arbutus was possibly in bloom in December, but that apple, rose, cherry, and lilac were not in bloom out of doors in Fitchburg during December, as is stated in the weather review for that month.

*Birds.*—*Blackbirds* were seen at Judsonia, Ark., 28th. *Bluebirds*, Southington, Conn., 12th, 20th to 28th; Baxter Springs, Kans., 17th, 18th. *Geese* flying north, Carbondale, Ill., 5th; Fort Madison, Iowa, 16th; Baxter Springs, Kans., 27th; Emerson, Nebr., 31st; Urbana, Ohio, 17th, 18th; flying west, Carbondale, Ill., 30th; Fort Madison, Iowa, 22d; flying northwest, Visalia, Cal., 10th; flying south, Creswell, Kans., 30th; Boise City Idaho, 28th; Vineland, N. J., 19th; Bellefontaine, Ohio, 18th; seen at Omaha, Nebr., 18th; Clear Creek, Nebr., numerous throughout the month; Corning, Mo., every day throughout the month. *Crows*, Judsonia, Ark., 8th; Pike's Peak, on summit, 6th; *Blue jays*, Judsonia, Ark., 17th; Monticello, Iowa, 30th; Palermo, N. Y., 22d; Westerville, Ohio, 20th. *Ducks*, Judsonia, Ark, 25th; Creswell, Kans., flying east, 14th; south, 28th; Boise City, Idaho, 28th, numerous. *Snowbirds*, Monticello, Iowa, 27th. *Bobolinks*, Westerville, Ohio, 20th. *Meadow larks*, first heard, Saint Meinrad, Ind., 28th; Monticello, Iowa, 22d; Somerset, Mass., 13th. *Prairie chickens*, Monticello, Iowa, 10th; flying south in large flocks, 22d and 26th. *Mocking-birds*, Baxter Springs, Kans., 17th. *Robins*, Somerset, Mass., 13th; New Bedford, Mass., 13th. *Sparrows*, Somerset, Mass., 13th; New Bedford, Mass., 13th. *Sea-gulls*, Cincinnati, 27th, first appearance this season.

*Insects—Bees.*—Fayette, Miss., 4th; Martinsville, Ill., 11th to 13th, 18th, 22d to 26th; Milford, Ind., 18th, 19th, 20th. *Frogs*—Piping, Milton, Fla., 5th; Sedgwick Kans., 27th. *Butterflies*—Fayette, Miss., 26th. *Caterpillars*—Palermo, 20th; Cleveland, Ohio, 19th.

*Polar bands.*—3d, Indiana, Virginia; 5th, Indiana; 6th, Indiana; 7th, Mississippi, South Carolina; 8th, Nebraska, New Hampshire, New Jersey, Virginia; 10th, New Hampshire; 12th Virginia; 15th, New Jersey; 17th, Indiana, Iowa; 18th, Indiana, Virginia; 19th, Dakota, Indiana; 21st, Nebraska; 23d, Indiana; 24th, Iowa; 25th, Virginia; 27th, Virginia; 29th, Indiana.

*Sunsets.*—The characteristics of the sky as indicative of fair or foul weather for the succeeding twenty-four hours have been observed at all Signal Service stations. Reports 101 stations show 3,128 observations to have been taken; of these 58 were reported doubtful; 2,508 cases, or 80.1 per cent., were followed by the expected weather, and 620 were not.

*Prairie fires.*—1st, 2d, 3d, 4th, 5th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 21st, 22d, 23d, 24th, 25th, 27th, 28th, 29th, 30th, 31st.

*Meteors.*—1st, Southington, Conn., Woodstock, Md., Rowe, Mass.; 2d, Woodstock, Md., Flushing, N. Y.; 3d, Woodstock, Md., Wappinger's, Falls, N. Y.; 4th, Como, Ill.; 6th, Boise City, Idaho, Southington, Conn., Vevay, Ind., Kensico, N. Y.; 7th, Fall River, Mass.; 9th, New Orleans; 13th, Creswell, Kans.; 14th, Boise City, Idaho; 17th, Saint Louis and Oregon, Mo., Starkey, N. Y.; 23d, Woodstock, Md., Oregon, Mo.; 24th, Sedgwick, Kans., Woodstock, Maryland, Rowe, Mass., Ateo, N. J.; 27th, Daven-

port, Saint Mary's Home, Ind.; 28th, Hennepin, Ill., Woodstock, Md.; 31st, Yankton, Dak.; 24th, Corsicana, at 7 h. 6 or 10 min., a large meteor appeared southeast 30° of zenith, moved west, and exploded at an elevation of about 30° like an ordinary rocket; color, greenish blue, and very brilliant; vapor cloud floated west.

*Earthquakes.*—Yokohama, Japan, reported by J. W. Coles, U. S. N., United States Naval Hospital, Yokohama, Japan, November 22, 3.50 p. m., severe shock of earthquake, lasting 5 seconds; 10.20 p. m., slight shock; 24th, 12.55 p. m., slight earthquake; 27th, 11.18 p. m., slight earthquake; 30th, 3.20 p. m., smart shock of earthquake, lasting 20 seconds; January 2, Louisa and Hanover Counties, Virginia, about 7 p. m., slight shock, accompanied by roaring sound; 8th, Cairo, Ill., 10.30 p. m., two slight shocks.

*Zodiacal light.*—Southington, Conn., 1st, 3d, 6th, 7th, 23d, 24th, 25th, 28th, 29th; Monticello, Iowa, 23d; Saint Mary's Home, Ind., 3d, 5th, 6th, 7th, 23d, 24th, 29th; Great Bend, Kans., 3d; Orono, Me., 29th, 30th; Somerset, Mass., 1st, 3d, 5th, 6th, 23d, 24th, 25th, 26th, 28th, 29th; Rowe, Mass., 29th; Cambridge, Mass., 1st, 3d, 5th, 7th, 23d to 26th, 28th to 30th; Clear Creek, Nebr., 3d, 5th, 20th, 22d, 23d; Freehold, N. J., 23d, 28th; Atco, N. J., 26th, 28th, 29th; Waterburg, N. Y., 24th, 29th; Tybee Island, 21st to 23d, 28th; Newbury, Vt., 3d, 28th, 29th, 30th.

### SOLAR PHENOMENA.

*Sun spots.*—The following observations, made by Mr. D. P. Todd, upon the spots of the sun, have been kindly communicated by Rear-Admiral John Rodgers, U. S. N., Superintendent of the Naval Observatory: None visible on the 2d, 3d, 4th, 5th, 6th, 7th, 8th, 11th, 12th, 15th, 16th, 18th, 19th, 29th, 30th; on the 22d, one group and six spots, both new; 23d, the same; 24th, one group and twelve spots, six new spots; 25th, the same; 26th, one group and ten spots, two spots having disappeared by solar rotation; 29th, none, all having disappeared by solar rotation. At Iowa City, Professor Hinrichs reports none on the 2d, 4th, 5th, 6th, 7th, 11th, 12th (cloudy ?), 15th, and 27th; 2 spots on the 22d—one large one near the center of sun; one group of five spots on the 24th; two spots on the 25th.

Published by order of the Secretary of War.

ALBERT J. MYER,
*Brigadier General (Brevet Assigned), Chief Signal Officer, U. S. A.*

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PAPER 35.

## MONTHLY WEATHER REVIEW, FEBRUARY, 1878.

### INTRODUCTION.

In compiling the present review the following data received up to March 14 have been made use of viz, the regular tri-daily weather charts, containing the data of simultaneous observations taken at one hundred and twenty-eight Signal Service stations and twelve Canadian stations; monthly journals and means from one hundred and thirty-eight of the former, and means from fourteen of the latter; two hundred and fifty-nine reports from voluntary observers; thirty-six monthly reports from United States Army post surgeons; marine records; international simultaneous reports; monthly reports of the weather services of the States of Iowa and Missouri; reliable newspaper extracts, and special reports. The most interesting features of the month have been, 1st, the general deficiency in pressure, which has been the most marked in Washington Territory, Oregon, the Gulf and South Atlantic States; 2d, the continued high temperatures in the Upper Mississippi and Lower Missouri Valleys; 3d, the large number of low areas traced from the Pacific; 4th, the severe storm of the 20th, 21st, 22d, and 23d (No. XI); 5th, the general deficiency in precipitation east of the Rocky Mountains, and excessive rain-falls on the Pacific coast, and consequent destructive floods; 6th, the remarkable measured wind-velocity of 150 miles per hour at Mount Washington; 7th, the tornadoes from the 7th to the 9th; 8th, the severe thunder-storms of the 20th; 9th, the forward state of vegetation in the Western States.

### BAROMETRIC PRESSURE.

*In general.*—The general distribution of atmospheric pressure is shown by the isobars on chart No. II. A comparison with the means for former years show that the pressures have been, in general, below the normal, and that this deficiency is very marked on the North Pacific slope and in the Gulf and South Atlantic States. In

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AVERAGE PROGRESS OF AREAS OF LOW BAROMETER EAST OF THE 100TH MERIDIAN.

| No. | Velocity. |
|---|---|
| I | 23? miles per hour. |
| II. | 36 do. |
| III. | 25? do. |
| IV. | 30 do |
| *V. | — do |
| *VI. | — do |
| VII. | 26? do |
| *VIII. | — do. |
| IX. | 30 do. |
| *X. | — do. |
| XI. | 22 do. |
| XII. | 30? do. |

* Too uncertain to be computed.

NOTE.—The Roman letters show number and order of areas of low barometer. The figures above the lines show the days of the month; those below, 1, 2 and 3, indicate respectively the 7:35 A. M., the 4:35 P. M., and 11 P. M. observations. The small circles on the lines indicate the position of the centre of the area of low barometer on the day and report, written respectively above and below the line.

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# WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U. S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

ISOBARS, ISOTHERMS AND PREVAILING WINDS FOR FEBRUARY, 1878

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. MAJ. GEN'L) CHIEF SIGNAL OFFICER, U. S. A.

## AVERAGE TEMPERATURES FOR FEBRUARY.

| DISTRICTS. | Average for January. Signal Service Observations. For several years. | For 1878. | Comparison of February, 1878, with the average for several years. |
|---|---|---|---|
| St. Lawrence valley | 16°.8 | 21°.0 | 19.2 above. |
| New England | 25 .9 | 30 .1 | 4°.2 above. |
| Middle Atlantic States | 35 .4 | 40 .0 | 4°.6 above. |
| South Atlantic States | 51 .0 | 51 .6 | 0°.6 above. |
| Gulf States | 55 .8 | 53 .2 | 2°.6 below. |
| Lower Lake region | 24 .0 | 29 .2 | 5°.2 above. |
| Upper Lake region | 19 .3 | 30 .0 | 10°.7 above. |
| Ohio valley and Tennessee | 37 .5 | 40 .4 | 2°.9 above. |
| Upper Mississippi valley | 23 .4 | 36 .7 | 13°.3 above. |
| Lower Missouri valley | 30 .5 | 39 .4 | 8°.9 above. |
| Upper Missouri valley | 14 .1 | 30 .5 | 16°.4 above. |
| Minnesota | 10 .4 | 29 .1 | 18°.7 above. |
| Rocky Mountains stations | 25 .2 | 27 .5 | 2°.3 below. |
| Pacific Coast | 50 .2 | 51 .4 | 1°.2 above |

## TEMPERATURES OF WATER FOR FEBRUARY, 1878.

| STATIONS. | Temperatures at bottom. Maximum. | Minimum. | Average depth of water. Feet. |
|---|---|---|---|
| †Alpena | — | — | — |
| Alexandria | 56 | 44 | 12.5 |
| Baltimore | 40.½ | 35 | 11 |
| †Buffalo | — | — | — |
| Cairo | 44 | 38 | 21 |
| Charleston | 55 | 51 | 41 |
| †Chicago | — | — | — |
| †Cleveland | — | — | — |
| Cincinnati | 44 | 35 | 14 |
| Detroit | 33.5 | 32.5 | 22 |
| Duluth | 34 | 33 | 12 |
| Eastport | 35.5 | 33.5 | 17 |
| †Escanaba | — | — | — |
| Galveston | 63 | 51 | 8 |
| Grand Haven | 34.5 | 32.5 | 19 |
| Jacksonville | 63 | 55 | 12 |
| Keokuk | 41 | 30 | 5 |
| Key West | — | — | — |
| †La Crosse | — | — | — |
| Louisville | 44 | 35 | 11 |
| Memphis | 45 | 37 | 20 |
| †Marquette | — | — | — |
| Milwaukee | 36 | 32.5 | 20 |
| Mobile | 55 | 49 | 16 |
| Montgomery | 56 | 45 | 15.½ |
| Nashville | 47 | 42 | 22 |
| New London | 38.5 | 34.5 | 11 |
| New York | 38 | 31 | 16 |
| Norfolk | 49 | 34 | 24 |
| †Omaha | — | — | — |
| Pittsburgh | 41 | 32 | 8 |
| Portland, Maine | 35 | 29 | 25 |
| Punta Rassa | — | — | — |
| San Francisco | — | — | — |
| Sandusky | 36 | 32 | 10 |
| St. Louis | 46 | 35 | 11.½ |
| St. Marks | 65 | 55 | 16.5 |
| †St. Paul | — | — | — |
| Savannah | 56 | 48 | 9 |
| Shreveport | — | — | — |
| †Toledo | — | — | — |
| Wilmington | 49 | 45 | 15 |
| Woods Holl | 36 | 31 | 8 |
| †Yankton | — | — | — |

† Observations interrupted by ice.

87° Long. West from 92° Greenwich

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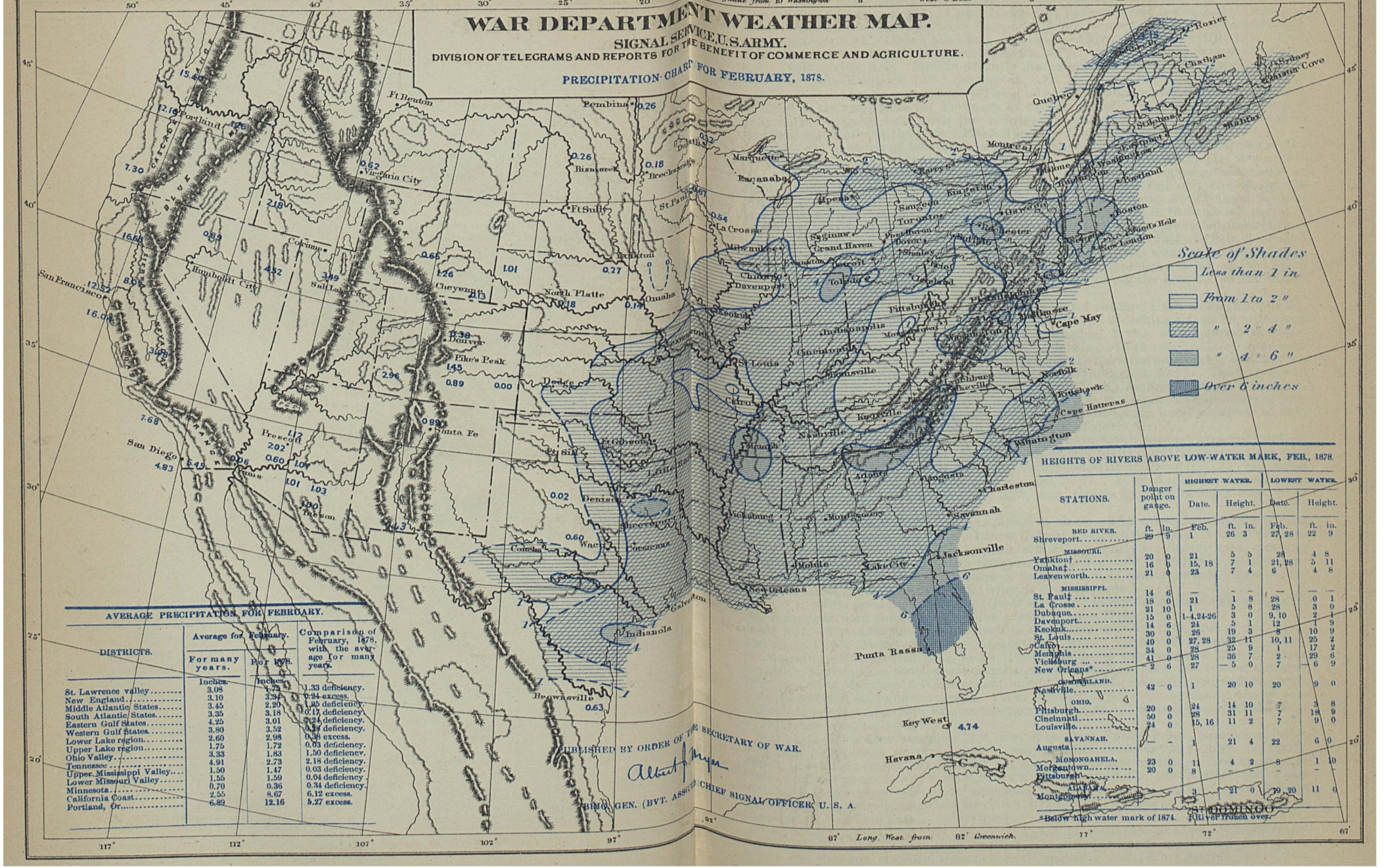
# WAR DEPARTMENT WEATHER MAP.

## SIGNAL SERVICE, U.S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

PRECIPITATION CHART FOR FEBRUARY, 1878.




### Scale of Shades

- Less than 1 in.
- From 1 to 2 "
- " 2 " 4 "
- " 4 " 6 "
- Over 6 inches

### AVERAGE PRECIPITATION FOR FEBRUARY.

| DISTRICTS. | Average for February. For many years. | Average for February. For 1878. | Comparison of February, 1878, with the average for many years. |
|---|---|---|---|
| | Inches. | Inches. | |
| St. Lawrence valley | 3.08 | 1.75 | 1.33 deficiency. |
| New England | 3.10 | 3.34 | 0.24 excess. |
| Middle Atlantic States | 3.45 | 2.20 | 1.25 deficiency. |
| South Atlantic States | 3.35 | 3.18 | 0.17 deficiency. |
| Eastern Gulf States | 4.25 | 3.01 | 1.24 deficiency. |
| Western Gulf States | 3.80 | 3.52 | 0.28 deficiency. |
| Lower Lake region | 2.60 | 2.98 | 0.38 excess. |
| Upper Lake region | 1.75 | 1.72 | 0.03 deficiency. |
| Ohio Valley | 3.33 | 1.83 | 1.50 deficiency. |
| Tennessee | 4.91 | 2.73 | 2.18 deficiency. |
| Upper Mississippi Valley | 1.50 | 1.47 | 0.03 deficiency. |
| Lower Missouri Valley | 1.55 | 1.59 | 0.04 deficiency. |
| Minnesota | 0.70 | 0.36 | 0.34 deficiency. |
| California Coast | 2.55 | 8.67 | 6.12 excess. |
| Portland, Or. | 6.89 | 12.16 | 5.27 excess. |

### HEIGHTS OF RIVERS ABOVE LOW-WATER MARK, FEB., 1878.

| STATIONS. | Danger point on gauge. | HIGHEST WATER. Date. | HIGHEST WATER. Height. | LOWEST WATER. Date. | LOWEST WATER. Height. |
|---|---|---|---|---|---|
| | ft. in. | Feb. | ft. in. | Feb. | ft. in. |
| RED RIVER. | | | | | |
| Shreveport | 29 9 | 1 | 26 3 | 27, 28 | 22 9 |
| MISSOURI. | | | | | |
| Yankton† | 20 0 | 21 | 5 5 | 28 | 4 8 |
| Omaha† | 16 0 | 15, 18 | 7 1 | 21, 28 | 5 11 |
| Leavenworth | 21 0 | 23 | 7 4 | 6 | 4 8 |
| MISSISSIPPI. | | | | | |
| St. Paul† | 14 6 | — | — | — | — |
| La Crosse | 18 0 | 21 | 1 8 | 28 | 0 1 |
| Dubuque | 21 10 | 1 | 5 8 | 28 | 3 0 |
| Davenport | 15 0 | 1-4,24-26 | 3 0 | 9, 10 | 2 1 |
| Keokuk | 14 6 | 24 | 5 1 | 12 | 1 9 |
| St. Louis | 30 0 | 26 | 19 3 | 6 | 10 9 |
| Cairo | 40 0 | 27, 28 | 32 11 | 10, 11 | 25 2 |
| Memphis | 34 0 | 28 | 25 9 | 1 | 17 2 |
| Vicksburg | 41 6 | 28 | 36 7 | 2 | 29 6 |
| New Orleans* | 2 6 | 27 | — 5 0 | 7 | 6 9 |
| CUMBERLAND. | | | | | |
| Nashville | 42 0 | 1 | 20 10 | 20 | 9 0 |
| OHIO. | | | | | |
| Pittsburgh | 20 0 | 24 | 14 10 | 7 | 3 8 |
| Cincinnati | 50 0 | 28 | 31 11 | 7 | 18 9 |
| Louisville | 24 0 | 15, 16 | 11 2 | 7 | 9 0 |
| SAVANNAH. | | | | | |
| Augusta | — — | 1 | 21 4 | 22 | 6 0 |
| MONONGAHELA. | | | | | |
| Morgantown | 23 0 | 11 | 4 2 | 8 | 1 10 |
| Pittsburgh | 20 0 | 8 | — — | — | — |
| ALABAMA. | | | | | |
| Montgomery | | 3 | 21 0 | 19, 20 | 11 0 |

*Below high water mark of 1874. †River frozen over.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. ASSOC.) CHIEF SIGNAL OFFICER, U. S. A.

Oregon there is a deficiency of 25 hundredths of an inch, and in the latter two districts of 12 to 15 hundredths of an inch.

*Barometric ranges.*—The largest and smallest ranges have been respectively as follows: California—Red Bluff, 1.01; Los Angeles, 0.75. Rocky Mountains—Denver, 0.82; Pike's Peak, 0.60. Northwest—Yankton, 1.19; Deadwood, 0.82. The Southwest—Concho, 1.41; Stockton, 0.74. Upper Mississippi Valley—Saint Louis, 1.31; Dubuque, 1.08. Upper Lakes—Chicago, 1.17; Marquette, 0.90; Lower Lakes—Detroit and Toledo, 1.16; Oswego, 0.94. Ohio Valley and Tennessee—Cairo, 1.33; Knoxville, 1.03. East Gulf States—Vicksburg, 1.12; Saint Mark's, 0.73. South Atlantic States—Augusta, 0.83; Jacksonville, 0.68. Middle Atlantic States—Fort Whipple, 1.03; Cape May, 0.89. New England—Eastport, 1.26; Burlington, 0.86.

*Areas of high barometer in general.*—These have been unimportant, furnishing a great contrast to the conditions for February of former years. The consequent absence of cold northerly gales has given the country generally a month of remarkably mild weather, especially in the Upper Mississippi and Lower Missouri Valleys.

No. I.—On morning of 1st this area of high pressure covered a small section of the Northwest, evidently advancing from Manitoba. At midnight of the 1st it was central at Pembina, barometer, 30.43 (0.30 above normal), clear, cool weather, calms or light winds. On morning of 2d, accompanied by marked fall of temperature, the ridge of high pressure spreading eastward has extended its limits from Dakota to Saint Lawrence Valley, being central at Escanaba, barometer, 30.42 (0.40 above normal). During 2d, clear weather, with calms or light northerly winds, prevailed from Minnesota to New York. On morning of 3d the central pressure had slightly decreased and a ridge of equal pressure, with generally clear and cold weather, extended from Northern Texas to Northern New York, with highest barometer, 30.45, at Port Stanley, Oswego (0.30 above normal). During afternoon of 3d the central portion disappeared off the New York coast.

No. II.—This area developing in Montana on 1st reached Utah on morning of 2d; Salt Lake City, barometer, 30.34 (0.40 above normal). Reaching Santa Fé, afternoon of 3d, on morning of 4th it had advanced to Central Texas, accompanied by clear, cold weather; Indianola, barometer, 30.34. Morning of 5th reached Alabama, with slightly increasing pressure. It was central in North Carolina on morning of 6th, with clear, calm, and colder weather; barometer at Wilmington, 30.33. Knoxville, 0.23 above normal. That night it disappeared off the North Carolina coast.

No. III.—Appearing in Manitoba on morning 8th; by midnight the barometer at Fort Garry read 30.46. It remained nearly stationary in Minnesota until afternoon of 9th, when it was gradually dissipated by the influence of storm No. V.

No. IV.—This area of high pressure first appeared in Southeastern Texas on afternoon 10th; clear weather, with brisk, northerly winds, gradually diminishing to calms, prevailed that day; morning 11th, highest pressure noted at Indianola, 30.33; afternoon 11th, it was central at New Orleans, barometer, 30.22. At midnight it was central in Alabama, reaching Georgia morning 12th, and disappeared off Georgia coast that evening.

No. V.—This area was first made manifest in clear, cold weather, and rising barometer in Northwest, morning 12th. It first defined itself on the Signal Service maps in Saint Lawrence Valley at midnight 13th, remaining nearly stationary until morning 14th, with clear weather and low temperatures. Rockliffe, barometer, 30.26; thermometer, 11°. Montreal and Burlington, barometer, 0.14 above normal. It was central over Nova Scotia morning 15th, when it disappeared.

No. VI.—This pressure first showed itself above the normal in Alabama morning 16th, and disappeared off the North Carolina coast forenoon 17th.

No. VII.—This area first defined itself in Minnesota morning 17th, and, at midnight, was central over Michigan with light northerly winds. Escanaba, barometer, 30.24. On morning 18th, central over Lake Huron; Saugeen, barometer, 30.33, 0.25 above normal. Traveling in south-southeast direction across New York, the center, morning 19th, was over Maryland; Washington, barometer, 30.37. Washington and Philadelphia, barometer, 0.23 above normal. Clear weather, with fresh northerly winds, prevailed along coast from New England to South Carolina. The area passed off the coast of Delaware evening of 19th.

No. VIII.—This area, morning 21st, was in Quebec, Father Point, barometer, 30.20, Chatham, 0.26 above normal. Cold, clear weather, with brisk to high northerly winds, prevailed; center at midnight at Chatham, barometer, 30.56, or 0.68 above normal. Highest pressure was morning 2d, Chatham, barometer, 30.67, or 0.78 above normal, with temperature —9°. On afternoon highest pressure was central over Nova Scotia; Sydney, barometer, 30.64, or 0.78 above normal, disappearing next morning off the coast of Newfoundland.

No. IX.—This area probably developed north of Montana, as shown by continued high barometer from morning 22d until afternoon 23d, when it appeared in Manitoba, where the pressure steadily increased until morning 24th; Fort Garry, barometer, 30.27. It moved south down the Missouri Valley, and on morning 25th the isobar

of 30.30 included this country from Alabama to Dakota, with highest pressure central in Missouri. Morning 26th it was central in Illinois, highest barometer, Davenport, 30.55, 0.41 above normal. Clear weather, with light northerly winds, prevailed from Dakota to South Carolina, and from Alabama to Lower Lakes. Morning 27th it was central over Ohio, Sandusky, barometer, 30.32, Toledo, barometer, 0.24 above normal. Clear weather prevailed east of Rocky Mountains, save in Gulf and South Atlantic States, which were affected by low area No. XII. Moving south, with diminishing pressure, it disappeared, afternoon 28th, in Alabama.

No. X.—Appears to have formed in Manitoba country, first showing itself morning 28th at Pembina, being central that afternoon over Upper Lakes. At midnight, 28th, with increasing pressure, it was central in Quebec; Rockliffe, barometer, 30.51, Parry Sound, barometer, 0.35 above normal.

*Areas of low barometer in general.*—Eleven areas of low pressure are traced upon chart No. I. Low areas Nos. VIII and X are not charted. They are divisible into two groups, viz: Nos. II, IV, V, VI, XI, XII, and XIII, appeared first on the Pacific coast, and thence moved in a southeasterly track over the Rocky Mountains. The others all first appeared east of the Rocky Mountains.

The storm described as low area No. XII in the January review continued as a severe northeast gale on the 1st along the Middle Atlantic and New England coasts, gradually diminishing in energy during the day. The following maximum velocities are reported for this storm on the 1st: New Haven 40 miles, northeast; Boston, 53 miles, north; Thatcher's Island, 60 miles, northeast, and Portland, 40 miles, northeast.

No. I.—A low pressure was developed on the morning of the 1st in the West Gulf States. On the 1st and 2d, accompanied by brisk winds and light rain in the Gulf and South Atlantic States, it moved in a southeasterly path into the East Gulf. On the 3d it advanced over Florida, and thence pursuing a track nearly parallel to the Gulf Stream, it gave rise, on the 4th, to the high winds and heavy rain that prevailed in the South Atlantic States on that day.

No. II.—This depression can be traced from the Pacific. On the 4th there was a rapid fall of the barometer in Oregon, and severe southerly gales prevailed on the Pacific coast on that day. The center of the low area moved to the southeast, and on the morning of the 5th the lowest pressure was in Wyoming, and thence the low area pursued its southeasterly path, and by the morning of the 6th had developed into a storm of considerable energy, central in Northwest Texas. At the a. m. report of the 7th the lowest barometer, 29.49, or 0.65 below the normal, was at Shreveport, La., with the highest pressure in the Middle States. At this time high southeast winds and heavy rains were reported from the East Gulf States, while in Texas the winds had veered to northwest, with colder, clearing weather and rising barometer. The storm, rapidly increasing in energy, had moved by the morning of the 8th into the Ohio Valley, where the isobar of 29.30 included both Cincinnati and Louisville, the barometer at the latter place being 0.79 below the normal. On this day there were wind velocities reported from Escanaba of 40 miles, north, and from Cape Lookout 60 miles, southwest. The storm-center then moved, with slightly diminishing energy, over the Middle States, and the wind directions show that, on the morning of the 9th, it had passed beyond the New England coast.

No. III.—This apparently was a subsidiary low area developed from the great depression No. II that crossed from the Pacific Ocean. On the morning of the 5th the center was in Dakota; thence the depression moved slowly to the eastward over Lake Superior, attended by light or brisks southeast winds, veering to colder northwesterly, and occasional light rain or snow, until, on the 7th, it disappeared north of Lake Huron.

No. IV.—This depression is traced from the Pacific. From midnight to the morning of the 6th a rapid fall of the mercury occurred on that coast, and heavy rain or snow fell on that and the succeeding day on the slope west of the Rocky Mountains. At the a. m. report of the 7th the barometer was lowest near Salt Lake. On this day the maximum wind velocity for the month was recorded at Pike's Peak—75 miles, N. The depression moved very rapidly in a southeasterly path, and the morning of the 8th showed a low area in Northwest Texas. During the day this depression moved slowly to the east, and during the night to the northeast, and by the morning of the 9th was central in Tennessee and the Ohio Valley, the barometer at Louisville, 29.25, being 0.78 below the normal. On the 9th it moved to the east, giving rise, in connection with the rising barometer in the Upper Lakes, to high northeasterly gales in the Lake region. On the 10th the storm-center passed over New England, where a northeast wind of 44 miles is noted at Eastport, and on the 11th the storm moved beyond Nova Scotia.

No. V.—This low area is traced from the Pacific. The barometer fell rapidly on the Pacific slope on the 11th, and very severe gales, with heavy rain, were reported from that coast on that day. On the morning of the 12th the depression was central in Utah, and then advancing rapidly in a southeasterly track, the low area was, at the a. m. report of the 13th, central in the Indian Territory. During the day thunder-storms were reported from the Gulf States. On the 13th and 14th the low area gradually extended,

with frequent rains, over the South and Southwest; but there appears to have been no well-defined storm-center. On the morning of the 15th a trough of low pressure extended from Lake Erie to the Gulf of Mexico, and during the day this depression was filled up by the inflowing air.

No. VI.—This depression is also traced from the Pacific. The a. m. report of the 13th showed a rapid fall in the mercury in California and Oregon, with heavy rain and high southerly gales. The low area moved, with diminishing energy, in a southeasterly track, and was last noted as an independent depression at the midnight report of the 13th, when it was central in Utah.

No. VII.—On the 13th there was a considerable fall of pressure in Florida and Cuba, accompanied by brisk easterly winds, heavy and frequent rains, with occasional thunder-storms. On the 14th the depression traversed Florida in an easterly track, and was rapidly followed by clearing weather and westerly winds.

No. VIII.—A storm of considerable energy prevailed, with high southerly winds and heavy rain, on the Pacific coast on the 14th. The depression moved, with diminished energy, eastward to the Rocky Mountains, and was there filled up by the inflowing air. Its path was too uncertain to be charted.

No. IX.—On the 15th the barometer fell slowly in the Northwest, and the center of the low area thus developed moved on the 16th into Wisconsin. On the 17th it advanced over the Lower Lake region and Middle States, and by the a. m. report of the 18th it had gone beyond the New England coast. In its passage it was accompanied by brisk but not high winds, and frequent but light rain fell to the south of its track and light snow to the north.

No. X.—During the night of the 15th and 16th there was a rapid fall of the mercury on the Pacific coast, with severe southerly gales and heavy rain. The storm was followed by rapidly rising barometer. Its track was too indefinite to be charted.

No. XI.—This depression is traced from the Pacific. On the 17th there was a decided fall in the barometer in Washington Territory. On the 18th the fall had extended to the Northwest. On the 19th the center of the depression moved in a southerly track into Missouri. On the 20th the lowest pressure was transferred to the Indian Territory, On that day the storm increased very rapidly in energy. Several thunder-storms were reported from the Gulf States and Tennessee, while the rain-area extended over the Ohio Valley, Lake region, and Middle States, with snow in New England. The same day the pressure fell 0.93 below the normal at Fort Gibson, and more than 0.80 below the normal at Fort Sill, Denison, Corsicana, Shreveport, and Memphis. On the 21st, the storm still increasing in energy, became central in the Ohio Valley, and on the same day the barometer rose very rapidly in New England and Nova Scotia. The pressure at the center of the depression continued during the day below 29.20, and the following pressures were noted below the normal: Memphis, 0.92; Cairo, 0.89; Louisville, 0.85. The morning report of the 22d shows the lowest pressure in Indiana, with the barometer still rapidly rising in Nova Scotia. At this time the isobar of 30.60, with an average temperature of +10°, extended from Father Point, Canada, slightly to the east of Eastport, Me.; the isobar of 29.60 with an average temperature of +50° extended from Baltimore, Md., to Erie, Pa. Both the temperature and pressure gradient indicated the severe gales that were felt on the New England and Middle Atlantic coasts on that day. At the a. m. report of the 23d the center of the low area had moved into Canada, near the Georgian Bay. It then advanced with rapidly diminishing energy in an easterly path into Nova Scotia and disappeared on the 24th beyond that coast. This was an unusually severe storm, and during its passage from the Pacific to the Atlantic the following high velocities are reported: 17th, Red Bluff, Cal., 44 miles, southeast; 20th, Dodge City, Kans., 60 miles, north; Stockton, Tex., 52 miles, west; New Orleans, 40 miles, southeast; Mobile, 42 miles, southeast; 22d, New London, Conn., 80 miles, east; 26th, Mount Washington, 150 miles, north.

No. XII.—On the 23d the mercury fell in Oregon, with southerly winds and frequent rains; the center of the low area moved in a southerly track along the coast, and at midnight of the 24th it was near San Diego, Cal. On the 25th it moved rapidly in a southeasterly track, and at the a. m. report of the 26th, the center of the low area was situated to the south of Brownsville, Tex. On the 26th it moved over the Gulf in an easterly track, and was accompanied in the Gulf States by easterly winds backing to northwest. On the morning of the 27th it was central in Southern Florida, and on that day moved to the east beyond the coast. The rain-fall in Southern Florida was excessive. During its passage the following maximum wind velocity was reported: 22d, Indianola, Tex., 84 miles, north.

No. XIII.—On the 25th and 26th there was a general fall of pressure on the Pacific coast, with heavy rain and southerly gales. On the 27th the center of the low area had moved into Utah, and on the 28th, still pursuing a southeasterly track, it had advanced into Texas.

As illustrating the service of the telegraph lines of the Signal Service and the signal stations established along the lines, equipped, as they are, for communicating with vessels in either the International Code or Signal Service Code, it may be stated that

the Italian bark Giuseppe Massano, Captain Meretto, ran ashore near Cape Henry, Va., and was reported to the signal station at 6.55 a. m. of the 10th. Information was at once sent to the Chief Signal Officer at Washington, and assistance thence asked from Norfolk. It was attempted by Cape Henry station to open communication by means of the flags of the International Code, but receiving no response from the ship, Private Harrison, fully equipped with flags, &c., of the Signal Service apparatus, was sent aboard to open communication with the shore, which he did with very good result. The following appears in the report of Sergeant Bell, in charge of signal station at Cape Henry: "At one time during the morning (11.30 a. m.), when the crew abandoned the vessel, and the captain and first mate were preparing to abandon her, Private Harrison informed the captain that he should have more confidence in his signaling, and that by this means he would keep him fully informed of all particulars from shore, which eventually proved the means of saving the ship from total loss, and she was subsequently removed with but slight damage by the wrecking steamer from Norfolk, summoned by means of the coast lines. Again, near Cape Hatteras on the 22d, a vessel was noticed flying a signal of distress. An unsuccessful effort was made to open communication with her by means of the flags of the International Code. The life-saving station, twelve miles distant, was notified by messenger. Later in the day, and before assistance could reach her, the vessel drifted out to sea. Information had been sent, as soon as the distress-signal was noticed, to Norfolk by means of the sea-coast telegraph line, and the United States revenue-cutter Hamilton, Captain Irish, sailed to her rescue from that port. This revenue-cutter arrived off Hatteras signal station the next morning, and without landing opened communication with that station by the Signal Service Code—by which messages of any character may be communicated—learned all particulars in reference to direction in which vessel was last seen and other matters in reference to her, steamed to sea in search, and found two days later the schooner H. C. Cushing, of Boston, abandoned and in a sinking condition, near the Gulf Stream.

### INTERNATIONAL METEOROLOGY.

October 7 to 12, great storm along the entire coast of China, followed by extraordinary cold NW. winds. 14th, latitude 43° 30′ N., 60° W., hurricane, WNW. to W., lasting 12 hours, with lightning and heavy rain. 16th, off Cape of Good Hope, heavy SW. gale. 21st, 29° 24′ N., 132° E., gale. 22d, 54° 14′ S., 76° 14′ W., gale. November 5, 34° N., 136° E., gale. 20th, off Cape of Good Hope, gale. 22d, 43° 4′ N., 125° W., gale. 23d, 46° 49′ N., 125° W., gale. December 10, between Tortugas and Cape Florida light, heavy NE. gale; latitude 44° 7′ S., longitude 30° 57′ W., terrific gale, with tremendous sea. 23d, off island of Grand Cayman, Caribbean Sea, NW. gale. 26th, 36° 25′ N., 2° 5′ W., heavy gale; off coast of Chili, gale. 30th, 20 miles SE. off Hatteras, terrific NNW. gale lasting 3 days. January 1, heavy gale off St Catharine, Bermudas. 5th, 17° 21′ N., 58° 36′ W., hurricane. 6th, 25° 33′ N., 72° 71′ W., heavy NE. gale, lasting 20 hours. 10th, 30° 35′ N., 74° W., hurricane from SE., lasting 7 hours. 11th, 38° N., 70° to 72° W., hurricane SE. to N., lasting 7 hours; 37° 02′ S., 22° 43′ E., very heavy W. gale, lasting 12 hours. 13th, 40° 38′ N., 68° 52′ W., strong WNW gale. 14th, 37° 71′ N., 71° W., hurricane from SE. to SW. 19th, 30° N., 50° W., heavy gale from SE. to N.; about 30° N., 50° W., hurricane from SSE., lasting 24 hours. 23d, 50° 13′ N., 22° W., strong WNW. gale; 45° N., 163° W., hurricane winds for 2 hours, barometer 28.34; British Isles, gales. 24th, 50° 10′ N., 26° 48′ W., and 49° 38′ N., 26° 17′ W., strong WNW., gales; 49° 40′ N., 7° 22′ W., NW. gale, with heavy squalls and hail; 44° 03′ N., 56° 11′ W., strong WSW. gale, barometer 29.90. 28th, 54° 53′ N., 14° 20′ W., fierce NW. squalls, with hail and rain; 49° 08′ N., 16° 49′ W., NW. fresh gale and hard squalls; 28° N., 70° W., heavy W. gale veering to NE., lasting 24 hours. 30th, 30 miles E. of Cape May violent E. gale; 32° 54′ N., 77° 32′ W., gale from SE., hauling to W. and NW., lasting 3 days. 31st, 40° 34′ N., 70° 50′ W., strong NE. gale and heavy snow-storm; 44° 40′ N., 44° 56′ W., thunder-storm from SW., followed by heavy NW. gale; 40° N., 73° 25′ W., gale from E., with snow; 35° 03′ N., 66° W., noon, heavy SE. gale veering to SW.; midnight, NW. gale, lasting until February 2d; 34° 26′ N., 75° 50′ W., heavy ESE. gale, lasting 24 hours; 100 miles E. of Sandy Hook, E. to SE hurricane, lasting 12 hours; 37° N., 75° W., gale ENE., tremendous sea; about 49° 30′ N., 5° W., strong S. gale veering to W., followed February 1st by very high sea. February 1st, 40° N., 73° 25′ W., gale NE. and snow; 43° 21′ N., 50° 07′ W., 46° 44′ N., 48° 10′ W., 47° 28′ N., 38° 31′ W., and 49° 38′ N., 40° 26′ W., heavy NW. gales and seas; 46° 14′ N., 40° 17′ W., furious SW. to NW. gale, immense sea; 47° 41′ N., 37° 36′ W., strong SW. gale, with hard squalls. 2d, 44° 48′ N., 44° 51′ W., gale. 4th, 49° 37′ N., 31° 19′ W., strong S. gale, with high sea. 5th, 54° 31 N., 18° 54′ W., strong WSW. gale and hard squalls; 34° 29′ N., 23° 13′ W., heavy SW. gale, veering to NW., lasting 24 hours; off the Banks of Newfoundland, terrible E. snow-storm, with tremendous sea; 49° N., 55° W., heavy gale. 6th, 44° 11′ N., 53° 27′ W., strong gale from SE. to NW.;

42° 40′ N., 52° 02′ W., strong SW. gale; 28° 04′ N., 60° 31′ W., terrific squalls, followed by NW. gale, lasting through the 7th; 54° 02′ N., 26° 04′ W., hard SSW. gale; 46° 29′ N., 43° 02′ W. and 50° 23′ N., 19° 13′ W., strong S. gale; 46° 53′ N., 34° 26′ W., heavy SE. gale; 40° N., 42 W., hurricane, with terrific cross-seas. 7th, 44° 25′ N., 53° W., hurricane from N.; 46° N., 44° W., hurricane, SW to NW.; 43° 14′ N., 56° 32′ W., strong NNW. gale; 41° 54′ N., 54° 56′ W., very heavy W. gale; 45° 13′ N., 45° 54′ W. strong gale. 8th, 42° 30′ N., 60° 08′ W. and 43° 53′ N., 48° 38′ W., strong NW. gales. 9th, 45° 02′ N., 44° 50′ W., heavy NW. gale and very high seas. 10th, 33° 22′ N., 68° 07′ W., gale from ENE.; 44° 32′ N., 48° 08 W., strong WNW. gale. 11th, 35° 40′ N., 73° 35′ W., heavy WSW. gale. 13th, 44° 29′ N., 47° 41′ W., strong NW. gale; 46° 36′ N., 38° 07′ W., heavy NW. gale, with violent squalls and snow. 14th, 45° 06′ N., 41° 52′ W., heavy NW. gale and hail-squalls; 47° 13′ N., 38° 04′ W., hard SSW. to WNW. gale; 50° 30′ N., 36° 42′ W., violent NNW. gale, fierce squalls, snow, and sleet; 48° 53′ N., 36° 02 W., heavy NW. gale; 48° 55′ N., 34° 33′ W., strong and violent S. to NNW. gales, with terrific squalls and high confused sea. 15th, 35° N., 67° W., S. gale; 44° 02′ N., 44° 50′ W., 45° 35′ N., 42° 25′ W., 48° 49′ N., 38° 47′ W., and 48° 26′ N., 38° 01′ W., hard NW. and W. gales, with fierce squalls, snow, and sleet. 16th, 47° 21′ N., 42° 15′ W., 50° 17′ N., 29° 21′ W., and 49° 5′ N., 26° 34 W., strong NW. to SW. gales, with hard snow-squalls. 17th, 48° 57′ N., 35° 28′ W., and 49° 29′ N., 31° 55′ W., strong NW. gales, with heavy squalls; 55° 20′ N., 9° 21′ W., and 55° 25′ N., 9° 48′ W., strong southerly gales. 18th, 47° 69′ W., NNE. gale, lasting 36 hours; 46° 43′ N., 40° 41′ W., violent gales (W.-E.-N.); 48° 45′ N., 39° 08′ W., strong SW. to SE. gale; 55° 18′ N., 13° 11′ W., strong NW. to SW. gale; 50° 37′ N., 27° 40′ W., heavy NW. to S. gale. 19th, 32° N., 73° W., violent NW. and SE. gales, with heavy rain; 42° 12′ N., 64° 28′ W., N. gale; 44° 47′ N., 45° 26′ W., violent NW. to SSW. gale; 47° 20′ N., 42° 59′ W., hurricane-like gale from NE. to W., with tremendous sea; 54° 23′ N., 19° 21′ W., severe NW. gale, high sea; 50° 05′ N., 20° 32 W., and 49° 40 N., 19° 42′ W., heavy SW. gales; 25° N., 63° W., heavy SW. to NW. gale, lasting 12 hours. 20th, 43° 37′ N., 48° 56′ W., violent to moderate SSW. to NW. gale; 46° 21′ N., 49° 28′ W., strong SSW. to NNW. gale; 53° 51′ N., 22° 09′ W., hard WNW. to WSW. gale; 50° 56′ N., 27° 37′ W., hard NW. gale, with terrific squalls; 49° 42′ N., 26° 55′ W., heavy westerly storm; 49° 34′ N., 21° 27′ W., strong SW. to NW. gale, with heavy squalls. 21st, 52° 54′ N., 26° 20′ W., and 49° 17′ N., 25° 26′ W., strong SW. gales; 48° 07′ N., 35° 57′ W., hurricane from W., with very heavy sea. 22d, 36° N., 72° W., violent SE. gale, lasting 48 hours; 52° 34′ N., 29° 17′ W., 48° 05′ N., 34° 30′ W., 48° 31′ N., 37° 52′ W., and 48° 37′ N., 37° 51′ W., strong and hard W. to SW. gales; 28° N., 79° W., heavy NNW. gale and sea, lasting 12 hours. 23d, two hundred and fifty miles SW. of Bermuda, heavy NW. gale; 47° 49′ N., 35° 34′ W., furious E. gale, with violent squalls and constant heavy rain. 24th, 49° 12′ N., 41° 04′ W., strong ENE. gale; 43° N., 53° 21′ W., SE. gale; 45° 04′ N., 41° 12′ W., violent NE. storm, mountainous sea. 25th, 37° N., 73° 40′ W., heavy NW. gale, lasting 48 hours. 26th, 43° 26′ N., 48° 34′ W., heavy NE. squalls, with heavy rain and snow. 27th, 43° 39′ N., 56° 40′ W., 45° N., 45° 36′ W., and 35° 53′ N., 71° 52′ W., heavy NW. gales.

### TEMPERATURE OF THE AIR.

*In general.*—The general distribution of the temperature of the air is shown by the isotherms on Chart No. II. By reference to the table of comparative temperatures, in the left-hand corner of same chart, it will be seen that the high temperatures existing during January have continued, in a still more marked degree, throughout the present month. The largest deviation occurs in Minnesota, where the mean temperature of four stations is 18°.7 above the normal. In the Missouri and Upper Mississippi Valleys and Upper Lake region the excess is from 9° to 16°; thence eastward to the Atlantic coast and Saint Lawrence Valley from 4° to 5°, and from the Ohio Valley to the Gulf coast and in the Rocky Mountain region from 2° to 3°. In the Pacific and South Atlantic coast States the excess is quite small.

*Monthly mean temperatures at special points* have been as follows: Pike's Peak, 2°.5; Mount Washington, 10°.2.

*Maximum and minimum temperatures.*—Maximum temperatures at Signal Service and voluntary stations above 70° are reported as follows: 85° at Flatonia, Fla; 81° at Fredericksburg, Tex.; 80° at Stockton, Concho, Fort Griffin, Fort McKavett, Tex., and Okahumpka, Fla.; 79° at Mason, Tex.; 78° at Jacksboro' and Austin, Tex.; 77° at Fort Sill, Ind. T.; 76° at Decatur, Tex., South Pueblo, Colo., and Datona, Fla.; 75° at Oglethorpe Barracks, Ga., Clarksville, Tex., and Savannah, Ga.; 74° at Houston and Jacksonville, Fla., Quitman, Ga., and Belmont Farm, Tex.; 73° at Weldon, N. C.; 72° at Great Bend and Kingsley, Kans., Fort Barrancas, Fla., Judsonia, Ark., Alta Vista, Va., and Cape Henry; 71° at Augusta, Wilmington, Los Angeles, New Orleans, and Fort Monroe, Va.

*Minimum temperatures* at Signal Service and voluntary stations were: —22° at Woodstock, Vt.; —20° at Newport, Vt., and Nile, N. Y.; —19° at Pike's Peak; —18° at

Summit, Colo., and Billerica, Mass; —17° at Mount Washington and Waterbury, N. Y.; —16° at Fort Garland, Colo., Cooperstown, N. Y., Orono, Me., and Westboro', Mass.; —15° at Fort Sanders, Wyo., and Dumbarton, N. H.; —14° at Tioga, Pa., Dudley, Colo., Detroit, Mich., and Cazenovia, N. Y.; —13° at Wappinger's Falls, N. Y., and Lunenburg, Vt.; —11° at Contoocookville, N. H., and Williamsport, Pa.; —10° at West Waterville, Me., and Palermo, N. Y.; 8° at Waltham, Mass., Franklin, Pa., Mechanics' Falls, Me., Plattsburg Barracks, N. Y., and Fort Fred Steele, Wyo.; —7° at Albany, N. Y.

*Ranges of temperature.*—Largest monthly and diurnal ranges have been, respectively, as follows: Cheyenne, monthly, 64°, diurnal, 44°; Griffin, 61° and 47°; Stockton, 61° and 46°; McKavett, 61° and 43°; Yankton, 59° and 32°; Jacksboro', 57° and 41°; Mason, 57° and 40°; Cleveland, 56° and 27°; Breckenridge, 55° and 38°; Fort Sill, 55° and 40°; North Platte, 54° and 36°; Omaha, 52° and 27°; Dodge City, 52° and 37°; Pembina, 52° and 38°; Saint Paul, 52° and 32°; Oswego, 52° and 35°; Boston, 52° and 31°.

*Small monthly and diurnal ranges* have been as follows: San Francisco, 20° and 13°; Sacramento, 21° and 16°; Red Bluff, 25° and 22°; Cape Hatteras, 28° and 21°; Boise City, 29° and 21°; Visalia, 30° and 24°; Los Angeles, 30° and 23°; Cape Lookout, 31° and 20°; Indianola, 32° and 23°; Galveston, 33° and 16°; Cairo, 33° and 24°; Smithville, 33° and 25°; Charleston, 35° and 20°; Cape May and Sandy Hook, 36° and 18°; Wood's Holl, 35° and 21°.

*Frosts* have been reported nearly every day in the Northwest, Lake region, and northern portion of New England; and in the other sections east of the Rocky Mountains, generally from the 1st to the 6th, 11th to 13th, on the 19th and 20th, and from the 26th to the 28th.

*Ice* is reported to have formed as follows: In Kansas, from the 1st to the 4th, 9th to 12th, and on the 24th; in Texas, on the 11th; Mississippi, 1st, 5th, 11th, and 12th; Florida, 12th; New Jersey, 7th and 18th; and in Massachusetts on the 21st.

## PRECIPITATION.

*In general.*—The general distribution of rain (and melted snow) for the month is shown on Chart III. By reference to the table in the lower left-hand corner of the same chart, it will be seen that there has been a very large excess in the Pacific coast States, and a general deficiency east of the Rocky Mountains, which is most marked in Tennessee, the Ohio Valley, East Gulf, and Middle Atlantic States. In the Lower Lake region and New England, a small excess occurs. The heavy rains in the Pacific States resulted in extensive flows, of which a short account is given below.

*Special heavy rains.*—1st, Westboro', Mass., 2.39 inches. 6th, Baton Rouge Barracks, La., 1.85 inches; New Orleans, La. (6th and 7th), 2.08 inches; Denison, Tex. (6th and 7th), 2.27 inches; Corsicana, Tex. (6th and 7th), 2.22 inches. 14th, Spring Garden, Tenn. (14th and 15th), 2.40 inches; Red Bluff, Cal. (13th and 14th), 3.25 inches. 15th, Los Angeles, Cal., 1.78 inches; Santa Cruz, Cal., 1.70 inches. 17th, Red Bluff, Cal., 2.41 inches; San Francisco, Cal., 1.92 inches. 20th, Red Bluff, Cal., 2.02 inches; Fort Gibson, Ind. T., 2.05 inches. 22d, New York City, 2.11 inches; New Haven, Conn., 4.13 inches; Springfield, Mass., 2.20 inches; Westboro', Mass., 2.51 inches; West Chester, Pa., 2.35 inches; Green Castle, Pa. (21st and 22d), 2.07 inches; Thatcher's Island, Mass., 3.01 inches; Fort Preble, Me., 3.30 inches; Alpena, Mich. (21st and 22d), 2.34 inches; Wilmington, N. C. (21st and 22d), 2.26 inches. 25th, Fort Duncan, Tex., 1.80 inches; Red Bluff, 1.99 inches.

*Large monthly rain-falls.*—At Red Bluff, Cal., 16.66 inches; Santa Cruz, Cal., 16.04 inches; Olympia, Wash. T., 15.50 inches; San Francisco, Cal., 12.52 inches; Portland, Oreg., 12.16 inches; Okahumpka, Fla., 10.80 inches; Salinas, Cal., 8.77 inches; Sacramento, Cal., 8.07 inches; Los Angeles, Cal., 7.68 inches; Datona, Fla., 7.64 inches; Roseburg, Oreg., 7.30 inches; Cambridge, Mass., 6.59 inches; New Haven, Conn., 6.40 inches; Westboro', Mass., 6.12 inches; Spring Garden, Tenn., 6.00 inches.

*Small monthly rain-falls.*—At Fort Lyon, Colo., Vail, Iowa, and Fort Hartsuff, Nebr., none; Fort Union, N. Mex., trace; Fort Griffin, Tex., 0.02 inches; Sydney Barracks, Nebr., 0.06 inches; Yuma, Ariz., 0.06 inches; Cheyenne, Wyo., 0.13 inches; Omaha, Nebr., 0.14 inches; Plattsmouth, Nebr., 0.15 inches; Fort McPherson, Nebr., and Tabor, Iowa, 0.16 inches; De Soto and North Platte, Nebr., and Breckenridge, Minn., 0.18 inches; Boonesboro', Iowa, 0.20 inches; Fort Pembina, Dak., and Norfolk, Nebr., 0.21 inches; Clear Creek, Nebr., 0.25 inches.

*Floods.*—Valley of the Sacramento, Cal.—During the latter half of January, the Sacramento River gradually rose, reaching 22 feet 3 inches above low-water mark at Sacramento City on the 31st. It continued rising until the 5th of February, 2 a. m., when 24 feet 11 inches was recorded, being 1 inch higher than any previous record. (Highest heretofore 24 feet 10 inches, March, 1876.) Between 2.30 and 3 a. m. a break occurred in the levee on east bank of the river, about one mile below Sacramento City, flooding an immense tract of country in Sacramento County, and, by backing up, flooded all the southern portion of city on the 6th. After the 6th the river gradually fell

until the 12th, when it commenced rising, the water being backed by the high southeast gales during the night of the 12th and 13th. At 3 p. m., 13th, 23 feet 11 inches was recorded. During the 12th the Washington River also rose, owing to a heavy snow and rain storm in the mountains. By this time the flood had spread over a great portion of Yolo County, and the water on the 11th was within three miles of Woodland, forming a vast lake to the north and south. On the 13th it extended eighteen miles below Sacramento. On the 14th the water fell somewhat, but rose again on the 15th, reaching 24 feet 1 inch, at noon of the 15th, 16th, and 17th. On the 17th, very heavy rains fell in the Upper Sacramento Valley, and heavy snows on the mountains, and during the afternoon the river rose at the rate of one foot per hour at Red Bluff; at 9 p. m., 24 feet above low-water mark was recorded and still rising at midnight; numerous breaks occurred in the levees on the Yolo side of the river, and 100 feet of the Sacramento Valley railroad track was washed away at Lexington Crossing. On the 18th the water again rose at Sacramento City, and the upward tendency continued until 7.40 p. m. of the 20th, when 25 feet 11½ inches was recorded, the water reaching Front-street railroad track, and being the highest ever known. By 2.45 p. m. it had fallen to 24 feet 8 inches, and the decline continued to end of month. At noon on the 20th the levee below Washington gave way, and on the 21st the town was almost totally inundated, houses were swept away, and the crevasses in Yolo County exceeded six miles in extent. Extensive overflows also occurred in Colusa County, and in Sutter County a tract of the country, 15 to 20 miles long and 8 miles wide, was covered to an average depth of 4 to 6 feet. On the 21st the levees protecting the islands in the delta of the Sacramento gave way, and Andros, Brannan, and Grand Islands were almost entirely submerged, with immense loss of property. At the close of the month reports from Sacramento say the whole of Sacramento Valley, on both sides of the river, for a distance of 150 miles, is under water, excepting a few well-guarded cities and towns. In Washington the streets were still several feet under water, and houses were being undermined and careening over. A report from Comanche, Calaveras County, California, says that on the 17th, 4.30 p. m., during a heavy rain-storm, a cloud burst in the hills south of here; four funnel-shaped clouds were observed passing in a northeasterly direction, apparently accompanied by heavy precipitation. Soon the slopes of the hills were covered with torrents of water. In a few minutes a bank of water, several feet in height, swept down Comanche Creek, flooding flats on either side, carrying away houses, &c., and drowning ten persons in Chinatown. On the 22d, at Meriden, Conn., flats along Harbor Brook completely submerged; streets flooded; heavy freshet in Moshanssuck River flooded northern portion of Providence, R. I. Tioga River very high at Elmira, N. Y.; lower portion of city flooded. At Port Hope and Oshawa, Ontario, severe floods also occurred.

*Hail.*—4th, Lenoir, N. C.; 6th, Visalia, Cal., Galveston; 7th, Santa Fé., N. Mex.; Augusta, Forsyth, Ga.; 9th, Nashville, Jackson, Mayport, Fla.; Danville, Ky., West Waterville, Me., Wytheville, Va.; 10th, Knoxville, Norfolk, Cape Henry, McPherson Barracks, Ga., Fort Independence, Mass., Springfield, Mass., Weldon, N. C., Wytheville, Va.; 13th, Visalia, Cal., Santa Cruz, Cal., Brockhaven, Miss., Fayette, Miss.; 15th, Montgomery, Saint Mark's; 18th, Salt Lake City; 19th, McKavitt, Tex., stones one inch in diameter, Davenport, Elmira, and Gennessee, Ill.; 20th, Mobile, Independence, Kans., Baxter Springs, Kans., Brockhaven, Miss., Wappinger's Falls, N. Y., Clarksville, Tex.; 21st, Highlands, N. C., McMinnville, Tenn.; 22d, Cornish, Me., West Waterville Me., Standish, Me., Springfield, Mass., Westboro, Mass., Flatonia, Tex., Woodstock, Vt., Mount Charlotte, Vt.; 23d, Mount Desert, Me.; 25th, Sandy Springs, Md.; 26th, Fort McHenry, Md., Santa Cruz, Cal., Creswell, Kans., and at Laredo, Tex., stones ¾ inch in diameter; 28th, Santa Fé, N. M.

*Sleet.*—1st, Wood's Holl, New London; 8th, Davenport, Detroit; 9th, Oswego, Erie, Indianapolis, Bangor, Me., Detroit; 10th, New Haven, Conn., Boston, Fort Independence, Mass., West Point, N. Y.; 12th, Cresco, Iowa; 13th, Keokuk, McPherson Barracks, Ga.; 14th, Davenport, Oregon, Mo.; 16th Cleveland, Cresco, Iowa; 18th, Auburn, N. H.; 19th, Detroit; 20th, South Pueblo, Cal.; 21st, Dubuque; 22d, Eastport, Newbury, Vt., Boston, Cornish, Me., Rowe, Mass., Westboro, Mass.; 23d, Bangor, Me., Plattsburg Barracks, N. Y., Cresco, Iowa; 24th, Cresco, Iowa.

*Depth of snow at close of month.*—In New England, ½ to 15 inches; on summit of Mount Washington, 40 inches; in the Middle Atlantic States, 0.50 to 4 inches; in the Upper Lakes, 0.25 to 3 inches; Indiana, 0.25 inch; Kansas, 2.50 inches; Summit, Colo., 50 inches; Pike's Peak, 24 inches; Bismarck, a trace; Salt Lake City, 1 inch; Santa Fé, N. Mex., 2 inches.

*Rainy days.*—The number of days on which rain or snow has fallen averages as follows: New England, 5 to 13; Middle Atlantic States, 2 to 14; South Atlantic States, 8 to 15; East Gulf States, 5 to 8; West Gulf States, 3 to 8; Lower Lake region, 14 to 20; Upper Lake region, 7 to 15; Upper Mississippi Valley, 3 to 16; Lower Missouri Valley, 4 to 10; Tennessee and the Ohio Valley, 2 to 15; Northwest, 2 to 7; Rocky Mountain region, 7 to 19; California, 14 to 21.

*Cloudy days.*—New England, 4 to 12; Middle Atlantic States, 5 to 22; South Atlantic

States, 4 to 18; East Gulf States, 0 to 14; West Gulf States, 0 to 7; Lower Lake region, 11 to 16; Upper Lake region, 8 to 17; Upper Mississippi Valley, 8 to 14; Lower Missouri Valley, 5 to 14; Tennessee and the Ohio Valley, 13 to 18; Northwest, 9 to 15; Rocky Mountain region, 2 to 14; California, 9 to 15.

*Precipitation from a cloudless sky.*—At Summit, Colo., on 3d, as snow. At Vevay, Ind., 8th, as rain.

RELATIVE HUMIDITY.

The average percentage of relative humidity for the month ranges about as follows: New England, 64 to 82; Middle Atlantic States, 57 to 81; South Atlantic States, 67 to 80; East Gulf States, 63 to 75; West Gulf States, 64 to 72; Lower Lake region, 67 to 80; Upper Lake region, 63 to 82; Tennessee and the Ohio Valley, 64 to 74; Upper Mississippi Valley, 62 to 72; Lower Missouri Valley, 65 to 75; California coast, 69 to 75; Sacramento Valley, 78 to 80. High stations report the following monthly average percentages not corrected for elevation: Mount Washington, 76, 7; Pike's Peak, 63, 7; Cheyenne, 48, 4; Denver, 44, 4; Salt Lake City, 66, 2; Boise City, 67, 5, and Winnemucca, 68, 9.

WINDS.

*In general.*—The prevailing winds, at the Signal-Service stations, are shown by arrows on Chart No. II. By reference to this chart it will be noticed that the prevailing direction east of the Appalachian Mountains is northwest, except along the immediate South Atlantic coast, where more northerly or northeasterly winds prevail; while west of the mountains from Eastern Tennessee to the Lower Lakes the prevailing directions are from west to south; in the Upper Lake region and Mississippi Valley and thence west to the Rocky Mountains the prevailing direction is northerly, except in Dakota and Montana, where southeast to southwest winds prevail; in the Pacific coast States, southerly to easterly winds predominate, except at Los Angeles and San Diego, which record north and northwest winds.

*Total movements of the air.*—The following are the largest monthly movements as recorded at the Signal-Service stations, viz: Pike's Peak, 15,890 miles; Cape Lookout, 11,221 miles; Cape May, 10,612 miles; Thatcher's Island, 10,543; Sandy Hook, 10,279; Indianola, 10,057; Barnegat, 9,146; Cape Henry, 9,093; Cape Hatteras, 8,779; Stockton, 8,602; Dodge City, 8,283; Sandusky, 8,182; Red Bluff, 8,120; Eastport, 7,891 miles. The smallest are: Deadwood, 1,830 miles; Lynchburg, 2,133 miles; Visalia, 2,134 miles; Springfield, 2,588 miles; Knoxville, 2,605; Augusta, 2,717 miles; Nashville, 3,246 miles; Salt Lake City, 3,568 miles; Cincinnati, 3,769 miles; Pittsburgh, 3,777 miles; Dubuque, 3,865 miles; Boise City, 3,877 miles. At Mount Washington a continuous record is not kept, but velocities over 100 miles per hour were recorded on five days.

*Local storms, tornadoes, &c.*, have occurred as follows: It is to be understood that the high winds generally accompanying extensive areas of low pressure have already been noticed. 8th, Augusta, Ga., about 1 a. m. a tornado struck the city in the southwest portion and traveled towards the northeast; its track was about three hundred yards wide and the destruction of property along its course quite large; it was preceded on the evening of 7th, at 7 p. m., by a thunder-storm, with hail. In referring to this thunder-storm, the observer at Augusta says: "Subsequent investigations of the tornado that followed this storm have led me to believe that this thunder-storm was an accompaniment of a tornado that devastated portions of Richmond and Burke Counties, to the south of this station; about 7.30 p. m. the clouds seemed to be driven towards the east with great velocity, and whirling and rolling furiously; the edge of the clouds nearest the sky was ragged, as if torn by a whirlwind; I could hear during the intervals of thunder a continual roaring sound, like a strong wind in a forest." On the same day (the 8th), at 7 a. m., a second tornado passed over Fayetteville, N. C., with a waterspout resembling a funnel-shaped column of smoke. It moved from SW. to NE., at about 25 miles per hour, and rose and fell, coming to the earth every 800 or 1,000 yards, and while down took trees, fences, and houses in its path. It was accompanied with a sound like distant thunder, and about ¼ inch rain-fall, lasting 15 minutes. A third tornado is also reported on the same day by the schooner "Pride of the East" between Capes Hatteras and Lookout, lasting one hour, with hail and rain. On the 9th, in the vicinity of Jacksonville, Fla., at 3 a. m. "a tremendous wind followed by hail and rain" is reported. 21st, Laconia, Ind., 4 p. m., tornado from SW., width of track 50 or 60 yards, duration from one to two minutes, was accompanied by heavy rain and thunder, and did considerable damage to houses, trees, and fences.

VERIFICATIONS.

*Indications.*—The detailed comparison of the tri-daily weather indications with the telegraphic reports for the succeeding twenty-four hours, shows a general percentage of omissions of 0.2 per cent., and of verifications of 85.1 per cent. The percentages of

verifications for the four elements have been: Weather, 89.6 per cent.; Wind, 83.6 per cent.; Barometer, 85.6 per cent. The percentages of verifications by geographical districts have been: New England, 86.8; Middle Atlantic States, 88.7; South Atlantic States, 85.8; East Gulf States, 84.8; West Gulf States, 87.5; Lower Lake region, 87.7; Upper Lake region, 86.3; Tennessee and the Ohio Valley, 85.6; Upper Mississippi Valley, 85.3; Lower Missouri Valley, 83.7. Of the 3,352 predictions that have been made, 53, or 1.6 per cent., are considered to have entirely failed; 103, or 3.1 per cent., were one-fourth verified; 433, or 12.9 per cent, were half verified; 450, or 13.4 per cent., were three-fourths verified; 2.313, or 69.0 per cent., were fully verified so far as can be judged from the weather maps.

*Cautionary signals.*—During the past month 139 cautionary signals have been displayed at 34 stations on the Gulf and Atlantic coasts and on Lake Michigan; of which 120, or 86.3 per cent., were reported verified within one hundred miles of the station. One signal was ordered up late. Thirty-nine cases of winds, of 25 miles or over per hour, have also been reported at these stations, for which no signals were displayed.

## NAVIGATION.

*Stages of water in rivers.*—In the table on Chart No. III are given the highest and lowest readings, for the month, on the Signal-Service river-gauges, from which it will be seen that the danger line on gauge has not been reached at any of the stations mentioned, and that the nearest approach to it occurred at Shreveport and Vicksburg. In the Lower Mississippi the lowest readings were recorded during the early part of the month, and the highest on the 27th and 28th.

*Ice in rivers and harbors.*—The following items will serve to show the conditions of the rivers and harbors in this respect: The Missouri, at Yankton, was frozen over until the 20th, when the ice broke, and the river has since continued open; at Omaha the ice broke on the 15th and 16th, and on the 19th the river was open for navigation; at Leavenworth it remained open throughout the month. The Mississippi remained frozen over at Saint Paul until the 28th, when the ice broke up and moved out: at La Crosse it remained closed until the 7th, when it commenced breaking up in the channel; on the 10th and 16th floating ice passed down from the La Crosse River, and from the 20th to 22d shore ice gave way, and ferry-boat commenced running; Guttenburg, 2d, river frozen over; 17th, clear; at Dubuque the ice broke up from 5th to 7th; on the 19th river was full of floating ice, but the observer states that "local navigation was practically uninterrupted during the month"; at Davenport, 1st to 4th, 9th to 12th, and the 17th, floating ice; at Keokuk, on the 3d, the river was clear; 10th, slush ice; 12th, clear; Muscatine, 5th, ice in river 9 inches; 19th, clear. On the Lakes ice is reported as follows: Duluth, 28th, ice in bay broken up by high winds. Marquette, 5th, ice in harbor broke up; 10th, ice formed; 13th, broke up; 15th, formed; 21st, broke up. Escanaba, ice in bay throughout month. Chicago, 1st to 25th, lake frozen; 26th, shore ice floating off. Grand Haven, 12th, river frozen over. Alpena, river frozen throughout month; 10th, bay entirely clear of ice; 18th, frozen over; 23d, clear. Detroit, 1st and 3d, river frozen; 4th, ice broke up. Toledo, 1st to 21st, Maumee River frozen over; 22d, broke up and cleared away from dock; at 2.45 p. m., an immense field of ice came down sweeping away span of new railroad bridge. Cleveland, 1st to 25th, floating ice. Buffalo, 1st to 23d, river frozen; 24th, broke up; 28th, river and harbor clear. Fort Niagara, 1st, river full of floating ice; 9th, clear. Sebago Lake, Maine, 28th, 15 inches ice in lower bay, "upper bay only frozen over one day this winter." Lake Champlain, at West Charlotte, Vermont, 7th, partly frozen; 8th, ice all gone, except in bays; 15th, much floating ice. The Hudson River, at Wappinger's Falls, 4th, firm; 20th, ice 10 inches thick; 26th, ice spongy; 27th, ice moving; 28th, river open to Poughkeepsie, navigation resumed. Albany, 28th, ice breaking up. West Point, 27th, first steamer passed up river. Ardenia, river open throughout month. Rockford, Ill., 5th, river clear; 11th, frozen over; 14th, clear. Morristown, Dakota, 28th, "James River nearly open." New London, Conn., 14th, Thames River full of floating ice from Shetucket.

## TEMPERATURE OF WATER.

The temperature of water, as observed in rivers and harbors, is shown in table on chart No. III.

*Maximum and minimum temperatures.*—The highest maxima have been: 65° at Saint Mark's, 63° at Galveston and Jacksonville, 56° at Augusta, Montgomery, and Savannah, and 55° at Charleston and Mobile. The lowest minima have been: 29° at Portland, Me., 30° at Keokuk, 31° at Wood's Holl and New York City, and 32° at Sandusky.

*Ranges of temperature.*—The least have been 1° at Detroit and Duluth, 2° at Eastport and Grand Haven, 3°.5 at Milwaukee, and 4° at Charleston, New London, Sandusky, and Wilmington. The largest: 12° at Galveston, 11° at Keokuk, Montgomery, and Saint Louis; and 10° at Saint Mark's.

## ATMOSPHERIC ELECTRICITY.

*Thunder-storms.*—4th, Texas; 6th, Texas, Louisiana; 7th, Florida, Alabama, Georgia, Louisiana, South Carolina; 8th, Alabama, North Carolina, Mississippi, Virginia; 9th, Florida, Tennessee, Georgia, Alabama, Indiana, Kentucky, Ohio; 10th, Virginia; 12th, Texas; 13th, California, Mississippi, Alabama; 14th, Florida, Louisiana; 15th, Florida; 17th, Georgia, North Carolina; 19th, Texas, Iowa, Illinois, Missouri; 20th, Indian Territory, Kansas, Texas, Mississippi, Alabama, Tennessee, Arkansas, Louisiana, Missouri, Ohio; 21st, Alabama, Tennessee, Kentucky, South Carolina, Florida, Georgia, Indiana, Missouri, North Carolina, Ohio, Pennsylvania; 22d, Maryland, New Jersey, New York, Pennsylvania, Texas, Virginia; 23d, Florida, Maryland; 24th, Kansas, North Carolina; 26th, Florida, Texas; 27th, Florida; 28th, New Mexico, Nebraska, Kansas, Georgia.

*Distant lightning.*—On the 7th at North Carolina, Florida, and Georgia; 9th, North Carolina; 21st, North Carolina and Georgia; 22d, Texas, North Carolina, and Maryland; 27th, Colorado; 28th, Colorado.

*Auroras.*—On the 5th at Cornish and Orono, Me., Contoocookville and Mount Washington, N. H.; 12th, Cresco, Iowa; 19th, Atco, N. J.; 26th, Escanaba and Alpena, Mich.; 27th, Albany, N. Y.; 26th, during sand-storm at Visalia, Cal., electricity intense; 28th, Santa Fé, atmospheric electricity intense, interfering with working of line. Pike's Peak, the assistant on station at summit, in ascending the mountain, encountered severe electric storm at timber line, in which his hair crackled, and he experienced a severe burning sensation all over the head.

*Magnetic phenomena.*—The average diurnal magnetic range in declination is again reported by Professor Hinrichs, of Iowa City, as 4½ minutes.

## OPTICAL PHENOMENA.

*Solar halos.*—2d, Dakota, Iowa, Kansas; 3d, Illinois, Iowa, Michigan; 4th, Connecticut; 5th, Michigan, Pennsylvania, Louisiana, Iowa, Florida; 6th, Dakota, Iowa, Nebraska, Georgia, Vermont; 7th, Iowa, Nebraska, Ohio, Wisconsin; 8th, New Hampshire, Wisconsin, California, Colorado; 9th, Iowa, Michigan, Wisconsin, California; 10th, Illinois, Iowa, Nebraska, California, Michigan; 11th, Illinois, Indiana, Iowa, Michigan, Nebraska, Wisconsin, Ohio, Rhode Island, Massachusetts; 12th, Connecticut, New Hampshire, Ohio, Tennessee, Alabama, Louisiana, Florida, Georgia, Rhode Island; 13th, Illinois, Indiana, Iowa, Ohio, West Virginia; 14th, Illinois, Indiana, Michigan, New York, Kentucky; 15th, Connecticut, Indiana, Maine, Massachusetts, New Hampshire, New York, Vermont, Texas; 16th, Connecticut, Missouri, New Hampshire, New York, Dakota; 17th, Maine, Maryland, Kentucky, North Carolina; 18th, Maryland, Dakota; 19th, Illinois, Indiana, Maine, Michigan, New York, Ohio, Kentucky; 20th, Nebraska, Illinois, Iowa, Maine, Ohio, Tennessee, Wisconsin, Dakota, Georgia; 21st, Nebraska, New Jersey, Ohio, Colorado; 22d, Iowa, Kansas; 23d, California, Kansas; 24th, Ohio; 25th, Connecticut, Indian Territory, Texas, Rhode Island; 26th, Colorado, Kansas, Texas, Georgia; 27th, Missouri, North Carolina, Georgia; 28th, Connecticut, Iowa, Massachusetts, Nebraska, New York, Kansas, Georgia, Rhode Island.

*Lunar halos.*—1st, Michigan; 2d, Massachusetts, Nebraska; 3d, Michigan; 4th, Nebraska; 6th, Arkansas, Maine, New Hampshire; 7th, Canada, Illinois, Iowa, Maryland, Michigan, New Jersey, Virginia, Wisconsin, Nebraska, Missouri, New York, Kentucky, Connecticut; 8th, Indiana, Minnesota, New Jersey, Wisconsin, Texas, Michigan, Vermont, Massachusetts; 9th, Dakota, Iowa, Massachusetts, Michigan, Minnesota, Nebraska, New Jersey, Pennsylvania, Wisconsin, California, Kansas, North Carolina, Georgia, South Carolina; 10th, Nebraska, Illinois, Iowa, Missouri, Ohio, Wisconsin, New Mexico, Massachusetts; 11th, Illinois, Indiana, Maryland, Massachusetts, Missouri, Nebraska, New Hampshire, New York, North Carolina, Ohio, Pennsylvania, Vermont, Wisconsin, Dakota, Texas, Iowa, Michigan, Tennessee, Rhode Island, Maine, Connecticut; 12th, Nebraska, Connecticut, Illinois, Iowa, Kansas, Kentucky, Maine, Massachusetts, New Hampshire, New York, North Carolina, Wisconsin, Nevada, Colorado, Mississippi, Alabama, Minnesota, Ohio, Tennessee, Florida, Georgia, South Carolina, Rhode Island; 13th, Indiana, Iowa, Kansas, New Jersey, New York, Ohio, Pennsylvania, Vermont, Wisconsin, California, Colorado, Minnesota, Illinois, Michigan, Kentucky, Massachusetts, Connecticut; 14th, Michigan, Connecticut, Indiana, Iowa, Mississippi, New Jersey, New York, Ohio, Vermont, Virginia, Wisconsin; 15th, Canada, Connecticut, Indiana, Maine, Massachusetts, Nebraska, New Jersey, New York, Texas, Michigan, North Carolina, New Hampshire, Rhode Island, Vermont; 16th, Dakota, Illinois, Indiana, Kansas, Kentucky, Maine, Massachusetts, Michigan, Mississippi, Missouri, New Hampshire, New Jersey, New York, North Carolina, Ohio, Vermont, California, Nebraska, Alabama, Minnesota, Tennessee, Virginia, Maine, Rhode Island, Connecticut; 17th, Illinois, Massachusetts, California, Nebraska, Mis-

souri, Connecticut; 18th, Illinois, Iowa, Kansas, Mississippi, Alabama, Louisiana, New York, New Hampshire, Massachusetts; 19th, Illinois, Indiana, Massachusetts, Virginia, Georgia, Connecticut; 20th, Maine, Nevada, Massachusetts; 21st, South Carolina; 23d, California.

*Mirage.*—Olivet, Dak., 4th; Baxter Springs, Kans., 28th; Moorhead, Minn., 1st and 2d; Genoa, Nebr., 4th; Tybee Island, Ga., 11th; New London, 3d and 19th.

### MISCELLANEOUS PHENOMENA.

*Botanical.*—Alabama: Green Spring, peach trees in bloom, 23d. Arkansas: Judsonia, spring beauties, maples, and daffodils blooming, 17th; wild forget-me-nots and peach trees in bloom, 22d. California: Visalia, peach trees in full bloom, 22d; Sacramento, almond and peach trees in bloom several weeks; trees leafing. Connecticut: New London, crocus blooming, 25th. Dakota: Olivet, weeds and grass sprouting, 28th. Florida: Houston, peach trees and rose bushes in bloom, 12th; crocuses and hyacinths in bloom, 28th; plum trees in bloom, 24th; Milton, plum trees in bloom, 28th; peach trees in bloom, 24th. Illinois: Havana, scilla siberica blooming, 25th; soft maples in bloom, 20th. Iowa: Fort Madison, peonies, horse-radish and calamus sprouting, 7th; elder trees budding, cherry and peach buds swelling, and blackberry buds bursting, 17th. Kansas: Creswell, peach buds swelling, 23d; wheat growing finely; 25th, Empire City, snowdrop and crocus in bloom, 12th; liverwort in bloom, 13th; Independence, adder-tongue in bloom, 25th; willow leafing, 22d; soft maple blooming 27th; peaches, cherries, and plums nearly in bloom, 28th; wheat growing the entire month; Baxter Springs, roses and honeysuckles leafing, 27th; Holton, forest trees budding, 28th; Lawrence, maples in bloom, 16th. Mississippi: Brookhaven, maple trees and jessamine blooming, hickory buds swelling, 24th; Vicksburg, peach trees blooming, 24th. Michigan: Litchfield, maple sap running, 28th. Louisiana: New Orleans, orange trees budding, 27th. Missouri: Lebanon, cherries budding, peach buds fully formed, 28th; Oregon, maple trees budding, 6th. New Hampshire: Mill Village, maple sap running well, 28th. New Jersey: Vineland, cottonwood and maple buds swelling, 9th. Ohio: Ruggles, wheat green, maple trees budding, 28th; Ringgold, wheat and fruit prospects good, 28th. Pennsylvania: Chambersburg, crocus and snow-drops in bloom, 21st. Tennessee: McMinnville, forest trees budding, iris and spirea blooming, 23d. Maryland: New Market, purple grackle first seen, 27th. Sandy Springs, wheat growing, flowers in bloom, 28th. Texas, Clarksville, peach and plum trees in bloom; Belmont Farm, wild flowers in bloom, 17th; peach and almond trees in bloom, 19th; Austin, garden vegetables abundant, flowers in bloom, all fruit trees in bloom, 28th; Graham, prairie violets in bloom, 17th. Virginia: Alto Vista, elder bushes budding, 22d; Prospect Hill, daffodils in bloom, 22d; hyacinths in bloom, 14th; Wytheville, aspens budding, 8th; pruning and transplanting, 28th. West Virginia: Morgantown, trees budding, 24th. Wisconsin: Rocky Run, willows budding, 4th.

*Birds.—Blackbirds*, Southington, Conn., 28th; Elmira, Ill., 23d; Great Bend, Kans., 28th; Fallston, Md., 23d; Mendon, Mass., 28th; Fayette, Miss., 1st, 7th; Bethel, Ohio, 24th. *Bullfinches*, Oregon, Mo., 26th. *Bluebirds*, Judsonia, Ark., 6th; Southington, Conn., 2d, 5th, 8th, 12th, 22d, 24th to 28th; Elmira, Ill., 25th; Hennepin, Ill., 27th; Sandwich, Ill., 28th; Havana, Ill., 3d; Louisville, Ill., 17th; Fort Madison, Iowa, 20th; Guttenburg, Iowa, 27th; Empire City, Kans., 13th; Independence, Kans., 28th; Afton, Iowa, 25th; Muscatine, Iowa, 25th; Boonsboro', Iowa, 27th; Stanley, Kans., 17th; Holton, Kans., 17th; Mendon, Mass., 28th; Fort Gibson, Ind. Ter., 19th; Davenport, Iowa, 20th; Somerset, Mass, 24th; Fall River, Mass., 23d; Northport, Mich., 28th; Litchfield, Mich., 25th: Oregon, Mo., 5th; Plattsmouth, Nebr., 15th; Starky, N. Y., 25th; Flushing, N. Y., 17th; Murphey, N. C., 10th; Highlands, N. C., 7th; Bellefontaine, Ohio, 24th; Little Mountain, Ohio, 22d; Bethel, Ohio, 13th; Jacksonburg, Ohio, 15th; Mount Auburn, Ohio, 24th. *Robins*, Elmira, N. Y., 22d; Sandwich, Ill., 21st; Havana, Ill., 3d; Milford, Ind., 24th; Fort Madison, Iowa, 20th; Empire City, Kans., 15th; Independence, Kans., 28th; Boonsboro', Iowa, 27th; Holton, Kans., 19th; Fort Gibson, Ind. Ter., 14th; Somerset, Mass., 19th; Fall River, Mass., 28th; Litchfield, Mich., 1st; Oregon, Mo., 19th; Freehold, N. J., 8th and 23d; Starky, N. Y., 28th; Bellefontaine, Ohio, 19th; Little Mountain, Ohio, 22d; Bethel, Ohio, 13th; Jacksonburg, Ohio, 21st; Mount Auburn, Ohio, 7th; Ringgold, Ohio, 21st; Brownsville, Pa., 21st; Lynchburg, Va., 28th. *Ducks*, Judsonia, Ark., 5th and 6th; Olivet, Dak., 20th; Elmira, Ill., 25th; Milford, Ind., 22d; Guttenburg, Iowa, 18th; Creswell, Kans., 3d, 11th, 14th, 23d; Muscatine, Iowa, 25th; Vail, Iowa, 19th; Great Bend, Kans., 6th; Dubuque, 20th; Oregon, Mo., 7th, 13th, and 18th; Emerson, Nebr., 20th; Jacksonburg, Ohio, 18th. *Crows*, Monticello, Iowa, 5th; Bethel, Ohio, 13; Ringgold, Ohio, 9th. *Killdeer*, Fort Madison, Iowa, 19th; Milford, Del., 22d; Baxter Springs, Kans., 16th; Fallston, Md., 23d. *Pigeons*, Fayette, Miss., 12th; Jacksonburg, Ohio, 18th. *Phebe birds*, Plattsmouth, Nebr., 23d; Somerset, Mass., 8th. *Buzzards*, Jacksonburg, Ohio, 25th. *Geese*, flying N., Sandwich, Ill., 23d; Elmira, Ill., 25th; Augusta, Ill., 17th;

Mount Sterling, Ill., 28th; Laconia, Ind., 9th; Milford, Ind., 22d; Monticello, Iowa, 19th; Guttenburg, Iowa, 19th; Creswell, Kans., 16th; Independence, Kans., 27th; Vail, Iowa, 18th; Nora Springs, Iowa, 19th; Visalia, Cal., 21st; Fort Gibson, Ind. T., 14th; Dubuque, 28th; Emerson, Nebr., 20th; Flushing, N. Y., 10th; flying W., Mount Sterling, Ill., 16th; flying S., Fort Madison, Iowa, 7th; Centre Mound, Kans., 21st; Somerset, Mass., 19th; flying N. E., Fort Madison, Iowa, 2d; Holton, Kans., 13th; N. W., Los Angeles, Cal., 6th. *Meadow larks*, Hennepin, Ill., 27th; Nora Springs, Iowa, 14th; Centre Mound, Kans., 28th; Great Bend, Kans., 28th; Bellefontaine, Ohio, 24th. *Chickadee*, Monticello, Iowa, 3d and 10th. *Woodpeckers*, Monticello, Iowa, 4th. *English sparrows*, New Market, Md., 21st; Somerset, Mass., 24th; Northport, Mich., 28th; Flushing, N. Y., 4th. *Blue jays*, Guttenburg, Iowa, 27th; Muscatine, Iowa, 25th; Oregon, Mo., 5th. *Red birds*, Oregon, Mo., 5th; Brookhaven, Miss., 25th. *Owls*, Oregon, Mo., 10th, 11th, 15th, 16th. *Mocking birds*, Houston, Tex., 14th; Independence, Kans., 17th; Savannah, Ill., 24th. *Prairie chickens*, Hennepin, Ill., 28th; Monticello, Iowa, 27th; Creswell, Kans., 27th.

*Miscellaneous.*—*Frogs* piping at Judsonia, Ark., 15th; Milford, Del., 22d; Guttenburg, Iowa, 20th; Baxter Springs, Kans., 5th and 6th; Creswell, Kans., 2d and 21st; Stanley, Kans., 17th; Independence, Kans., 18th; Fallston, Md., 21st; Sandy Springs, Md., 21st; Fort Gibson, Ind. T., 13th; Fayette, Miss., 1st, 6th, and 14th; Howard, Nebr., 18th; Alto Vista, Va., 1st; Prospect Hill, Va., 8th. *Earth-worms*, Lawrence, Kans., 28th; Oregon, Mo., 23d. *Bees*, Milford, Ind., 20th; Guttenburg, Iowa, 6th; Afton, Iowa, 26th; Savannah, 24th; Chambersburg, Pa., 27th. *Caterpillars*, Monticello, Iowa, 28th; Tioga, Pa., 27th. *Lizzards*, Austin, Tenn., 13th. *Millers*, Fort Madison, Iowa, 6th. *Butterflies*, Guttenburg, Iowa, 5th; Savannah, 24th; Fayette, Miss., 8th and 16th. *Moths*, Guttenburg, Iowa, 5th; Oregon, Nev., 25th and 26th. *Mosquitos*, Fort Madison, Iowa, 28th; Independence, Kans., 24th to 28th. *Grasshoppers*, Guttenburg, Iowa, plentiful, 26th; Boonsboro', Iowa, 7th.

*Polar bands.*—7th, Indiana; 8th, Mississippi, Iowa, New Hampshire; 10th, Iowa; 12th, Virginia; 13th, Iowa; 16th, Missouri; 17th, New Hampshire; 18th, Mississippi, Nebraska; 19th, Indiana; 21st, Missouri, Nebraska; 26th, Vermont; 27th, Indiana; 28th, Indiana, Nebraska, Virginia.

*Sunsets.*—The characteristics of the sky as indicative of fair or foul weather for the succeeding 24 hours, have been observed at all Signal-Service stations. Reports from 107 stations show 2,942 observations to have been taken, of which 2,539, or 86.3 per cent., were followed by the expected weather. Fifty-three doubtful cases were reported.

*Prairie fires.*—1st, Indian Territory; 2d, Indian Territory, Dakota; 3d, Indian Territory, Minnesota; 4th, Minnesota, Kansas; 5th, Kansas; 6th, Dakota, Minnesota; 7th, Minnesota; 8th, Minnesota; 9th, Minnesota; 10th, Minnesota; 16th, Kansas; 17th, Kansas; 18th, Kansas; 19th, Kansas; 21st, Kansas; 22d, Indian Territory; 23d, Indian Territory, Dakota, Kansas; 24th, Dakota, Kansas; 25th, Indian Territory, Kansas; 26th, Indian Territory, Dakota, Iowa, Kansas; 27th, Indian Territory, Texas, Dakota, Kansas; 28th, Dakota, Kansas.

*Meteors.*—3d, Westchester, Pa.; 4th, Monticello, Iowa, Woodstock, Md., Flatonia, Tex.; 5th, Mobile; 6th, Woodstock, Md., Westerville, Ohio; 7th, Saint Mary's Home, Ind., Somerset, Mass.; 9th, Fort Pembina, Dak.; 12th, Fall River, Mass., Dunbarton, N. H.; 15th, Chepachet, R. I.; 16th, Chepachet, R. I.; 18th, Saint Mary's Home, Ind.; 21st, Flatonia, Tex.; 22d, New Orleans; 24th, Kensico, N. Y.; 25th, Woodstock, Md., Kensico, N. Y., Mt. Auburn, Ohio; 26th, Woodstock, Md.; 27th, Corning, Mo., Freehold, N. J.; 28th, Woodstock, Md., Freehold, N. J. 19th, Cincinnati, 10.15 p. m., a meteor shot through the clouds and moved from SW. to NE.; it was very luminous, and small particles continually fell from it.

*Zodiacal lights.*—Southington, Conn., 3d, 4th, 5th, 26th to 28th; Daytona, Fla., 1st, 4th, 19th to 26th; Como, Ill., 2d; Saint Mary's Home, Ind., 3d, 7th, 18th, 26th to 28th; Iowa City, Iowa, 1st to 4th, 19th, 27th, 28th; Monticello, Iowa, 1st, 2d, 4th, 22d to 26th; Great Bend, Kans., 25th; Okaloosa, La., 18th; Cornish, Me., 5th, 19th, 20th; Somerset, Mass., 2d, 3d, 4th, 5th, 18th, 19th, 24th to 28th; Cambridge, Mass., 2d to 5th, 18th to 19th, 24th to 28th; Corning, Mo., 23d to 27th; Oregon, Mo., 2d, 21st to 23d, 25th to 28th; Clear Creek, Nebr., 2d, 19th, 21st, 23d, 25th, 26th; Freehold, N. J., 26th to 28th; Atco, N. J., 3d, 4th, 5th, 26th to 28th; Moriches, N. Y., 25th; Waterburg, N. Y., 4th, 18th; Bellefontaine, Ohio, 18th, 28th; Williamsport, Pa., 28th; Wytheville, Va., 5th, 19th, 27th, 28th; Savannah, 1st; Tybee Island, Ga., 23d, 24th; Newburg, Vt., 2d, 19th, 26th, 27th; Olivet, Dak., every night.

*Earthquakes.*—Records recently received from Coban, Guatemala, contain the following accounts: July 13, 1877, 5.15 a. m., thirteen or fourteen shocks, direction E. to W.; 20th, 10.05 a. m., two slight shocks, E. to W.; 27th, 8 p. m., slight shock, lasting few seconds. August 27, 11.35 a. m., three shocks from N. September 10, 10.45 a. m., two shocks, lasting seven seconds; the façade of church of San Sebastian swayed to and fro noticeably. November 21st, 10.16 a. m., two vertical shocks; 10.37 p. m., a number of small shocks, the first vertical, the last apparently from SW., duration forty

seconds; 26th, 9.57 a. m., a few vertical shocks, repeating quickly, lasting twenty seconds. From Iquique, Peru, January 23d, 1878, 7.50 p. m., strong shock, lasting thirty seconds. "Shock appears to have been much greater in the interior, and many factories had to suspend work." Arica, Peru, January 23d, 8.10 p. m., "very severe and prolonged shock, followed by slighter shocks throughout night." Iquique, January 24th, 8.30 p. m., heavy shock, followed by lighter shocks during night, and on the 25th, every fifteen minutes; "roads obstructed, and shipping operations paralyzed for three days." On the 5th of the present month, 11.20 a. m., Flushing, N. Y., severe shock, shaking houses and breaking crockery and windows. 26th, 11.56 a. m., San Francisco, Cal., three vibrations, N. to S., lasting about five seconds.

*Tidal wave.*—At Callao, Peru, South America, January 27, "sea excessively rough all day; the waves washed with violence along the whole sea-front of town and for about two miles on either side, causing great destruction of property; flooded whole of English railroad station and streets adjoining; wet-dock badly damaged; all forts fronting on sea suffered; the Ayacucho battery nearly washed away."

### SOLAR PHENOMENA.

*Sun spots.*—The following observations, made by Mr. D. P. Todd, have been communicated by Rear-Admiral John Rodgers, U. S. N., Superintendent of the Naval Observatory.

| February, 1878. | No. of new— | | Disappeared by solar rotation. | | Reappeared by solar rotation. | | Total number visible. | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| | Groups. | Spots. | Groups. | Spots. | Groups. | Spots. | Groups. | Spots. | |
| 3— 3 p. m. | 2 | 14 | 0 | 0 | — | — | 2 | 14 | |
| 4—11 a. m. | 0 | 12 | 0 | 0 | 0 | 0 | 2 | 26 | Many of the spots very small. |
| 5—10 a. m. | 0 | 4 | 0 | 0 | 0 | 0 | 2 | 30 | Many of the spots very small. |
| 6— 2 p. m. | 0 | 5 | 0 | 0 | 0 | 0 | 2 | 35 | Many of the spots very small. |
| 7— 3 p. m. | 0 | 0 | 0 | 10 | 0 | 0 | 2 | 25 | Most of the spots small. |
| 12— 1 p. m. | 0 | 0 | — | — | 0 | 0 | 0 | 0 | Spots probably disappeared by solar rotation. |
| 16—12 m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 18— 1 p. m | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 19—12 m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 20—12 m | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 25— 3 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 26— 3 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 27—11 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Large group of faculæ. |
| 28—11 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Large group of faculæ. |

Professor Hinrichs, of Iowa City, reports on the 3d, 1 group, 7 spots, two very large size; 4th, 2 groups, 12 spots; 5th, 2 groups, 12 spots; 6th, 2 groups, 9 spots; on the other days of observation, viz, the 11th, 12th, 19th, 26th, 27th, and 28th, no spots were observed.

Published by order of the Secretary of War.

ALBERT J. MYER,
*Brig. Gen. (Bvt. Assgd.), Chief Signal Officer, U. S. A.*

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PAPER 36.

## MONTHLY WEATHER REVIEW, MARCH, 1878.

### INTRODUCTION.

In compiling the present review the following data, received up to April 13, have been made use of, viz: the regular tri-daily weather charts, containing the data of simultaneous observations taken at 130 Signal Service stations and 12 Canadian stations; monthly journals and means from 134 of former, and means from 12 of latter; two hundred and forty-three monthly registers from volunteer observers; forty-seven monthly registers from United States Army post surgeons; marine records; international simultaneous observations; monthly reports of the weather services of the States of Iowa and Missouri; reliable newspaper extracts; special reports.

BAROMETRIC PRESSURE.

Upon Chart No. II is shown the general distribution of the atmospheric pressure by the isobaric lines. Compared with the means for March of previous years the pressure for the present month averages lower than usual, except for the California coast, where it has been about the normal. From the Missouri Valley to the Upper Lakes it is lower from 0.15 to 0.25 of an inch; in Nova Scotia, from 0.10 to 0.15 of an inch.

*The local barometric ranges*, as reduced to sea-level, for the month, have been as follows: *Large.*—Springfield, Mass., 1.64 inches; Portland, Me., 1.58; Mount Washington, 1.55; Boston, 1.53; Albany, New Haven, and Wood's Holl, 1.49; New London and Eastport, 1.48; Newport, 1.46; Burlington, 1.44; New York, 1.41; Philadelphia, 1.36, and Rochester, 1.33 inches. *Small.*—San Diego, 0.52 inch; Los Angeles and Key West, 0.55; Yuma, 0.65; Santa Fé, 0.60; Brownsville, Tex., 0.68; Mobile, 0.70; New Orleans, Vicksburg, and Saint Marks, 0.73; San Francisco, Pioche, Montgomery, and Galveston, 0.75; and Visalia, Indianola, Nashville, and Jacksonville, 0.76 inches.

*Areas of high pressure.*—Ten of these have appeared and are described. While the number is about the average for the month, yet none of them are very decided, as is usual for the month of March. There have not been any general "northers" in the Gulf States during the month.

No. I.—This is a continuation of the high-pressure area described in the February review as No. X. 1st, in the morning it was central north of New York; highest barometer, reduced to sea-level, 30.69 inches at Rockliffe, Canada, and 0.65 above the normal at Father Point. The temperature was below zero in the Ottawa and Saint Lawrence Valleys, minimum —12° at Rockliffe, and below freezing from New England to the Lakes and interior of the Middle States and North Carolina. 2d, it was highest in the morning in Southern New England, with the barometer 30.43 at New London, and 0.41 above the normal at Boston and New London; temperature below freezing from Northern Michigan to New England, and below zero over the mouth of the Saint Lawrence. During the day it disappeared in advance of storm No. I.

No. II.—1st, the pressure increased along the entire Pacific coast, with clear weather, the barometer at San Francisco reading 0.30 above the normal by midnight. 2d, it continued advancing eastward across the Rocky Mountain region, producing high northerly winds and gales from Dakota to Northern Texas; N. 56 miles on Pike's Peak; midnight barometer at Salt Lake City 0.49 above normal; morning minimum temperature on Pike's Peak, —10°. 3d, it extended toward the Lower Missouri Valley and the Southwest, with colder and clear weather; barometer 0.30 above normal at Denver and North Platte in the afternoon. 4th, in the morning it was central in Texas and Indian Territory, with barometer 0.23 above normal at Fort Sill and Denison. 5th, morning, it covered the South Atlantic States, with cold and clear weather; temperature below freezing from Northern Georgia and Eastern Tennessee to New England; at Wilmington, midnight, barometer 0.45 above normal. 6th, isobar 30.40 included the South Atlantic States and portions of Nova Scotia and New Brunswick, and 0.51 above normal at Halifax. In the first section it continued above the normal during this day and the following, while storm No. 3 was passing eastward. 8th, it apparently extended itself northward, with increasing pressure, over the Middle States; midnight, above normal 0.40 at Cape May, 0.44 at Burlington, and 0.49 at Kingston. 9th, isobar 30.60 reached fromNew Jersey to the Saint Lawrence Valley; 0.58 above normal at Burlington and 0.68 at Father Point. It passed to the southeastward during the 9th and 10th, in advance of storm No. V.

No. III.—During the 7th this high area advanced eastward over the Pacific States, especially Oregon, following storm No. III. 8th, morning, the barometer at Portland read 30.50, or 0.44 above the normal; by midnight 0.39 above at Virginia City. 9th, it apparently passed northward into British America.

No. IV was first felt on the 10th as advancing southeastward over the Saint Lawrence Valley. 11th, morning, barometer at Father Point 0.72 above normal. 12th, isobar 30.40 included New Brunswick, with temperatures slightly above zero. During the 12th and 13th it disappeared to the eastward in advance of storms Nos. VII and VIII.

No. V apparently advanced southeastward over the Rocky Mountain region on the 13th. 14th, morning, barometer at North Platte 0.21 above normal, and midnight 0.23 above at Santa Fé; afternoon, it was central in Missouri. 15th, morning, central in the Lower Ohio Valley, with increased pressure; midnight, it covered the Southern States, and afterward lost its identity under the influence of storm No. IX, then advancing southeastward over the Lake region.

No. VI.—16th, morning, barometers at Virginia City 0.28 and North Platte 0.35 above the normals; the central highest pressure passed eastward over Manitoba; afternoon, barometer at Bismarck 0.36 above normal. 17th, it appeared as a barometric ridge, reaching from Minnesota to Nebraska, which gradually moved eastward. 18th, morning, isobar 30.20 included the country from Michigan to Northern Mis-

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No. I.

# WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U.S. ARMY. DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

AVERAGE PROGRESS OF AREAS OF LOW BAROMETER EAST OF THE 100TH MERIDIAN.

| No | Velocity. |
|---|---|
| I. | 24 miles per hour. |
| ‡II. | — do. |
| ‡III. | — do. |
| IV. | 25 do |
| V. | 23 do |
| ‡VI. | — do |
| ‡VII. | — do |
| VIII | 30 do. |
| IX. | 23 do. |
| X. | 18 do. |
| ‡XI. | — do. |
| ‡XII. | — do. |
| XIII. | 16 do. |
| XIV. | 22 do. |
| ‡XV. | — do. |
| XVI. | 34 do. |
| XVII. | 28 do. |

‡ Too uncertain to be computed.

TRACKS OF CENTRES OF AREAS OF LOW BAROMETER FOR MARCH, 1878.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

NOTE.—The Roman letters show number and order of areas of low barometer. The figures above the lines show the days of the month; those below, 1, 2 and 3, indicate respectively the 7:35 A. M., the 4:35 P. M., and 11 P. M. observations. The small circles on the lines indicate the position of the centre of the area of low barometer on the day and report, written respectively above and below the line.

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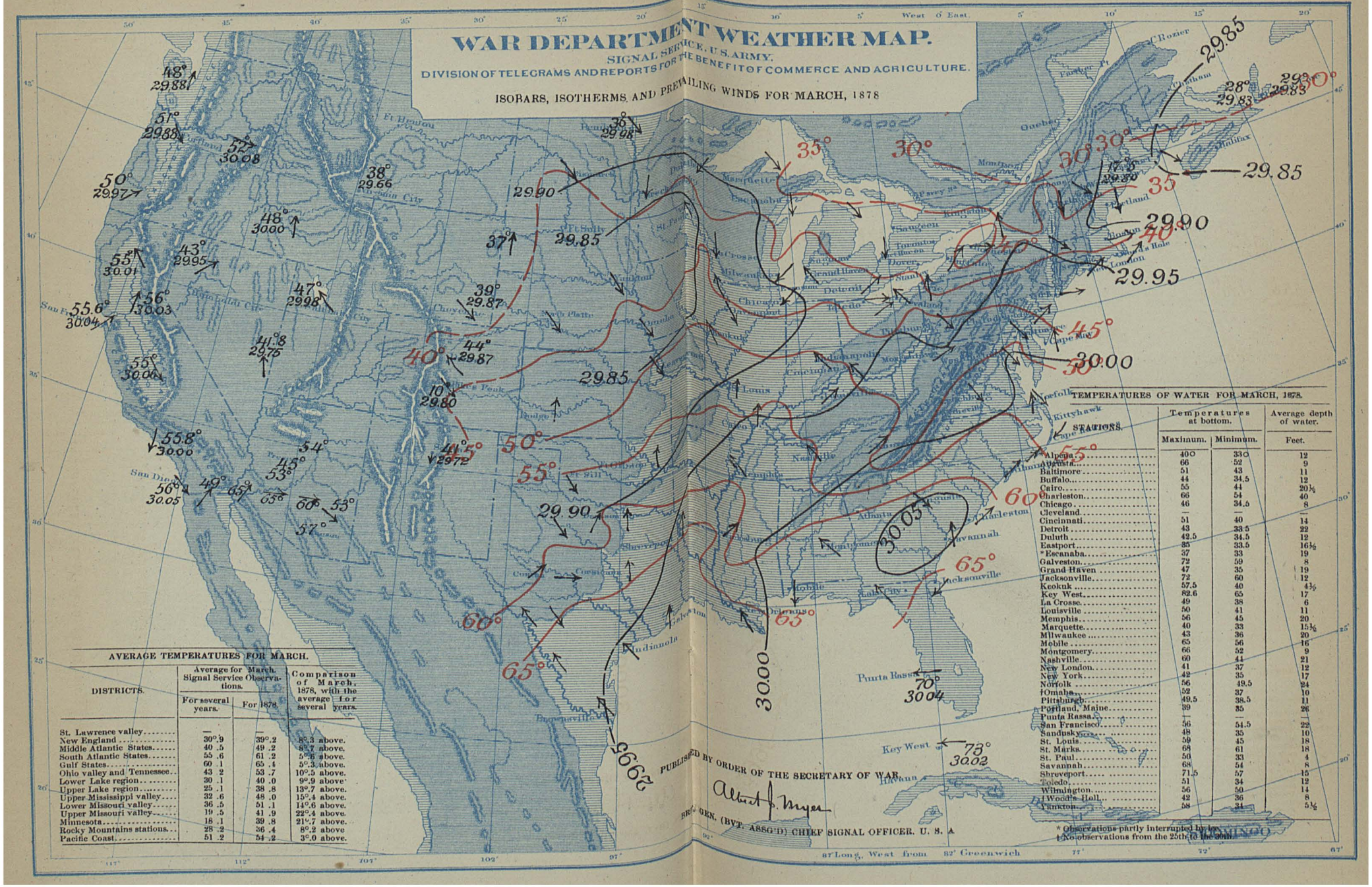
# WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U. S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

ISOBARS, ISOTHERMS, AND PREVAILING WINDS FOR MARCH, 1878




## AVERAGE TEMPERATURES FOR MARCH.

| DISTRICTS. | Average for March. Signal Service Observations. For several years. | For 1878. | Comparison of March, 1878, with the average for several years. |
|---|---|---|---|
| St. Lawrence valley | — | — | — |
| New England | 30°.9 | 39°.2 | 8°.3 above. |
| Middle Atlantic States | 40 .5 | 49 .2 | 8°.7 above. |
| South Atlantic States | 55 .6 | 61 .2 | 5°.6 above. |
| Gulf States | 60 .1 | 65 .4 | 5°.3 above. |
| Ohio valley and Tennessee | 43 .2 | 53 .7 | 10°.5 above. |
| Lower Lake region | 30 .1 | 40 .0 | 9°.9 above. |
| Upper Lake region | 25 .1 | 38 .8 | 13°.7 above. |
| Upper Mississippi valley | 32 .6 | 48 .0 | 15°.4 above. |
| Lower Missouri valley | 36 .5 | 51 .1 | 14°.6 above. |
| Upper Missouri valley | 19 .5 | 41 .9 | 22°.4 above. |
| Minnesota | 18 .1 | 39 .8 | 21°.7 above. |
| Rocky Mountains stations | 28 .2 | 36 .4 | 8°.2 above |
| Pacific Coast | 51 .2 | 54 .2 | 3°.0 above. |

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Albert J. Myer

BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

## TEMPERATURES OF WATER FOR MARCH, 1878.

| STATIONS. | Temperatures at bottom. Maximum. | Minimum. | Average depth of water. Feet. |
|---|---|---|---|
| Alpena | 40○ | 33○ | 12 |
| Alpena | 66 | 52 | 9 |
| Baltimore | 51 | 43 | 11 |
| Buffalo | 44 | 34.5 | 12 |
| Cairo | 55 | 44 | 20⅛ |
| Charleston | 66 | 54 | 40 |
| Chicago | 46 | 34.5 | 8 |
| Cleveland | — | — | — |
| Cincinnati | 51 | 40 | 14 |
| Detroit | 43 | 33.5 | 22 |
| Duluth | 42.5 | 34.5 | 12 |
| Eastport | 35 | 33.5 | 16⅛ |
| *Escanaba | 37 | 33 | 19 |
| Galveston | 72 | 59 | 8 |
| Grand Haven | 47 | 35 | 19 |
| Jacksonville | 72 | 60 | 12 |
| Keokuk | 57.5 | 40 | 4⅛ |
| Key West | 82.6 | 65 | 17 |
| La Crosse | 49 | 38 | 6 |
| Louisville | 50 | 41 | 11 |
| Memphis | 56 | 45 | 20 |
| Marquette | 40 | 33 | 15⅛ |
| Milwaukee | 43 | 36 | 20 |
| Mobile | 65 | 56 | 16 |
| Montgomery | 66 | 52 | 9 |
| Nashville | 60 | 44 | 21 |
| New London | 41 | 37 | 12 |
| New York | 42 | 35 | 17 |
| Norfolk | 56 | 49.5 | 24 |
| †Omaha | 52 | 37 | 10 |
| Pittsburgh | 49.5 | 38.5 | 11 |
| Portland, Maine | 39 | 35 | 26 |
| Punta Rassa | — | — | — |
| San Francisco | 56 | 54.5 | 22 |
| Sandusky | 48 | 35 | 10 |
| St. Louis | 59 | 45 | 18 |
| St. Marks | 68 | 61 | 18 |
| St. Paul | 50 | 33 | 4 |
| Savannah | 68 | 54 | 8 |
| Shreveport | 71.5 | 57 | 15 |
| Toledo | 51 | 34 | 12 |
| Wilmington | 56 | 50 | 14 |
| Woods Holl | 42 | 36 | 8 |
| Yankton | 58 | 34 | 5½ |

* Observations partly interrupted by ice.
† No observations from the 25th to the 30th.

Longs. West from 82° Greenwich

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AVERAGE PRECIPITATION FOR MARCH.

| DISTRICTS. | Average for March. For many years. | Average for March. For 1878. | Comparison of March, 1878, with the average for many years. |
|---|---|---|---|
| | Inches. | Inches. | |
| St. Lawrence valley | — | — | — |
| Montreal | 3.32 | 2.34 | 0.98 deficiency. |
| New England | 3.30 | 4.06 | 0.76 excess. |
| Middle Atlantic States | 3.85 | 3.39 | 0.46 deficiency. |
| South Atlantic States | 4.25 | 1.68 | 2.57 deficiency. |
| Eastern Gulf States | 6.46 | 5.10 | 1.36 deficiency. |
| Western Gulf States | 4.50 | 3.49 | 1.01 deficiency. |
| Ohio Valley | 4.24 | 3.09 | 1.15 deficiency. |
| Tennessee | 5.40 | 3.38 | 2.02 deficiency. |
| Lower Lake region | 2.70 | 3.95 | 1.25 excess. |
| Upper Lake region | 2.55 | 2.73 | 0.18 excess. |
| Upper Mississippi Valley | 2.25 | 2.31 | 0.06 excess. |
| Lower Missouri Valley | 2.25 | 2.74 | 0.49 excess. |
| Upper Missouri Valley | 1.80 | 1.19 | 0.61 deficiency. |
| Minnesota | 1.35 | 2.79 | 1.44 excess. |
| California Coast | 2.09 | 2.98 | 0.89 excess. |
| Portland, Or | 8.26 | 6.23 | 2.03 deficiency. |

HEIGHTS OF RIVERS ABOVE LOW-WATER MARK, MARCH 1878.

| STATIONS. | Danger point on gauge. | | HIGHEST WATER. Date. | HIGHEST WATER. Height. | | LOWEST WATER. Date. | LOWEST WATER. Height. | |
|---|---|---|---|---|---|---|---|---|
| | ft. | in. | Mch. | ft. | in. | Mch. | ft. | in. |
| RED RIVER. | | | | | | | | |
| Shreveport | 29 | 9 | 10 | 25 | 0 | 31 | 19 | 1 |
| MISSOURI. | | | | | | | | |
| Yankton | 20 | 0 | 27 | 7 | 0 | 21 | 4 | 7 |
| Omaha | 16 | 0 | 29 | 8 | 11 | 1 | 5 | 11 |
| Leavenworth | 21 | 0 | 31 | 9 | 7 | 3 | 6 | 6 |
| MISSISSIPPI. | | | | | | | | |
| St. Paul | 14 | 6 | 17, 18 | 6 | 5 | 3, 4 | 2 | 2 |
| La Crosse | 18 | 0 | 22 to 24 | 3 | 0 | 1 | 0 | 0 |
| Dubuque | 21 | 10 | 28 | 5 | 11 | 1, 2, 3 | 2 | 11 |
| Davenport | 15 | 0 | 27 to 30 | 4 | 6 | 1 & 5 | 2 | 5 |
| Keokuk | 14 | 6 | 11 | 5 | 11 | 9 | 3 | 2 |
| St. Louis | 30 | 0 | 12 | 22 | 10 | 28, 29 | 14 | 0 |
| Cairo | 40 | 0 | 17 | 35 | 9 | 31 | 21 | 3 |
| Memphis | 34 | 0 | 20 | 28 | 8 | 31 | 18 | 0 |
| Vicksburg | 41 | 0 | 25 to 28 | 41 | 0 | 1 | 37. | 0 |
| New Orleans* | 2 | 6 | 21 | — 3 | 6 | 1 | — 5 | 1 |
| CUMBERLAND. | | | | | | | | |
| Nashville | 42 | 0 | 14 | 17 | 2 | 31 | 5 | 7 |
| OHIO. | | | | | | | | |
| Pittsburgh | 20 | 0 | 5 | 10 | 4 | 28 | 5 | 2 |
| Cincinnati | 50 | 0 | 17 | 33 | 5 | 30 | 14 | 7 |
| Louisville | 24 | 0 | 17 | 12 | 4 | 31 | 7 | 9 |
| SAVANNAH. | | | | | | | | |
| Augusta | — | – | 14 | 13 | 6 | 25 | 6 | 10 |
| MONONGAHELA. | | | | | | | | |
| Morgantown | 23 | 0 | 3 | 6 | 6 | 28 | 2 | 1 |
| Pittsburgh | 20 | 0 | 5 | 10 | 4 | 28 | 5 | 2 |
| [illegible] | | | | | | | | |
| Montgomery | — | — | 1 | 14 | 9 | 27 | 5 | 6 |

*Below high water.

sissippi and Northeastern Arkansas, and 0.32 above normal at Milwaukee. 19th, morning, it was central in Tennessee, and only 0.19 above normal at Nashville. It was dissipated in the Southern States on that and the following day.

No. VII.—19th, advanced southeastward over Manitoba; barometer 30.40 at Fort Garry. 20th, it covered the Upper Lake region; morning, barometer at Milwaukee 30.33, or 0.34 above normal; only a slight fall in temperature accompanied it. 21st, isobar 30.20 reached from Virginia northward over Lake Ontario into Quebec, and the following morning included the Lake region and Middle States, with minimum temperatures of near zero in the Lower Saint Lawrence Valley and New Brunswick. During the day it rapidly disappeared under the influence of storms Nos. XI and XIII.

No. VIII.—23d, morning, barometer at Virginia City 0.30 above normal. 24th, it passed eastward over Manitoba, with a decided fall in the temperature from the northwest to the Lakes; morning maximum barometer 30.40 at Fort Garry. 25th, the highest was central in the Lower Ohio Valley, with freezing temperatures in the morning from Virginia and Eastern Tennessee northward. 26th, morning, highest barometer 30.18 at Norfolk, and then passed eastward in advance of storm No. XIV. It was this high-pressure area, in connection with storm No. XV, that caused the sudden fall in temperature nights of the 24th and 25th, and consequent injury to fruits and tender vegetables as far south as Virginia.

No. IX advanced southeastward from Manitoba the 27th toward the northwest. At Fort Garry highest barometer 30.27 morning of the 28th, and only 0.14 above the normal at Pembina. 29th, highest over the Upper Lakes. 30th, morning, with increased pressure, it was central north of New York; barometer 30.37 at Rockliffe, and 0.33 above normal at Burlington; thence it took a northeastward course, owing to the very low pressure area prevailing on the coast of Nova Scotia.

No. X.—The month closed with high pressure existing over the country from Oregon to Dakota and Nebraska. 31st, afternoon, barometer at Portland, Oreg., 0.34, and midnight at North Platte 0.26 above normals.

*Areas of low pressure.*—Of these 17 have been traced, as shown upon chart No. I. The most severe were Nos. I, III, V, IX, X, XIII, XV, XVI, and XVII. The terrific snow-storm produced by No. III, from the 7th to the 11th, in Colorado, Wyoming, and western portions of Nebraska and Dakota, will always be remembered by those who experienced it. Nos. IX, X, and XVI produced heavy easterly gales, shifting to northwesterly along the Atlantic coast, from North Carolina northward, and Nos. I, XV, and XVII southerly veering to northwesterly gales.

No. I.—This is a continuation of the low-pressure area described in the February Review as No. XIII. 1st, at 7.35 a. m. it was central in Northwestern Texas, with low barometer from Texas to Dakota; 0.45 below the normal at Fort Sill. By midnight it had moved to Eastern Kansas, with diminished central pressure; 0.45 below normal at Leavenworth. During the day high winds, gales, and rain prevailed from the southwest to the northwest, partly as snow from Colorado to Dakota, with thunder-storms in Kansas, Arkansas, and Western Tennessee. At Creswell, Kans., there was a furious hail, heavy rain, and thunder-storm, and the streams rose five feet within three hours. 2d, the rain-area extended to the Lakes, New England, Middle States, and East Gulf States, with frequent high winds and gales, while clearing weather followed from the Missouri Valley to the Gulf States. Thunder-storms occurred from Georgia to Illinois, Indiana, and Ohio; tornado in Casey County, Kentucky; on Mount Washington heavy snow fell, with a west wind of hurricane velocity. A. m., minimum barometer 29.31 at Keokuk, or 0.66 below normal. 3d, a. m., minimum barometer 29.24 at Port Huron, or 0.72 below normal; midnight, barometer 29.17 at Eastport, and 0.75 below normal at Boston. The rain-area continued moving eastward, but generally turning into light snow in the Lake region and Saint Lawrence Valley, with thunder-storms in Florida and from Maryland to Massachusetts. Clearing weather extended over the Upper Lake region, Southern and Middle Atlantic States. 4th, a. m., barometer 29.08 at Eastport, or 0.84 below normal; p. m., 29.04 at Sydney, or 0.85 below. It disappeared eastward toward Newfoundland, followed by high northwesterly winds and gales from North Carolina northeastward. During its progress the following maximum hourly velocities were recorded, viz: Pike's Peak, N. 50; Camp Stockton, W. 40; North Platte, NW. 66; Cairo, SW. 42; Grand Haven, N. 36; Cleveland, SE. 38; Punta Rassa, NW. 48; Cape Henry, NW. 43; Sandy Hook, S. 36 and NW. 44; Wood's Holl, SE. 45; Thatcher's Island, S. 32 and NW. 36; and Mount Washington, W. 96 miles. Cautionary signals were displayed on Lake Michigan, and at the Atlantic and Gulf coast stations, excepting Florida. All were justified, except along the Gulf coast, yet the brig "Ransom" encountered very heavy seas and heavy S. gales in the Gulf on the 3d, and heavy NW. gales on the 4th. At some distance off the Atlantic coast vessels report having experienced SW. gales, at times hurricane squalls, with tremendous sea, on the 3d, and violent NW. gales on the 4th.

No. II.—2d, the pressure began diminishing along the Pacific coast. 3d, rainy

weather prevailed from the northern half of California to Washington Territory, with high southerly winds and gales; p. m. barometer at Portland 29.69, or 0.34 below normal. 4th, morning, it was probably central in Montana, where light rains fell, with rapidly falling barometer thence toward the northwest; midnight, it appeared as a barometric trough, reaching from New Mexico to Eastern Dakota, with barometer lowest at Pembina, 29.44, or 0.60 below normal. 5th, it disappeared north of the Upper Lakes without any precipitation east of Montana; a. m. Pembina barometer 0.69 below normal. Maximum hourly velocities—Portland, Oreg., S. 36; Pike's Peak, SW. 64; Dodge City, SW. 44; Chicago, S. 35; and Saint Louis, S. 38 miles. The signals ordered for Lake Michigan, morning of the 5th, were rather late.

No. III.—5th, this storm passed over Washington Territory and Oregon at night, accompanied by high southerly winds and heavy rains; barometer 0.40 below normal at Portland. 6th, it extended to Idaho, Nevada, and California. 7th, it turned into a heavy and very severe snow-storm from Eastern Nevada to Colorado, and Wyoming, with winds shifting to cold northerly; p. m. barometer at Denver 0.54, and midnight at North Platte 0.71, below the normals. The barometer rapidly fell from the Southwest to the Northwest, producing a steep barometric gradient and frequently brisk and high southerly to easterly winds. 8th, the severe snow-storm continued from Colorado to Western Dakota, with cold northerly gales; falling and low barometer, high southerly to easterly winds and gales, and frequent rains from the southwest to the northwest and Lake Superior, with frequent thunder-storms; a. m. barometer at North Platte 0.70, p. m. at Dodge City 0.68, and midnight at Omaha 0.55, below the normals; during the evening, the winds in western portions of Nebraska and Kansas shifted to cold, northerly gales. 9th, the snow-storm ceased in Colorado, but continued from Eastern Wyoming to Western Dakota; high southeast to northeast winds and gales and rainy weather from Missouri to Wisconsin, Minnesota, and Eastern Dakota; colder, clearing weather and northwesterly gales from Western Nebraska to Northern Texas. 10th, it moved northwestward, with increased central pressure; easterly gales prevailed from Northern Wisconsin to Northern Dakota; probably united with a second depression which advanced southeastward over Dakota; p. m. barometer 0.59 below normal at Bismarck. 11th, remained almost stationary in Southeastern Dakota. 12th, united with No. VII. 13th, gradually disappeared in Southeastern Minnesota. Quite a number of lives are reported to have been lost in this snow-storm; also, herds of sheep. Cautionary signals were ordered for Lake Michigan evening of the 7th and justified. Maximum hourly velocity—Red Bluff, SE. 33; Salt Lake City and Pioche, NW. 32; Santa Fé and Fort Sill, W. 40; Stockton, Tex., NW. 44; Pike's Peak, NW. 92; Cheyenne, N. 64; North Platte, SE. 44 and NW. 60; Dodge City, SW. 60; Saint Louis, SE. 40; Duluth, NE. 62; Breckenridge, E. 43, and Bismarck, NE. 48 miles.

No. IV.—6th, frequent light rains fell from the Upper Mississippi Valley to the Lakes, with brisk and occasionally high southerly veering to westerly winds, and with thunder-storms from Eastern Missouri to Wisconsin, Michigan, and Indiana. 7th, the central depression passed over Northern New England, with frequent light showers from the Lower Lakes and Middle States eastward, and with thunder-storms from New Jersey and Eastern Pennsylvania to Connecticut and Rhode Island. On Mount Washington a hurricane of NW. 138 miles prevailed during the evening. Of the cautionary signals displayed at Kittyhawk, Cape Henry, Cape May, and Sandy Hook, the two former were not, and the two latter were, justified.

No. V.—8th, developed from No. III in Texas, in the eastern half of which rain accompanied thunder-storms, with increasing southeasterly winds. 9th, thunder-storms, very heavy rains, and gales occurred from Eastern Texas to Arkansas, Mississippi, and Western Tennessee; over four inches of rain fell at Shreveport, Vicksburg, and Little Rock, and a reported fall of over twelve inches at Okalooska, Ouachita County, Louisiana, within sixteen hours, flooding the surrounding country. 10th, it was gradually dissipated in Northern Georgia, after having produced southerly gales and thunder-storms in Florida, Alabama, and Georgia, and a tornado at Atlanta, Ga. Signals displayed the 8th from Indianola to New Orleans, the 9th from Mobile to Key West and Cape Hatteras, were all justified except at Key West. Maximum hourly velocities—Galveston, N. 46; Mobile, SE. 48; Montgomery, SE. 36; Jacksonville, SE. 30; and Charleston, SE. 35 miles.

No. VI.—9th, during the night the barometer rapidly fell in the Saint Lawrence Valley. 10th, very light snow and rain was reported thence to Nova Scotia, with southerly veering to northwesterly winds, which, on Mount Washington, increased to a hurricane velocity of NW. 114 miles. Minimum barometer, 29.69 at Sydney in the afternoon.

No. VII.—11th, it developed in Northwestern Texas, and moved northeastward, producing light thunder-storms in Indian Territory and Kansas; p. m. barometer at Fort Sill, and midnight at Leavenworth, 0.37 below normals. 12th, it united with storm No. III; thunder-storms, with hail at places, were reported from Iowa to Eastern Missouri and Western Illinois.

Nos. VIII and IX.—11th, the former commenced forming in Louisiana as a secondary depression to No. VII, with thunder-storms from Southern Alabama to Florida and Southern Georgia. 12th, the central pressure diminished very rapidly as it moved northeastward; rainy weather and increasing winds prevailed from the Atlantic States to the Lower Lakes and Ohio Valley, with thunder-storms from Florida to Ohio and New Jersey; midnight barometer at Pittsburg 29.43, or 0.51 below normal. During this day a third low-pressure area, No. IX, developed in the South Atlantic States, which at midnight was central between Norfolk and Cape May. 13th, the former passed into Canada and the latter moved up the coast; rainy weather continued from the Middle States and Lower Lakes eastward, generally turning into heavy snow from the Saint Lawrence Valley to Eastern Nova Scotia, with thunder-storms in the Middle Atlantic States. 14th, the latter passed to the eastward over Nova Scotia. The signals displayed for these storms from North Carolina to Maine were all justified. Maximum hourly velocities—Cape Lookout, SW. 30; Cape May, W. 72; Sandy Hook, NE. 44; Boston, NE. 24; and Eastport, E. 32 miles.

No. X.—The southern edge of this storm was felt on the 13th from Washington Territory to northern half of California, where rainy weather prevailed; p. m. barometer at Portland, Oreg., 0.36 below normal. 14th, light rains fell in Nevada and Idaho, and the pressure diminished in the extreme Northwest. 15th, the center moved southeastward over Manitoba, producing light rains and high winds, thence to the Upper Lakes. 16th, the rain-area and high winds extended to the Lower Lakes and western portion of Middle States, with thunder-storms in Lower Michigan and Ohio. 17th, by morning it had developed into two distinct depressions, central near Buffalo and southwest of Cape May, which reunited by midnight off the Southern New England coast; rainy weather prevailed from the Lower Lakes to the Middle and Eastern States, with easterly gales from New Jersey to Maine. 18th, as it moved northeastward, it was preceded by easterly gales and heavy rains, generally turning into heavy snow. 19th, the central pressure diminished; midnight barometer 29.28 at Chatham. Signals were ordered for the Lakes and from North Carolina to Southern New England. Those on Lakes Huron and Ontario were not justified. Maximum hourly velocities—Bismarck, NW. 42; Duluth, NW. 36; Escanaba, N. 32; Cleveland, S. 36; Sandy Hook, NE. 40; Thatcher's Island and Eastport, NE. 48 miles.

No. XI.—During the progress of this storm, heavy rains fell in Cuba and Southern Florida night of the 16th and the 17th. Maximum velocity at Key West, SE. 29 miles.

No. XII.—This disturbance was of little interest. Occasionally light thunder-storms accompanied it in the eastern portions of Dakota and Kansas.

No. XIII.—17, light rains occasionally fell in the Pacific States, and the barometer at San Francisco fell 0.48 below the normal. 18th, generally light rains fell from thence southeastward to the extreme western portion of Texas. The deviations of the barometric readings from the normals show that this storm crossed the Rocky Mountain region in a southeasterly direction, but its path cannot be definitely located. 19th, it passed into the Gulf, producing heavy rains in Southwestern Texas. 20th and 21st, the tri-daily weather charts show it to be advancing toward Florida. Several vessels report having experienced gales and suffered damage from the same in the Gulf. The latter date and 22d, rainy weather prevailed in Florida, with high winds and gales. Signals were displayed from Indianola to Key West. Although not justified from New Orleans to Saint Mark's, they served to prevent vessels from running into the storm. Maximum velocities—Indianola, NE. 40; Key West, E. 26; Tybee Island, E. 36; and Stockton, Tex., SE. 58 miles.

No. XIV.—20th, advanced southeastward over Dakota, producing brisk to high winds, and generally light thunder-storms from Iowa and Kansas to Dakota. 21st, it disappeared in the Lower Ohio Valley.

No. XV.—21st, night, falling barometer indicated its approach toward Manitoba. 22d and 23d, it rapidly advanced southeastward over Canada to Northern Maine, with generally light rains or snow, the latter date from the Lakes to the Saint Lawrence Valley; increasing winds thence to the Middle and East Atlantic coasts; thunder-storms in Indiana and Lower Michigan. 24th, the central pressure continued diminishing; barometer at Portland, Me., fell to 28.93, or 0.97 below the normal; frequent rains fell from Virginia to Nova Scotia, but turning into snow thence northward, with high southwesterly winds, veering to very cold northwesterly gales. 25th, as it moved northeastward, the barometer at Father Point read 28.82; the maximum hourly wind-velocity of the month (NW. 156 miles), was registered on Mount Washington late in the afternoon. During its passage signals were up at all the Lake stations, and Atlantic coast from Savannah northward. Maximum velocities—Breckenridge, N. 36; Escanaba, N. 40; Grand Haven, NE. 38; Port Huron, NE. 36; Sandusky, NW. 47; Rochester, W. 31; Eastport, S. 37; Thatcher's Island and Newport, NW. 48; Sandy Hook, SW. 34 and NW. 54; Cape May, S. 32 and NW. 60; and Kittyhawk, NE. 47 miles.

No. XVI.—24th, the barometer, which had been falling the previous day along

the entire Pacific coast, reached its minimum at San Francisco, 0.34 below the normal, with diminishing pressure in the Rocky Mountain region and the extreme Northwest; threatening and rainy weather prevailed in the Pacific States and Nevada, with brisk and high southeasterly winds in latter, and thunder-storms in Southwestern Oregon. 25th, it crosses the Rocky Mountain region, with frequent rains from the Pacific States to Utah and Idaho; in Southern California, high westerly winds and gales. 26th, as it advanced southward, it appeared as an extensive barometric trough, reaching from the Upper Lakes southwestward toward New Mexico and Northwestern Texas; light rains were occasionally reported from Utah, Arizona, New Mexico and Texas toward the Lakes, partly as snow in last section; high winds and gales from New Mexico and Northern Texas to Southern Dakota, with thunder-storms at places; midnight barometer at Omaha 0.60 below normal. 27th, the barometric trough continued, extending from southwest to northeast, with steep gradients from Nebraska to Northern Texas; 0.59 below normal at Fort Gibson. Threatening and rainy weather prevailed from the Gulf States to Colorado, Wyoming, Southern Dakota, Iowa, Lake region and New England, partly as snow in the northeast and northwest portions of this area; thunder-storms from the Gulf States to Missouri, Illinois, Southern Michigan, Lake Erie, and Western Pennsylvania; tornado at Green Spring, Ala., with hail. 28th, it moved to the Middle Atlantic coast, with heavy rains; thunder-storms and gales from Florida to New England. 29th, it appeared to move eastward toward, and then northeastward along, the Gulf Stream; high northeast to northwest winds and gales prevailed from North Carolina to Maine. 30th and 31st, it approached Nova Scotia as a severe and heavy rain-storm, but in Eastern Maine and New Brunswick as an unusually severe snow-storm. The barometic gradient was remarkably steep in that region. Minimum barometer, 29.43 at Halifax. Cautionary signals were ordered the 26th and 27th for all the lake and coast stations, and very generally reported as justified, except along Lakes Ontario and Superior. Maximum velocities: Yuma, W. 45; Stockton, W. 46; North Platte, NE. 60; Dodge City, N. 58; Fort Gibson, SE. 36; Escanaba and Milwaukee, N. 36; Port Huron, N. 35; Cleveland, S. 33 and N. 42; Saint Marks, S. 42; Cape Lookout, SW. 40; Kittyhawk, SW. 39 and NE. 37; Cape May and Sandy Hook, N. 36; Barnegat, N. 40; Wood's Holl, SW. 40; and Portland, N. 33 miles.

No. XVII.—26th, the pressure, before recovering the normal, again began diminishing along the Pacific coast, with rain-areas. 27th, the San Francisco barometer fell 0.46 below the normal, with rain and brisk to high winds thence to Nevada. 28th, the rain-area extended eastward across the Rocky Mountain region partly as snow. 29th, thunder-storms occurred in Indian Territory; light rains or snow thence to Southern Dakota, Wyoming, and Utah; the central lowest pressure crossed Indian Territory. 30th, light rains fell in the Southern and Middle States; frequently heavy rains in the Ohio Valley; but generally turning into snow from the Upper Lakes to the Lower Missouri Valley; thunder-storms from Alabama to Illinois, Indiana, and Ohio. 31st, it passed eastward over the Middle States to the coast, with a secondary depression developing in North Carolina; rainy weather, with frequent thunder-storms, accompanied it from Lake Erie and Pennsylvania to Florida. Signals were displayed along the lakes, except Lake Superior, and the Atlantic coast from North Carolina to Massachusetts, but were only justified for Lakes Michigan and Erie, and from New Jersey to North Carolina. Maximum velocities: San Diego, S. 23; Dodge City, N. 36; Milwaukee, NE. 35; Cape Lookout, NW. 42; Cape Henry, NW. 35; and Cape May, NW. 36 miles.

## INTERNATIONAL METEOROLOGY.

*Storms.—January* 11th, latitude 32° S., longitude 31° E., strong gales W. to WNW. 17th, off Cape of Good Hope, heavy NW. gale. 19th, 27° N., 50° W., hurricane. 24th, off New Zealand, heavy SE. gales. 29th, 40° 16′ N., 67° 53′ W., NW. moderate storm. *February* 1st, 37° 20′ N., 70° W., gale from NE. to E., lasting 24 hours. 2d, 47° 58′ N., 44° 45′ W., moderate gale and snow-squalls. 4th, 37° 20′ N., 70° W., hurricane. 5th, about 43° N., 44° W., heavy NW. gale and high cross-sea; 56° 2′ N., 51° 53′ W., 2 p. m., SW. gale, with tremendous sea. 6th, near 44° 42′ N., 36° 19′ W., heavy NW. gale; 46° 8′ N., 43° 40′ W., 7.35 a. m., Washington mean time, barometer 28.62, temperature 45°, S. 10° E., hurricane, very heavy sea from S. 20° W., weather threatening; 30° 30′ S., 38° E., hurricane. 7th, 44° 09′ N., 44° 56′ W., 7.35 a. m., Washington mean time, barometer, 28.90, temperature 41° 5′ N. 85° W. violent gale, heavy N. 78° W. swell, weather stormy. 8th, 44° 51′ N., 48° 51′ W., 7.35 a. m., Washington mean time, barometer 29.40, temperature 33°, N. 78° W. violent gale, heavy N. 78° W. swell, weather stormy. 9th, 5° N., 39° W., heavy SE. squall; 5° N., 44° W., E. gale, lasting 12 hours. 10th, 47° N., 26° W., violent gale from SW. to NW., with high seas. 13th, 49° 40′ N., 29° 30′ W., hurricane; 43° N., 40° W., gale. 14th, 34° 46′ N., 69° 10′ W., revolving gale, SW. to NE., lasting 36 hours; 34° 50′ N., 74° 30′ W., severe easterly gale. 15th, 43° N., 37° W., brisk N. W. gale and furious squall from NE.. 16th, 39° 35′ N., 32° 45′ W., heavy gale and dreadful sea. 18th, between 45° and 47° N., and 26° and 29° W. (18th–19th), very heavy gale and high sea; 44° N., 37° W., heavy hur-

ricane, veering from S. to NW.; 46° N., 32° W., hurricane; about 50° N., 32° W., terrible N. W. hurricane; 50° N., 32° W., hurricane from SE. to NNW., lasting 7 hours; between Cape Hatteras and Bermuda, very heavy gale from W., veering to N., with high cross-sea, lasting 48 hours. 19, 45° 32′ N., 39° 54′ W., hurricane from SSE. to NNW., with heavy cross-sea; 45° 40′ N., 42° W., "hurricane from S., lasting until 21st, when it shifted to N., and blew terrific;" 47° N., 25° W., "heavy sea swept decks for 24 hours;" off Bermuda, heavy sea struck vessel, sweeping deck; about 35° 12′ N., 42° 20′ W., violent hurricane. 21st, about 50° N., 34° W., heavy SW. gale, with severe squalls and tremendous sea. 22d, 44° 30′ N., 128° 20′ W., heavy SE. gale and sea; 41° N., 50° W., hurricane. 23d, 51° 02′ N., 34° 22′ W., heavy NE. gale, very high and rough sea; 35° N., 41° W., storm. 24th, 41° 30′ N., 38° 10′ W., gale from NNW., with fierce squalls and tremendous seas. 26th, 42° N., 47° W., hurricane from SSW. to NNW. 27th, 49° 12′ N., 33° 26′ W., strong W. gale, with rising sea; near 51° N., 36° 25′ W., heavy westerly gale, with high cross-seas; 48° 07′ N., 36° 05′ W., heavy SW. gale, backing to NW., lasting 48 hours. 28th, westerly gales in 48° 39′ N., 34° 31′ W.; 48° 13′ N., 37° 24′ W., with high sea; 49° 41′ N., 29° 03′ W., with heavy squalls and high sea; and 50° 40′ N., 37° 16′ W. *March* 1st, 46° 34′ N., 43° 07′ W., fresh NW. gale, with high W. sea; 51° 01′ N., 10° 41′ W., WSW. moderate gale, squally, high head-sea; 49° 20′ N., 25° 18′ W., high sea. 2d, 48° 12′ N., 40° 36′ W., SW. to NW. storm, heavy squalls and high sea; 42° 49′ N., 42° 31′ W., 11 a. m., N. gale, with hail, snow, and heavy sea. 3d, 43° 40′ N., 47° 40′ W., midnight of 3d, violent gale and thick snow-storm; 46° 49′ N., 44° 22′ W., NW. storm; 50° 23′ N., 24° 26′ W., SW. to WNW. fresh to moderate gale, with high sea; 48° 47′ N., 32° 15′ W., SSW. and WNW. very severe hurricane-like gale, high irregular sea, decks under water; 49° 43′ N., 10° 28′ W., high sea from WSW.; 50° 27′ N., 24° 59′ W., WNW., strong winds and high sea; 47° 37′ N., 32° 10′ W., WNW. strong gale, high sea, sleet and hail; 40° N., 31° W., strong WNW. gale. 4th, 42° 09′ N., 60° 09′ W., S. and SW. strong gale, high SW. sea; 49° 04′ N., 28° 50′ W., WNW. fresh gale, high sea; 47° 56′ N., 37° 15′ W., WNW. severe gale, high sea; 49° 21′ N., 28° 34′ W., WNW., strong wind, high sea; 46° 42′ N., 34° 37′ W., WNW. fresh gale, very high, confused sea; 51° 33′ N., 18° 03′ W., W. fresh gale, lasting 12 hours. 5th, 44° 52′ N., 55° 41′ W., WSW. storm, dense fog; 48° 30′ N., 33° 23′ W., WSW. moderate gale; 47° 44′ N., 33° 41′ W., W. by N. fresh gale, high sea; 46° 52′ N., 42° 28′ W., WSW. severe gale, very high sea; 48° 11′ N., 32° 40′ W., WSW. fresh breeze, high sea; 51° 02′ N., 19° 24′ W., WNW. strong gale and squalls; 45° 58′ N., 37° 50′ W., high sea; 50° 55′ N., 23° 18′ W., fresh gale and high seas. 6th, 45° 16′ N., 48° 53′ W., strong SW. gale; 53° 13′ N., 24° 52′ W., WNW. strong breeze and high sea. 7th, 44° 24′ N., 45° 38′ W., moderate SW. gale; 48° 42′ N., 34° 21′ W., high SW. sea; 54° N., 4° E, heavy storm. 9th, 45° 26′ N., 46° 33′ W., high sea from W. 11th, 42° 26′ N., 55° 35′ W., strong NW. breeze, with heavy squalls; 45° 23′ N., 43° 10′ W., fresh gale. 12th, 46° 49′ N., 39° 58′ W., strong gale, very high sea; 47° 48′ N., 41° 03′ W., SW. moderate gale, high sea; 44° 44′ N., 46° 35′ W., SW. and NW. fresh gale and snow-squalls; 42° 05′ N., 54° 56′ W., NNW. stormy, heavy squalls; 44° N., 47° 15′ W., NW. heavy gale, high sea, snow and hail; 45° 35′ N., 45° 16′ W., heavy NW. gale; 44° 50′ N., 45° W., heavy WNW. gale, very high sea; off North Foreland, 53° N., heavy NW. gales; 48° 59′ N., 45° 13′ W., 4.10 p. m. Greenwich time, barometer 28.76, terrible cyclone struck, blowing with great violence from N. to NNW., till 3 p. m. 13th, tremendous sea. 13th, 45° 24′ N., 42° 13′ W., strong NW. gale with very high sea; 46° 10′ N., 44° 52′ W., fierce WNW. gale, high sea; 40° 51′ N., 63° 20′ W., high N. sea; 42° 43′ N., 50° 34′ W, NW. gale; 50° 11′ N., 27° 30′ W., high southerly sea; 44° 28′ N., 46° 08′ W., heavy gale. 14th, 46° 59′ N., 35° 28′ W., WNW. stormy, high sea; 48° 38′ N., 33° 14′ W., high westerly sea. 15th, 45° 18′ N., 41° 39, W., high W. sea; 46° 52 N., 39° 02′ W., high SW. sea. 16th, 43° 59′ N., 46° 53′ W., SW. stormy, high sea; 44° 47′ N., 44° 52′ W., high SW. sea; 23° N., 67° W., ENE. gale. 18th, 49° 30′ N., 24° W., terrific gale from S. round to NNW. 19th, 45° 11′ N., 42° 24′ W., NW. SW., fresh breeze with squalls ending with gale; 51° 25′ N., 26° 05′ W., gale. 20th, 42° 13′ N., 59° 02′ W., SE. to W. fresh gale and high sea; 43° 50 N., 48° 27 W., S. to W. strong breeze to fresh gale; 43° 07′ N., 48° 19′ W., southwesterly gale, confused sea; 47° 49′ N., 34° 11′ N., NNW. stormy, high sea. 21st, 42° 23′ N., 54° 32′ W., SE. and NW. strong winds and squalls; 44° 55′ N., 44° 50′ W., variable fresh gales and squally; 46° 21′ N., 41° 41′ W., high sea and heavy rain. 22d, 41° 25′ N., 59° 18′ W., WNW. gale; 45° 37′ N., 42° 33′ W., SE. and W. strong gales, hard squalls, high sea; 43° 46′ N., 48° 26′ W., W. fresh gale, hard squalls; 45° N., 43° 28′ W., SE. and W. strong gale, high E. sea; 41° 12′ N., 61° W., gale. 24th, 47° 48′ N., 40° 12′ W., SW. to WNW. moderate to strong gale, high sea; 42° 11′ N., 59° 46′ W., W. and SSW. very stormy; Moville Roads, N. of Ireland, NE. gale. 55° 22′ N., 9° 05′ W., N. hard gale. Snow-squalls, high sea. 29th, 51° 03′ N., 16° 05′ W., NNE. fresh gale, squally, heavy sea.

### TEMPERATURE OF THE AIR.

The isothermal lines upon Chart No. II illustrate the general distribution of the temperature of the air for the month. Without a single exception, the average is

above that for years in every district, and especially so from the Missouri Valley to the Upper Lake region, as will be seen by a reference to the table in the left-hand corner of the same chart. For the past four months the temperature has averaged very high over this same area, and more so for December and March than for January and February.

*Minimum and maximum temperatures* respectively are—in Maine: at Orono, 8° and 56°; Eastport, 9°, 53°. New Hampshire: Mount Washington, 18°, 35°; Auburn, 12°, 64°. Vermont: Woodstock, 1°, 63°; West Charlotte, 12°, 66°. Massachusetts: Rowe, 4°, 52°; Boston, 10°, 71°. Rhode Island: Chepachet, 10°, 60°; Newport, 15°, 63°. Connecticut: Southington, 12°, 71°; New Haven, 17°, 65°. New York: North Argyle, 5°, 59°; Starkey, 10°, 80°; Nile, 6°, 72°. New Jersey: Atlantic City, 10°, 63°; Atco, 20°, 73°. Pennsylvania: Blooming Grove, 10°, 70°; Pittsburgh, 16°, 74°; Cannonsburg, 18°, 78°. Delaware: Dover, 22°, 68°; Milford, 22°, 73°. Maryland: New Market, 16°, 76°; Saint Inigoes, 32°, 72°. District of Columbia: Washington, 21°, 73°. Virginia: Fort Whipple, 20°, 72°; Alto Vista, 25°, 78°; Prospect Hill, 29°, 77°. West Virginia: Helvetia, 18°, 72°; Morgantown, 18°, 75°. North Carolina: Highlands, 23°, 65°; Goldsboro', 33°, 82°; Wilmington, 34°, 84°. South Carolina: Spartanburg, 27°, 79°; Charleston, 41°, 83°. Georgia: Gainesville, 32°, 82°; Quitman, 34°, 85°. Florida: Daytona, 33°, 88°; Jacksonville, 39°, 86°; Key West, 39°, 87°. Alabama: Green Spring, 28°, 81°; Montgomery, 37°, 83°; Mobile, 42°, 83°. Mississippi: Fayette, 38°, 81°; Vicksburg, 43°, 85°. Louisiana: Oskaloosa, 33°, 88°; Shreveport, 45°, 87°. Texas: Uvalde, 32°, 87°; Laredo, 44°, 90°; Brownsville, 41°, 88°. Indian Territory: Fort Sill, 24°, 85°; Fort Gibson, 29°, 81°. Arkansas: Mount Ida, 32°, 84°; Judsonia, 37°, 85°. Tennessee: Knoxville, 26°, 77°; Memphis, 38°, 80°. Kentucky: Louisville, 26°, 75°; Bowling Green, 32°, 78°. Ohio: Lewisburg, 16°, 70°; Hillsboro', 23°, 84°. Indiana: Richmond, 22°, 72°; Fort Wayne, 42°, 79°. Michigan: Alpena, 4°, 56°; Grand Rapids, 9°, 72°. Wisconsin: Neillsville, 10°, 57°; Rocky Run, 27°, 70°. Illinois: Riley, 18°, 69°; Anna, 36°, 82°. Missouri: Oregon, 22°, 83°; Springfield, 34°, 81°. Iowa: Boonsboro', 18°, 79°; Vail, 18°, 80°. Minnesota: Duluth, 17°, 62°; Breckenridge, 19°, 72°. Dakota: Fort Pembina, 13°, 70°; Yankton, 21°, 77°. Nebraska: Fort McPherson, 12°, 83°; Genoa, 22°, 84°. Kansas: Fort Leavenworth, 22°, 78°; Independence, 26°, 87°. New Mexico: Fort Union, 8°, 68°; Fort Wingate, 10°, 68°. Colorado: Pike's Peak, —23°, 33°; Fort Garland, 6°, 66°; Fort Lyon, 11°, 80°. Wyoming: Fort Sanders, 11°, 66°; Fort Fetterman, 14°, 75°. Utah: Coalville, 12°, 72°; Salt Lake City, 27°, 73°. Idaho: Boise City, 26°, 75°. Nevada: Winnemucca, 14°, 69°; Camp McDermitt, 15°, 73°. California: Fresno, 32°, 80°; San Francisco, 46°, 66°; Red Bluff, 34°, 76°. Montana, Oregon, and Washington Territory not yet received.

*Ranges of temperature.*—The *monthly* ranges will appear from an examination of the minimum and maximum temperatures just given. The smallest ranges occurred along the California and Gulf coasts; the largest ranges are reported from New England, Lake region, Missouri, and Red River of the North Valleys, and Wyoming Territory.

*Greatest daily ranges.*—In New England they vary from 22°, least, at Eastport, to 42°, greatest, on Mount Washington; Middle States, from 24° at Cape May to 38° at Norfolk and Lynchburg; South Atlantic States, from 16° at Cape Lookout to 37° at Augusta; East Gulf States, from 11° at Key West to 35° at Montgomery; West Gulf States, from 18° at Galveston to 35° at Corsicana: Tennessee, from 29° at Memphis to 39° at Knoxville; Ohio Valley, from 26° at Cairo to 36° at Pittsburgh; Lower Lake region, from 26° at Detroit to 40° at Erie; Upper Lake region, from 24° at Port Huron to 37° at Milwaukee; Upper Mississippi Valley, from 26° at La Crosse to 30° at all the other stations; Lower Missouri Valley, from 30° at Omaha to 41° at Yankton; Red River of the North Valley, 40°; Western Texas, from 33° at Laredo to 45° at Stockton and 48° at Henrietta; Indian Territory to Western Nebraska, from 35° at Fort Gibson to 42° at North Platte; Rocky Mountain stations, from 23° on Pike's Peak to 44° at Denver; Utah and Nevada, from 28° at Salt Lake City and Pioche to 36° at Winnemucca; Idaho, 29° at Boise City; California, from 15° at San Francisco to 36° at Yuma.

*Frost out of ground.*—Massachusetts, from 10th to 14th; New Hampshire, 31st. The ground was reported as *frozen* in Maryland on the 25th; Michigan, 20th, 24th, 25th, 29th; New York, 25th; Virginia, 5th; Kansas, 4th.

*Ice* is reported to have formed as follows: Ohio, 5th, 25th, 29th; Tennessee, 25th and 26th; Indiana, 25th; Kentucky, 25th; Illinois, 19th, 20th, 25th, 29th; New Jersey, 5th, 25th, 26th; Iowa, 25th; Kansas, 4th, 10th, 13th, 31st; Maryland, 17th, 21st; Nebraska, 11th, 12th, 16th, 28th, 29th, 31st; New Hampshire, 31st; New York, 16th, 21st, 22d, 25th, 26th; North Carolina, 26th; Ohio, 25th; Pennsylvania, 5th, 16th, 21st to 26th and 30th; Vermont, 15th, 16th; Virginia, 5th, 20th, 21st.

## PRECIPITATION.

On chart No. III is illustrated as accurately as possible the general distribution of the rainfall, which includes the melted snow, for the month. In the left-hand corner of the same chart will be found a table giving the average precipitation for March by

districts. The excess has been greatest in Minnesota and the Upper Lake region. There has been quite a large deficiency from the South Atlantic and Gulf States to the Ohio Valley, but the greatest deficiencies occurred in Tennessee, the South Atlantic States, and at Portland, Oreg.

*Special heavy rains.*—1st, Fort Larned, Kans., 1.20 inches. 8th, Breckenridge, Minn., 2.22 inches. 6th, Lebanon, Mo. (9th and 10th), 2.28 inches; New Orleans, La., 2.73 inches in about 7 hours; Vicksburg, Miss., 4.46 inches; Clarksville, Tex., 2 inches in 5 hours; Springfield, Mo. (8th and 9th), 3.25 inches; Shreveport, La., 4.14 inches; Mount Ida, Ark. (8th and 9th), 2.30 inches; Fayette, Miss., 3.60 inches; Okalooska, La., 12.65 inches (†) in 16 hours; Brookhaven, Miss., 3 inches; Baton Rouge Barracks, La., 3.50 inches. 10th, New Orleans, La., 2.04 inches; Boonsboro', Iowa (8th to 10th), 2.80 inches; Fort Barrancas, Fla., 3.25 inches in 5½ hours. 11th, Dover, Del. (11th and 12th), 2 inches; Mendon, Mass., 2 inches; Fort Barrancas, Fla., 3.18 inches. 12th, Woodstock, Md. (11th, 12th, and 13th), 3.60 inches; Fall River, Mass. (11th to 13th), 2.35 inches; Lynchburg, Va., 2.14 inches; Fort Whipple, Va., 2.28 inches; Washington, D. C., 2.60 inches; Green Castle, Pa., 2.37 inches; Moriches, N. Y. (11th and 12th), 1.98 inches; College Hill, Ohio, 2.25 inches; Capeville, Va., 2.80 inches (2 inches in 1 hour); Bethel, Ohio, 2 inches; Mount Auburn, Ohio, 2.32 inches; Fall River, Mass. (11th and 12th), 2.26 inches; New Market, Md. (11th and 12th), 2.48 inches; Ruggles, Ohio, 2.60 inches; Deadwood, Dak., 1.70 inches; Fort Pembina, Dak., 1.85 inches; Fort Hamilton, N. Y., 2.48 inches; Daytona, Fla., 2.42 inches. 13th, Accotink, Va. (12th and 13th), 2.90 inches; Vineland, N. J. (11th to 13th), 2.10 inches; Somerset, Mass. (11th to 13th), 2.44 inches. 18th, Waltham, Mass. (17th and 18th), 3.55 inches. 19th, Uvalde, Tex., 2.21 inches. 26th, Independence, Kans. (26th to 28th), 3.12 inches. 27th, Fort Barrancas, Fla., 2.80 inches. 28th, Saint Mark's, Fla., 4.95 inches.

*Largest monthly rainfalls.*—At Okalooska, La., 13.77 inches; Fort Barrancas, Fla., 10.75 inches; Mount Washington, N. H., 10.66 inches; Halifax, N. S., 10.28 inches; Sydey, C. B., 9.57 inches; Saint Mark's, Fla., 8.65 inches; Olympia, Wash., 7.90 inches; Roseburg, Oreg., 6.36 inches; Portland, Oreg., 6.23 inches; Waltham, Mass., 6.85 inches; Judsonia, Ark., 6.75 inches.

*Smallest monthly rainfalls.*—Fort Griffin, Fort Richardson, and Pilot Point, Tex., too small to measure; Coleman City, Tex., 0.03 inch; Graham, Tex., 0.12 inch; Yuma, Ariz., 0.13 inch; Jacksboro', Tex., 0.15 inch; Fort McKavett, Tex., 0.19 inch; Decatur, Tex., 0.23 inch; Fort Garland, Colo., 0.24 inch; Burke's, Ariz., 0.28 inch.

*Floods.*—9th, crevasses reported 18 and 35 miles below New Orleans; heavy freshets also occurred in the vicinity of Okalooska, La. 12th, Mansfield, Ohio, following a heavy thunder-storm, Rocky Fork overflowed its banks and flooded lower portion of city; destructive freshets in the vicinity of Wheeling, W. Va. 31st, the Sacramento Valley still remains under water, the depth of water at Sacramento City oscillating between 22 feet 1 inch and 22 feet 3 inches throughout the month; the southern suburb below "cross levee" and the village at Washington are still submerged; at Colusa, on the 30th, the water was still near high-water mark.

*Hail.*—1st, Fort McPherson, Nebr.; Baxter Springs, Kans.; De Soto, Nebr.; Franklin, Pa. 2d, Sidney Barracks, Nebr.; Martinsville, Ill.; Milford, Ind.; Fayetteville, N. C.; Indianapolis, Ind. 3d, Fort McHenry, Fallston, and New Market, Md.; De Soto, Nebr.; Freehold and Pleasant Run, N. J.; Ardenia, N. Y.; Accotink, Va.; Carlisle and Philadelphia, Pa. 4th, De Soto, Nebr. 6th, Rockford, Ill.; Detroit, Mich.; Burlington, Ia.; Logansport, Ind. 7th, Baxter Springs, Kans.; De Soto, Nebr.; Catawissa, Pa.; Boise City, Idaho; New London. 8th, Emerson, Nebr.; Beloit, Wis.; Fort Gibson, Ind. T.; Fredericksburg and Uvalde, Tex.; Duluth. 9th, Brookhaven, Miss.; Corsicana and Galveston, Tex. 10th, Kensico, N. Y. 11th, Fort Independence, Mass.; Nora Springs, Iowa; New Bedford and Fall River, Mass.; Kensico, N. Y.; New London. 12th, Cornish, Me.; Kensico, N. Y.; Nashville. 13th, Milford, Ind.; Rowe, Mass.; Woodstock, Vt.; Mount Solon, Accotink, and Fort Whipple, Va.; Bangor and Eastport, Me. 15th, Muscatine, Iowa. 16th, Chicago and Detroit. 17th, Reading, Pa. 18th, Fort Garland, Colo.; Creswell, Kans.; Somerset, Mass.; Winnemucca, Nev.; Santa Fé, N. Mex.; New London. 19th, North Volney, N. Y. 20th, Iowa City, Iowa; Genoa, Nebr. 23d, Fort Wayne and Grand Haven, Mich. 24th, Fallston, Md.; Somerset and New Bedford, Mass. 26th, Fort Wallace, Kans.; Fresno, Cal.; Vevay, Ind.; Independence, Kans.; Detroit. 27th, New Orleans, Vicksburg, Albany, Green Spring, Ala.; Creswell and Independence, Kans.; Brookhaven and Fayette, Miss.; Corsicana and Mason, Tex. 28th, Salt Lake City; Portsmouth, N. C.; De Soto, Nebr.; Fayetteville, N. C.; Spartanburg, S. C.; Clarksville and McMinnville, Tenn.; Coalville, Utah; Los Angeles, Cal. 29th, Dodge City, Kans. 30th, Camp McDermitt, Nev.; Fort Fred Steele, Wyo.; Fayetteville, N. C.; Cincinnati and Lewisburg, Ohio; Brownsville, Pa. 31st, Lewisburg, Ohio; West Chester and Philadelphia, Pa.; Morgantown, W. Va. At Creswell, Kans., on the 1st, 2.30 p. m., a furious hail-storm from SW.; 2 inches of hail and 1.58 inches of water fell in 30 minutes.

*Depth of snow at close of month.*—On summit of Mount Washington, 42 inches; Pike's Peak, 40 inches; Eastport, Me., 15 inches; Elmira, Ill., 1 inch; Rowe, Mass., in woods

in vicinity, 6 inches; Dunbarton, N. H., snow-drifts in neighboring forests; Urbana, Ohio, $\frac{1}{16}$ inch; Catawissa, Pa., $\frac{1}{10}$ inch; Woodstock, Vt., half of surface of ground covered.

*Rainy days.*—Number of days on which rain or snow has fallen varies as follows: New England, from 8 to 23; Middle Atlantic States, from 6 to 21; South Atlantic States, from 4 to 8; Gulf States, from 4 to 9; Ohio Valley, from 7 to 17; Tennessee, 10; Lower Lake region, from 15 to 23; Upper Lake region, from 9 to 18; Upper Mississippi Valley, from 10 to 15; Lower Missouri Valley, from 7 to 13; Rocky Mountains, 8; Pacific Coast States, from 9 to 18.

*Cloudy days.*—For New England the number varies from 8 to 17; Middle Atlantic States, 4 to 13; South Atlantic States, 4 to 10; Gulf States, 2 to 10; Tennessee, 4 to 7; Ohio Valley, 6 to 15; Lower Lake region, 12 to 18; Upper Lake region, 10 to 18; Northwest, 4 to 12; Rocky Mountains, 6 to 13; Pacific Coast States, 5 to 18.

## RELATIVE HUMIDITY.

The average percentage of relative humidity for the month ranges about as follows: New England, from 62 at Springfield, Mass., to 75 at Wood's Holl and Eastport; Middle Atlantic States, 53 at Lynchburg to 81 at Atlantic City; South Atlantic States, 61 at Augusta to 86 at Cape Hatteras, 67 at Key West; Gulf States, 55 at Shreveport to 75 at Galveston; Ohio Valley and Tennessee, 54 at Memphis to 67 at Pittsburgh; Lower Lake region, 66 at Oswego to 82 at Buffalo; Upper Lake region, 68 at Marquette to 83 at Milwaukee; Upper Mississippi Valley, 57 at Saint Louis to 67 at Keokuk; Red River of the North Valley, 74 at Pembina to 76 at Breckenridge; Lower Missouri Valley, 62 at Leavenworth to 71 at Bismarck; Western Texas, 41 at Fort Griffin to 44 at Mason; Indian Territory, 56 at Fort Gibson; western portions of Kansas and Nebraska, 54 at Dodge City to 61 at North Platte; Rocky Mountain stations, 41 at Santa Fé to 59 at Cheyenne; Utah and Nevada, 53 at Salt Lake City to 58 at Winnemucca; Idaho, 62 at Boise City; California, 73 at Los Angeles to 79 at San Diego. The percentage at *high* stations is 65 for Pike's Peak and 86 for Mount Washington.

## WINDS.

The prevailing winds at the Signal Service stations are shown by the arrows, flying with the wind, on chart No. II. The *maximum* velocities, in miles per hour, have been given in the description of the movements of low-pressure areas.

*Total movements of the air.*—The following are the largest monthly movements as recorded at the Signal Service stations, viz: Pike's Peak, 17,279 miles; Cape May, 13,171; Sandy Hook, 12,335; Thatcher's Island, 12,176; Cape Lookout, 12,039; Dodge City, 11,711; North Platte, 10,892; Sandusky, 10,832; Barnegat, 10,472; Kittyhawk, 10,200; Breckenridge, 10,374; Cheyenne, 10,024; Cape Henry, 9,961; Fort Whipple, 9,704; Boston, 9,599; Eastport, 9,489; Key West, 9,015. The smallest are: Visalia, 1,728 miles; Deadwood, 2,156; Uvalde, 2,627; Brackettville, 3,088; Augusta, 3,155; Boise City, 3,159; Lynchburg, 3,225; Laredo, 3,364; Knoxville, 3,562; Los Angeles, 3,690, Shreveport, 3,944; Springfield, 3,990.

*Local storms, tornadoes, &c.*, have occurred as follows: On the 2d, Casey County, Kentucky, between 2 and 3 p. m., a severe tornado occurred, doing great damage in vicinity of Rich Hill and Mount Olive. Its path was about 400 yards wide, and in its course swept away dwellings, large trees, horses, cattle, and other stock; seven persons were killed and several injured. 10th, about 11 a. m., a violent wind-storm, without rain, passed over Atlanta, Ga., and vicinity, filling the atmosphere with dust and doing considerable damage to buildings, fences, &c. 11th, tornado reported in vicinity of Danville, Ky. 12th, Jefferson County, West Virginia, frightful storm of hail and rain, destroying wheat, &c., damaging buildings and killing cattle. 27th, Green Springs, Ala., tornado, blowing down trees, houses, &c.; wind, at 1 p. m., SE.; at 3 p. m., SW. 28th, fifteen miles NE. of Quitman, Ga., tornado, destroying two houses; path narrow and not extending far; commenced with a southwest wind.

## VERIFICATIONS.

*Indications.*—As worked up three times daily and carefully compared with the actual conditions during the succeeding twenty-four hours, the following results have been obtained, viz: the percentage verified averages 87.0 for New England, 88.8 for the Middle States, 87.6 for the South Atlantic States, 79.5 for the Eastern Gulf States, 81.7 for the Western Gulf States, 87.4 for Tennessee and the Ohio Valley, 87.2 for the Lower Lake region, 87.4 for the Upper Lake region, 86.6 for the Upper Mississippi Valley, and 84.6 for the Lower Missouri Valley. For all the districts the average verified is 85.8 per cent. By elements the percentage verified averages 88.8 for the weather, 85.0 for the wind direction, 87.6 for the temperature, and 81.8 for the barometer. There were 6 omissions to predict (5 for temperature and 1 for barometer), out of 3,720, or 0.16 per cent. Of the 3,714 predictions that have been made 81, or 2.2 per cent., are recorded as having completely failed; 118, or 3.2 per cent., as one-fourth verified; 372, or 10.0 per cent., as one-half verified; 686, or 18.5 per cent., as three-fourths verified; 2,457, or 66.1 per cent., as fully verified.

*Cautionary signals.*—The display of signals was resumed at all the Lake stations on the 15th. Out of 233 signals ordered, 191, or 82 per cent., were justified by subsequent hourly velocities of 25 miles and over at or within 100 miles of the station, but of these 21 were *somewhat late*; 42 *signals were not justified*. There were 62 cases reported in which the velocity reached 25 miles or over, without the display of signals.

NAVIGATION.

*Stages of water in rivers.*—In the table on the right-hand side of chart No. III are given the highest and lowest readings of the Signal Service river-gauges for the month, with the dates. The Red River rose steadily from the 1st to the 10th, and then fell to the close of the month. The Arkansas, at Little Rock, fell during the first few days, then rose to the 16th, after which it regularly fell. In the Tennessee, Cumberland, Savannah, Allegheny, Youghiogheny, and Monongahela the changes were unimportant. The Ohio, at Pittsburgh, rose 44 inches on the 4th and 5th. At Cincinnati there was an almost constant fall from 30 feet 10 inches the 1st to 22 feet 8 inches the 11th, then rose to 33 feet 5 inches by the 17th, and fell to close. At Louisville it fell from 11 feet 20 inches the 1st to 9 feet 9 inches the 12th; then rose to 12 feet 4 inches the 17th, and afterwards fell. In the Missouri the changes were light. Mississippi, from Saint Paul to Keokuk, the oscillations were not important. At Saint Louis, rose to 17 feet 1 inch the 6th, fell to 15 feet 9 inches the 9th, rose to 22 feet 10 inches by the 12th, and then fell to its minimum near close of month. At Cairo, fell from 33 feet the 5th to 30 feet 11th, rose to 35 feet 9 inches by 17th, and then fell to its minimum. At Memphis, rose from 26 feet the 1st to 26 feet 11 inches the 8th, fell to 25 feet 5 inches the 13th, rose to 28 feet 8 inches the 20th, and afterwards fell. At Helena, oscillated between 35 feet 6 inches the 14th and 37 feet 11 inches (within 2 feet of the danger-line) on the 22d, and then fell to near 27 feet the 31st. At Vicksburg, steadily rose from 1st to 25th, remained stationary to the 28th, and fell to 40 feet 6 inches by 31st. At New Orleans the changes were very gradual.

*Ice in rivers and harbors.*—The following items will serve to show the condition of the rivers and harbors in this respect: The Missouri—Bismarck, 3d to 5th, ice soft; 6th, breaking up, teams broke through; 8th, ice moving; 11th, river rising; 16th, ice commenced running out; 17th, clear; 18th, floating ice; 19th, clear; 20th, navigation opened. Fort Rice, Dakota Territory, 10th, main channel filled with broken ice; 12th, ice moving; 15th, clear. Leavenworth, 27th, first boat passed up river. Red River of the North—Pembina, 11th, ice covered with water, crossing unsafe; 14th, breaking up; 15th, moving out; 16th, clear; 17th, full of floating ice; 18th, clear, navigation opened; 22d, first steamer arrived. Upper Mississippi—Saint Paul, 1st to 4th, river open, thin floating ice; Dubuque, 10th, first steamer from below arrived; Davenport, 9th, navigation opened; Keokuk, 8th, first boat left for Saint Paul. Upper Lakes—Duluth, 17th, first arrival; 19th, first departure. Escanaba, 5th, ice moved from around docks, navigation opened; 16th, ice cleared out of bay. Northport, 5th, shore-ice left bay; 20th, first steamer arrived. Grand Haven, 15th, "no ice in straits to prevent vessels passing through," first steamer arrived. Alpena, Thunder Bay River frozen over until 3d; 4th to 6th, ice in river breaking up; 7th, clear; 10th, first boat arrived. Saginaw Bay, Lake Huron, 5th, ice moved out. Georgian Bay and Lake Huron—8th, perfectly free of ice; navigation partly opened at Owen Sound, Georgian Bay. Detroit, 7th to 8th, floating ice. Port Huron, 24th, lake navigation commenced. Lower Lakes—Cleveland, 1st, ice broken up on lake; 20th, navigation opened. Buffalo, 1st, harbor and lake entirely free from ice; 16th, navigation opened. Oswego, 9th, first vessel arrived. Saint Lawrence River, 10th, free of ice from the lake to Ogdensburg. Hudson River—Albany, 5th, ice moving; 6th, floating ice at Rhinebeck, Barrytown, Germantown, Catskill to Stockport, and slight gorges from Stockport to Schodack; 9th, open from Albany to New York; 14th, Albany, first boat from New York arrived; 24th, shore-ice formed, bays and coves frozen over. Penobscot River, Maine, 12th, ice out of river as far as the Narrows. Saint Croix River, Maine, 15th, navigation opened as far as Calais. Kennebec River, Maine, 16th, ice-jam at lower end of Swan Island broke, opening navigation to Augusta nearly a month earlier than usual. Sebago Lake, Maine, 31st, lower bay still covered with ice. Mount Desert, Maine, 13th, ice out of harbor. 19th, Pennsylvania Canal, Pennsylvania, opened; Delaware and Raritan Canal, New Jersey, opened.

ATMOSPHERIC ELECTRICITY.

*Thunder-storms.*—1st, Kansas, Tennessee, Illinois, Arkansas, Texas; 2d, Kentucky, Georgia, Illinois, Indiana, North Carolina, Tennessee; 3d, Virginia, Maryland, Massachusetts, Connecticut, Delaware, Florida, Indiana, New Jersey, New York, Pennsylvania; 4th, Massachusetts; 6th, Texas, Iowa, Missouri, Indiana, Michigan, Illinois, Kansas, Ohio, Wisconsin; 7th, Minnesota, Mississippi, Pennsylvania, New Jersey, Virginia, Rhode Island, Connecticut, Dakota, New York, Kansas, Maryland, Massachusetts, West Virginia; 8th, Indian Territory, Nebraska, Dakota, Minnesota, Texas, Illinois, Iowa, Kansas, Missouri, Wisconsin; 9th, Texas, Alabama, Louisiana, Tennessee, Arkansas, Delaware, Iowa, Mississippi, Missouri; 10th, Florida, Alabama,

Maryland, Massachusetts, Pennsylvania; 11th, Indian Territory, Kansas, Alabama, West Virginia, Tennessee, Pennsylvania, Florida, Virginia, Maryland, Georgia, Iowa, Kentucky, Missouri, Nebraska, New York, Ohio, West Virginia; 12th, Alabama, Iowa, Missouri, Ohio, West Virginia, Kentucky, Illinois, Virginia, Pennsylvania, New York, New Jersey, Maryland, Delaware, Florida, Georgia, Indiana, North Carolina, South Carolina, Tennessee; 13th, Virginia, Pennsylvania, New Jersey, New York, Florida, Indiana, Maryland, Ohio; 14th, Pennsylvania, New Jersey; 15th, Texas; 16th, Michigan, Ohio, Texas; 17th, Florida; 18th, New Mexico, California; 19th, Kansas, Dakota; 20th, Kansas, Nebraska, Iowa, Dakota; 21st, Indian Territory, Nevada, Dakota, Illinois, Iowa; 22d, Texas; 23d, Michigan, Ohio, Indiana, Illinois; 24th, California, West Virginia, Ohio, Pennsylvania, Virginia, New Jersey, Delaware, Indiana, Iowa, Maryland, New York; 25th, Idaho; 26th, Nebraska, California, Texas, Ohio, Michigan, Kansas, Indiana; 27th, Texas, Louisiana, Mississippi, Alabama, Missouri, Michigan, Ohio, New York, Pennsylvania, Arkansas, Florida, Illinois, Indiana, Kansas, Massachusetts, North Carolina, Tennessee; 28th, Utah, Florida, Tennessee, Georgia, South Carolina, North Carolina, Virginia, Maryland, Maine, Indiana, Massachusetts, Missouri, Pennsylvania; 29th, Indian Territory, Illinois, Kansas, Missouri, Texas, West Virginia; 30th, Alabama, Florida, Tennessee, Ohio, Kentucky, Indian Territory, Georgia, Louisiana, Maryland, Texas, West Virginia; 31st, Texas, Mississippi, West Virginia, Pennsylvania, Florida, Georgia, Louisiana, Ohio, Virginia.

*Auroras.*—Pembina, Dak., 3d and 23d; Newbury, Vt., 29th; Kensico, N. Y., 17th; Starkey, N. Y., 5th; Coalville, Utah, 3d; Judsonia, Ark., 8th; Vevay, Ind., 20th; Cresco, Iowa, 27th; Iowa City, 1st, 12th, 23d, 27th, 28th; Woodstock, Md., 6th, 21st, 22d, 26th, 28th. On Pike's Peak, the electricity was intense, and interfered with the working of wires on the 6th and 26th; North Platte, strong, 8th; Santa Fé, interfered with the working of telegraph lines north and south, 18th and 26th.

*Magnetic phenomena.*—Prof. G. Hinrichs, Iowa City, Iowa, reports the average diurnal magnetic range in declination as 6.6 minutes.

### OPTICAL PHENOMENA.

*Solar halos.*—1st, Illinois, Indiana, Michigan, New York, Ohio, Pennsylvania, Wisconsin, Georgia; 2d, Connecticut, Maine, New Hampshire, New York, Vermont, Florida, Georgia, Rhode Island, North Carolina; 3d, California; 4th, Ohio; 5th, Illinois, Indiana, Iowa, Kansas, Michigan, Wisconsin, Ohio, Georgia; 6th, Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New York, Virginia, New Mexico, Rhode Island, Vermont, Connecticut; 7th, Delaware, Illinois, Iowa, Ohio, Texas, Georgia, North Carolina, Rhode Island; 8th, Indiana, Ohio, Michigan, Georgia, South Carolina; 9th, Illinois, Indiana, Ohio, Kentucky, Georgia, Maine; 10th, Iowa, Ohio, New Mexico, Michigan, Maine; 11th, Illinois, Iowa, Maine, Nebraska, Ohio, Wisconsin, South Carolina, Vermont, New Hampshire; 12th, Iowa, Ohio, Maine; 13th, Florida, South Carolina; 14th, Ohio, Michigan, Connecticut, North Carolina; 15th, Iowa, Mississippi, Nebraska, New York, Pennsylvania, California, Louisiana, Michigan, South Carolina; 16th, Mississippi, Ohio, California, Texas, Louisiana, South Carolina, Georgia; 17th, Maine, New York, Vermont, Colorado, Louisiana, Florida, South Carolina; 18th, Ohio, Colorado; 19th, California, Louisiana; 20th, Illinois, Iowa, Mississippi, Wisconsin, Louisiana; 21st, Connecticut, Mississippi, New Hampshire, New York, Ohio, Pennsylvania, South Carolina, North Carolina, Rhode Island; 22d, Colorado, South Carolina; 23d, Connecticut, New Jersey, Ohio, California, Rhode Island, Vermont; 24th, Connecticut, Ohio, South Carolina, Maine; 25th, Connecticut, New Mexico; 26th, New York, Ohio, California; 27th, Minnesota, Michigan, Ohio, North Carolina; 28th, Iowa, Michigan; 29th, Illinois, Indiana, Ohio, Kentucky; 30th, New York, South Carolina, Georgia, North Carolina, Virginia; 31st, California, Iowa, New Hampshire, New York, Vermont.

*Mirage.*—Morristown, Dak., 31st; Olivet, Dak., 24th, 25th; New London, Conn., 21st.

### MISCELLANEOUS PHENOMENA.

*Botanical.*—Alabama: in bloom, 17th, quince and dogwood; 11th, sloes and wild plums; 12th, buckeye; 20th, honeysuckle; 25th, may-apple; 24th, snowdrops; 20th to 30th, apple and pears; 21st, fish poison; 16th, peach, apricot, and plum; in leaf, 10th, quince tree; 8th, poplar and tulip trees. California: Visalia, in bloom, 2d, apple; 3d, plum. Connecticut: in bloom, 16th, white maple; in leaf, 19th, sycamore and elm; 15th, willow; budding, 6th, flowers; 8th, spirea; 19th, cherry; 20th, apple and pear; 24th, tiger-lilies and lilies of the valley sprouting. Arkansas: in bloom, 15th, red-bud trees; 6th, apricots; 18th, dogwood; 22d, lilacs; 25th, sweet gum; 26th, buckeye; in leaf, 16th, black and red oak. Dakota: Olivet, 1st, grass and weeds sprouting. Pembina, 24th, willows in bloom, grass sprouting. Florida: in bloom, 7th, peaches; in leaf, 28th, trees generally. Georgia: in bloom, 7th, peach and plum; in leaf, 20th, forest trees. Illinois: in bloom, 20th to 24th, peach; 22d, Japan quince; 25th, violets; 27th, flowering almond; 28th, daffodils; 21st, cowslips; 7th, ash and elm; in leaf, 11th, gooseberry; budding, 8th, peonies, gooseberries, rose bush, lilac, and crab-apple; sprouting, 6th, grass and rhubarb. Indiana: in bloom,

1st, daffodils; 12th and 19th, peach; 8th, pansies; 14th, violets; 12th, iris, lilac, and hyacinth; 10th, spinage gathered; budding, 8th, peach. Iowa: in bloom, 23d, 26th, and 31st, peach; 11th, maple and elm; 16th, liverwort, wild flowers, and hazel brush; 21st, cottonwood and box elder; 14th, poplars; 18th, myrtle; 24th, june cherries; 31st, Siberian crab-apple; in leaf, 8th, plum; 31st, apple; budding, 9th, maple and lilac; sprouting, 8th, grass and leeks; 24th, wheat; 31st, grass sufficient for pasture. Indian Territory: Fort Sill, in bloom, 5th, peach. Idaho Territory: Boise City, in bloom, 20th, plum and cherry; 22d, peach. Kansas: in bloom, 9th, 11th, 19th to 21st, peach; 25th, wild plum and judas tree; 16th, tulips and ivy; 13th, maples; 15th, violets; 20th, plums; 26th, red bush; 27th and 30th, apples; in leaf, 5th, raspberries; 14th, lilacs; 23d, apples; 31st, pear, peach, and forest trees; 22d, crab-apple; 19th, rose and vine; budding, 6th, maples; sprouting, 31st, corn and oats; 14th, prairie-grass. Louisiana: in bloom, 16th, orange trees. Maine: 28th, mayflowers first gathered. Maryland: in bloom, 24th, peach; 14th, forsythia; 17th, plum; 24th, cherry; 7th, crocus and periwinkle; in leaf, 11th, weeping willow; budding, 8th, alder. Massachusetts: in bloom, 1st, skunk cabbage; 13th and 14th, crocus; 23d, pansies; 10th, violets; in leaf, 23d, lilac and syringa; budding, 12th, willow. Mississippi: in bloom. 1st, pitch pine; 5th, sweet-gum, evergreen, cherry, yellow woodbine, and red maple; 6th, violets, spider-wort, and whortleberry; 3d, post oak, red oak, and plum; 8th, dewberry, red woodbine, sassafras and judas tree; 10th, flag-lily; 12th, papaw; 13th, spirea, flowering almond and verbena; 16th, white oak, black-jack oak, iron-wood, crab-apple, dogwood, box-alder, and live oak; 17th, beech, wild cherry, and long-leaf pine; 21st, azalia and apple; 27th, petunias, begonias, roses, sweet william, and blackberry; 31st, black locust; in leaf, 6th, poplar; 12th, china tree; 30th, all forest trees in full leaf. Michigan: in bloom, 13th, polyanthus; 19th, maple. Missouri: in bloom, 1st, hazel; 10th, 13th, 20th, and 22d, peach; 8th, elm and maple; 18th, service-berry; 19th, crocus and apricot; 21st, bridal-wreath; 28th, flowering almond; in leaf, 8th, rose and lilac; 7th, gooseberry and raspberry; 14th, clematis; 24th, morello-cluny tree and cherry; 22d, siberian crab-apple; 27th, pear and plum; budding, 2d, honeysuckle; sprouting, 2d, alder; 6th, violets; 10th, grass green and growing finely; 28th, wheat twenty-two inches high. Nebraska: in bloom, 20th, 25th, 31st, peach; 8th, maple; 20th, cottonwood; 23d, apricot; 26th, gooseberry. Nevada: Winnemucca, 23d, grass growing, sage brush in leaf. New Mexico: Santa Fé, 25th, trees budding, grass sprouting. New Jersey: in bloom, 17th, forsythia; 19th, japan quince; 27th, peach and maple; 9th, blue-bells and lilies; in leaf, 17th, lilac; 31st, grass forward, and wheat in excellent condition. New York: in bloom, 12th, soft maple; 16th, May flowers; 15th, dandelions; budding, 29th, lilac; 8th, wild onions and grass growing; 31st, wheat looks very well. North Carolina: in bloom, 4th and 27th, peach; 3d, apricot; budding, 3d, peach. Ohio: in bloom, 20th, peach; 9th, maple; 8th, crocus and snowdrops; 14th, violets; 28th, cherry; 10th, elm; budding, 9th, lilac; 11th, grass growing; 27th, wheat looking very well. Pennsylvania: in bloom, 7th, maples; 31st, peach and apricot; 31st, wheat looking well. South Carolina: in bloom, 1st, peach; 13th, oak. Tennessee: in bloom, 5th, wild flowers; 11th, plum; 14th, peach; Memphis, 31st, vegetation much advanced. Texas: in bloom, 12th, roses; in leaf, 16th, live oak; 31st, wheat and oats look well, corn sprouting. Utah: Salt Lake City, in bloom, 24th, apricot; 28th, peach. Virginia: in bloom, 13th, 14th, 15th, 23d and 27th, peach; 10th, apricot; 15th, cherry; 20th, plum; 22d, forsythia; 11th, liverwort; 10th, strawberries; in leaf, 22d, willow and crab apple; 27th, gooseberry and quince; budding, 26th, canada snake root; 12th, grass growing finely. West Virginia: Morgantown, in bloom, 17th, easter flowers; 19th, peach; in leaf, 17th, rose bushes; 18th, jessamine; 12th, gooseberry; 12th, apple trees in full bud. Wisconsin: in bloom, 31st, elm, white maple, alder, willow, lombard poplar, liverwort, and blood root; budding, 31st, crab-apple, lilac, and currant.

*Birds.—Blackbirds:* Fort Pembina, Dak., 20th; Southington, Conn., 4th; Saint Mary's Home, Ind., 4th; Monticello, Iowa, 13th; Vail, Iowa, 6th; Creswell, Kans., 24th; Cornish, Me., 29th; Standish, Me., 23d; Waltham, Mass., 5th; Oregon, Me., 18th; Genoa, Nebr., 9th; Waterburg, N. Y., 29th; Palermo, N. Y., 6th; Contoocookville, N. H., 22d; Linden, N. J., 10th; Starkey, N. Y., 13th. *Blue jays:* Detroit, Mich., 2d. *Bluebirds:* Fort Wayne, Mich., 6th; Mount Sterling, Ill., 1st; Tabor, Iowa, almost daily; Boonsboro', Iowa, throughout month; Milford, Ind., 1st; Cornish, Me., 9th; Rowe, Mass., 10th; Waltham, Mass., 1st; New Bedford, Mass., 30th; Northport, Mich., 11th; Minneapolis, Minn., 6th; Palermo, N. Y., 3d; Auburn, N. H., 7th; Dunbarton, N. H., 1st; Waterburg, N. Y., 7th; Coalville, Utah, 20th; Woodstock, Vt., 7th; Madison, Wis., 4th. *Thrush:* Urbana, Ohio, 30th. *Robins:* Southington, Conn., 6th; Hennepin, Ill., 4th; Monticello, Iowa, 7th; Tabor, Iowa, almost daily; Boonsboro', Iowa, throughout month; Vail, Iowa, 27th; Afton, Iowa, 14th; Cornish, Me., 20th; West Waterville, Me., 20th; Standish, Me., 10th; Rowe, Mass., 10th; Waltham, Mass., 15th; New Bedford, Mass., 8th; Fall River, Mass., 10th, in great numbers; Detroit, Mich., 1st; Northport, Mich., 10th; Minneapolis, Minn., 21st; Norfolk, Nebr., 11th; Plattsmouth, Nebr., 1st; Auburn, N. H., 9th; Dunbarton, N. H., 9th; Linden, N. J., 6th; Waterburg, N. Y., 7th; Flushing, N. Y., 1st; Chambersburg, Pa., 4th; West Charlotte, Vt.,

17th; Coalville, Utah, 21st; Woodstock, Vt., 8th; Lynchburg, Va., 1st; Ashland, Wis., 20th; Rocky Run, Wis., 3d; Madison, Wis., 1st; New London, Conn., 8th. *Geese:* Fort Hartsuff, Nebr., 18th; Judsonia, Ark., 27th, 28th, 29th; Southington, Conn., 10th, 16th, 30th; Morristown, Dak., 1st; Quitman, Ga., 1st; Riley, Ill., 1st, 2d; Mount Sterling, Ill., 1st; Laconia, Ind., 2d; Saint Mary's Home, Ind., 4th; Monticello, Iowa, 5th; Tabor, Iowa, almost daily; Boonsboro', Iowa, throughout month; Creswell, Kans., 20th, 27th, 28th; West Waterville, Me., 25th; Standish, Me., 4th; Mount Desert, Me., 7th; Oregon, Mo., 6th; Genoa, Nebr., 16th; Litchfield, Mich., 3d and 4th; Frankford, Mo., 4th; Norfolk, Nebr., 20th; Palermo, N. Y., 3d; Auburn, N. H., 28th; Catawissa, Pa., 17th. *Ducks:* Olivet, Dak., 1st; Mount Sterling, Ill., 8th, 20th; Monticello, Iowa, 5th; Tabor, Iowa, almost daily; Boonsboro', Iowa, throughout month; Standish, Me., 4th; Frankford, Mo., 2d; Rocky Run, Wis., 4th. *Swallows:* Fayette, Miss., 30th; Prospect Hill, Va., 19th. *Cedarbirds:* Prospect Hill, Va., 18th. *Meadow Larks:* Fort Pembina, Dak., 29th; Mount Sterling, Ill., 21st; Monticello, Iowa, 4th; Vail, Iowa, 11th; Milford, Ind., 7th; Afton, Iowa, 14th; Empire City, Kans., 4th; Norfolk, Nebr., 14th; Genoa, Nebr., 6th; Contoocookville, N. H., 29th; Urbana, Ohio, 19th. *Redbirds:* Houston, Fla., 8th; Cornish, Me., 29th; Somerset, Mass., 7th; Waterburg, N. Y., 29th; Starkey, N. Y., 16th; New London, Conn., 8th. *Woodpeckers:* Creswell, Kans., 23d; Starkey, N. Y., 28th. *Osprey:* Prospect Hill, Va., 23d. *Cranes:* Houston, Fla., 7th; Tabor, Iowa, almost daily; Vail, Iowa, 31st; Empire City, Kans., 7th; Baxter Springs, Kans., 5th; Genoa, Nebr., 22d; Belmont Farm, Tex., 18th. *Sparrows:* Monticello, Iowa, 10th; Cornish, Me., 16th; Standish, Me., 10th; Rowe, Mass., 10th; Waltham, Mass., 13th; Somerset, Mass., 19th; Oregon, Mo., 11th; Contoocookville, N. H., 22d; Waterburg, N. Y., 8th; Ringgold, Ohio, 26th; Chambersburg, Pa., 4th; Woodstock, Vt., 13th. *Hummingbirds:* Fayette, Miss., 28th; Brookhaven, Miss., 24th; Starkey, N. Y., 30th. *Pigeons:* Northport, Mich., 7th and 8th, numerous. *Bobolinks:* Chambersburg, Pa., 2d. *Oriole:* Strafford, Vt., 18th. *Phebes:* Starkey, N.Y., 11th; West Charlotte, Vt., 31st. *Chickadees:* Starkey, N.Y., 16th. *Prairie Chickens:* Olivet, Dak., 5th; Creswell, Kans., 9th. *Whippoorwills:* Forsyth, Ga., 20th; Milford, Ind., 12th; Brookhaven, Miss., 19th. *Killdeers:* Creswell, Kans., 12th; Norfolk, Nebr., 8th; Palermo, N. Y., 28th; Bellefontaine, Ohio, 10th; Bloomfield, Wis., 10th. *Nightingale:* Fayette, Miss., 28th. *Mockingbirds:* Judsonia, Ark., 7th; Brookhaven, Miss., 28th. *Wrens:* Chambersburg, Pa., 30th. *Martins:* Houston, Fla., 4th; Laconia, Ind., 17th; Stanley, Kans., 30th; New Market, Md., 16th; Lebanon, Mo., 28th; Ringgold, Ohio, 28th; Chambersburg, Pa., 29th. *Owls:* Oregon, Mo., 12th.

*Earthquakes.*—On the 12th, at Columbus, Ky., 4 a. m., severe shock, overturning furniture, &c.; a portion of the bank of Mississippi River caved in; rumbling lasted a few seconds. 12th, Milford, Vt., two shocks. 17th, Saint Thomas, Lower California, two sharp shocks. 18th, Tacoma, Wash., 6.30 a. m., shock plainly felt.

*Sun spots.*—The following observations, made by Mr. D. P. Todd, have been kindly communicated by Rear-Admiral John Rodgers, U. S. N., Superintendent of the United States Naval Observatory:

| March, 1878. | No. of new— | | Disappeared by solar rotation. | | Reappeared by solar rotation. | | Total number visible. | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| | Groups. | Spots. | Groups. | Spots. | Groups. | Spots. | Groups. | Spots. | |
| 1— 1 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 3— 8 p. m. | 1 | 8 | 0 | 0 | 0 | 0 | 1 | 8 | Large group of faculæ. |
| 5— 10 a. m. | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 5 | |
| 5— 12 m. | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | |
| 6— 1 p. m. | 0 | 2 | 1 | 4 | 0 | 0 | 1 | 3 | |
| 8— 10 a. m. | 0 | 6 | 0 | 0 | 0 | 0 | 1 | 9 | Spots mostly small. |
| 8— 2 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 9 | Spots mostly small. |
| 9— 11 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | Large groups of faculæ. |
| 9— 4 p. m. | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 6 | Large groups of faculæ. |
| 11— 11 a. m. | 0 | 9 | 0 | 0 | 0 | 0 | 1 | 10 | |
| 13— 10 a. m. | 0 | 4 | 0 | 0 | 0 | 0 | 1 | 14 | Large group of faculæ. |
| 16— 10 a. m. | 0 | 10 | 0 | 0 | 0 | 0 | 1 | 24 | Many of the spots small. |
| 18— 11 a. m. | 0 | 0 | 0 | 12 | 0 | 0 | 1 | 2 | Large group of brilliant faculæ. |
| 19— 3 p. m. | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | |
| 20— 11 a. m. | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | |
| 20— 12 m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | |
| 20— 4 p. m. | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | |
| 21— 2 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | |
| 22— 11 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | |
| 22— 5 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | |
| 23— 12 m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | |
| 25— 3 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 26— 11 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 29— 12 m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

Prof. G. Hinrichs, at Iowa City, Iowa, reports none on the 1st, 6th, 18th, 19th (cloudy), 20th, 23d, 24th, 25th, 26th, 28th, and 31st; one group of four spots on the 4th; one group of two spots the 8th and 11th; one group of six spots the 12th.

*United States Signal-Service telegraph-lines.*—Sergeant Belville, in charge of station at Cape Lookout, N. C., reported that, on March 21, the United States revenue steamer Schuyler Colfax anchored off the station, and, by means of the International Code of Signals, asked for and obtained the weather indications. This is believed to be the first instance in which such information has been called for and received from a United States Signal-Service station. At 7.35 a. m., March 25, Private William Bolton, in charge of the "Flying Signal Station" at Life-Saving Station No. 3, about twenty-five miles south of Cape Henry, informed the Chief Signal-Officer by telegraph that the Austrian brigantine Nipoli went ashore early that morning about two miles north of his station, and that he had proceeded to and opened a telegraph-station at the scene of the disaster. Notice was at once telegraphed to the Coast Wrecking Company, United States revenue cutter, Seaman's Aid Society, &c., at Norfolk, Va., and to the United States revenue cutter Hamilton, at Delaware Breakwater, Delaware. The Coast Wrecking Company's steamer Rescue left Norfolk at 9.15 a. m. and reached the stranded vessel at 2 p. m. same day. The United States revenue cutter Hamilton arrived there at 6 a. m. of the 26th. Owing to the prompt action of Private Bolton, and the immediate transmittal of said information to the proper authorities, the vessel was saved, having been gotten off at 4 p. m. of the 28th. The following letter in the case is published:

WAR DEPARTMENT,
OFFICE OF THE CHIEF SIGNAL-OFFICER,
*Washington, D. C., March 29, 1878.*

SIR: The Chief Signal-Officer takes pleasure in commending the alacrity and energy displayed by you at the time of the wreck of the Nipoli. This is the first instance in which the wreck of a vessel has been reported by telegraph from the scene of wreck in advance of the arrival of the life-boat.

I am, sir, very respectfully, your obedient servant,

ALBERT J. MYER,
*Brigadier-General (Brevet Assigned), Chief Signal-Officer of the Army.*

Private WILLIAM BOLTON,
*Signal Service, U. S. Army, in charge of*
*Flying Station at Life-Saving Station No. 3,*
*Van Slack's Landing, Currituck County, North Carolina.*

Published by order of the Secretary of War.

ALBERT J. MYER,
*Brigadier-General (Brevet Assigned), Chief Signal Officer, U. S. A.*

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PAPER 37.

## MONTHLY WEATHER REVIEW, APRIL, 1878.

### INTRODUCTION.

In compiling the present review the following data, received up to May 13, have been made use of, viz: The regular tri-daily weather charts, containing the data of simultaneous observations taken at one hundred and thirty Signal-Service stations and twelve Canadian stations, as telegraphed to this office; monthly journals and reports, one hundred and three and one hundred and twenty-nine, respectively, from the former, and monthly means from thirteen of the latter; reports from twenty-five Signal-Service sunset stations; two hundred and thirty-seven monthly registers from voluntary observers; forty-nine monthly registers from United States Army post surgeons; marine records; international simultaneous observations; monthly reports of the weather services of the States of Iowa and Missouri; reliable newspaper extracts; special reports.

### BAROMETRIC PRESSURE.

Upon Chart No. II is shown the general distribution of the atmospheric pressure for the month by the isobaric lines. Compared with the means for April of previous years, the pressure for the present month averages decidedly lower, especially in the Northwest.

*The local barometric ranges*, as reduced to sea-level, for the month, vary as follows: New England, from 1.00 inch on Mount Washington to 1.26 at Eastport. Middle At-

lantic States, 0.80 at Lynchburg to 1.09 at Sandy Hook. Lower Lake region, 0.81 at Cleveland to 0.91 at Oswego and Toledo. Upper Lake region, 0.87 at Chicago to 1.35 at Duluth. Upper Mississippi Valley, 0.82 at Saint Louis to 1.29 at Saint Paul. Missouri Valley, 0.84 at Bismarck to 1.19 at Yankton. Red River of the North Valley, 1.06 at Pembina to 1.28 at Breckenridge. Plains of Nebraska and Kansas, 1.21 at Dodge City to 1.47 at North Platte. Rocky Mountain region, 0.80 at Cheyenne to 0.99 at Deadwood. Between Rocky Mountains and Pacific States, 0.50 at Yuma to 0.75 at Salt Lake City and 0.92 at Winnemucca, Nev. California, 0.31 at Campo to 0.66 at Red Bluff. Texas, 0.76 at Indianola to 1.00 at Fort Concho. Ohio Valley and Tennessee, 0.62 at Nashville to 0.77 at Pittsburg. South Atlantic States, 0.65 at Jacksonville to 0.93 at Cape Lookout. Gulf States, 0.52 at Mobile to 0.80 at Shreveport and 0.46 at Key West.

*Areas of high pressure.*—Seven are described. None of these have been decided.

No. I.—This is a continuation of the high-pressure area spoken of in the March review as No. X. 1st, it covered the country from Oregon to the Missouri Valley with cold and generally clear weather; a. m. barometer at Virginia City 0.26 inch above normal, and Pike's Peak minimum temperature 3° Fah. 2d, was central in Montana, but with slightly diminished pressure. 3d, it moved eastward into the region between the Rocky Mountains and Missouri River, with diminished pressure. 4th, p. m. barometer at Santa Fé 0.13, and midnight at Corsicana, Tex., 0.16, above normals. 5th, central in New Mexico, after which it was dissipated.

No. II gradually formed between storms I and II on the 7th. 8th, morning, it reached from the Lower Lakes to the North Carolina coast, with freezing temperatures from Northeastern New England northward; midnight, central in the Lower Saint Lawrence Valley. 9th, a. m. barometer at Eastport 0.38 above normal, and temperature below freezing from Nova Scotia and Northern Maine northward. 10th, a. m., central on the New England coast, and then disappeared to the eastward, in advance of storm III.

No. III appeared in Oregon on the 6th, where the pressure gradually increased until it reached its maximum, 0.17 above normal, a. m., of the 9th. The latter morning it extended southeastward over Utah, and the temperature fell below freezing from Montana and Eastern Oregon to Nevada. 10th, morning minimum temperatures below freezing from Nevada, Utah, and New Mexico northward; —19° on Pike's Peak. The pressure increased toward Texas. 11th, it disappeared over the country from Arizona to Texas, apparently to the southward, also eastward over the Gulf States.

No. IV.—This high-pressure area was central, morning of the 14th, north of the Upper Lakes, with freezing temperatures in Northern Michigan. 15th, a. m. barometer at Marquette 0.20 above normal. During the day it extended southeastward over New England. 16th, a. m. barometers at Marquette 0.24, and Portland, Me., 0.29, above normals. 17th, a. m. barometer 0.36 above normal at Chatham, N. B., and freezing temperatures from Nova Scotia to the mouth of the Saint Lawrence. 18th, a. m. barometer 0.48 above normal at Sydney, Cape Breton, and then rapidly passed to the eastward, also southward along the coast.

No. V advanced southeastward, night of the 22d, over the mouth of the Saint Lawrence. 23d, a. m. barometer at Father Point, Ont., 0.35, and midnight at Sydney, Cape Breton, 0.46, above normals. The remainder of the month it remained almost stationary over Nova Scotia and the Gulf of Saint Lawrence, oscillating backward and forwards, with the barometer at Sydney, Cape Breton, 0.45 above the normal the last day.

No. VI —22d, the pressure rose somewhat above the normal along the Pacific coast 23d, it extended eastward across the Rocky Mountain range. 24th, the barometers at Cheyenne and Santa Fé 0.10 above normals. 25th, it withdrew to the southwestward; at midnight it reached from California to New Mexico. 26th, remained about stationary. 27th, moved to Utah, Nevada, and California; midnight barometer at San Francisco 30.20 inches, or 0.13 above normal. 28th, continued northward toward Oregon. 29th, barometer at Portland, Oreg., 30.37, or 0.24 above normal. 30th, it apparently disappeared to the northward.

No. VII.—27th, it advanced southward over Minnesota; barometer at Duluth 0.12 above normal. 28th, highest over Lake Superior, and later disappeared.

*Areas of low pressure.*—Of these ten have been traced and charted. Nos. I, II, V, and VI developed into very severe storms.

No. I.—2d, it advanced northward over Florida at night. 3d, the pressure diminished very rapidly; barometer at Wilmington fell to 29.37 inches, or 0.65 below the normal. It developed into two distinct depressions, with heavy rains and occasional thunder-storms from Florida to North Carolina, and easterly gales on the coast. The schooner Steelman was struck by the high NW. winds following it off Pensacola, and driven to Key West. 4th, the secondary depression disappeared, as shown on chart No. I. The storm-center moved northeastward off the coast, producing heavy gales, at times of hurricane force, high seas and heavy rains. At Kittyhawk, N. C., the barometer fell 0.73 below the normal. During the three first days of the month, the

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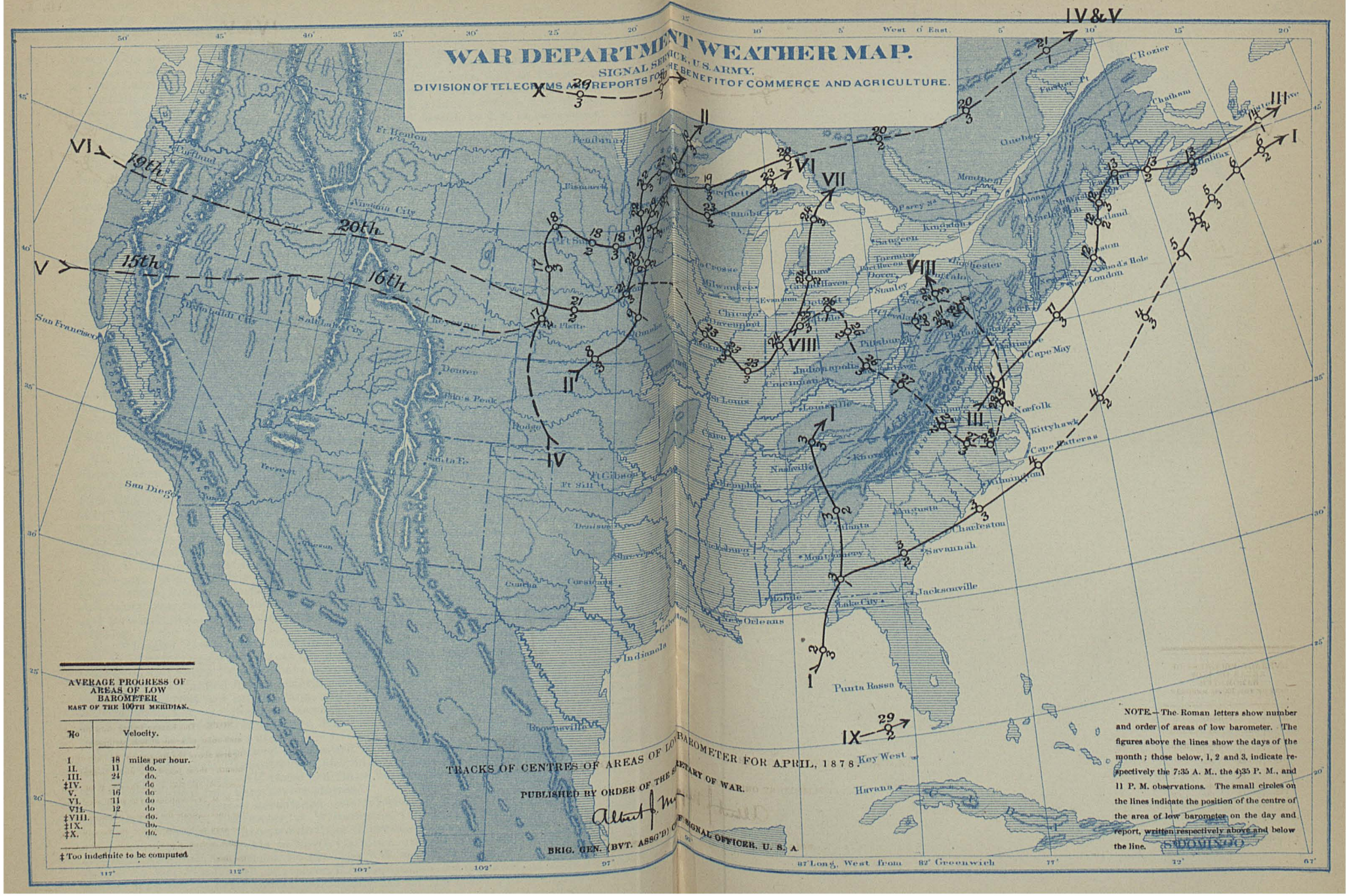
WAR DEPARTMENT WEATHER MAP.
SIGNAL SERVICE, U.S. ARMY.
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.
TRACKS OF CENTRES OF AREAS OF LOW BAROMETER FOR APRIL, 1878.
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
BRIG. GEN. (BVT. ASS'G'D) CHIEF SIGNAL OFFICER, U. S. A.
AVERAGE PROGRESS OF AREAS OF LOW BAROMETER EAST OF THE 100TH MERIDIAN.
No. Velocity.
I 18 miles per hour.
II. 11 do.
III. 24 do.
‡IV. — do
V. 16 do
VI. 11 do
VII. 12 do
‡VIII. — do.
‡IX. — do.
‡X. — do.
‡ Too indefinite to be computed
NOTE.—The Roman letters show number and order of areas of low barometer. The figures above the lines show the days of the month; those below, 1, 2 and 3, indicate respectively the 7:35 A. M., the 4:35 P. M., and 11 P. M. observations. The small circles on the lines indicate the position of the centre of the area of low barometer on the day and report, written respectively above and below the line.
19th
20th
15th
16th
Long. West from Greenwich

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## AVERAGE TEMPERATURES FOR APRIL.

| DISTRICTS. | Average for April, Signal Service Observations. For several years. | For 1878. | Comparison of April, 1878, with the average for several years. |
|---|---|---|---|
| St. Lawrence valley | 38°.7 | 46°.3 | 7°.6 above. |
| New England | 41 .2 | 49 .3 | 8°.1 above. |
| Middle Atlantic States | 50 .6 | 57 .5 | 6°.9 above. |
| South Atlantic States | 65 .0 | 67 .8 | 2°.8 above. |
| Gulf States | 66 .5 | 70 .0 | 3°.5 above. |
| Ohio valley and Tennessee | 54 .6 | 61 .4 | 6°.8 above. |
| Lower Lake region | 41 .0 | 51 .8 | 10°.8 above. |
| Upper Lake region | 37 .4 | 47 .9 | 10°.5 above. |
| Upper Mississippi valley | 47 .4 | 55 .6 | 8°.2 above. |
| Lower Missouri valley | 50 .7 | 58 .5 | 7°.8 above. |
| Upper Missouri valley | 40 .0 | 49 .0 | 9°.0 above. |
| Minnesota | 37 .4 | 47 .1 | 9°.7 above. |
| Rocky Mountains stations | 35 .8 | 39 .1 | 3°.3 above |
| Pacific Coast | 54 .6 | 55 .1 | 0°.5 above |

## TEMPERATURES OF WATER FOR APRIL, 1878.

| STATIONS. | Temperatures at bottom. Maximum. | Minimum. | Average depth of water. Feet. |
|---|---|---|---|
| Alpena | 53° | 37°' | 12 |
| Augusta | 73 | 58 | 9 |
| Baltimore | 65 | 50 | 11 |
| Buffalo | 60 | 44 | 12 |
| Charleston | 70.5 | 64.5 | 42 |
| Chicago | 55 | 40 | 8 |
| Cleveland | 62 | 41 | 14 |
| Detroit | 54 | 39 | 22 |
| Duluth | 44 | 41.5 | 11 |
| Eastport | 38.5 | 34 | 15 |
| Escanaba | 46 | 37 | 20 |
| Galveston | 78 | 64 | 7 |
| Grand Haven | — | — | — |
| Jacksonville | 79 | 66 | 12 |
| Key West | 86.5 | 73.2 | 16 |
| Marquette | 45 | 38 | 15½ |
| Milwaukee | 53 | 42 | 20 |
| Mobile | 72 | 64 | 17 |
| Montgomery | 72 | 62.5 | 10 |
| New London | 52 | 40.5 | 12 |
| New York | — | — | — |
| Norfolk | 69 | 53 | 24 |
| Portland, Maine | 48.5 | 38.5 | 26 |
| Punta Rassa | 82 | 70 | 12 |
| San Francisco | 57 | 55 | 22 |
| Sandusky | 61 | 41 | 10 |
| St. Marks | 71 | 65 | 18 |
| Savannah | 72 | 64 | 8 |
| Toledo | 64 | 43 | 12 |
| Wilmington | 65 | 56 | 14 |
| Wood's Holl | 52 | 41 | 8 |

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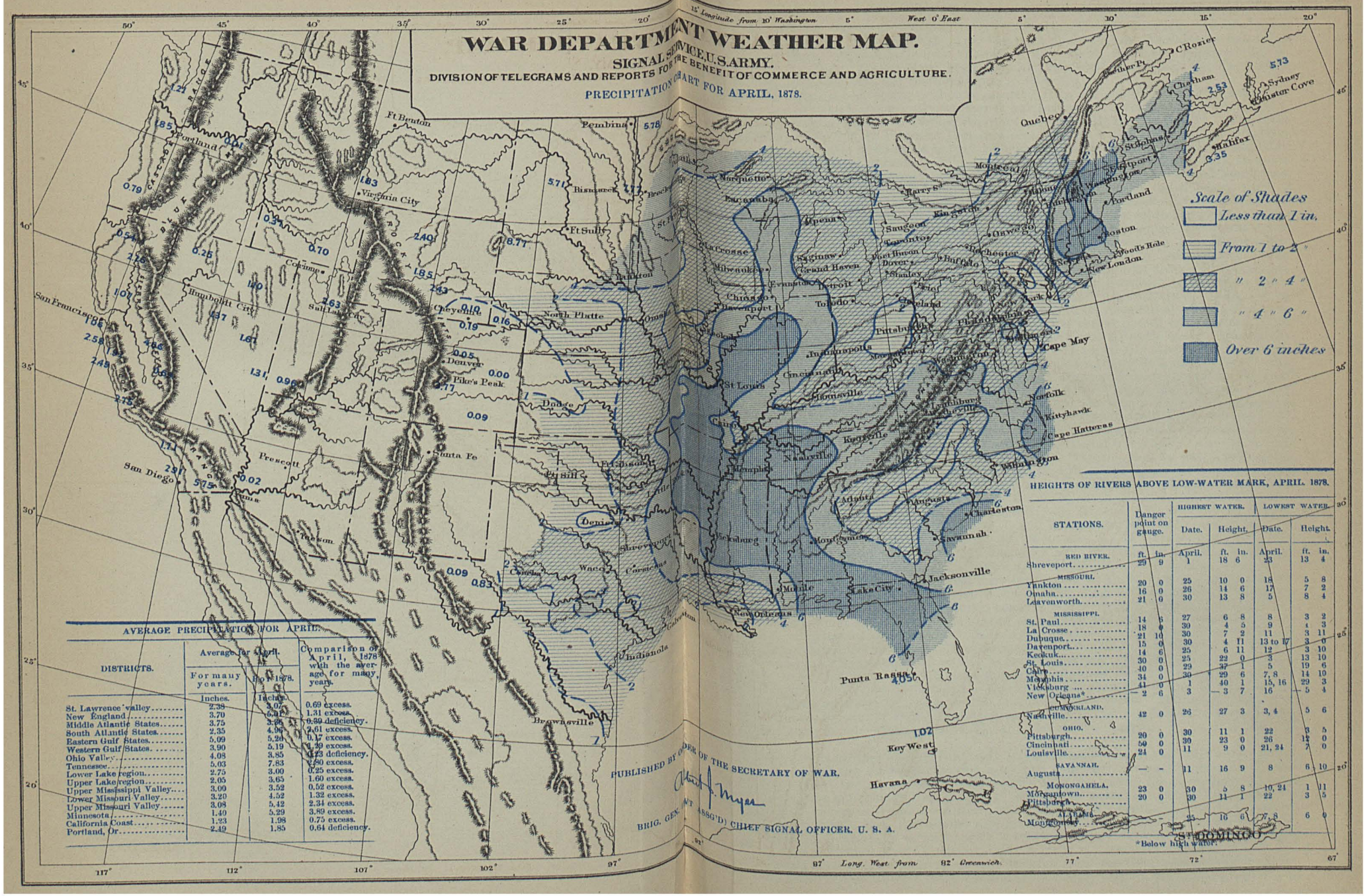
# WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U.S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

PRECIPITATION CHART FOR APRIL, 1878.




## AVERAGE PRECIPITATION FOR APRIL.

| DISTRICTS. | Average for April. For many years. | Average for April. For 1878. | Comparison of April, 1878 with the average for many years. |
|---|---|---|---|
| | Inches. | Inches. | |
| St. Lawrence valley | 2.38 | 3.07 | 0.69 excess. |
| New England | 3.70 | 5.01 | 1.31 excess. |
| Middle Atlantic States | 3.75 | 3.36 | 0.39 deficiency. |
| South Atlantic States | 2.35 | 4.96 | 2.61 excess. |
| Eastern Gulf States | 5.09 | 5.26 | 0.17 excess. |
| Western Gulf States | 3.90 | 5.19 | 1.29 excess. |
| Ohio Valley | 4.08 | 3.85 | 0.23 deficiency. |
| Tennessee | 5.03 | 7.83 | 2.80 excess. |
| Lower Lake region | 2.75 | 3.00 | 0.25 excess. |
| Upper Lake region | 2.05 | 3.65 | 1.60 excess. |
| Upper Mississippi Valley | 3.00 | 3.52 | 0.52 excess. |
| Lower Missouri Valley | 3.20 | 4.52 | 1.32 excess. |
| Upper Missouri Valley | 3.08 | 5.42 | 2.34 excess. |
| Minnesota | 1.40 | 5.29 | 3.89 excess. |
| California Coast | 1.23 | 1.98 | 0.75 excess. |
| Portland, Or | 2.49 | 1.85 | 0.64 deficiency. |

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (ASST'D) CHIEF SIGNAL OFFICER, U. S. A.

## HEIGHTS OF RIVERS ABOVE LOW-WATER MARK, APRIL, 1878.

| STATIONS. | Danger point on gauge. | HIGHEST WATER. Date. | HIGHEST WATER. Height. | LOWEST WATER. Date. | LOWEST WATER. Height. |
|---|---|---|---|---|---|
| | ft. in. | April. | ft. in. | April. | ft. in. |
| RED RIVER. | | | | | |
| Shreveport | 29 9 | 1 | 18 6 | 23 | 13 4 |
| MISSOURI. | | | | | |
| Yankton | 20 0 | 25 | 10 0 | 18 | 5 8 |
| Omaha | 16 0 | 26 | 14 6 | 17 | 7 2 |
| Leavenworth | 21 0 | 30 | 13 8 | 5 | 8 4 |
| MISSISSIPPI. | | | | | |
| St. Paul | 14 5 | 27 | 6 8 | 8 | 3 2 |
| La Crosse | 18 0 | 30 | 4 5 | 9 | 4 3 |
| Dubuque | 21 10 | 30 | 7 2 | 11 | 3 11 |
| Davenport | 15 0 | 30 | 4 11 | 13 to 17 | 3 0 |
| Keokuk | 14 6 | 25 | 6 11 | 12 | 3 10 |
| St. Louis | 30 0 | 25 | 22 0 | 3 | 13 10 |
| Cairo | 40 0 | 29 | 37 1 | 5 | 19 6 |
| Memphis | 34 0 | 30 | 29 6 | 7, 8 | 14 10 |
| Vicksburg | 41 0 | 1 | 40 1 | 15, 16 | 29 3 |
| New Orleans* | 2 6 | 3 | 3 7 | 16 | 5 4 |
| CUMBERLAND. | | | | | |
| Nashville | 42 0 | 26 | 27 3 | 3, 4 | 5 6 |
| OHIO. | | | | | |
| Pittsburgh | 20 0 | 30 | 11 1 | 22 | 3 5 |
| Cincinnati | 50 0 | 30 | 23 0 | 26 | 12 0 |
| Louisville | 24 0 | 11 | 9 0 | 21, 24 | 7 0 |
| SAVANNAH. | | | | | |
| Augusta | — — | 11 | 16 9 | 8 | 6 10 |
| MONONGAHELA. | | | | | |
| Morgantown | 23 0 | 30 | 5 8 | 10, 24 | 1 11 |
| Pittsburgh | 20 0 | 30 | 11 1 | 22 | 3 5 |
| ALLEGHANY. | | | | | |
| Morgantown | | 25 | 10 6 | 7, 8 | 6 0 |

*Below high water.

pressure continued low in Nova Scotia, evidently due to the storm described as No. XVII in the March review, and, now, again began decreasing. 5th, it reached the coast of Nova Scotia, producing northeasterly gales, with rain and snow, thence to the mouth of the Saint Lawrence. 6th, the barometer at Halifax fell to 28.83, or 1.00 below the normal. Cautionary signals were ordered the 3d, from North Carolina to New Jersey, and the 4th for the New England coast. Warnings were also sent, night of the 4th, for Canadian stations in Nova Scotia, New Brunswick, and the Saint Lawrence Valley. Except for the New England and Northern New Jersey coasts, all were justified. Maximum hourly velocities: Key West, NW. 44; Jacksonville, W. 34; Cape Lookout, E. 60; Cape Hatteras, NE. 72; Kittyhawk, NE. 64; Cape May, NW. 38; Eastport, NE. 26; Father Point, E. 52 miles.

No. II.—This severe storm evidently resulted from the combination of two disturbances, one of which apparently advanced northeastward over Texas, producing frequent rains from thence to Indian Territory and New Mexico on the 7th. The other was felt on the 7th at Victoria, British Columbia, as a SW. gale, and at Umatilla, Oreg., as a W. gale of 60 miles hourly velocity, while the pressure rapidly diminished from Montana to Minnesota. 8th, threatening and rainy weather, with frequent thunder-storms, was reported from the Gulf States to the Upper Lakes and Northwest. From Western Dakota to Colorado northerly gales prevailed, with heavy snow at places. The two united, and were central in Eastern Nebraska by midnight. At Omaha the barometer fell 0.81 below the normal. 9th, as the storm progressed northeastward over Minnesota, the central pressure continued diminishing, the barometer at Saint Paul falling 28.85, or 1.00 below the normal. A barometric trough ran southward into the Gulf. The rain-area extended eastward over the Lake region, Middle States, and South Atlantic States, with frequently heavy thunder-storms and occasional hail. Clear weather prevailed in the Southwest; northwesterly gales, with snow, from Colorado and Western Nebraska to Montana and Western Dakota. 10th, the barometers fell at Breckenridge, Saint Paul, and Duluth to, respectively, 28.85, 28.83, and 28.78, or 1.07, 1.09, and 1.10 below the normals. The center passed northeastward into Canada, with the barometric trough reaching to the South Atlantic coast. During this and the preceding days the barometric gradient was unusually steep from the Northwest to the Upper Lakes, producing very stormy weather, the winds at times reaching a hurricane force, and causing considerable damage. Clear and clearing weather followed from the Gulf States to the South Atlantic States, Ohio Valley, and Missouri Valley, while the rain-area extended to New England. 11th, the winds diminished in force in the Lake region, with clearing weather. Cautionary signals were displayed on the 7th along the West Gulf coast; on the 8th along the East Gulf and Atlantic coasts, except Maine, and at all the Lake stations. Warnings were also telegraphed the 8th for the Canadian stations along Lakes Huron, Erie, and Ontario, and in the Upper Saint Lawrence Valley. They were justified, except along the New England coast and Lake Ontario and at Key West. Maximum velocities: Indianola, W., 36; Mobile, SE., 30; Charleston, SE., 33; Smithville, N. C., S., 42; Kittyhawk, SE., 50; Barnegat and Atlantic City, E., 25; Erie, SE., 43; Toledo, SW., 45; Alpena, SW., 28; Grand Haven, SW., 36; Milwaukee, SW., 54; Escanaba, S., 48; Marquette, SE., 34; Duluth, NE., 48; Saint Paul, SE., 36; Breckenridge, N., 42; Lacrosse, S., 44; Davenport, SW., 48; Cairo, SE., 46; Leavenworth, SW., 52; Yankton, NW., 48; Bismarck, NW., 60; Dodge City, N., 44; North Platte, NW., 66; Cheyenne, NW., 37; Pike's Peak, NW., 52 miles.

No. III gradually formed as a subsidiary depression to No. II, and was central afternoon of the 11th on the Middle Atlantic coast, with fresh to brisk winds. Thunder-storms occurred from the South Atlantic coast to Southern New England. 12th, it increased very much in intensity as it moved northeastward along the coast. The barometer at Portland fell to 29.29, or 0.61 below the normal. High northwesterly winds or gales prevailed in the Middle Atlantic States and Southern New England. 13th, a. m., barometer at Eastport 29.26, or 0.65 below the normal. It disappeared to the eastward over Nova Scotia. Signals were displayed night of the 11th along the eastern New England coast, and all justified. Warnings were dispatched a. m. of the 12th for the Canadian stations in Nova Scotia and New Brunswick. Maximum velocities: Cape May, N., 40; Sandy Hook, W., 43; New London, E., 26 and NW., 27; Boston, SE., 35; Eastport, E., 30; Father Point, E., 45; Mount Washington, E., 54 and NW., 66 miles.

No. IV.—It is quite probable that this storm originated on the 12th between the Pacific coast and the Rocky Mountains, and then extended eastward toward the Lower Missouri Valley, Indian Territory, and Northern Texas. 13th, the p. m. barometers at Salt Lake City and Dodge City read 0.47 below the normals. At Julian, Southern California, a severe rain and wind storm prevailed; at Winnemucca, Nev., heavy snow-storm; at Fort Sill, Ind. T., thunder and hail storm; at Cottonwood Falls, Emporia, and Kirkendall, Kans., a tornado, with very large hail, sweeping cars from the railroad-track and killing several persons. The midnight barometer at Virginia City fell 0.49 below the normal. 14th, frequent rains fell from the Gulf States to Ohio, Lake Michigan, and the northwest, with occasional thunder-storms; destructive hail-storm

occurred at Lamar, Mo.; heavy snow in Utah and Southern Nevada. 15th, while the pressure continued low in Kansas, a subsidiary depression formed in the Gulf States, producing heavy thunder-storms at places. At Waterville, Kans., a waterspout is reported to have formed. 16th, the subsidiary depression passed eastward over Southern Georgia. The pressure having been high to the northward, northeasterly gales and heavy rains occurred along the North Carolina coast, for which signals had been displayed the previous day. At Cape Lookout, NE., 48; Kittyhawk, NE., 44; Cape Henry, NE., 48 miles. 17th, the main depression united with the following storm, as shown on Chart No. I.

No. V.—13th, light rain fell in Washington Territory and Oregon, with a heavy hail-storm at Eugene City, Oreg. 14th, the barometers at Portland, Oreg., and San Francisco read 0.44 below the normals. Light rains prevailed in California; at Julian, Cal., heavy rain-storm, turning into a blinding snow-storm at night. 15th, a. m. barometer at San Francisco 0.48 below normal, and the storm-center passed into the interior. Heavy rains accompanied it in California and light snow in Nevada. 16th, heavy snow fell in Northern Arizona, Utah, and Southern Montana, and light rains in the southern portions of California and Arizona. Southerly gales began from New Mexico and Northwestern Texas to Wyoming and Western Dakota. 17th, the barometers at Cheyenne and North Platte fell, respectively, 0.58 and 0.68 below the normals. Gales prevailed from the Northwest to Colorado and Indian Territory, with threatening and rainy weather and frequent thunder-storms; heavy snow from Montana and Wyoming to Utah; on Pike's Peak, severe snow-storm, with the temperature 9° below zero; at Leavenworth, Kans., and Olivet, Dak., tornadoes; at Deadwood, Dak. ("Black Hills"), heavy rain-storm. 18th, its progress was very slow. The a. m. barometer at Bismarck read 0.72 below the normal, but the central depression rose during the day. Rainy weather and southeasterly gales continued in Minnesota and Dakota, changing into a severe snow-storm at Deadwood; to the southwestward of the storm-center, as far as Colorado, westerly gales, with clear or clearing weather. 19th, it continued diminishing in force, but with frequent thunder-storms and hail, in the Upper Mississippi Valley and Upper Lake region. A barometric trough reached southward into Texas, in which, as the wind suddenly shifted from southerly to northerly, it became destructive at places; at Fort Concho, Tex., a heavy hail and rain storm resulted, causing great damage—hail two feet deep in places—the northwest wind blew with hurricane force for some time. 20th and 21st, during its passage northeastward, rainy weather, occasional thunder-storms, and brisk to high westerly winds accompanied it from the Lower Lakes and Middle States eastward. The signals displayed on the Texas coast the 17th were not justified; those on Lakes Michigan and Superior, night of the 17th, were lowered too soon; of those along the New Jersey and North Carolina coast, the latter were not justified. Maximum velocities: San Francisco, SW., 28; Pike's Peak, SW., 64 and NW., 56; Fort Bayard, N. Mex., SW., 43; Fort Craig, N. Mex., SW., 40; Denver, W., 50; Cheyenne, NW., 44; Colorado Springs, W., 60; North Platte, SE., 96 and W., 66; Dodge City, SE., 40 and SW., 52; Bismarck, E., 74 and N., 60; Breckenridge, E., 50; Saint Paul, SE., 33; Duluth, NE., 30; Marquette, SE., 36; Milwaukee and Port Huron, W., 36; Sandy Hook, W., 30; Thatcher's Island, W., 36; Mount Washington, NW., 102 miles. Warnings were sent, night of the 17th, for the Canadian stations on Lakes Huron and Erie.

Nos. VI and VII.—18th, the pressure rapidly diminished along the Pacific coast, with a high wind at Victoria, British Columbia. 19th, continued diminishing; barometers falling below normals 0.47 at San Francisco and 0.53 at Portland, Oreg. Light rain fell from Washington Territory to California. 20th, a. m. barometer at Salt Lake City 0.42 below normal, and diminishing pressure from the Missouri Valley southward. The rain-area extended eastward partly as snow to Montana, Idaho, Utah, and Arizona. 21st, p. m., barometer at Yankton 0.58 below normal. Threatening and rainy weather prevailed from the Upper Lakes to the Northwest, with frequent thunder-storms; severe hail-storms in Iowa and Illinois; tornado in Northwestern Iowa. 22d, it appeared as an extensive barometric trough, reaching from Minnesota to Texas, and No. VII developed. Rainy weather was reported from the Southwest to the Northwest and Lake region. 23d, generally light rains fell in the Lake region; frequently very heavy rains and destructive thunder-storms, with hail, from the Lower Ohio Valley and Missouri to Alabama and Eastern Texas; tornadoes at Corsicana, Tex., and Green Springs, Ala. 24th, passed northward over Lower Michigan, but with frequent rains and heavy thunder-storms from the Lake region southward; at Rome, Ga., a tornado; midnight barometer at Alpena 0.81 below normal. Cautionary signals were ordered the 22d for Lakes Superior and Michigan, but late; also from New Jersey to North Carolina; 23d, for the Gulf coast and from North Carolina to New Jersey: 24th, for the Lower Lakes and Southern New England. Maximum velocities: San Diego, S., 32; Salt Lake City, S., 32; North Platte, E., 60; Bismarck, NE., 60; Cairo, SW., 55; Galveston, NW., 40; Cape Lookout, S., 72; Sandy Hook, E., 36; Cleveland, SW., 45; Detroit, S., 42; Duluth, NE., 38 miles.

No. VIII developed the 25th in Southern Michigan from No. VII. 26th, 27th, and

28th, thunder-storms were frequent in the Middle States, and heavy at places with hail. The last day very destructive hail-storms occurred in Southeastern Virginia, Maryland, and Delaware. 29th, it was dissipated, as shown on the chart. Cautionary signals on the New Jersey and New England coasts were not justified, except at Eastport; those on the North Carolina coast were late. Maximum velocities: Capes Lookout and Hatteras, SW., 36; Eastport, NE., 35.

No. IX was not of much importance. Moderate rains fell in Cuba and Southern Florida, accompanying thunder-storms, with very brisk southeast winds at Key West.

No. X.—Light rains accompanied this disturbance from the Northwest to the Upper Lakes, with occasionally high winds; Bismarck, W., 42; Breckenridge, NW., 35; Milwaukee, SW., 34 miles.

## INTERNATIONAL METEOROLOGY.

STORMS.—*December* 31.—York Factory, Hudson's Bay, B. A., noon, heavy northerly gale commenced, reaching a velocity of 47 miles at midnight, and from midnight to 2.45 a. m., January 1, averaged 71 miles per hour, with squalls estimated at 100. At 2.45 a. m. the anemometer was blown away, and the following velocities were estimated: 2.45 a. m. to 6.33 a. m., average 50 miles, and 6.33 a. m. to 9 a. m., average 40 miles. It was preceded by fresh southerly winds on the 30th, and followed by cold and strong N. W. winds until the 6th; the thermometer registering —33° on the morning of the 3d, the lowest reading recorded during the months of December, January, and February.

*January.*—4th, 51° S., 81° W., heavy SE. winds. 8th, 49° N., 7° W., heavy sea. 21st, off San Francisco, 5.30 p. m., SE. gale, rain. 22d, off San Francisco, 4.30 a. m., SE. gale increased; 11 a. m., tremendous sea.

*February.*—3d, 28° 06′ S., 53° 12′ E., violent rotary gale, lasting a few hours. 7th, 29° 30′ S., 44° E., terrific NE. gale, veering to NW. and ending at SW.; barometer 29.30; fearful cross-seas, lasting 16 hours; land and sea birds fell on deck exhausted. Tahiita, Society Islands, hurricane; 129 persons reported killed and much property destroyed. 10th, 57° 55′ S., 64° W., heavy gales. 15th, 48° 54′ N., 18° 30′ W., heavy NW. to SW. gale. 16th, outer bank, off San Francisco, terrible gale, with seas mountain high. 20th, Fowey Rocks, Florida Reefs, 5 a. m., wind SSE. and heavy seas, driving steamer Arratoon on reefs.

*March.*—4th, 41° 19′ N., 52° 44′ W., heavy SSW. gale, with tremendous sea; about 28° N., 67° 54′ W., SE. gale, going around to SW., and blowing furiously for 48 hours. 11th, 48° 08′ N., 46° 35′ W., 7.35 a. m., Washington mean time, barometer 29.39, wind NW., 24 miles; 2 p. m., W. by N., 60 miles; 5.30 p. m., barometer 29.22, lowest point. 12th, 42° N., 44° 50′ W., 7.35 a. m., Washington mean time, barometer 29.59, wind NW., 60 miles. 13th, 46° N., 45° W., hurricane from W., with heavy sea. 24th, 45° 17′ N., 38° 47′ W., heavy S. gale, veering around to NW., lasting 6 hours. 25th, 41° 02′ N., 65° 08′ W., SSW. and WNW., very stormy. 26th, 41° 28′ N., 65° 31′ W., fresh W. gale, with heavy snow-squalls; 40° 34′ N., 70° 40′ W., storm, snow, and hail squalls. 27th, 43° 26′ N., 46° 34′ W., severe storm. 29th, 49° 22′ N., 5° 43′ W., 5 a. m., barometer 28.92, lowest; 7 a. m., furious gale from N. and E.; 9 a. m. to 11 p. m., velocity of wind estimated from 50 to 75 miles. 31st, 49° 35′ N., 8° 30′ W., N. and NW., stormy.

*April*—1st, 39° 30′ N., 14° 25′ W., NW. rising wind, heavy snow-squalls. 2d, 49° 26′ N., 20° 15′ W., moderate NW. gale, high sea, squally; 53° 28′ N., 21° 49′ W., fresh NW. gale and heavy hail-showers; 49° 41′ N., 7° 36′ W., strong NW. breeze, heavy rain-squalls; 4th, 26° 30′ N., 69° W., SE. to NW. gale, lasting five days; 49° 50′ N., 36° 26′ W., strong ESE. gale; 49° 42′ N., 11° 33′ W., W. and WNW. wind and high sea; 37° 58′ N., 50° W., severe hurricane. 6th, 48° 36′ N., 27° 15′ W., SE. and ESE. moderate breeze, high sea, and rain. 2d to 7th, lat. 36° 50′ to 39° 44′ N., long. 53° 16′ to 63° 39′ W., barometer 28.53 inches, S. to WSW. gales, with heavy sea. 7th, 35° 30′ N., 69 W., heavy NE. gale. 8th, 45° 29′ N., 41° 19′ W., W. and ESE. variable wind, very high cross-sea, cloudy and heavy rain; steamer Athenian, from Liverpool for Constantinople, capsized during heavy gale between 50 and 60 miles off Sicily. 9th, 48° 53′ N., 39° 10′ W., E. gale and high sea; 43° 26′ N., 47° 30′ W., fresh NNE. gale, heavy squalls and high sea; 43° 16′ N., 47° 50′ W., fresh ESE. and NE. gale, very high sea, heavy rain; 44° 43′ N., 44° 32′ W., fresh NE. gale and high sea. 10th, 42° 16′ N., 54° 54′ W., moderate NE. and N. gale, and very high sea. 17th, 43° 50′ N., 46° 42′ W., fresh westerly breeze to fresh gale and high sea; 45° 32′ N., 43° 50′ W., fresh NW. breeze and heavy squalls; 48° 05′ N., 29° 00′ W., SW. changeable winds, heavy squalls. 18th, 42° 08′ N., 53° 21′ W., and 43° 40′ N., 48° 07′ W., strong NW. gales, high seas; 36° 50′ N., 57° W., SSE. gale, heavy squalls. 19th, 45° 21′ N., 39° 15′ W., WNW. heavy weather and sea; 50° 58′ N., 13° 14′ W., strong SSW. gale; 49° 38′ N., 23° 07′ W., SW. and NW. increasing wind and sea, moderate gale in morning. 20th, 43° 39′ N., 48° 47′ W., strong NE. to NW. gale and snow-storms; 43° 48′ N., 45° 41′ W., W. and SE. heavy weather and sea; 49° 03′ N., 27° 41′ W., hard NW. gale and heavy W. sea; 50° 39′ N., 18° 03′ W., variable winds, strong gale, and high westerly sea; 48° 37′ N.,

28° 01′ W., violent WNW., SW., and NW. gale, very high westerly sea. 21st, heavy gale along northern coast of Spain; 42° 30′ N., 56° 14′ W., NW. storm and rain; 50° 01′ N., 22° 56′ W., variable, strong gale and high westerly sea; 47° 06′ N., 35° 19′ W., NW. and SSE. gale. 22d, 48° 53′ N., 28° 08′ W., variable winds, strong gales, and high westerly sea; 45° 58′ N., 38° 42′ N., very heavy SW. and NW. gale, and tremendous NW. sea. 23d, 48° 08′ N., 35° 43′ W., strong westerly gale; 47° 53′ N., 33° 18′ W., strong NNW., breeze and squally. 25th, 43° 00′ N., 49° 19′ W., W. to N. by W. strong gale; 44° 41′ N., 43° 22′ W., strong northerly gale, high westerly sea, and terrific squalls. 27th, 47° 53′ N., 33° 11′ W., strong E. gale, high SE. sea.

*Ice at sea.*—April 6th, steamer Northern Light, 3 miles off Cariboo, N. S., in solid field of ice; passengers report Gulf of St. Lawrence and Straits of Northumberland full of ice as far as they could see. 10th, 30 miles east of Newfoundland banks, large iceberg. 16th, 46° 45′ N., 42° 21′ W., very large iceberg. 17th, vessel from St. John's, Newfoundland, at Halifax, N. S., reports saw ice as far as eye could reach; whole of Cape Breton coast up to Canso blockaded 18th, White Bay, Newfoundland, steamer Micmac crushed in ice.

### TEMPERATURE OF THE AIR.

The isothermal lines on Chart No. II illustrate the general distribution of the temperature of the air for the month. Like the preceding month, the average of the mean temperatures is above that for years in every district, and mostly so in the Lake region, as will appear from a reference to the table on the left side of the same chart.

*Minimum and maximun temperatures*, respectively: Maine—at West Waterville, 29° and 65°; Orono, 30°, 68°. New Hampshire—Mount Washington, 15°, 47°; Dunbarton, 34°, 71°. Vermont—Woodstock, 28°, 72°; West Charlotte, 36°, 82°. Massachusetts—Rowe, 32°, 64°; Somerset, 38°, 80°. Rhode Island—Chepachet, 32°, 74°; Newport, 35°, 67°. Connecticut—New London, 37°, 72°; Mystic, 36°, 78°. New York—Waterburg, 27°, 76°; Moriches, 42°, 78°. New Jersey—Vineland, 33°, 85°; Acto, 41°, 82°. Pennsylvania—Franklin, 24°, 78°; Cannonsburg, 32°, 89°. Delaware—Milford, 41°, 80°; Dover, 46°, 80°. Maryland—Woodstock, 34°, 79°; New Market, 40°, 86°. District of Columbia—Washington, 42°, 84°. Virginia—Wytheville, 31°, 83°; near Keswick Station, 44°, 88°. West Virginia—Helvetia, 30°, 86°; Morgantown, 32°, 89°. North Carolina—Highlands, 33°, 75°; Weldon, 45°, 90°. South Carolina—Aiken, 42°, 84°; Charleston, 46°, 84°. Arkansas—Mount Ida, 38°, 88°; Judsonia, 50°, 85°. Tennessee—Knoxville, 37°, 82°; Austin, 42°, 86°. Kentucky—Danville, 41°, 80°; Louisville, 42°, 82°. Ohio—Lewisburg, 30°, 77°; Ringgold, 36°, 86°. Indiana—Richmond, 32°, 77°; Saint Meinrad, 45°, 82°. Michigan—Fort Wayne, 21°, 73°; Detroit, 29°, 74°; Escanaba, 25°, 63°; Northport, 32°, 78°. Wisconsin—Neilsville, 15°, 75°; Embarrass, 30°, 78°; La Crosse, 35°, 77°. Illinois—Riley, 30°, 75°; Cairo, 44°, 83°. Anna, 46°, 85°. Georgia—Gainesville, 42°, 84°; Augusta, 45°, 89°. Florida—Milton, 50°, 86°; Okahumpka, 50°, 92°. Alabama—Montgomery, 45°, 88°; Mobile, 50°, 86°. Mississippi—Brookhaven, 44°, 79°; Vicksburg, 49°, 86°. Louisiana—Baton Rouge Barracks, 40°, 89°; Okalooska, 49°, 89°; Shreveport, 44°, 88°. Texas—Fort McKavett, 34°, 90°; New Ulm, 51°, 92°; Brackettville, 45°, 95°; Rio Grande City, 51°, 109°. Indian Territory—Fort Sill, 32°, 91°; Fort Gibson, 36°, 87°. Missouri—Corning, 33°, 80°; Oregon, 34°, 87°; Springfield, 40°, 86°. Iowa—Logan, 26°, 80°; Guttenburg, 28°, 78°; Fort Madison, 39°, 82°. Minnesota—Minneapolis, 27°, 73°; Breckenridge, 25°, 74°. Dakota—Pembina, 21°, 76°; Fort Randall, 24°, 80°; Lower Brule Agency, 28°, 81°. Nebraska—Fort McPherson, 5°, 80°; Camp Sheridan, 20°, 80°; De Soto, 32°, 88°. Kansas—Fort Hays, 29°, 86°; Creswell, 30°, 88°; Empire City, 40°, 96°. New Mexico—Fort Union, 15°, 78°. Montana—Virginia City, 19°, 65°. Colorado—Pike's Peak, −19°, 34°; Fort Garland, 6°, 70°; Denver, 29°, 80°. Wyoming—Fort Sanders, 12° 65°; Camp Brown, 15°, 73°; Cheyenne, 19°, 71°. Utah—Coalville, 26°, 69°; Salt Lake City, 30°, 73°. Idaho—Boise City, 23°, 77°. Nevada—Winnemucca, 24°, 74°; Camp McDermit, 26°, 82°; Pioche, 21°, 75°. California—Santa Cruz, 36°, 70°; Red Bluff, 35°, 90°; Los Angeles, 41°, 80°. Oregon—Umatilla, 24°, 82°; Roseburg, 29°, 76°. Arizona—Tucson, 36°, 94°.

*Ranges of temperature.*—The *monthly* ranges will appear from an examination of the minima and maxima temperatures just given. *Greatest daily ranges* vary in New England from 13°, least, on Mount Washington, to 36° at Boston; Middle Atlantic States, 16° at Cape May to 33° at Lynchburg; South Atlantic States, 19° at Cape Lookout to 33° at Augusta; East Gulf States, 14° at Key West to 39° at Montgomery; West Gulf States, 19° at Galveston to 36° at Shreveport and 46° at Fort Griffin; Ohio Valley and Tennessee, 23° at Cincinnati to 34° at Pittsburg; Lower Lake region, 22° at Oswego to 36° at Erie; Upper Lake region, 19° at Milwaukee to 27° at Duluth and Marquette; Upper Mississippi Valley, 24° at Saint Louis to 30° at Dubuque; Lower Missouri Valley, 28° at Omaha to 41° at Yankton; Minnesota and Dakota, 24° at Bismarck to 42° at Pembina; Colorado, 34° on Pike's Peak to 41° at Denver; Utah, Nevada, and Idaho, 29° at Salt Lake City to 40° at Winnemucca; California, 16° at San Francisco to 30° at Los Angeles and 41° at Red Bluff and Yuma.

*Ice* is reported to have formed as follows: Dakota, at Norristown, ¼ inch, 6th. Mis-

souri, at Oregon, 3d, 11th. Nebraska, at Geneva, 1st, 3d, 4th. Ohio, at Westerville, 5th, 7th, 11th; at Urbana, ½ inch, 5th. Utah, at Coalville, 10th, 24th. Vermont, at Stafford, 18th; at West Charlotte, 20th.

*Frosts* on the nights of the 24th and 25th of March injured vegetation as follows: In Clarke County, Virginia, peaches, cherries, and other early blossoming fruits nearly all destroyed; at Hagerstown, Md., cherries, peaches, and early fruit somewhat injured. On April 20 peach-blossoms were injured at Winnemucca, Nev.; April 18 flowers were killed on low ground at Kensico, N. Y.

## PRECIPITATIONS.

On Chart No. III is illustrated the general distribution of the rainfall, which includes the melted snow, for the month. On the left side of the same chart will be found a table giving the average precipitation for April by districts. Deficiencies have occurred in the Middle Atlantic States, Ohio Valley, and at Portland, Oreg. In the remaining sections the fall has been above the average, especially in the South Atlantic States, Minnesota, and Dakota.

*Special heavy rains.*—2d, Gulf Hammock, Levy County, Florida (1st to 3d), 4.75 inches; Mayport, Fla. (1st to 3d), 3.00 inches; Saint Augustine, Fla. (1st to 3d), 4.64 inches; 4th, Goldsboro', N. C, (3d, 4th), 2.07 inches; Cape Henry, 2.53 inches; Cape Hatteras, 2.05 inches; 7th, Indianola, 2.73 inches. 8th, Galveston, 3.27 inches; Vicksburgh, 2.40 inches; near Brookhaven, Miss., 210 inches; near Fayette, Miss., 2.50 inches; Fort Barrancas, Florida, 2.75 inches. 9th, Tybee Island (8 a. m. to 10 p. m.), 4.36 inches; Savannah, 3.52 inches; Charleston, 5.26 inches; Gulf Hammock, Fla., 2 inches; Highlands, N. C., 3 inches; Daytona, Fla. (9th, 10th), 2.70 inches. 10th, Goldsboro', N. C. (9th, 10th), 2.25 inches; Lenoir, N. C. (9th, 10th), 2.20 inches; Breckenridge (10th, 11th), 5.12 inches; Vevay, Ind., 2.80 inches; Cape Hatteras, 2.83 inches. 11th, Greenville, N. C., 3 inches. 14th, Fort Rice, Dakota (14th to 16th), 3.94 inches. 15th, near Quitman, Ga. (14th, 15th), 2.60 inches; Saint Mark's, 3.69 inches; Shreveport, 2.92 inches. 17th, Bismarck, 2.35 inches; Deadwood, 3.20 inches; Fort Randall, Dakota (15th to 17th), 2.35 inches; 18th, near Fayette, Miss., 2.30 inches. 19th, Memphis (19th and 20th), 3.59 inches; Mount Sterling, Ill. (in two hours), 3 inches. 21st, Elmira, Ill., 2.40 inches; Neillsville, Wis. (21st and 22d), 2.30 inches; Manitowac, Wis. (21st and 22d), 2.18 inches; Deadwood (21st and 22d), 2.26 inches; Wautoma, Wis., 3 inches. 22d, Anna, Ill. (22d and 23d), 2.35 inches; Indianapolis, 2.04 inches; Empire City, Kans., 2.75 inches; Baxter Springs, Kans., 3.10 inches; Melissa, Tex., 2 inches; Mount Ida., Ark. (22d and 23d), 2.60 inches. 23d, Peoria, Ill., 1.98 inches; McMinnville, Tenn., 2.60 inches; Saint Louis (22d and 23d, in about five hours), 3.75 inches; Memphis, 3.98 inches; Nashville, 2.95 inches; Vicksburgh, 2.93 inches; Judsonia, Ark., 2.10 inches; Springfield, Mo. (22d and 23d), 4.40 inches; Lebanon, Mo. (21st to 24th), 4.49 inches; near Brookhaven, Miss., 2.35 inches; near Fayette, Miss., 2.70 inches; Macon, Miss., 2.25 inches; Fort Barrancas, Florida, 3.48 inches; Green Springs, Ala., 2.50 inches. 24th, Mobile, 2.13 inches; Montgomery, 2.17 inches; Grand Rapids, Mich., 2.61 inches; Martinsville, Ill. (22d to 24th), 5.78 inches. 25th, Cape Henry, Virginia, 2.50 inches. 26th, Milton, Mass. (25th and 26th), 2.20 inches. 27th, Mount Washington (25th to 29th), 9.50 inches; Wolfboro', N. H. (26th and 27th), 2.50 inches. 28th, Rowe, Mass. (27th and 28th), 2.35 inches; Hennepin, Ill., 2.60 inches; Mystic, Conn., 2.10 inches. 29th, Worcester, Mass. (28th to 30th), 3.44 inches; Waltham, Mass. (29th and 30th), 3.08 inches; Southington, Conn., 2.50 inches. 30th, Lawrence, Mass. (29th and 30th), 2.69 inches; Dunbarton, N. H., 2.34 inches.

*Largest monthly rain-falls.*—Mount Washington, 23.41 inches; Memphis, 11.93 inches; Cape Henry, Va., 9.39 inches; Savannah, 9.08 inches; Kittyhawk, N. C., 8.95 inches; Deadwood, Dak., 8.77 inches; Dunbarton, N. H., 8.73 inches; Mount Ida, Ark., and Mount Sterling, Ill., 8.60 inches; Gulf Hammock, Levy County, Florida, 8.85 inches; Saint Mark's, Fla., 7.65 inches; Vicksburg, 7.13 inches; Martinsville, Ill., 8.42 inches; Springfield, Mo., 7.85 inches; Breckenridge, Minn., 7.77 inches; Cape Hatteras, 7.38 inches.

*Smallest monthly rain-falls.*—Kit Carson, Colo., none; Umatilla, Oreg., 0.01 inch; Yuma, Cal., 0.02 inch; Denver, Colo., 0.05 inch; Trinidad, Colo., and Fort Davis, Tex., 0.09 inch; Fort Sanders, Wyo., and Fort Richardson, Tex., 0.07 inch; Pilot Point, Tex., 0.11 inch; Edinburg, Tex., 0.13 inch; Sidney Barracks, Nebr., 0.16 inch; Burkes, Ariz., 0.17 inch; Cheyenne, Wyo., 0.19 inch; Colorado Springs, Colo., 0.20 inch.

*Floods.*—16th and 17th, country covered with water in Suwannee County, Florida, following heavy rains; corn and cotton seeds destroyed by rot. 21st, Deadwood, Dak., high water in rivers and creeks, damaging property; 26th, house washed away. 22d and 23d, Saint Louis, heavy rain; cellars, &c., flooded; washout on Missouri Pacific Railroad. 23d, Memphis, heavy rain; bridges, culverts, and railroad tracks swept away; all streams were bank full; the saw-mills on Wolf River suffered considerably. Mobile, river rose, flooding wharves. 24th, Judsonia, Ark., river very high, slight overflows. 26th, Omaha, high water in Missouri River (14 feet 6 inches); water partly

covered flats, and submerged about 20 yards of the Burlington and Missouri River Railroad track. In Merrimack and Hillsborough Counties, New Hampshire, as follows: 14th to 30th, Contoocookville, river and creeks very high, farming delayed by excessive rains, also injury to mills and railroads; 30th, Dunbarton, rivers very high; Nashua, Merrimack River still rising (now 13 feet above high-water mark); Nashua, river very high; Souhegan River very high, flats at Danforth's Corners flooded. 30th, Sacramento, Cal., submerged portion of city now uncovered, river within its natural banks, gauge reading 19 feet 9 inches; Washington also uncovered.

*Droughts.*—Crops were reported as suffering for want of rain on the 17th at Melissa, Tex.; 24th, Decatur, Tex.; 30th, in northern portion of Missouri.

*High tides.*—3d, Portsmouth, N. C., island partly submerged. 16th, Charleston, very high; Portsmouth, N. C., making roads impassable. 30th, Indianola.

*Hail.*—1st, Utah. 3d, Iowa, Tennessee. 4th, Kansas. 6th, Pennsylvania, and at Greencastle 1 inch in diameter. 7th, California. 8th, Utah. 9th, Tennessee; Martinsville, Ind., 1 inch in diameter. 10th, Iowa, North Carolina. 11th, North Carolina, South Carolina, Virginia; Fayetteville, N. C., size of partridge and hen's eggs, destroying fruit and vegetables, and killing poultry. 12th, New York. 13th, Indian Territory, Wyoming Territory, Iowa, Kansas, Nebraska, British Columbia, Oregon; Cottonwood Falls and Emporia, Kans., 2 to 3 inches in diameter, destroying considerable grain. 14th, Wyoming Territory, Arkansas, California, Illinois, Mississippi, Texas. 15th, Nebraska, Wyoming Territory, Kansas, California, British Columbia. 16th, Kansas, Nebraska, Minnesota, Nevada. 17th, Dakota, Nebraska, California, Kansas, Utah. 18th, Nebraska, Nevada, Mississippi, Wisconsin, 19th, Illinois, Iowa, Michigan, Texas, Minnesota, Pennsylvania. 20th, California, Dakota, New Jersey, New York, California, Utah; near Northport, Mich., as large as hickory nuts, 18 inches deep at places. 21st, Illinois, Iowa, North Carolina, Nebraska; Osceola, Ill., 10 inches in circumference. 22d, California, Missouri, New York, Ohio, Indian Territory, Texas, Minnesota. 23d, Ohio, Wyoming Territory, Texas, Tennessee; at Fort Sill, Ind. Ter., ground covered, stones as large as walnuts. 24th, Indiana, New York, North Carolina, Ohio, Pennsylvania. 25th, Indiana, Kentucky, Ohio, Nevada; Louisville, Ky., considerable damage to fruit trees. 26th, Maryland, New Jersey, New York, North Carolina, Pennsylvania; near Woodstock, Md., ground completely covered. 27th, Colorado, Maryland, Iowa, Michigan, New York, Ohio, Pennsylvania, Virginia. 28th, Delaware, Maryland, New York, North Carolina, Ohio, Colorado, Texas, Virginia, Pennsylvania; near Woodstock, Md., 6 inches deep on a level. 29th, Delaware, Massachusetts, New Jersey, New York. 30th, Kansas; Creswell, Kans., 1 to 2 inches diameter.

*Rainy days.*—The number of days on which rain or snow has fallen, varies as follows: New England, 15 to 23; Middle Atlantic States, 9 to 19; South Atlantic States, 7 to 14; Gulf States, 3 to 11; Ohio Valley and Tennessee, 11 to 16; Lower Lake region, 13 to 17; Upper Lake region, 11 to 17; Upper Mississippi Valley, 11 to 19; Lower Missouri Valley, 8 to 13; at Bismarck and Deadwood, Dak., 19; from Western Kansas and Nebraska to Nevada and Idaho, 5 to 10; California, 4 to 10.

*Cloudy days.*—For New England the number varies from 15 to 24; Middle Atlantic States, 6 to 18; South Atlantic States, 6 to 10; Gulf States, 2 to 13; Western Texas, 2 to 9; Ohio Valley and Tennessee, 6 to 17; Lower Lakes, 8 to 14; Upper Lakes, 7 to 15; Upper Mississippi Valley, 5 to 17; Lower Missouri Valley, 5 to 14; Minnesota and Dakota, 10 to 15; Rocky Mountain region, 3 to 11; California, 3 to 10.

*Snow.*—In Northern New England it fell on the 1st, 2d, 5th, 6th, 7th; Western Virginia, 3d, 5th; Upper Michigan, 5th; Minnesota, 8th, 10th, 11th; Western Dakota, 9th to 22d; Western Nebraska, 8th to 18th; New Mexico, 17th, 22d; Colorado, 8th, 9th; Wyoming, 7th to 9th, 12th to 22d, 24th to 30th; Utah, 14th to 17th, 19th to 21st, 26th; Idaho, 12th, 13th, 20th; Nevada, 9th, 13th to 17th, 19th to 22d, 26th; California, on mountains, 13th, 14th, 16th, 19th, 20th.

*Depth of snow at close of month.*—The following are the only stations reporting snow: Los Angeles, Cal., visible on mountains; summit of Pike's Peak, 24 inches in depth.

## RELATIVE HUMIDITY.

The average percentage of humidity for the month ranges as follows: New England, from 66 at Springfield to 80 at Thatcher's Island; Middle Atlantic States, 56 at Lynchburg to 81 at Atlantic City; South Atlantic States, 64 at Augusta to 77 at Cape Lookout; Gulf States, 62 at Corsicana to 63 at Montgomery and 77 at Galveston; Ohio Valley and Tennessee, 56 at Louisville to 64 at Memphis; Lake region, 63 at Toledo to 78 at Buffalo and Milwaukee; Upper Mississippi and Lower Missouri Valleys, 56 at Saint Louis to 69 at Keokuk; Minnesota and Dakota, 62 at Bismarck to 71 at Breckenridge; Rocky Mountain region, 33 at Denver to 52 at Boise City, Idaho, and 67 at Pioche, Nev.; California, 59 at Red Bluff to 70 at San Francisco. The percentage at high stations averages 66 for Pike's Peak and 92 for Mount Washington.

## WINDS.

The prevailing winds at the Signal-Service stations are shown by the arrows, flying with the wind, on Chart No. II. The maximum velocities, in miles per hour, have been given in the description of the movements of low-pressure areas. On Mount Washington the highest velocity, 102 miles, occurred on the 21st.

*Total movements of the air.*—The following are the largest monthly movements, as recorded at the Signal-Service stations, viz: Pike's Peak, 15,086 miles; North Platte, 12,203; Cape Lookout, 12,046; Umatilla, Oreg., 11,706; Bismarck, 10,862; Cape May, 10,748; Cape Hatteras, 10,744; Breckenridge, 10,620; Dodge City, 10,489; Indianola, 9,853; Sandy Hook, 9,353; Milwaukee, 9,308; Sandusky, 9,299; Barnegat, 9,072. The smallest are: Deadwood, Dak., 1,486 miles; Visalia, Cal., 1,665; San Antonio, 1,973; Knoxville, 2,549; Augusta, 2,744; Shreveport, 3,015; Brackettville, Tex., 3,081; Lynchburg, 3,115; Springfield, Mass., 3,232; Boise City, Idaho, 3,496.

## VERIFICATIONS.

*Indications.*—As worked up and issued to the public three times daily, they have been carefully compared with the actual conditions during the succeeding twenty-four hours with the following results, viz: The percentage verified averages 81.8 for New England; 80.5 for the Middle Atlantic States; 79.6 for the South Atlantic States; 76.7 for the East Gulf States; 78.7 for the West Gulf States; 77.4 for the Ohio Valley and Tennessee; 80.1 for the Lower Lake region; 78.8 for the Upper Lake region; 77.1 for the Upper Mississippi Valley; 76.0 for the Lower Missouri Valley. For all the districts the average verified is 78.7 per cent. By elements the percentage verified averages 85.9 for the weather; 81.3 for the wind direction; 74.1 for temperature; 73.5 for the barometer. There were 17 omissions to predict (5 for weather, 2 for wind direction, 7 for temperature, and 3 for barometer) out of 3,600, or 0.47 per cent. Of the 3,583 predictions that have been made, 219, or 6.1 per cent., are recorded as having completely failed; 176, or 4.9 per cent., as one-fourth verified; 536, or 15.0 per cent., as one-half verified; 576, or 16.1 per cent., as three-fourths verified; 2,076, or 57.9 per cent., as fully verified.

*Cautionary signals.*—Out of 191 signals ordered to be displayed, 117, or 61.2 per cent., were justified by subsequent hourly velocities of 25 miles and over at or within 100 miles of the station, but of these 20 were somewhat late, and 16 were ordered down too soon; 74 were not justified.

## NAVIGATION.

*Stages of water in rivers.*—In the table on the right side of Chart No. III are given the highest and lowest readings of the Signal-Service river-gauges for the month, with the dates. At no point was the "danger line" reached during the month.

*Opening of navigation.*—Upper Missouri, steamer Big Horn made the first trip of season from below, passed Lower Brule Agency on the 1st, arrived at Fort Lincoln the 9th and Bismarck the 10th, left Bismarck on the 12th, and reached Fort Benton, Mont., on the 30th; reported river in good condition, and rising rapidly; this is the earliest trip on record. Lakes, 4th, Duluth, first large steamer left for lower ports; Charlotte, Lake Ontario, first boat arrived. 6th, Rochester, Canadian steamers commenced running. 7th, Northport, Mich., steamers arrived. 10th, Milwaukee, first arrival from Lower Lakes. 12th, Duluth, Minn., two Canadian steamers arrived, first of season and earliest on record. Marquette, navigation opened by arrival of steam barges, reporting water in Sault Ste. Marie Canal one foot lower than last year; depth at entrance of basin, 11 feet 3 inches. In northern portion of New England, 2d, Bangor, Me., ice passed out of Penobscot River; navigation resumed after 93 days of ice. 14th, Sebago Lake, Maine, clear. 13th, Winnipiseogee Lake, New Hampshire, clear of ice; one month earlier than usual. Red River, at Shreveport, navigation good throughout month, but upper river falling and navigation almost suspended on the 30th.

*Canal navigation.*—1st, north branch of Pennsylvania Canal opened. 9th, Delaware and Hudson Canal opened. 15th, Erie and Oswego Canal opened.

## ATMOSPHERIC ELECTRICITY.

*Thunder-storms.*—1st, Florida, Georgia, Nebraska. 2d, Florida. 3d, Florida, Georgia, Missouri, Alabama, North Carolina, Tennessee. 4th, Florida, North Carolina. 6th, Dakota, New Jersey, Ohio, Pennsylvania. 7th, Illinois, Iowa, Kansas, Missouri, Nebraska, Texas. 8th, Dakota, Kansas, Florida, Georgia, Illinois, Louisiana, Mississippi, Missouri, Alabama, Tennessee. 9th, Florida, Illinois, Indiana, Iowa, Ohio, Tennessee, Kentucky, South Carolina, Georgia. 10th, California, Indiana, Kentucky, Missouri, North Carolina, Ohio, Texas, West Virginia, Tennessee, Pennsylvania, Maine. 11th,

Virginia, Delaware, Massachusetts, North Carolina, Pennsylvania, South Carolina, Georgia, New York. 12th, Connecticut, New Jersey, New York, Indiana, Pennsylvania, Vermont, Virginia. 13th, Dakota, Indian Territory, Kansas, Illinois, Indiana, Iowa, Missouri, Nebraska, Ohio, Virginia. 14th, Dakota, Arkansas, Florida, Georgia, Illinois, Indiana, Iowa, Michigan, Mississippi, Missouri, Indian Territory, Alabama, Tennessee. 15th, Florida, Illinois, Indiana, Iowa, Kentucky, Massachusetts, Missouri, Nebraska, North Carolina, Texas, Louisiana, Georgia, Alabama, South Carolina, Tennessee, Virginia. 16th, Dakota, Indian Territory, Kansas, Florida, Illinois, Iowa, Missouri, Nebraska. 17th, Dakota, Kansas, Iowa, Louisiana, Missouri, Nebraska, New Jersey, Indian Territory, Alabama. 18th, Indiana, Illinois, Iowa, Louisiana, Mississippi, Missouri, Minnesota. 19th, Illinois, Indiana, Iowa, Kansas, Louisiana, Michigan, Missouri, Ohio, Pennsylvania, Texas, Wisconsin, Minnesota, Oregon, Tennessee. 20th, Dakota, New York, Delaware, Georgia, Illinois, Maine, Maryland, New Jersey, Ohio, Pennsylvania, California, Nebraska, Texas, West Virginia, Tennessee, Virginia, Vermont. 21st, Dakota, Kansas, Illinois, Indiana, Iowa, Maine, Massachusetts, Nebraska, New Hampshire, New Jersey, New York, California, Minnesota, Wisconsin, Tennessee, Pennsylvania. 22d, Indian Territory, Michigan, New York, Ohio, Illinois, Indiana, Iowa, Kansas, Louisiana, Maryland, Massachusetts, Mississippi, Missouri, Texas, Alabama, Wisconsin, Pennsylvania, West Virginia, Kentucky. 23d, New York, Texas, Arkansas, Florida, Illinois, Indiana, Iowa, Louisiana, Maryland, Michigan, Mississippi, Missouri, New Jersey, Ohio, Pennsylvania, Alabama, Wisconsin, Tennessee. 24th, Florida, Georgia, Indiana, Maryland, Michigan, New Jersey, New York, North Carolina, Ohio, West Virginia, Virginia, Pennsylvania, South Carolina, Tennessee. 25th, Rhode Island, Connecticut, Indiana, Kentucky, Maryland, Mississippi, Missouri, North Carolina, Ohio, Nevada, Virginia. 26th, New York, Virginia, Delaware, Georgia, Maryland, Massachusetts, New Jersey, North Carolina, Pennsylvania. 27th, Colorado, Maryland, New York, Virginia, Michigan, Ohio, Pennsylvania, Texas, Alabama, Wisconsin. 28th, Maryland, Delaware, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Kansas, Texas, Alabama, Virginia. 29th, Dakota, Massachusetts, Minnesota, New York, Rhode Island, Connecticut, Delaware, New Jersey, Pennsylvania, Maryland. 30th, Iowa, Kansas, Massachusetts, Missouri, Nebraska.

*Auroras.*—Vevay, Ind., 2d; Iowa City, Iowa, 5th; Monticello, Iowa, 26th; North Argyle, N. Y., 2d; Escanaba, Mich., 3d; Morgantown, W. Va., 24th; Indianapolis, Ind., 28th; Burlington, Iowa, 19th; Wood's Holl, Mass., 18th; Bangor, Me., 19th; Starkey, N. Y., 14th, 30th; Wappinger's Falls, N. Y., 8th; Wytheville, Va., 27th, 29th, 30th.

*Magnetic phenomena.*—Professor G. Hinrichs, Iowa City, Iowa, reports the average diurnal magnetic range in declination as 8.2 minutes.

*Telegraphic communication interfered with by atmospheric electricity.*—Visalia, Cal., 3d, 2 p. m., wires surcharged with electricity. Pike's Peak, 10th, 13th, and 22d, intense electricity, could not transmit reports; 22d, incessant crackle at lightning arrester; 27th, intense electricity. Concho, Tex., 19th, communication interrupted during thunder-storm; 28th, atmosphere greatly charged with electricity. Mason, Tex., 7th, storm interfered with communication. New London, 29th, air highly charged with electricity, interfering with telegraph wires.

### OPTICAL PHENOMENA.

*Solar halos.*—1st, Mississippi, Ohio, Kentucky. 2d, California, Texas, Alabama, Kentucky. 3d, Illinois, Indiana, Michigan, Ohio. 4th, Iowa, Massachusetts, New York, Ohio, Rhode Island. 5th, Delaware, Georgia, Illinois, Indiana, Iowa, Michigan, New York, Ohio, Kentucky. 6th, Iowa, Connecticut. 7th, Michigan, Ohio. 8th, Pennsylvania, New Hampshire. 9th, Mississippi, New York, Ohio, Rhode Island, Connecticut, Massachusetts. 11th, Illinois, Indiana, Michigan, Pennsylvania, Ohio, Nebraska. 12th, Connecticut, New York, Ohio. 13th, Illinois, Indiana, Iowa, Ohio, Pennsylvania, West Virginia, Kentucky. 14th, Michigan, Pennsylvania, Vermont, California, Ohio, Georgia, Nebraska. 15th, Connecticut, New Jersey, New York, Ohio. 16th, Michigan, New Hampshire, Ohio, Rhode Island, Massachusetts, Connecticut, Texas. 17th, Illinois, Indiana, Michigan, Ohio, Maine. 18th, Massachusetts, New York, Michigan, Ohio, Kentucky, Vermont. 19th, Ohio, Georgia, Virginia, New York, Connecticut. 20th, Connecticut, Maine, Massachusetts, New Hampshire, New York, Ohio, Vermont, South Carolina. 21st, Michigan, New Hampshire, Kentucky. 22d, Connecticut, Iowa, Maine, Massachusetts, Nebraska, New Hampshire, New York, Ohio, Vermont, South Carolina, Rhode Island. 23d, Maine, New York, Ohio, Georgia. 24th, Colorado. 25th, Michigan, Connecticut. 26th, Ohio, Louisiana. 27th, New York, Kansas, Texas, Vermont. 28th, Nebraska. 29th, Michigan, Utah, California, Florida, Connecticut. 30th, Illinois, Iowa, Michigan, and Connecticut.

*Lunar halos.*—5th, Iowa. 7th, Michigan, Utah, Virginia, Nebraska, South Caro-

lina, Georgia, Vermont. 8th, New York, Michigan, Maryland. 9th, Maine, Virginia, Kansas, Missouri, West Virginia, Rhode Island. 10th, Illinois, Missouri, Wyoming Territory, Nebraska, Iowa. 11th, Illinois, Kansas, Maryland, Michigan, Ohio, Texas, Minnesota, Pennsylvania, Kentucky, South Carolina. 12th, Massachusetts, Michigan, Wisconsin, Dakota, Missouri, Ohio, New York, Rhode Island, Nebraska. 13th, Delaware, Maine, Michigan, Ohio, Virginia, Wisconsin, Missouri, West Virginia, Kentucky. 14th, Michigan, Virginia, New York, Kentucky, Florida. 15th, Illinois, New Jersey, New York, Missouri, Minnesota, South Carolina, Pennsylvania, New Hampshire, Texas. 16th, Indiana, Iowa, Michigan, Alabama. 17th, Illinois, Michigan, New Jersey, Ohio, Virginia, Maine. 18th, South Carolina, Massachusetts. 19th, Massachusetts. 22d, New York. 25th, Wisconsin. 29th, South Carolina. 30th, South Carolina.

*Mirage.*—Olivet, Dak., 2d, 3d, 28th, 29th, 30th; Iowa City, Iowa, 22d; New London, Conn., 15th; Starkey, N. Y., 21st.

### MISCELLANEOUS PHENOMENA.

*Botanical.*—Maine: in bloom, 26th, wild strawberry; leafing, 16th, raspberry, lilac; 18th, red maple; 24th, poplar. New Hampshire: in bloom, 14th, trailing arbutus; 16th, elm; 30th, apple; leafing, 20th, red maple, lilac, gooseberry; 30th, maple, elm, birch; 30th, fruit forward. Vermont: in bloom, 4th, 11th, mayflowers; 30th, plum, strawberry; budding, 28th, maple; 30th, grass four inches high. Massachusetts: in bloom, 1st, willow; 2d, trailing arbutus; 5th, cinque foil; 6th, maple, hazel; 10th, lilac, elm; 13th, willow; 3d, dandelion; 14th, alder, poplar, fever bush; 8th, violet; 11th, hyacinth; 18th, forsythia; 19th, magnolia, larch; 17th, anemone, addertongue; 20th, cowslip; 23d, cherry; 25th, plum; 22d, horsechestnut; 28th, hawthorn; 21st, peach; ripe, 23d, rhubarb; leafing, 4th, gooseberry; 6th, currant; 24th, garden pease two inches high. Connecticut: in bloom, 8th, red maple, peach; 21st, shad-bush; 24th, cherry; 27th, pear; 28th, apple; 17th, violet, jonquil; leafing, 10th, syringa; 27th, apple; 15th, rose; 22d, horsechestnut, pear. New York: in bloom, 4th, daffodil; 12th, maple; 14th, dandelion, trailing arbutus; 18th, cherry; 21st, peach, plum; 30th, flowering almond, strawberry, blackalder; 29th, apple, pear; 18th, magnolia; 27th, lilac; 23d, currant, shad-bush; 7th, violet, hyacinth; 15th, crocus, snow-drop; 17th, apricot; leafing, 1st, lilac; 30th, locust; 24th, forest trees; 29th, rye heading, grain in fine condition; 24th, wheat unusually forward. New Jersey: in bloom, 11th, strawberry, pear, maple; 12th, cherry, peach; 14th, plum; 24th, lilac, apple, dogwood, grape; leafing, 25th, forest trees. Maryland: in bloom, 27th, pea; 27th to 30th, wheat heading out. Pennsylvania: in bloom, 10th to 19th, peach; 14th, cherry, plum; 16th, grape; 19th, apple, pear; leafing, 20th, forest trees; 20th to 24th, rye heading; 30th, wheat heading. West Virginia: in bloom, 5th, cherry; 10th, apple, plum; 15th, wheat looks well. Virginia: in bloom, 3d, dogwood, sassafras; 10th, poplar, maple, apple, pear, judas tree; 13th, cherry; 15th, lilac; 19th, fruit formed on all trees, except apple, in the eastern portion of State; in the northwestern portion, cherries formed on the 28th. North Carolina: ripe, 30th, strawberry. Florida: ripe, 23d, strawberry, plum, and dewberry; 1st, blackberry ripening, 15th, plentiful. Mississippi: in bloom, 20th, snap dragon; 22d, gladiola, morning glory; 27th, Carolina pink, wild rose, larkspur, moss rose, portulacca; 27th, oats in full head. Arkansas: in bloom, 1st, white oak; 2d, blackberry; ripe, 1st, maple seed; 11th, strawberry; 24th, cherry. Missouri: in bloom, 2d, black locust; 3d, violet; 4th, crabapple; 5th, cherry; 6th, apple; 7th, dandelion; 8th, strawberry; 11th, lilac; 16th, tulip; 18th, larkspur; 19th, snowball; 20th, honeysuckle, horseradish; 27th, white walnut; 26th, yellow rose; 29th, pea; 22d, blackberry; 26th, potato; ripe, 22d, maple seed; leafing, 5th, maple; 17th, bluegrass heading; 20th, wheat in full head, prospects good. Indian Territory: in bloom, 17th, locust; ripe, 29th, strawberry. Ohio: in bloom, 1st, 11th, 13th, 15th, 17th, peach; 24th, apple, lilac; 4th, pear; 18th, cherry, plum, flowering almond, maple; 21st, redbud; 11th, magnolia; 27th, honeysuckle; 20th, dogwood; 25th, quince; 6th, currant, gooseberry; leafing, 20th to 28th, trees generally; 30th, barley heading; 17th, wheat and tobacco very forward. Indiana: in bloom, 1st, apricot, violet, hyacinth, crocus, narcissus, galanthus, anemone; 3d, redbud, jonquil, flowering almond, wild plum; 8th, cherry, pear; 10th, plum, peach; 15th, pear, cherry, tulip, iris; 17th, apple; 20th, dogwood; 22d, rose; 23d, wheat heading. Illinois: in bloom, 3d, dandelion, pear, elm; 4th, buttercup; 5th, cherry, crabapple, strawberry, blackberry; 7th, lilac; 15th, apple; 18th, plum; 21st, snowball; 22d, roses, mayapple, geranium; 24th, prairie candlestick; 26th, actea; budding, 5th, grapevine; leafing, 21st, grapevine. Michigan: in bloom, 6th, daffodil; 29th, shad-bush; 30th, peach, apple; leafing, 29th, forest trees. Iowa: in bloom, 5th, dandelion; 6th, apple, pear, gooseberry; 7th, cherry, plum; 8th, peach; 20th, lilac, jessamine; 23d, judas tree; 24th, strawberry, currant; 27th, hawthorn; 30th, pea; leafing, 11th, black walnut; 27th, crabapple; ripe, 30th, white maple seed. Wisconsin: in bloom, 19th, plum; 20th, bloodroot, violet, liverwort; 21st, dandelion, clover; 29th, strawberry; 30th, cherry, mountain ash, horsechestnut; 11th, blue iris; 22d, apple; leafing, 29th, willow, balm of

gilead; 30th, currant nearly full bloom. Kansas: in bloom, 5th, crabapple; 7th, apple; 3d, plum; 4th, cherry, pear; 6th, flowering almond; 10th, rose; ripe, 8th, elm and maple seeds. Nebraska: in bloom, 8th, crabapple, plum; 11th, flowering almond, apple, cherry; 13th, strawberry; 2d, wild flowers; 20th, wild cherry and plum; 9th, trees leafing. Dakota, Olivet: 1st, grass commencing to look green; 15th, sufficient growth for stock; prairies mostly green; 20th, cottonwood leafing. Nevada: in bloom, 2d, peach; leafing, 29th, poplar, cottonwood. California, Visalia: 12th, barley and wheat heading.

*Birds.—Wild Geese:* Mount Sterling, Ill., 2d, 17th; Creswell, Kans., 6th, 10th, 11th, 12th; New Bedford, Mass., 7th; Springfield, Mass., 8th; Rowe, Mass., 9th; Contoocookville, N. H., 4th; Flushing, N. J., 25th; Green Castle, Pa., 22d; Woodstock, Vt., 6th; Newport, Vt., 10th; Embarrass, Wis., 19th; Bismarck, Dak., 11th, 25th; Dubuque, Iowa, 30th; Newport, R. I., 7th; Fort Griffin, Tex., 5th. *Martins:* Monticello, Iowa, 10th; Afton, Iowa, 8th; Cornish, Me., 15th; Fallston, Md., 9th; Plattsmouth, Nebr., 10th; Oregon, Mo., 9th; Palermo, N. Y., 4th; Weldon, N. C., 12th, 23d; Bellefontaine, Ohio, 6th; Jacksonburg, Ohio, 11th; Lewisburg, Ohio, 8th; Catawissa, Pa., 1st; Newport, Vt., 20th; Embarrass, Wis., 14th. *Swallows:* Southington, Conn., 25th to 29th; New Corydon, Ind., 18th; Guttenburg, Iowa, 13th; Cornish, Me., 15th; West Waterville, Me., 24th; Somerset, Mass., 2d; New Bedford, Mass., 3d; Litchfield, Mich., 20th; Waltham, Mass., 22d; Palermo, N. Y., 20th; Contoocookville, N. H., 14th; Pleasant Run, N. J., 22d; Wappinger's Falls, N. Y., 16th; Flushing, N. Y., 14th; Bellefontaine, Ohio, 19th; Sandusky, Ohio, 10th; Jacksonburg, Ohio, 11th, 15th; Bethel, Ohio, 23d; Catawissa, Pa., 10th; Chambersburg, Pa., 12th; West Charlotte, Vt., 17th; Woodstock, Vt., 30th; Strafford, Vt., 22d; Wytheville, Va., 15th; Prospect Hill, Va., 13th; Morgantown, W. Va., 13th; Atlantic City, N. J., 2d; Fort Union, N. Mex., 24th; Waterburg, N. Y., 26th. *Whippoorwills:* Laconia, Ind., 9th; Holton, Kans., 14th; Fort Madison, Iowa, 18th; Saint Meinrad, Ind., 14th; Guttenburg, Iowa, 18th; Cresco, Iowa, 23d; Oskaloosa, La., 12th; Fallston, Md., 14th; Plattsmouth, Nebr., 18th; Fayette, Miss., 1st; Oregon, Mo., 27th; Palermo, N. Y., 23d; Kensico, N. Y., 20th; Weldon, N. C., 22d; Murphy, N. C., 3d; Ringgold, Ohio, 17th; near Keswick Station, Va., 10th; Dover Mines, Va., 10th. *Wrens:* Monticello, Iowa, 10th; Plattsmouth, Nebr., 18th; Oregon, Mo., 27th; Palermo, N. Y., 30th. *Cranes:* Monticello, Iowa, 20th; Creswell, Kans., 18th; Oregon, Mo., 16th; Dover Mines, Va., 10th; Fort Griffin, Tex., 4th; Camp Sheridan, Nebr., 4th. *Catbird:* Tabor, Iowa, 23d; Somerset, Mass., 20th; Plattsmouth, Nebr., 18th; Murphy, N. C., 10th; Sandusky, Ohio, 30th; Jacksonburg, Ohio, 28th; Fayetteville, N. C., 1st; Bethel, Ohio, 22d; Prospect Hill, Va., 23d. *Mocking birds:* Baxter Springs, Kans., 15th; Fort Madison, Iowa, 18th; Brookhaven, Miss., 6th; Oregon, Mo., 6th. *Phebes:* Woodstock, Vt., 9th. *King birds:* Baxter Springs, Kans., 16th; Fayetteville, N. C., 1st; Prospect Hill, Va., 29th. *Cuckoos:* Brookhaven, Miss., 24th; Fayette, Miss., 16th. *Prairie chickens:* Fayette, Miss., 18th. *Thrush:* Southington, Conn., 21st; Baxter Springs, Kans., 14th; Somerset, Mass., 8th, 19th; Litchfield, Mich., 20th; Jacksonburg, Ohio, 16th; Woodstock, Vt., 25th. *Humming-birds:* Laconia, Ind., 13th; Fayetteville, N. C., 14th. *Kingfishers:* West Charlotte, Vt., 17th. *Blackbirds:* Cornish, Me., 19th; Woodstock, Vt., 26th; Coalville, Utah, 27th. *Quail:* Brookhaven, Miss., 16th. *Bluejays:* Creswell, Kans., 29th. *Killdeers:* Starkey, N. Y., 2d. *Snipe:* Creswell, Kans., 20th; Litchfield, Mich., 20th. *Pelicans:* Corning, Me., 15th, in large flocks. *Yellow birds:* Palermo, N. Y., 23d; Woodstock, Vt., 15th. *Meadow larks:* Palermo, N. Y., 3d; Embarrass, Wis., 1st. *Grouse:* Cornish, Me., 11th. *Ducks:* Nashville, Tenn., 19th. *Woodpeckers:* Cornish, Me., 2d; Brookhaven, Miss., 4th; Woodstock, Vt., 25th. *Orioles:* Fort Madison, Iowa, 28th; Cornish, Me., 15th; Litchfield, Mich., 30th; Plattsmouth, Nebr., 22d; Oregon, Mo., 27th. *Brants:* Fort Madison, Iowa, 28th.

*Miscellaneous.—Frogs piping:* Vevay, Ind., 2d; Monticello, Iowa, 29th; Cornish, Me., 5th; Standish, Me., 3d; Fall River, Mass., 4th; Palermo, N. Y., 24th; Contoocookville, N. H., 3d; Woodstock, Vt., 11th; Newport, Vt., 18th; Embarrass, Wis., 1st; Dubuque, Iowa, 11th; Camp Sheridan, Nebr., 4th. *Colorado potato-bug:* Laconia, Ind., 18th, numerous; New Market, Md., 29th, in large numbers; Litchfield, Mich., 30th, numerous; Vineland, N. J., 30th, in large numbers; Chambersburg, Pa., 30th, very abundant; Oliver, Dak., 16th. *Fire-flies:* Saint Meinrad, Ind., 16th; New Orleans, La., 6th. *Millers:* Creswell, Kans., 6th. *Bees:* Standish, Me., 10th; Oregon, Mo., 6th; West Charlotte, Vt., 19th; Embarrass, Wis., 29th; Waterburg, N. Y., 26th. *Bats:* Freehold, N. J., 20th; Catawissa, Pa., 22d. *Butterflies:* Somerset, Mass., 7th; New Bedford, Mass., 14th; Catawissa, Pa., 23d; West Charlotte, Vt., 29th. *Wasps:* Oregon, Mo., 7th. *Lady-bugs:* Oregon, Mo., 17th. *Crickets:* Oregon, Mo., 19th. *June-bugs:* Palermo, N. Y., 30th. *Mosquitoes:* Olivet, Dak., 3d, 11th. *Shad:* First caught on the 3d at Wappinger's Falls, N. Y.; 4th, Ardenia, N. Y.; Flushing, L. I., *fishing* better than for 30 years past.

*Meteors.*—Visalia, Cal., 30th; Judsonia, Ark., 11th; Southington, Conn., 18th; Woodstock, Md., 1st, 2d, 5th, 25th, and 26th; Milton, Mass., 29th; Fall River, Mass., 3d; Litchfield, Mass., 20th; Oregon, Mo., 3d; Waterburg, N. Y., 19th and 20th; North Volney,

N. Y., 20th; Wappinger's Falls, N. Y., 3d; Westerville, Ohio, 15th; Green Castle, Pa., 7th; Port Jervis, N. Y., 16th, 12.10 a. m., a large meteor of intense brilliancy passed from south to north, altitude 45°, burst when near northern horizon with a report resembling heavy thunder heard after an interval of nearly two minutes; sky somewhat cloudy.

*Polar bands.*—Baltimore, Md., 8th; New Corydon, Ind., 1st, 3d, 4th, 7th; Guttenburg, Iowa, 12th; Iowa City, Iowa, 17th; Tabor, Iowa, 17th; Gardiner, Me., 3d; Plattsmouth, Nebr., 20th; North Argyle, N. Y., 4th; Vineland, N. J., 22d; Wytheville, Va., 1st, 17th.

*Prairie and forest fires.*—In Kansas every day except 7th, 9th, and 17th; Missouri, 1st, 4th, 5th, 19th, 23d, 28th; Dakota, 2d to 4th, 6th, 12th, 13th, 24th, 28th to 30th; Iowa, 4th; Nebraska, 5th, 24th, 26th; New Jersey, 21st; New York, 12th, 13th.

*Zodiacal light.*—Southington, Conn., 3d, 18th, 21st; Cresco, Iowa, 22d, 27th; Monticello, Iowa, 5th, 6th, 18th, 19th, 20th, 23d, 26th, 27th, 28th, 29th, 30th; Somerset, Mass., 3d, 18th, 19th, 20th, 21st; Fall River, Mass., 21st; Rowe, Mass., 2d; Cambridge, Mass., 3d, 17th, 18th, 19th, 21st; Corning, Mo., 19th, 24th, 26th, 27th; Atco, N. J., 1st, 2d, 21st, 26th, 30th; Tybee Island, Ga., 1st; Waterburg, N. Y., 2d, 19th, 20th, 21st; Bellefontaine, Ohio, 4th; Wytheville, Va., 4th.

*Earthquake.*—On the 15th, at Glendive, Mont., on the Yellowstone, three distinct shocks were felt, following each other at intervals of half an hour. A rent in the ground was reported 500 yards long, revealing a coal vein, and emitting a strong odor of sulphur.

*Sunspots.*—The following observations, made by Mr. D. P. Todd, have been forwarded by Rear-Admiral John Rodgers, U. S. N., Superintendent of the United States Naval Observatory, Washington, D. C., viz: None visible on the 1st, 6th, 7th, 8th, 11th, 12th, 13th, 14th, 17th, 18th, 19th, 21st, 22d, 23d, 25th, 26th, 29th, and 30th. Now, one group and one spot, the 2d; large group of faculæ visible the 5th and 27th.

Prof. G. Hinrichs, Iowa City, Iowa, reports having examined the sun's disk on sixteen days, but without seeing any spots.

Published by order of the Secretary of War.

ALBERT J. MYER,
*Brigadier-General (Brevet Assigned), Chief Signal Officer, U. S. A.*

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PAPER 38.

## MONTHLY WEATHER REVIEW, MAY, 1878.

### INTRODUCTION.

In compiling the present review, the following data, received up to June 14, have been made use of, viz: the regular tri-daily weather charts, containing the data of simultaneous observations taken at one hundred and forty Signal-Service stations and fourteen Canadian stations; monthly journals and means from one hundred and thirty six of the former, and monthly means from thirteen of the latter; reports from twenty-five Special Sunset stations; two hundred and twenty-two reports from voluntary observers; thirty-one monthly reports from United States Army post surgeons; marine records; international simultaneous reports; monthly reports of the weather services of the States of Iowa and Missouri; reliable newspaper extracts and special reports. The most interesting features of the month have been: the return to normal temperatures east of the Rocky Mountains; the number and severity of tornadoes and thunder and hail storms; and the heavy rain-falls along the eastern slope from Dakota to Northern Texas and Arkansas.

### BAROMETRIC PRESSURE.

*In general.*—On Chart No. II is shown the general distribution of atmospheric pressure by the isobaric lines. Compared with the means of previous years, the pressure for the present month is slightly below normal, the deficiency being greatest over New England, where it averages about 0.05 of an inch.

*Barometric ranges.*—These have been somewhat smaller than usual, and vary as follows: In New England, the greatest range was 0.86 inch at Eastport, and smallest, 0.75 at Springfield; Mount Washington, 0.76. Middle States, 0.74 at Albany and New York, and 0.51 at Lynchburg. South Atlantic States, 0.67 at Cape Hatteras, and 0.38 at Tybee Island. Eastern Gulf States, 0.39 at Saint Mark's, and 0.25 at Key West. Western Gulf States, 0.65 at Corsicana, and 0.37 at New Orleans. Ohio Valley and Tennessee, 0.67 at Pittsburg, and 0.42 at Knoxville. Lake region, 0.87 at Alpena, 0.63 at Oswego. Upper Mississippi Valley, 0.79 at Saint Paul, 0.61 at Saint Louis. Missouri Valley, 1.06 at Yankton, 0.80 at Bismarck. Plains of Kansas and Nebraska

(where the largest ranges occurred), 1.19 at Dodge City, and 1.05 at North Platte. Rocky Mountains and Western Plateau, 0.83 at Salt Lake City, and 0.57 at Santa Fé; Pike's Peak, 0.55. Pacific Coast, 0.46 at San Francisco, and 0.28 at Los Angeles.

*Areas of high pressure in general.*—Of these six have been sufficiently well marked to warrant description. No. II was attended by severe frosts from the 11th to the 14th.

No. I appeared during the 1st on the coast of Oregon and Washington Territory; 11 p. m. barometer at Portland, Oreg., 30.35, or 0.28 above the normal, with cool northerly winds prevailing thence to Nevada and Utah; light snow and a southwest gale on the summit of Pike's Peak, with a temperature of 10°. 2d, a. m. barometer at Portland, 30.44, or 0.32 above normal; 11 p. m. barometer at Salt Lake City, 30.18, or 0.32 above normal; cool and clear weather prevailed throughout this region during the day, the minimum temperature at Boise City being 29°; at Winnemucca 31°, and Cheyenne 30°. A heavy northwest snow-storm also prevailed, during latter part of day, from Dakota to Manitoba, severe squalls being reported in the valley of the Red River of the North. 3d, a. m. barometer at Salt Lake City, 30.24, or 0.36 above normal, where the maximum pressure remained throughout the day; a. m. minimum temperatures, Virginia City and Cheyenne, 28°, Bismarck, 27°, and Pembina and Fort Garry, 26°; the northwest snow-storm in the Northwest continued during the early part of the day, and high north and northwest winds and gales during latter part of day at Pike's Peak, in western portions of Nebraska and Kansas, and on the coast of Texas. 4th, the pressure fell from Oregon to Colorado, and continued highest in the Southwest, the lowest a. m. temperature, 30° (except in Dakota and Manitoba), occurring at Santa Fé and Fort Craig, N. Mex. During the day the winds in the Southwest changed from northerly to southwesterly, a severe southwest gale and high sea being reported off the mouth of the Brazos River. 5th, the highest pressure was over the Gulf of Mexico, with brisk to high northerly winds in the East Gulf. Cautionary off-shore signals were ordered on the morning of the 3d at Indianola and Galveston, and were justified by north winds of 34 and 39 miles respectively.

No. II formed in the Rocky Mountain region during 7th, in rear of storm-area No. V, and extended eastward. 8th, a. m. barometers above normal at Santa Fé, 0.28 inch; at Dodge City, 0.29, and at Cheyenne and North Platte, 0.26; minimum temperature, 30° at Cheyenne; northerly winds extended over the Southwest, with occasional heavy rains; cautionary off-shore signals were ordered at Indianola and Galveston, the former of which was justified by a wind of 34 miles. 9th, the maximum pressures continued over the western plains and Missouri Valley; 11 p. m. barometers at Dodge City, North Platte, and Yankton, 0.42, 0.41, and 0.38 above normals, respectively. 10th, minimum a. m. temperatures were reported: at Deadwood and Breckenridge, 30°; Cheyenne, 31°; Pembina, Marquette, and Rockliffe, 32°; 11 p. m. barometers at Fort Gibson, Yankton, and Pembina, 0.30, 0.32, and 0.35 above normals, respectively; generally clear or fair weather prevailed west of the Mississippi, excepting light rains in Southern Texas and New Mexico, but during the 11th and 12th cloud and rain increased from Texas to Dakota, the storm-center, No. VIII, probably developing in this region. 12th, a. m. barometers at Yankton, Breckenridge, and Pembina, 0.35, 0.36, and 0.36 inch above normals, respectively; minimum temperatures, Pembina and Fort Garry, 24°; Yankton and Escanaba, 28°. 13th, a. m. barometers at Yankton, Breckenridge, and Pembina, 0.23, 0.27, and 0.28 above normals, respectively; minimum temperatures, Pembina, 28°, Port Stanley, 29°, Breckenridge, Escanaba, Alpena, and Rockliffe, 30°. 14th, a. m. barometer at Escanaba, 30.14, or 0.16 above normal; minimum temperatures, Saugeen, 27°, Escanaba, 28°, Alpena, 30°, Marquette, Parry Sound, and Rochester, 31°. 15th, a. m. barometer at Father Point, 30.14, or 0.24 above normal, and at Chatham, 30.16, or 0.23 above normal; minimum temperatures, Rockliffe, 27°, Saugeen, Parry Sound, and Chatham, 28°. From the 11th to the 14th quite severe and destructive frosts occurred in Iowa, the Lake States, Maryland, New Jersey, and New England; ice formed very generally, and snow was reported in Dakota, Iowa, Ontario, New York, Pennsylvania, and northern portions of New Hampshire and Vermont.

No. III appeared over Lake Superior during the night of the 16th, and on the 17th extended eastward over the Lake region. 18th, a. m. barometer at Saugeen, 0.26 inch above normal; 11 p. m. barometer at Father Point, 0.34 above normal. On the morning of the 19th it appeared central over the Gulf of Saint Lawrence, and the isobar 30.10 included the whole Atlantic States. During the 20th the pressure gradually gave way in advance of storm-area No. IX, and during the 21st this area disappeared to the eastward.

No. IV appeared during the 20th, in the Northwest, in rear of storm-area No. IX, the isobar 30.10 extending southeastward to Lower Michigan, Indiana, and Western Tennessee by the morning of the 21st; southwestward of this area easterly winds and increasing cloudiness prevailed in advance of storm-area No. XII. Morning of the 22d, isobar 30.20 included the Lake region, the pressure being 0.31 above normal at Escanaba, Saugeen, and Parry Sound; minimum temperatures, Parry Sound, 32°, and Rockliffe, 31°. During the day the center remained almost stationary, but with a

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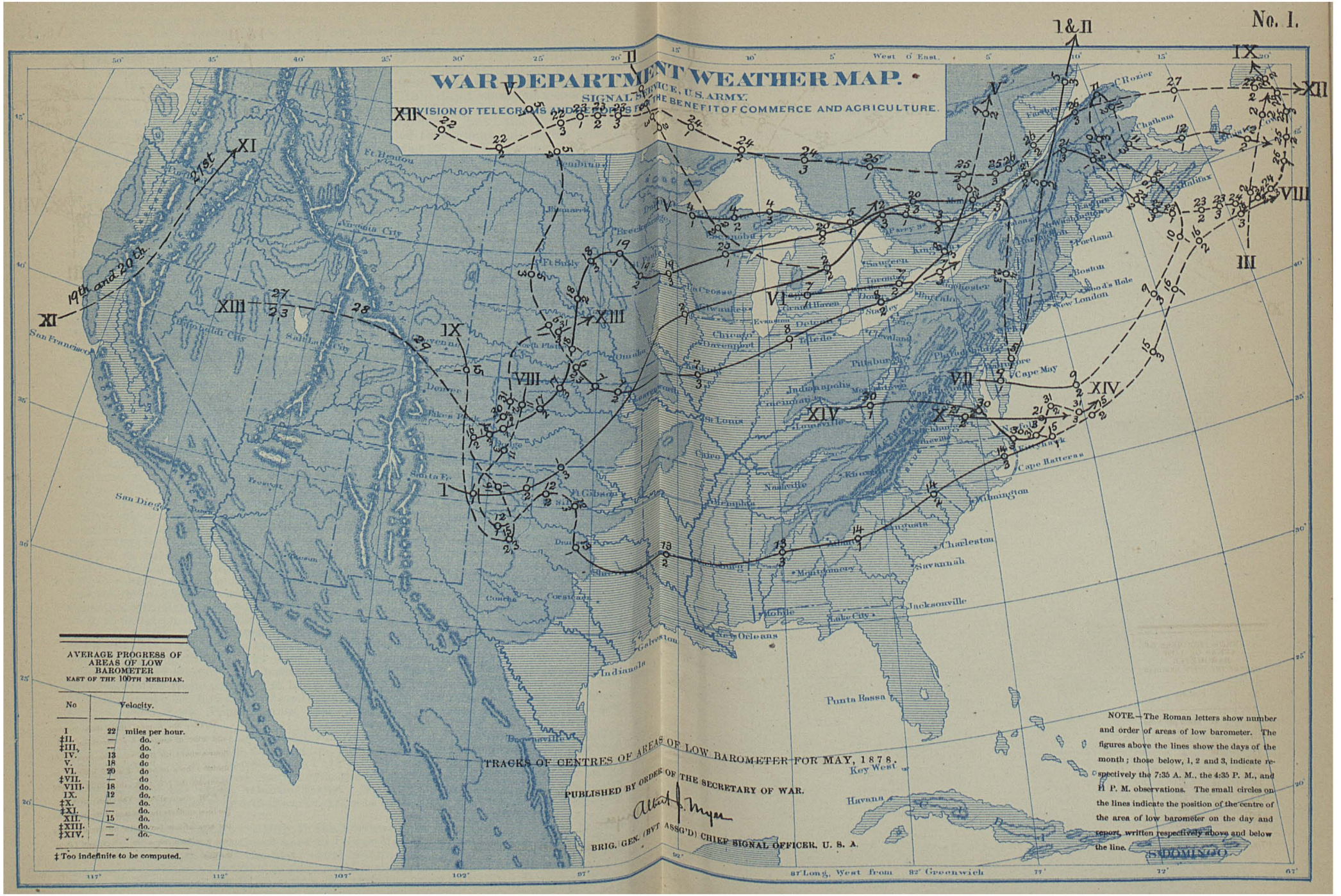
No. I.

# WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U.S. ARMY.

COMPILATION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.




AVERAGE PROGRESS OF AREAS OF LOW BAROMETER EAST OF THE 100TH MERIDIAN.

| No | Velocity. | |
|---|---|---|
| I. | 22 | miles per hour. |
| ‡II. | — | do. |
| ‡III. | — | do. |
| IV. | 13 | do |
| V. | 18 | do |
| VI. | 20 | do |
| ‡VII. | — | do |
| VIII. | 18 | do. |
| IX. | 12 | do. |
| ‡X. | — | do. |
| ‡XI. | — | do. |
| XII. | 15 | do. |
| ‡XIII. | — | do. |
| ‡XIV. | — | do. |

‡ Too indefinite to be computed.

TRACKS OF CENTRES OF AREAS OF LOW BAROMETER FOR MAY, 1878.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

NOTE.—The Roman letters show number and order of areas of low barometer. The figures above the lines show the days of the month; those below, 1, 2 and 3, indicate respectively the 7:35 A. M., the 4:35 P. M., and 11 P. M. observations. The small circles on the lines indicate the position of the centre of the area of low barometer on the day and report written respectively above and below the line.

87° Long. West from 82° Greenwich

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No. II.

AVERAGE TEMPERATURES FOR MAY.

| DISTRICTS. | Average for May. Signal Service Observations. For several years. | Average for May. Signal Service Observations. For 1878. | Comparison of May, 1878, with the average for several years. |
|---|---|---|---|
| St. Lawrence valley | 54°.0 | 53° | 1°.0 below. |
| New England | 54 .5 | 56 .2 | 1°.7 above. |
| Middle Atlantic States | 62 .2 | 62 .6 | 0°.4 above. |
| South Atlantic States | 71 .7 | 73 .4 | 1°.7 above. |
| Gulf States | 74 5 | 75 .2 | 0°.7 above. |
| Ohio valley and Tennessee | 67 1 | 65 .6 | 1°.5 below. |
| Lower Lake region | 54 .8 | 55 .2 | 0°.4 above. |
| Upper Lake region | 50 .9 | 50 .9 | Normal. |
| Upper Mississippi valley | 62 .4 | 58 .0 | 4°.4 below. |
| Lower Missouri valley | 64 .8 | 61 .4 | 3°.4 below. |
| Upper Missouri valley | 58 .4 | 52 .6 | 5°.8 below. |
| Minnesota | 54 .2 | 50 .9 | 3°.3 below. |
| Rocky Mountains stations | 49 .7 | — | |
| Pacific Coast | 58 .2 | 59 .4 | 1°.2 above |

TEMPERATURES OF WATER FOR MAY, 1878.

| STATIONS. | Temperatures at bottom. Maximum. | Temperatures at bottom. Minimum. | Average depth of water. Feet. |
|---|---|---|---|
| Alpena | 61° | 46° | 12 |
| Augusta | 78 | 68 | 7 |
| Baltimore | 68 | 55 | 11 |
| Buffalo | 60 | 52 | 13 |
| Charleston | 80 | 70.5 | 42 |
| Chicago | 59 | 53 | 8 |
| Cleveland | 63 | 55 | 14 |
| Detroit | 59 | 51 | 22 |
| Duluth | 47 | 45 | 11 |
| Eastport | 42 | 38 | 18 |
| Escanaba | 51 | 43 | 21 |
| Galveston | — | — | — |
| Grand Haven | 63 | 47 | 19 |
| Jacksonville | 86 | 76 | 12 |
| Key West | 88 | 78 | 16 |
| Marquette | 49 | 44 | 15½ |
| Milwaukee | 53 | 47 | 20 |
| Mobile | 82 | 69 | 17 |
| New London | 56 | 49 | 12 |
| New York | 64 | 55 | 15 |
| Norfolk | 75 | 59 | 24 |
| Portland, Maine | 53.5 | 46 | 26 |
| Punta Rassa | — | — | — |
| San Francisco | — | — | — |
| Sandusky | 67 | 56 | 10 |
| St. Marks | 76 | 69 | 18 |
| Savannah | 85 | 72 | 8 |
| Toledo | 68 | 56 | 11 |
| Wilmington | 79 | 65 | 14 |
| Wood's Holl | 59 | 51 | 8 |

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No. III.

AVERAGE PRECIPITATION FOR MAY.

| DISTRICTS. | Average for May. For many years. | Average for May. For 1878. | Comparison of May, 1878, with the average for many years. |
|---|---|---|---|
| | Inches. | Inches. | |
| St. Lawrence valley | 3.58 | 3.19 | 0.39 deficiency. |
| New England | 4.10 | 2.73 | 1.37 deficiency. |
| Middle Atlantic States | 3.65 | 4.81 | 1.16 excess. |
| South Atlantic States | 4.00 | 3.90 | Normal. |
| Eastern Gulf States | 3.89 | 4.81 | 0.92 excess. |
| Western Gulf States | 3.70 | 5.49 | 1.79 excess. |
| Tennessee | 3.55 | 2.79 | 0.76 deficiency. |
| Ohio Valley | 3.68 | 3.22 | 0.46 deficiency. |
| Lower Lake region | 3.20 | 3.21 | Normal. |
| Upper Lake region | 3.45 | 3.32 | 0.13 deficiency. |
| Upper Mississippi Valley | 3.60 | 3.83 | 0.23 excess. |
| Lower Missouri Valley | 4.10 | 5.23 | 1.13 excess. |
| Upper Missouri Valley | 4.00 | 3.59 | 2.41 deficiency. |
| Minnesota | 2.60 | 2.61 | Normal. |
| California Coast | 0.53 | 0.37 | 0.16 deficiency. |
| Portland, Or. | 1.97 | 2.17 | 0.20 excess. |

HEIGHTS OF RIVERS ABOVE LOW-WATER MARK, MAY. 1878.

| STATIONS. | Danger point on gauge. ft. | Danger point on gauge. in. | Highest water. Date. May. | Highest water. Height. ft. | Highest water. Height. in. | Lowest water. Date. May. | Lowest water. Height. ft. | Lowest water. Height. in. |
|---|---|---|---|---|---|---|---|---|
| RED RIVER. | | | | | | | | |
| Shreveport | 29 | 9 | 31 | 21 | 0 | 1 | 15 | 10 |
| MISSOURI. | | | | | | | | |
| Yankton | 20 | 0 | 26 | 10 | 8 | 19-20 | 6 | 8 |
| Omaha | 16 | 0 | 28-29 | 16 | 10 | 20 | 9 | 0 |
| Leavenworth | 21 | 0 | 31 | 16 | 4 | 17 | 9 | 5 |
| MISSISSIPPI. | | | | | | | | |
| St. Paul | 14 | 6 | 1-2 | 6 | 2 | 31 | 4 | 1 |
| La Crosse | 18 | 0 | 1-2 | 4 | 5 | 31 | 1 | 11 |
| Dubuque | 21 | 10 | 3 to 6 | 8 | 6 | 29 | 5 | 4 |
| Davenport | 15 | 0 | 9 | 7 | 1 | 28 | 3 | 8 |
| Keokuk | 14 | 6 | 5 | 8 | 3 | 29 | 4 | 10 |
| St. Louis | 30 | 0 | 30 | 23 | 2 | 18 | 18 | 0 |
| Cairo | 40 | 0 | 1 | 35 | 3 | 19 | 26 | 6 |
| Memphis | 34 | 0 | 1-2 | 29 | 11 | 19 | 21 | 3 |
| Vicksburg | 41 | 0 | 8 to 14 | 40 | 7 | 27-28 | 37 | 5 |
| New Orleans* | — 2 | 6 | 19-20 | — 3 | 6 | 1 | — 4 | 6 |
| CUMBERLAND. | | | | | | | | |
| Nashville | 42 | 0 | 22 | 15 | 10 | 29-30 | 5 | 9 |
| OHIO. | | | | | | | | |
| Pittsburgh | 20 | 0 | 1 | 11 | 0 | 30-31 | 3 | 5 |
| Cincinnati | 50 | 0 | 3 | 30 | 5 | 31 | 13 | 10 |
| Louisville | 24 | 0 | 4 | 11 | 3 | 29 | 7 | 3 |
| SAVANNAH. | | | | | | | | |
| Augusta | — | — | 7 | 8 | 4 | 31 | 5 | 6 |
| MONONGAHELA. | | | | | | | | |
| Morgantown | 23 | 0 | 1 | 5 | 4 | 31 | 1 | 9 |
| Pittsburgh | 20 | 0 | 1 | 11 | 0 | 30-31 | 3 | 5 |
| ALABAMA. | | | | | | | | |
| Montgomery | — | — | — | — | — | — | — | — |

*Below low-water.

decrease of pressure, and, during the 23d, this area was either dissipated or moved off to the northeastward.

No. V.—The pressure rose during the 22d in Oregon, Washington Territory, and Idaho, with clearing, followed by clear weather; remained high during the 23d, and reached the maximum at Portland, Oreg., on the morning of the 24th; a. m. barometer 30.34, or 0.22 above the normal. During the rest of the day, however, the pressure fell in this district, but rose at the Rocky Mountain stations. 25th, a. m. barometer at Cheyennne and Denver, 0.24 and 0.27 above normals; the pressure remained high in this region throughout the 25th, but on the 26th this area was probably dissipated in advance of low-pressure area No. XIII.

No. VI.—This area appeared over Manitoba on the 27th; spread over the Lake region during the 28th, and over Lower Canada and northern portion of New England during the 30th and 31st.

*Areas of low pressure in general.*—Of these, thirteen have been well marked and their tracks are shown on Chart No. I. The most severe were Nos. I, V, VIII, IX, and XII, the last being accompanied by the severe tornadoes of the 23d in Wisconsin and Illinois. Nos. II, IV, VI, VII, and X were subsidiary areas.

No. I.—This area of low pressure probably developed in the Southwest during the 1st, when brisk to high southerly winds were reported in Northern Texas and Indian Territory, and (at 11 p. m.) high northwest to northeast winds in Colorado, and Western Kansas; during the night of the 1st, it moved northeastward, and heavy rains were reported at Leavenworth, Des Moines, and Dubuque. During the 2d, it passed eastward over the Lake region, accompanied by brisk and high winds and light rains. Cautionary signals were ordered up on the morning of the 2d, on Lakes Michigan, Huron, and Erie, and maximum velocities were reported, as follows: Chicago, SW., 25 miles; Port Huron, S., 36; Sandusky, SW., 32, and Cleveland, S., 48. 3d, the lowest pressure apparently remained north of Lake Ontario and New York, with continued rain, cloudy weather, and thunder-storms in the Lower Lake region, and thence southwestward to the Gulf coast. 4th, the lowest pressure probably continued in Northeastern New York, the barometric trough extending southwestward along the Appalachian chain to Virginia; a severe thunder-storm occurred in Florida from 5.40 to 9.30 p. m.—maximum velocity at Punta Rassa, NW. 36. At 7.35 a. m. of the 5th the lowest pressure was recorded at Cape May, 29.57, or 0.46 inches below the normal; wind S. 31 miles. Northerly winds prevailed from Philadelphia to Washington, and westerly from Lynchburg to Wilmington; a severe thunder-storm, with hail, passed over Wilmington at 3 a. m.; wind NW., 52 miles; steamer Northeast blown ashore in Cape Fear River. At 4.35 p. m. the center had apparently withdrawn to the northward; Quebec, 29.48, or 0.41 inches below normal, wind N., gale; heavy rain-falls were recorded on the North Carolina and New Jersey coasts, in the Hudson River Valley, and over Lake Champlain, and a severe gale prevailed on the New England coast. At 11 p. m. the center had passed to the northeast; Father Point barometer, 29.40, or 0.46 inches below normal, wind S., 19. Cautionary signals were ordered, at midnight of the 2d, from Sandy Hook to Cape May, and, on the morning of the 3d, from Cape Lookout to Wood's Holl. At 4 p. m. and midnight of the 3d all signals were ordered down, but were again hoisted, on the morning of the 4th, at Cape May and on the coast of North Carolina. Morning of the 5th signals were ordered up on the coast of New England, from New York to Wood's Holl. The following maximum velocities were recorded: 3d, Cape May, S., 36, and Kittyhawk, SW., 32; 4th, Kittyhawk, W., 48, and Cape May, S., 36; 5th, Cape Lookout, SW., 50; Cape Hatteras, SW., and Kittyhawk, W., 48, and Wood's Holl, S., 45.

No. II.—During the 1st a low-pressure area existed in Manitoba. 2d, a. m., barometer at Pembina 29.56, or 0.39 inches below normal; during the day and night it was followed by high NW. winds and snow, the area probably joining area No. I.

No. III was probably a depression passing northward off Nova Scotia and Cape Breton.

No. IV.—During the early morning of the 4th the pressure fell at Duluth, with light rain, and a small area of low barometer, probably formed over western portion of Lake Superior, which moved eastward during the day over Northern Michigan. Morning of the 5th it was north of Lake Huron, and probably joined area No. I.

No. V.—As high-pressure area No. I moved towards the Southwest the pressure fell rapidly, and, during the 5th, an extensive area of low pressure appeared in the Northwest. At 4.35 and 11 p. m. the minimum pressure was recorded at Pembina (29.44 or 0.38, and 29.42 or 0.44 below normals, respectively), but at both these times of observation the low-pressure area appeared to extend southwestward to Salt Lake City (29.55 or 0.31 inches, and 29.61 or 0.25, respectively). Brisk southwest to northwest winds, with partly cloudy weather, prevailed in Nevada and Utah, and, with rain, in Idaho; rain and sleet also prevailed in Montana and Dakota. 6th, the low area moved southeastward, and, at 11 p. m., was central from Kansas to Iowa, followed by high northerly winds in Nebraska and heavy rains in Wyoming and Colorado, and preceded in the Upper Mississippi Valley and Lake region by southerly winds, increasing cloud-

iness, and light rains. On the night of the 6th a subsidiary center formed in the Lake region, and, at 7.35 a. m. of the 7th, was central in Lower Michigan; it will be treated as area No. VI. During the 7th the present area moved eastward to Illinois, preceded by a thunder-storm on Lake Michigan. During the night it passed eastward to Northern Indiana, with severe wind and rain-storms in its SW. quadrant; at 3 a. m., 8th, a severe wind and rain-storm passed over Memphis, and heavy rains fell in the valley of the Arkansas River. During the 8th it passed over the Lower Lake region, accompanied by light rains, and, on the 9th, disappeared to the northeastward. Cautionary signals were ordered up, morning of the 9th, along the New Jersey and New England coasts, but were only justified at Eastport, Me.—maximum wind E. 30 miles.

No. VI.—This area probably formed during the night of the 6th, in Wisconsin, subsidiary to area No. V; 7th, was central in the Lower Lake region, accompanied by numerous thunder-storms thence to the Ohio Valley, and, by morning of the 8th, had disappeared. Cautionary signals were ordered a. m. of the 7th on Lakes Huron, Erie, and Ontario. Maximum wind velocity, Cleveland, SW., 36 miles.

No. VII was also subsidiary to storm-area No. V, and appeared as a separate depression, on the morning of the 9th, over the Middle Atlantic coast. During the latter part of the 8th heavy thunder-storms were reported in Virginia; at Richmond a violent storm of wind, rain, and hail was reported; 9th, 4.35 p. m., the center had passed off the coast, and was followed by brisk northeast to northwest winds and clearing weather; 10th, moved northeastward to Nova Scotia, accompanied by coast rains; 11th, remained over the Canadian maritime provinces, and, on the 12th, moved eastward, followed by westerly winds and clearing weather.

No. VIII probably developed during the 11th over the high lands of Northwestern Texas and Western Kansas; at 11 p. m. high northeast winds prevailed in latter section, and southeast winds and cloudy weather thence to the Lower Mississippi Valley and East Gulf coast; northeast winds and rain in Kansas and Missouri. 12th, remained in the Southwest, but on the 13th moved eastward to Alabama, accompanied by cloudy weather and light rains from the Gulf coast to the Ohio Valley. At 7.35 a. m., 14th, it was central in Georgia, with south to east winds, threatening and cloudy weather, and light rains thence to the South Atlantic coast and Virginia. The cautionary signals, ordered up on the morning of the 12th, in advance of a small depression, which had probably developed during the early morning in the interior of the South Atlantic States, were continued, and signals were also ordered up, on the morning of the 14th, at Wilmington and Smithville. At 4.35 p. m. it was central in South Carolina, and brisk to high southeast winds prevailed along the coast from Cape Lookout to Cape Henry; 11 p. m. central on coast of North Carolina, SE. to NE. gales and heavy rains prevailing from Hatteras to Henry; steamer Resolute, 60 miles off Hatteras in Gulf stream, reports "regular cyclone," and steamer Columbus, 60 miles north of Hatteras, "severe easterly gales from SE. to NE. and N., with terrific squalls and bad cross-seas." 15th, 7.35 a. m., center had passed off the coast, and E. to NW. high winds and gales prevailed on the New Jersey and North Carolina coasts; unusually high tides occurred, and Chesapeake Bay was considered too rough for Baltimore steamers to leave; ship Eastern Star, latitude 30° 30′ N., longitude 74° W., reports "heavy gale backing to NE., and blowing hurricane for 18 hours." During the rest of the day the winds along the coast decreased, with clearing weather, and the storm-center moved northeastward, with light rains along the New England and Nova Scotian coast. Cautionary signals were ordered up, afternoon of the 14th, from Cape May to Sandy Hook, and, morning of the 15th, from New York to Eastport. Maximum velocities—Smithville, SE., 31 miles; Capes Lookout and Henry, NE., 48; Cape Hatteras, SE., and Kittyhawk, N., 56; Atlantic City, NE., 44; Barnegat, E., 45; Sandy Hook, NE., 36; and Thatcher's Island, NE., 32. In rear of this storm the temperature fell quite low, and severe frosts were reported on the morning of the 16th in Pennsylvania and Virginia.

No. IX.—During the 15th high temperatures were recorded in Northwestern Texas and New Mexico; south to east winds, occasionally high, from the West Gulf coast to Iowa, and northerly winds from New Mexico to Wyoming; heavy rains and thunder-storms occurred in Southern Texas, Indian Territory, and Nebraska. At 4.35 p. m. the lowest barometers were at Dodge City (29.14, or 0.18 inches below normal) and Fort Sill (29.42, or 0.24). On the 16th heavy snows and rains were reported in Utah and Colorado, and at 11 p. m. the lowest barometers were at Cheyenne (29.64, or 0.26 below normal) and Denver (29.57, or 0.36), the latter being the lowest pressure recorded at the station during the month. A southwest gale of 52 miles prevailed on Pike's Peak, with light snow. 17th, the center moved slowly eastward, preceded by brisk to high southerly winds and high temperatures in Northern Texas and Indian Territory (92° at Fort Griffin 4.35 p. m.), and followed by northerly winds and low temperatures from New Mexico to Dakota (35° at Santa Fé, 11 p. m., with snow). 18th, center moved northward from Kansas and Nebraska to Southern Dakota; a terrific thunder-storm passed over Leavenworth during the early morning; during the middle of the day heavy rains fell at Corsicana, Dodge City, and Lexington, and during the

evening severe winds and rain-storms, as follows: Vicksburg, 7 p. m., terrific rain and wind storm—maximum velocity 55 miles, rain-fall 2.14 inches; Carolina Landing (50 miles north of Vicksburg), destructive tornado—buildings destroyed; Little Rock, heavy and destructive storm; Saint Louis, very heavy wind and rain-storm—much damage—maximum velocity at 1 p. m., NW., 60 miles; Poseyville, Ind., tornado. On the 19th heavy rains fell at New Orleans, Mobile, and Punta Rassa, viz, 3.54, 1.58, and 3.10 inches, respectively; at Punta Rassa wind NW., 36, veering to E. 32 miles, during heavy thunder-storm from 7.25 p. m. to midnight. 19th, center moved eastward to Southern Minnesota, and the area of cloud and rain extended over the Lake region; a thunder-storm, high winds, and rough seas occurred on Lake Michigan. 20th, center passed into Ontario; a severe SW. gale prevailed at New Corydon, and a terrific thunder-storm at Logansport (1.30 a. m), Ind.; disastrous hail and rain storm at Wheeling, W. Va., and severe thunder-storms at Cleveland, Rochester, and Toronto. Cautionary signals were ordered up on Lakes Superior and Michigan at midnight of the 17th; Huron and Erie during the 18th; and on Ontario on the 19th. Maximum velocities—Duluth, NE., 42 miles; Milwaukee, E., 36; Port Huron, W., 36; Toledo, SW., 48; Sandusky, W. 39; Cleveland, S., 49; and Erie, S., 34. 21st, center moved into the Saint Lawrence Valley; between 2 and 3 a. m. heavy thunder-storms were reported at Baltimore and Newark, and a subsidiary area, No. X, formed during the day in Virginia. During the 22d the present area passed southeastward to the Atlantic, and rains continued for several days in the Canadian maritime provinces, which were especially heavy in Nova Scotia during the 22d and 23d. Cautionary signals were ordered on the 19th from Cape Lookout to Sandy Hook, and on the 20th from New York to Eastport. Maximum velocities—Sandy Hook, SE., 34; New London, SE., 36. On the 22d, as the storm-center passed southeastward from the Saint Lawrence Valley to the Atlantic, a velocity of 81 miles per hour was recorded on the summit of Mount Washington.

No. X probably formed during the latter part of the 20th in West Virginia, passed southeastward during the 21st over Virginia, and thence off the coast of North Carolina.

No. XI.—This area was first noticed in California and Nevada on the 19th, where it was accompanied by rain, and, in the mountains, snow; lowest pressure at San Francisco, 4.35 p. m.; 20th, 29.68, or 0.30 below normal. 20th, rain extended to Idaho, Utah, and Colorado. 21st, 4.35 p. m., lowest pressure at Portland, Oreg., 29.79, or 0.28 below normal.

No. XII.—During the 21st, while high-pressure area No. X was central over the Upper Lakes, easterly winds and increasing cloudiness prevailed from Texas to the Northwest; heavy rains and SE. gales prevailed in Wyoming, Colorado, and Western Kansas, and a severe E. thunder-storm, followed by floods, in Northern Texas. 22d, the lowest pressure was probably north of Montana and Dakota, but the barometric trough extended southward to Texas, with southerly winds; northwesterly winds prevailing at the Rocky Mountain stations. At Fort Fetterman a high W. wind prevailed all day, with light rain; in El Paso and Douglas Counties, Colorado, a terrific rain-storm, flooding all streams, and carrying away railroad bridges, &c.; on Pike's Peak a SW. gale all day—maximum velocity 84 miles. 23d, lowest pressure probably in Manitoba (Pembina, 7.35 a. m., 29.48, or 0.42 below normal); cloud and rain extended over Lake region and Ohio Valley; very destructive tornadoes occurred from 3.30 to 6 p. m. at places in Southern Wisconsin and Northern Illinois (which will be more fully noticed under the head of "Tornadoes"), and thunder-storms were general in the Upper Lake region. Cautionary signals were ordered up on Lake Superior and the western shore of Lake Michigan, on the evening and midnight of the 22d, and for eastern shore of Lake Michigan and Lakes Huron and Erie on the 23d. Maximum velocities: Marquette, SE., 30 miles; Milwaukee, SW., 48, and Alpena, W., 28. 24th to 27th, center moved eastward to the Gulf of St. Lawrence, probably about as shown on the chart of storm-tracks; severe thunder-storms were reported on the 25th in North Carolina, where heavy hail did considerable damage to crops, and in New Hampshire; 26th, severe thunder-storm near Providence, R. I., and hail-storm at Cooperstown, N. Y. On the summit of Mount Washington, a severe thunder-storm with hail occurred, during which the wires were so powerfully affected that it was necessary to withdraw the switch cut-out; 27th, hurricane from NW., 102 miles per hour.

No. XIII.—Probably developed in Nevada, Utah, and Southern Idaho on the 27th, while high-pressure area No. VI was in Manitoba. During the latter part of the 26th the pressure fell from California to Utah, and at 11 p. m., 27th, the lowest barometer was at Salt Lake City (29.47, or 0.39 below normal); cloudy and threatening weather and light rains extended thence to Dakota, Nebraska, and Kansas, with high south winds in two latter. 28th, 4.35 p. m.; Salt Lake City, barometer 29.50, or 0.36 below normal, with brisk to high southeast to southwest winds in Nevada and Utah. From 11 p. m., of the 28th, to 11 p. m., 29th, the barometers were lowest at Cheyenne and Denver (ranging from 0.08 to 0.19 below normal), and, during the afternoon of the 29th, the observer on the summit of Pike's Peak reported a southwest gale of 80 miles

per hour, "blowing towards a heavy local storm over the plains about 20 miles to the northeast." During the afternoon of the 30th the center probably moved southeastward to Western Kansas. A very severe hail-storm occurred during the afternoon at North Platte; the observer states "hail fell as large as hens' eggs, some masses of ice weighed 1½ pounds, breaking all glass on W., NW., and N. exposures and cutting holes in tin roofs; temperature fell 21° in 10 minutes; storm extended 15 miles in length and 5 in width." 4.35 p. m. temperature at North Platte, 62°, wind N., 24 miles; Dodge City, 92°, wind SW., 20. During the 31st, the lowest pressure remained almost stationary, but severe local storms occurred in Missouri and Illinois; Springfield, Mo., 5.15 p. m., heavy wind and rain storm—total rain-fall 3.25 inches, maximum velocity of wind 60 miles, veering to N, with hail. Gardner, Ill., tornado, destroying buildings. Davenport, Iowa, severe thunder-storm, wind SE., 48 miles, blowing down trees &c.; "during the severe wind several whirlwinds formed along the river, which gathered up the water and whirled it upward ten to twenty feet in spiral columns."

No. XIV.—During the early morning of the 29th, a severe thunder-storm prevailed in Southern Iowa, accompanied by very heavy rains; six inches fell at Glenwood, Mills County, causing heavy floods, and, during the day the barometric trough extended eastward from area No. XIII throughout the Ohio Valley, in which region a distinct area of low pressure formed by morning of the 30th. This area passed over the Middle Atlantic States during the latter part of the day, accompanied by heavy thunder-storms.

## INTERNATIONAL METEOROLOGY.

April 10, latitude 27° 30′ S., 105° 48′ W., violent hurricane. 11th, Bark Lilly Grace, from Pabellon de Pica for New York, reports: "Experienced terrible hurricane during night, in latitude 36° S., put into Valparaiso, April 24. 21st, 26° N., 56° W., heavy gale; 43° N., 44° W., hurricane, sea mountain high; 38° N., 60° W., heavy seas. 30th, 51° 02′ N., 25° 02′ W., fresh northeast to northwest winds and squalls.

May 1, first arrival of season at Halifax, N. S., from Magdalen Islands, reported unusually mild winter, little snow, and islands clear of ice until February; 48° 26′ N., 31° 40′ W., strong NW. breeze, squalls; 47° 01′ N., 34° 38′ W., heavy NW. rain-squalls; 50° 38′ N., 33° 00′ W., fresh NW. gale, hard squalls and heavy sea. 2d, 46° 28′ N., 38° 16′ W., fresh NW. breeze and squalls; 50° 28′ N., 38° 06′ W., strong NNW. gale, heavy sea. 3d, 44° 36′ N., 44° 52′ W., fresh SSW. gale; 43° 56′ N., 46° 41′ W., stormy, wind SW., much water on deck. 4th, 45° 46′ N., 46° 10′ W., strong W. gale; 49° 26′ N., 29° 37′ W., wind WSW., stormy, rain, and high sea; 42° 58′ N., 49° 20′ W., strong WNW. and NNW. gale, high confused sea; 43° 04′ N., 50° 50′ W., westerly storm, much water on deck; 49° 38′ N., 29° 40′ W., WSW. gale, high sea; 47° 58′ N., 31° 26′ W., SW. gale, high sea; 50° 24′ N., 19° 29′ W., W. gale, rain, high sea; 51° 11′ N., 29° 09′ W. (7.35 a. m., Washington mean time), barometer 29.18, S. 5° W. gale and high sea. 5th, 48° 06′ N., 35° 16′ W., SW. to N., stormy, much rain, and cross-sea. 6th, 49° 31′ N., 27° 56′ W., strong N. to W. gale and heavy sea; 48° 36′ N., 30° 27′ W. hard NW. gale and heavy sea; 51° 06′ N., 16° 38′ W., high NW. sea; 54° 30′ N., 15° 38′ W. (7.35 a. m., Washington mean time), barometer 29.15, S. 68° E. gale with incessant rain. 7th, 47° 58′ N., 35° 18′ W., hard northerly gale and squalls; 49° 12′ N., 19° 43′ W., WNW. stormy, heavy sea; 50° 50′ N., 23° 12′ W., high NW. sea; 54° 50′ N., 20° 59′ W., strong, SE. gale and heavy rain. 9th, 47° 11′ N., 35° 39′ W., high seas; 49° 54′ N., 39° 05′ W., fresh NE. to N. gale, high N. sea. 10th, 45° 37′ N., 43° 25′ W., high seas; 48° 14′ N., 46° 29′ W., dense fog, high sea swell. 11th, 37° N., 69° W., "tornado" from NW.; 46° 10′ N., 53° 15′ W., dense fog and heavy rain. 12th, 43° 37′ N., 58° 52′ W., dense fog; 49° 42′ N., 10° 10′ W., and 49° 48′ N., 8° 45′ W., high seas. 13th, 41° 13′ N., 62° 51′ W., WNW., stormy; 45° 03′ N., 39° 58′ W., WNW. strong wind and high sea; 51° 05′ N., 16° 29′ W., SW. stormy, rain and high cross-sea. 14th, 45° 55′ N., 44° 08′ W., NW. squally, high sea; 49° 55′ N., 24° 47′ W., WNW. rain-squalls; 48° 58′ N., 23° 04′ W., very heavy sea. 15th, 43° 58′ N., 46° 09′ W., high confused sea; 48° 00′ N., 32° 30′ W., high swell; 48° 07′ N., 30° 58′ W., NW. stormy; 49° 57′ N., 5° 00′ W., heavy rain and sea; Saint George's Channel (7.35 a. m., Washington mean time), barometer 29.20, S. 59° W. gale. 16th, 51° 22′ N., 13° 43′ W., squally; 49° 39′ N., 11° 50′ W., heavy sea and rain-showers; 51° 29′ N., 11° 51′ W. (7.35 a. m., Washington mean time), barometer 29.20, S. 27° W. gale, increasing to whole gale and storm, with high sea-swells. 16th and 17th, 38° N., 68° 30′ W., severe hurricane; 49° 25′ N., 18° 13′ W., strong SW. gales, heavy sea, and rain; 49° 37′ N., 7° 11′ W., high W. sea; schooner Belle (from Mobile, May 4th, for Havana), dismasted in squall on 17th, abandoned on the 18th, 60 miles SSE. of Key West; 18th, 51° 26′ N., 15° 08′ W., high sea; 48° 47′ N., 25° 05′ W., high sea, heavy rain-showers; 51° 35′ N., 25° 16′ W. (7.35 a. m., Washington mean time), barometer 29.49, N., 25° W. gale; 49° 37′ N. 12° 15′ W., SW. to W. strong gale, heavy swell, and high sea. 19th, 41° 38′ N., 62° 01′ W., NE. squall; 51° 11′ N., 21° 52′ W., high sea; 40° 37′ N., 15° 53′ W., WNW. heavy gale and high sea. 23d, 51° 03′ N., 14° 22′ W., W. squally; 24th, 44° 29′ N., 62° 46′ W. (7.35 a. m., Washington mean time), barometer 29.80, N. 53° E. gale; 49° 15′ N., 23°

17′ W., fresh N. gale and high sea; 55° 50′ N., 16° 35′ W., N. squalls. 25th, 50° 00′ N., 20° 45′ W., NW. by W. squalls.

*Ice at sea.*—March 14th, 40° N., 56° W., steamship Borussia passed large quantity of ice. 15th, 44° 30′ N., 52° 25′ W., steamship Fernwood saw large iceberg and got fast in a field of drift ice; steered SE. for 5 hours to get free, and during the night passed 10 large icebergs, some of which were 100 feet high; not entirely free until she reached 47° 22′ N., 47° 20′ W.

April 5, Heath Point, Anticosti Island, schooner Mayflower caught in ice and abandoned; during night ice moved and vessel disappeared.

May 1, 43° N., 54° W., iceberg 60 feet high. 4th, vessels at Canso reported obliged to abandon voyage to Magdalen Islands owing to ice; large number of vessels ice-bound near Eastport, P. E. Islands. Bark Presto grounded on Chatham, N. B., bar, May 8; at night the ice came down on her and crowded her up. 10th, 42° 49′ N., 50° W., 5.30 a. m., small iceberg 2 miles distant.

### TEMPERATURE OF THE AIR.

The isothermal lines on chart No. II show the general distribution of the temperature of the air for month. By reference to the table in the left-hand corner of the same chart, it will be seen that the temperature over the entire country has varied but little from the normal for the month.

*Minimum and maximum temperatures* respectively.—Maine: At Gardiner 31° and 72°; Cornish, 40°, 84°; New Hampshire: Mount Washington, 13°, 58°; Dunbarton, 26°, 84°. Vermont: Burlington, 37°, 80°; Woodstock, 32°, 86°. Massachusetts: Springfield, 37°, 81°; Billerica, 42°, 90°. Rhode Island: Newport, 40°, 73°; Connecticut: New Haven, 36°, 80°; Colebrook, 38°, 83°. New York: Waterburg, 32°, 84°; Wappinger's Falls, 36°, 86°. New Jersey: South Orange, 36°, 84°; Vineland, 43°, 86°. Pennsylvania: Tioga, 28°, 82°; Philadelphia, 43°, 88°. Delaware: Dover, 34°, 84°. Maryland: Woodstock, 32°, 83°; Owing's Mills, 37°, 80°. District of Columbia: Washington, 39°, 87°. Virginia: Snowville, 32°, 88°; Dover Mines, 39°, 92°. West Virginia: Helvetia, 34°, 82°. North Carolina: Franklin, 39°,'83°; Goldsboro', 47°, 93°. South Carolina: Aiken, 50°, 94°; Spartanburg, 51°, 92°. Georgia: Gainesville, 50°, 93°; Forsyth, 58°, 94°. Florida: Daytona, 58°, 93°; Houston, 66°, 100°. Alabama: Montgomery, 52°, 94°; Mobile, 55°, 98°. Mississippi: Brookhaven, 52°, 92°; Fayette, 52°, 88°. Louisiana: Point Pleasant, 55°, 88°; Algiers, 58°, 86°. Texas: Clarksville, 51°, 91°; Ferrill, 62°, 98°. Ohio: Hillsboro', 41°, 79°; College Hill, 44°, 83°. Kentucky: Danville, 42°, 81°; Bowling Green, 46°, 89°. Tennessee: McMinnville, 47°, 88°; Austin, 42°, 91°. Arkansas: Mount Ida, 48° 88°; Judsonia, 50°, 90°. Michigan: Detroit, 30°, 79°; Litchfield, 45°, 74°. Indiana: New Harmony, 40°, 84°; Laconia, 45°, 88°. Illinois: Louisville, 37°, 87°; Como, 35°, 83°. Missouri: Wet Glaze, 30°, 87°; Saint Louis, 29°, 97°. Kansas: Manhattan, 33°, 85°; Independence, 48°, 90°. Wisconsin: Neillsville, 22°, 66°; Beloit, 34°, 80°. Iowa: Ames, 38°, 71°; Logan, 32°, 88°. Nebraska: Clear Creek, 36°, 83°; Norfolk, 40°, 80°. Minnesota: Breckenridge, 29°, 78°; Saint Anthony, 37°, 80°. Dakota: Olivet, 28°, 84°. Colorado: Denver, 32°, 87°; Fort Lyon, 33°, 91°. Wyoming: Fort Sanders, 10°, 71°; Cheyenne, 28°, 76°. Utah: Salt Lake City, 34°, 83°. Nevada: Winnemucca, 28°, 83°. California: Los Angeles, 47°, 89°; San Francisco, 48°, 78°; Visalia, 45°, 97°. Arizona: Yuma, 52°, 105°.

*Ranges of temperature.*—The *monthly* ranges will appear from examination of the minima and maxima temperatures just given.

*Greatest daily ranges* vary in New England from 22°, least on Mount Washington, to 32° at Boston; Middle Atlantic States, 19° at Cape May to 34° at Fort Whipple, Va.; South Atlantic States, 17° at Cape Hatteras to 31° at Augusta; East Gulf States, 22° at Key West to 29° at Saint Mark's; West Gulf States, 18° at Galveston to 29° at Shreveport; Ohio Valley and Tennessee, 22° at Cairo to 34° at Knoxville; Lower Lake region, 22° at Oswego to 27° at Detroit, Erie, and Rochester; Upper Lake region, 20° at Chicago and Grand Haven to 36° at Marquette; Upper Mississippi Valley, 26° at Dubuque to 35° at Saint Paul; Lower Missouri Valley, 31° at Omaha to 39° at Yankton; Minnesota and Dakota, 34° at Bismarck to 43° at Pembina; Colorado, 27° on Pike's Peak to 42° at Denver; Utah and Nevada, 30° at Salt Lake City to 42° at Winnemucca; California, 26° at San Francisco to 40° at Red Bluff.

*Frost* occurred as follows: Maine, 14th to 16th (17th, injured vegetation). New Hampshire, 7th, 13th, 15th, 17th; on Mount Washington, 5th to 18th, 20th to 30th. Vermont, 7th to 9th, 14th, 15th, 17th, 18th, 24th. Massachusetts, 7th (13th, injured vegetation), 17th. Connecticut, 11th to 14th. New York, 6th, 7th (13th to 17th, injured vegetation), 18th, 23d. New Jersey, 11th (13th, 14th, injured vegetation), 16th. Pennsylvania, 10th, 11th, 12th (13th, 14th, 16th, injured vegetation), 23d, 29th, 31st. Delaware (16th, injured vegetation), 23d. Maryland, 4th (13th, injured vegetation), 15th and 23d. Virginia, 6th, 11th (13th, 16th, injured vegetation). North Carolina, 5th, 6th, 10th, 11th (16th, injured vegetation). Kentucky, 10th, 11th, 13th, 15th. Ohio, 5th, 6th, 8th to 12th (13th, 16th, injured vegetation). Indiana, 6th, 11th, 12th

(13th, injured vegetation), 14th, 15th, 27th. Illinois, 4th, 9th, 10th (11th, 12th, 13th, injured vegetation). Michigan, 4th to 6th, 10th to 17th, 28th to 30th. Wisconsin, 6th, 10th, 12th (13th, injured vegetation), 30th. Minnesota, 3d, 4th, 10th to 13th. Iowa, 3d to 5th, 10th (11th, 12th, 13th, injured vegetation), 17th, 27th. Missouri, 3d, 4th (10th, injured vegetation), 15th. Kansas, 4th, 10th, 14th. Nebraska, 3d, 4th (10th, injured vegetation), 12th. Dakota, 1st to 15th, 21st, 27th to 29th. Wyoming, 3d, 8th, 10th. Colorado, 8th, 10th. Utah, 7th, 8th. New Mexico, 3d, 4th, 18th.

*Ice* is reported to have formed as follows: Dakota, at Olivet, 9th, ½ inch, 12th ⅛ inch; Bismarck, 2d, ½ inch; Missouri, 10th; Nebraska, 4th, 10th to 12th; Iowa, 4th, 11th to 14th, 16th; Wisconsin, 10th, 12th, 13th; Michigan, 13th to 15th; Indiana, 12th; Ohio, 4th to 6th, 13th, 14th; Pennsylvania, 12th, 13th, 14th, 16th; Virginia, 16th; New Jersey, 12th to 14th; New York, 13th, 14th, 16th; Connecticut, 12th to 16th; Massachusetts, 13th, 14th; Vermont, 12th, 15th; New Hampshire, 13th.

## PRECIPITATION.

*In general.*—The general distribution of rain (and melted snow) for the month is shown on Chart No. III. Fillmore City, Utah, and Kit Carson, Colo. (sunset stations), report 10.30 and 13.25 inches rain-fall, respectively; but these figures are probably incorrect. By reference to the table in the lower left-hand corner of the same chart it will be seen that the rain-fall for the month has been considerably above the normal in the Southwest, Lower Missouri Valley, Eastern Gulf and Middle Atlantic States, and decidedly below normal in New England.

*Special heavy rains.*—2d, Judsonia, Ark., 2.75 inches; Mount Ida, Ark. (2d and 3d), 3.35 inches. 3d, Brookhaven, Miss., 2.30 inches. 5th, Wappinger's Falls, N. Y. (4th, 5th), 2.30 inches; Ardenia, N. Y. (4th, 5th), 2.11 inches; Wilmington, N. C. (4th, 5th), 2.30 inches; Colebrook, Conn. (4th 5th), 2.30 inches; Mount Washington, 2.87 inches; Dover Mines, Va. (4th, 5th), 2.25 inches; Mount Solon, Va. (4th, 5th), 2.10 inches. 8th, Point Pleasant, La., 2.06 inches. 10th, Brackettville (10th, 11th), 3.59 inches. 12th, Lawrence, Kans. (11th, 12th), 2.05 inches; Wet Glaze, Mo., 2.00 inches; Austin, Tex., 2.80 inches; Castroville, 2.16 inches; Fredericksburg, 3.00 inches. 14th, Fort Monroe, Va., 2.02 inches; Brackettville, 2.28 inches; Cape Henry, 2.27 inches. 15th, Accotink, Va. (14th, 15th), 2.00 inches; Cape Henry (14th, 15th), 3.02 inches; Independence, Kans., 2.08 inches. 17th, New Orleans, 2.05 inches; Independence, Kans. (17th, 18th), 2.20 inches. 18th, Louisville, Ill. (18th, 19th), 3.00 inches; Vicksburg, 2.14 inches; Corsicana, 2.35 inches; Kansas City, Mo., 2.00 inches; Wet Glaze, Mo., 2.30 inches; Fayette, Miss. (18th, 19th), 2.50 inches. 19th, Algiers, La. (19th, 20th), 4.00 inches; New Orleans, 3.54 inches; Macon, Miss. (18th, 19th), 2.25 inches; Deadwood, Dak. (18th, 19th), 3.68 inches. 20th, Fayetteville, N. C., 2.50 inches. 21st, Goldsborough, N. C., 3.75 inches; Clarksville, Tex. (20th, 21st), 6.50 inches. 22d, Dodge City (21st, 22d), 3.30 inches; Fort Gibson, 2.52 inches; near Genoa, Nebr., 2.30 inches; Judsonia, Ark. (24th, 25th), 2.25 inches; Independence, Kans. (22d to 25th), 4.12 inches. 27th, Charleston, S. C., 3.48 inches. 29th, Logan, Iowa, 2.50 inches; De Soto, Nebr., 3.88 inches; Glenwood, Mills County, Iowa, 6.00 inches. 30th, Hennepin, Ill., 2.90 inches. 31st, Wood's Holl (30th, 31st), 3.53 inches; Brookhaven, N. Y. (30th, 31st), 4.03 inches; Newport, 3.80 inches; Atlantic City (30th, 31st), 4.69 inches; Mystic, Conn., 2.00 inches; Lebanon, Mo., 1.44 inches (in 45 minutes); Springfield, Mo., 3.25 inches.

*Largest monthly rain-falls.*—At Glenwood, Iowa, 12.00 inches; Springfield, Mo., 11.75 inches; near Independence, Kans., 10.06 inches; Clarksville, Tex., 10.25 inches; Judsonia, Ark., 9.85 inches; Wet Glaze, Mo., 9.50 inches; Lebanon, Mo., 9.39 inches; Mount Washington, 9.28 inches; Algiers, La., 8.90 inches; Henrietta, Tex., 8.33 inches; Deadwood, Dak., 7.80 inches; Fayetteville, N. C., 7.60 inches, and Goldsborough, N. C., 7.50 inches.

*Smallest monthly rain-falls.*—At Florence, Tucson, Camp Grant, and Yuma, in Arizona, and Monterey and Santa Barbara, Cal., none; Visalia, Cal., 0.08 inch; San Francisco, 0.16 inch; Concho, Tex., and Sacramento, Cal., 0.17 inch; Burkes, Ariz., 0.21 inch; Contoocookville, N. H., 0.30 inch; Prescott, Ariz., 0.33 inch; Umatilla, Oreg., 0.35 inch; and Campo, Cal., 0.41 inch.

*Floods.*—8th, at Riley, Ill., heavy rains, fields badly flooded, crops injured. 12th, Castroville, Tex., heavy rain-storm, streams swollen, damaging crops and fences. 19th, New Orleans, heavy rains, streets flooded two feet deep; Cherry Creek, Colo., heaviest flood since 1864, caused by heavy rains on the divide at head of creek 52 miles south of Denver; all bridges (seven in number) were swept away, lower part of Denver flooded, railroads damaged, and crops and fences washed away. 21st, Denison, Tex., trains delayed by heavy rains for the past three days; track flooded and bridges washed away. 22d, Deadwood, Dak., freshets, four houses washed away near the placer mines. The Missouri River at Omaha, on the 25th, overflowed its banks. 26th, portion of Burlington and Missouri Railroad track partly covered. 27th to 29th, flats covered in all directions; railroad tracks along river submerged; Omaha Smelting and Refining Works in positive danger. 29th, in Southwestern Iowa, severe thunder-

storm, with excessive rain, causing the Nishnabatony River to overflow its banks; bridges almost impassable; the Missouri River in this section arose above its banks, destroying crops on the bottom lands. 29th, De Soto, Nebr., heavy rains, bridges washed away.

*Droughts.*—Houston, Fla., month very dry, impeding the growth of vegetation.

*High tides.*—15th, Atlantic City, N. J., severe NE gale; high tide sweeping railroad track. 16th, Charleston, unusually high tides; Cape Lookout, very high tide. 30th, Sandy Hook, very high tides, injured jetties.

*Hail.*—2d, Texas, Kansas; 3d, Wyoming Territory, Ohio; 4th, Ohio; 5th, Ohio, North Carolina, Virginia; 6th, North Carolina; 7th, Kansas, Nebraska, Indian Territory, Texas, Tennessee, Illinois Iowa; 8th, Wyoming Territory, Texas, Illinois, Louisiana, Mississippi; 9th, Michigan, Pennsylvania; 10th, Colorado, Wyoming Territory, Minnesota, Ohio, Michigan, Indiana, Pennsylvania; 11th, Colorado, West Virginia, Ohio, New York, Virginia, Rhode Island, Connecticut, Wyoming Territory, Illinois, Massachusetts, New Jersey, Pennsylvania, Vermont; 12th, Indiana, Nebraska, New Hampshire, New York; 13th, Massachusetts, Maine, New York, Vermont; 15th, Colorado; 16th, Florida; 17th, Colorado, Missouri, Nebraska; 18th, Colorado, Texas, Mississippi, Iowa, Arkansas, Kansas, New Jersey; 19th, Kansas, Iowa, Michigan, Minnesota, Illinois, Kentucky, Wisconsin; 20th, West Virginia, New York, Pennsylvania; 21st, Virginia, Wyoming Territory, New Jersey, Pennsylvania; 22d, Nebraska; 23d, Minnesota, Indian Territory, Illinois, Iowa, Kansas; 24th, Virginia, Wisconsin; 25th, New Mexico, Iowa, Kentucky, Maine, Vermont; 26th, Texas, New Hampshire, Maine, New York, Vermont; 27th, Maine, Vermont; 28th, Kansas, Iowa, Massachusetts, Nebraska; 29th, Kansas; 30th, Nebraska, Iowa, Maryland; 31st, Florida, Iowa, Missouri.

*Rainy days.*—The number of days on which rain or snow has fallen varies as follows: New England, 6 to 21; Middle Atlantic States, 12 to 17; South Atlantic States, 5 to 13; Gulf States, 5 to 11; Ohio Valley and Tennessee, 12 to 18; Lower Lake region, 11 to 19; Upper Lake region, 10 to 18; Upper Mississippi Valley, 11 to 21; Lower Missouri Valley, 11 to 15; Northwest, 10 to 19; Western Plains, 8 to 15; Rocky Mountains, 6 to 23, and Pacific Coast, 3 to 11.

*Cloudy days.*—For New England the number varies from 6 to 21; Middle Atlantic States, 5 to 14; South Atlantic States, 2 to 9; Gulf States, 4 to 13; Ohio Valley and Tennessee, 3 to 11; Lower Lake region, 7 to 13; Upper Lake region, 7, to 12; Upper Mississippi Valley, 7 to 17; Lower Missouri Valley, 14 to 16; Northwest, 10 to 21; Western Plains, 13 to 18; Rocky Mountains, 2 to 8, and Pacific Coast, 3 to 17.

*Snow* fell as follows: New Hampshire, 12th, 13th; Vermont, 12th, 14th; Massachusetts, 11th, 13th, 14th; Connecticut, 15th; New York, 12th; New Jersey, 11th; Pennsylvania, 11th; Ohio, 10th; Michigan, 4th, 10th to 12th, 14th, 15th; Wisconsin, 4th, 11th; Minnesota, 3d, 10th; Iowa, 3d, 11th, 12th; Nebraska, 11th, 12th, 17th; Dakota, 2d, 3d, 11th, 12th; Wyoming, 2d, 6th, to 8th, 16th to 19th; and in Colorado, on Pike's Peak, 1st to 3d, 6th, 7th, 12th, 14th, 15th, 18th to 21st, 24th, 25th; snow on summit, at end of month, 30 inches, and in gulches 60 feet deep; New Mexico, 17th; Utah, 16th, 17th; Nevada, 12th to 14th, 20th, 21st, 22d, 28th, 31st.

## RELATIVE HUMIDITY.

The average percentage of relative humidity for the month ranges as follows: New England, 59 to 78; Middle Atlantic States, 60 to 77; South Atlantic States, 59 to 80; East Gulf States, 67 to 75; West Gulf States, 61 to 77; Lower Lake region, 61 to 71; Upper Lake region, 64 to 75; Ohio Valley and Tennessee, 58 to 67; Upper Mississippi Valley, 57 to 70; Lower Missouri Valley, 63 to 65; Red River of the North Valley, 59 to 67; Eastern slope, from Dakota to interior of Texas, 45 to 72; Western plateau, 34 to 50; California, 48 to 75. High stations report the following: Mount Washington, 91; Pike's Peak, 63; Cheyenne, 58; Denver, 47; Santa Fé, 24.

## WINDS.

The prevailing winds at Signal-Service stations are shown by arrows, flying with the wind on Chart No. II. East of the Mississippi the prevailing direction is westerly; in the Southwest, southerly; and in the Northwest, northwesterly. The maximum velocities have already appeared under the description of storm-areas.

*Total movements of the air.*—The following are the largest monthly movements, as recorded at the Signal-Service stations, viz: Pike's Peak, 20,276 miles; Cape Lookout, 11,918; North Platte, 11,055; Cape May, 10,467; Kittyhawk, 10,465; Indianola, 10,454; Breckenridge, 10,134; Dodge City, 10,064; Saudusky, 9,839; Sandy Hook, 9,764; Decatur, 9,742, and Cape Hatteras, 9,741. The total movement is not recorded on Mount Washington, but velocities exceeding 70 miles per hour occurred on six days. The smallest are: Deadwood, Dak., 2,226 miles; Campo, 2,378; Lynchburg, 2,499; Roseburg, 2,759; Visalia, Cal., 2,892; Boerne, Tex., 2,981; Brackettville, Tex., 3,354; Nashville, 3,425; Augusta, 3,450; Los Angeles, 3,459; Shreveport, 3,479; Montgomery, 3,520; Knoxville, 3,770; Springfield, Mass, 3,925.

*Tornadoes* accompanying storm-area No. XII. The following notes on the severe tor-

nado of the 23d, in Southern Wisconsin, will serve to show the course of the storm. It was probably first noticed by an observer situated in a valley about ten miles west of Mineral Point, who states "that he saw the cyclone traveling at the rate of about five miles an hour. It seemed to gather strength as it moved. When it struck the hill it shot off in the direction of Mineral Point, and after it had passed him he could hear it roar miles away." Professor Hinrichs reports, "tornado cloud observed during p. m., 23d, in Jones County, Iowa," and states, in Iowa Monthly Weather Review, "probably the same which, a few hours later, came down to earth's surface in Wisconsin, near Mineral Point." The storm entered Mineral Point, Iowa County, from the SW., and passed along a ridge of ground extending over one-fourth of a mile in width; it then struck a two-story frame house, containing 13 rooms, completely demolished it, and carried one of the inmates 400 feet in the air, and then dashed her to the ground dead; a rafter from this house was found one mile distant, driven over five feet in the ground. A large barn 300 feet NW. of this house was also demolished and carried in an opposite direction to the passage of the cyclone. Immense damage was done to the property in this vicinity, and a number of persons killed and wounded; "a barn and horse were carried completely away, and neither horse, barn, nor any portion of either have since been found." "About 2½ miles E. of the city a school-house was carried away, with the teacher and scholars. The teacher was badly injured and two scholars killed." The cyclone then passed eastward over the southern portion of Dane County; at Perry, houses and barns were totally demolished; many persons killed. At Primrose (about 4 p. m.), houses and barns were totally demolished; many persons killed; hail size of tea-cups, breaking glass on W. and N. exposures; rain fell in torrents, flooding fields and sweeping away fences. Verona Corners and vicinity, severe hail-storm, breaking all glass on W. exposures; hail-stones eight inches in circumference; streams in vicinity flooded. Montrose, houses destroyed. Oregon Cemetery, monuments shattered and number of plain stones broken off. Fitchburg (7 or 8 miles SW. of Madison), farm house carried entirely away; track of storm 2 miles wide. From Primrose (25 miles SE. of Madison), through Mount Vernon to Paoli, wide-spread damage is reported; 12 to 15 persons killed. Near Oregon, 2 horses carried 100 feet and dashed to earth, killing them instantly; storm raised from the ground 7 or 8 miles SW. of Madison; again struck ground near Fort Atkins, NE. of Madison. Near Primrose and Paoli the storm seemed from one-half to one mile in width. Madison, 4 to 4.30 p. m., cyclone from SSW.; buildings destroyed; during the heavy rain the air was suddenly observed to be filled with falling leaves, small twigs, shingles, laths, and large sticks (one board measuring 8 feet long and 1 foot wide, seemingly to have been wrenched from a house), all filling the air as high as the eye could reach, and falling straight to the earth. "In the outskirts of the storm-belt there appeared to be two strata of clouds, the lower a heavy mist, through the occasional breaks of which could be seen the upper layer of heavy black clouds, snarled, tangled, and quivering, from which was discharged all kinds of *débris*." No notes have yet come to hand from the east portion of Dane County, but the cyclone entered Jefferson County about 5.15 p. m., where the "tornado struck the earth at Cedar Lake," passing eastward; average width of path 30 rods, although in places half-mile wide; left the earth again at Bulkwinklesville, 16 miles east of Cedar Lake. Eye-witnesses state that the water in west end of Cedar Lake was lifted up 200 feet, leaving bottom of lake clearly visible. Oakland, houses and barns destroyed, persons killed and injured; track one mile wide, damage done in less than three minutes; in Rome and Hebron barns were blown down and unroofed. The storm then entered Waukesha County, commencing about 5 p. m. at Waukesha, and lasting about two hours; wind blowing in all directions; houses unroofed, sidewalks torn up, trees and fences blown down. Milwaukee, 6.42 to 7.35 p. m., severe tornado; path of greatest severity from SSW. to NNE. and very narrow; buildings blown down; tornado appears to have dissipated over Lake Michigan. Barrington, Cook County, Illinois, terrific storm; about 6 p. m. the storm cloud was observed approaching from SW., accompanied by an almost indescribable noise; when about 200 yards from observer it struck the ground with a deafening noise, and seemed to rest a moment; then rose in air about 55 feet, carrying up a mass of earth, trees, and *debris*; it again descended, and striking the side of a farm house, carried it up, whirling it over and over, and completely demolished it at an elevation of about 150 feet. The inmates were all killed, and the observer had to hold on to the grass with his full strength to keep from being drawn into the vortex. The storm-cloud was observed advancing at a distance of four miles, and after destroying other buildings passed over in a northeasterly direction; in several places, where the storm struck the ground, it would carry up earth, &c., and leave a hole from 150 to 300 feet square. About 6.30 p. m. a SW. hurricane prevailed at Highland Park (on the lake shore), followed by huge hail-stones, 3½ inches in diameter, resulting from the meeting of two storms from the NW. and SW.; belt of hail one-half mile wide; laths and *débris* fell before the hail, the whole lasting from 1 to 20 minutes; huge hail also fell at Riverside, Winnetka, and Park Ridge. Tornado in Adams and Brown Counties, Illinois; appeared about 6.30 p. m. about 1 mile south

of Mound Station, coming from W. and passing a little S. of E.; houses and barns carried away; horses, cows, &c., killed, and persons injured.

*Waterspout.*—26th, Decatur, Tex., 4.45 p. m., waterspout passed southward down Sandy Creek, tearing up trees, fences, &c.

VERIFICATIONS.

*Indications.*—The detailed comparison of the tri-daily weather indications with the telegraphic reports for the succeeding twenty-four hours shows a general percentage of omissions of 0.2 per cent., and of verifications of 83.2 per cent. The percentages of verifications for the four elements have been: Weather, 87.6; wind, 86.6; temperature, 82.1; barometer, 76.6. The percentages of verifications by geographical districts have been: New England, 84.0; Middle States, 86.6; South Atlantic States, 84.6; East Gulf States, 82.3; West Gulf States, 80.9; Lower Lake region, 84.8; Upper Lake region, 83.5; Tennessee and Ohio Valley, 82.5; Upper Mississippi Valley, 82.7; Lower Missouri Valley, 80.6. Of the 3,713 predictions that have been made, 139, or 3.7 per cent., are considered to have entirely failed; 120, or 3.2 per cent., were one-fourth verified; 592, or 15.9 per cent., were half verified; 390, or 10.5 per cent., were three-fourths verified; 2,472, or 66.7 per cent., were fully verified, so far as can be judged from the weather maps.

*Cautionary signals.*—During the month 228 cautionary signals were displayed; 151, or 66.2 per cent., were justified by subsequent hourly velocities of 25 miles and over, at or within 100 miles of the station. Four signals were late and two were lowered too early; 77 were not justified.

NAVIGATION.

*Stages of water in rivers.*—In the table, on the right hand side of Chart No. III, are given the highest and lowest readings of the Signal Service river gauges during the month, with dates of same. At Omaha the Missouri rose ten inches above the danger-line on the 28th and 29th, and the consequent damage is noticed under the head of floods. At Vicksburg the Mississippi was within six inches of the "danger-line" from the 8th to the 14th.

ATMOSPHERIC ELECTRICITY.

*Thunder-storms.*—1st, Illinois, Indiana, Iowa, Kansas, Missouri, Nebraska, New Jersey, Michigan. 2d, Kansas, Arkansas, Illinois, Iowa, Kansas, Missouri, Texas, Virginia, Nebraska, Indian Territory, Ohio, Indiana. 3d, Arkansas, Florida, Kansas, Louisiana, New York, Ohio, Texas, Virginia, Mississippi, Alabama, Tennessee. 4th, Maine, New Jersey, North Carolina, Ohio, Pennsylvania, Vermont, Virginia, Alabama, Florida, Tennessee, Maryland. 5th, New Jersey, North Carolina, Virginia, Dakota, West Virginia, Tennessee, Georgia. 6th, Indian Territory, Wyoming Territory, Colorado, North Carolina. 7th, Michigan, Arkansas, Illinois, Indiana, Iowa, Kansas, Kentucky, Nebraska, New York, Ohio, Pennsylvania, Texas. 8th, New Mexico, New York, Arkansas, Illinois, Indiana, Kentucky, Louisiana, Michigan, Nebraska, North Carolina, Ohio, Pennsylvania, Tennessee, Texas, Virginia, Mississippi, Alabama, Wisconsin, West Virginia. 9th, New York, Texas, Virginia. 10th, Indiana, Michigan, Pennsylvania, Virginia, Texas, West Virginia, Virginia, Maine. 11th, Wyoming Territory, Dakota, Maine, Nebraska, Vermont, Texas. 12th, Florida, Colorado. 13th, Indian Territory, Arkansas, Florida, Texas, Mississippi, Tennessee. 14th, Georgia. 15th, Indian Territory, Dakota, Kansas, Michigan, Nebraska. 16th, Florida, Kentucky, Louisiana, Alabama. 17th, Kansas, Wyoming Territory, Illinois, Iowa, Missouri, Nebraska, North Carolina, Indian Territory, Mississippi, Louisiana. 18th, Michigan, Arkansas, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, New York, Ohio, Texas, Mississippi, Missouri, Minnesota, Tennessee, North Carolina, Florida. 19th, Minnesota, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Nebraska, New York, Ohio, South Carolina, Tennessee, California, Alabama, Wisconsin, Florida, Georgia. 20th, Illinois, Indiana, Louisiana, New York, Ohio, Pennsylvania, Texas, Wisconsin, Nevada, Colorado, Alabama, Michigan, West Virginia. 21st, Indian Territory, Maine, Virginia, Wyoming Territory, Arkansas, Delaware, Illinois, Kansas, Kentucky, Louisiana, Maryland, New Jersey, New York, Pennsylvania, South Carolina, Texas, Virginia, West Virginia, Alabama, Florida, Georgia. 22d, Arkansas, Dakota, Florida, Illinois, Kansas, Nebraska, New Jersey, Indian Territory, Minnesota. 23d, Indian Territory, Michigan, Nebraska, Florida, Illinois, Iowa, Kansas, Michigan, Virginia, Wisconsin, Dakota, Missouri, Minnesota, Georgia. 24th, New Mexico, New York, Wyoming Territory, Arkansas, Illinois, Indiana, Kansas, Maryland, Michigan, Pennsylvania, Tennessee, Virginia, Missouri, Ohio, West Virginia, North Carolina. 25th, Dakota, Illinois, Kansas, Kentucky, Massachusetts, New Hampshire, North Carolina, Tennessee, Vermont, Virginia, Colorado, Texas, Indian Territory. 26th, Illinois, Iowa, Massachusetts, New York, North Carolina, Pennsylvania, Texas, Vermont, Virginia, South Carolina, Georgia, New Hampshire. 27th, Dakota, Louisiana, Maine, South Carolina, Vermont, Colorado, Wyoming Territory, Nebraska, Alabama, Mississippi, Georgia. 28th, Indian Territory, Dakota, Illinois, Iowa, Nebraska, Kansas, North Carolina, Massachusetts. 29th, Florida, Illinois, Indiana, Iowa, Kansas, Missouri, Wyoming Territory, Nebraska, Dakota, Florida. 30th, Indian Territory, Ne-

braska, Virginia, Dakota, Delaware, Illinois, Iowa, Maryland, Missouri, New Jersey, North Carolina, Tennessee, Texas, Virginia, West Virginia, Florida, Minnesota. 31st, Minnesota, Florida, Illinois, Iowa, Missouri, Nebraska, Pennsylvania, Indian Territory.

*Auroras.*—Washington, D. C., 11th; Burlington, Vt., 18th; Detroit, Mich., 24th; Oswego, N. Y., 26th, 30th.

*Magnetic phenomena.*—Prof. G. Hinrichs, Iowa City, Iowa, reports the average magnetic diurnal range in declination as 8.36 minutes.

*Telegraphic communication interfered with by atmospheric electricity.*—Pike's Peak, Col., 7th, heavy thunder-storm, compelled to cut out wires; 12th, wires cut out, but sparks would still pass between windows; 22d, severe electricity, had to cut out wires; 26th, intense electricity. Santa Fé, N. Mex., 9th, intense 17th, 24th, and 25th. Norfolk, Va., 30th, wires badly affected, cable arrester at Lynn Haven fused by lightning. Mount Washington, 26th, wires powerfully affected, compelled to withdraw switch cut-off.

OPTICAL PHENOMENA.

*Solar halos.*—1st, New York. 2d, New York, Iowa, Maine, Ohio. 4th, South Carolina. 5th, California, Rhode Island, Maine, New York. 6th, Ohio, Kentucky, Rhode Island, Maine, Massachusetts, Connecticut, Illinois, Indiana, New Hampshire, New York. 7th, Rhode Island, Iowa, Connecticut, Dakota, Massachusetts, New Hampshire, New Jersey, Ohio. 8th, Ohio, Connecticut. 9th, Louisiana, Mississippi. 10th, Mississippi. 11th, California, South Carolina, Georgia, Mississippi. 12th, California, South Carolina, Georgia. 13th, Ohio, Illinois, Indiana, Iowa, Maryland, West Virginia. 14th, Florida, Minnesota, Ohio, New Jersey, Illinois, New York, Pennsylvania. 15th, Texas, Kentucky, Iowa, Connecticut, Indiana, Massachusetts, New Hampshire, Mississippi. 16th, California, Ohio, South Carolina, Georgia, New Hampshire, New Jersey, Maryland. 17th, Rhode Island, Illinois, Iowa, Michigan, New Hampshire, New York. 18th, Michigan, Ohio, Maine, Indiana. 19th, New Hampshire, Massachusetts. 20th, New Hampshire, Virginia. 21st, California, Connecticut, New York, Mississippi. 22d, Iowa, Ohio, Kentucky, Georgia, Indiana, Mississippi. 23d, Alabama, Tennessee, Mississippi. 24th, Ohio, Rhode Island, Arkansas, Illinois, Indiana, New Hampshire. 25th, Ohio, Michigan, Tennessee, Rhode Island, Connecticut, Iowa, Vermont, Mississippi. 26th, Ohio, Connecticut, Texas, Vermont. 27th, California, Ohio, Maryland, New Jersey. 28th, California, Ohio. 29th, California, Dakota, Ohio, Iowa, New Jersey, Pennsylvania. 30th, California, Dakota. 31st, Nevada, Wisconsin.

*Lunar halos.*—1st, Michigan. 3d, New York. 5th, Minnesota, Connecticut. 6th, Dakota, Nebraska, Iowa, Missouri, Indiana, Maine, Ohio, Pennsylvania. 8th, South Carolina, New Jersey, North Carolina. 9th, Colorado, Texas, Alabama, Florida, Mississippi, Missouri, Minnesota. 10th, Wyoming Territory, Nevada, Kansas, Texas, Florida, Mississippi, Missouri, Minnesota, Louisiana, Wisconsin. 11th, Colorado, Nebraska, Texas, Louisiana, Mississippi, Minnesota, West Virginia, North Carolina, Georgia, Massachusetts. 12th, Nevada, Dakota, Indian Territory, Louisiana, Minnesota, South Carolina, North Carolina, Georgia, Iowa, New Jersey. 13th, Dakota, Texas, Michigan, Wisconsin, Ohio, New York, West Virginia, Pennsylvania, Connecticut, Illinois, Indiana, Iowa, Massachusetts. 14th, Kansas, Texas, Florida, Minnesota, Michigan, Ohio, New York, Rhode Island, Massachusetts, Connecticut, Pennsylvania. 15th, Wyoming Territory, Louisiana, Texas, Florida, Wisconsin, New York, Indiana, Ohio, Kentucky, Virginia, West Virginia, Mississippi. 16th, Kansas, New York, New Jersey, Pennsylvania. 17th, Michigan, New York, Indiana, South Carolina, Rhode Island, Massachusetts, Connecticut. 21st, Indian Territory. 24th, Louisiana, Illinois. 28th, Nebraska, Indian Territory. 29th, Dakota, Indian Territory.

*Mirage.*—Olivet, Dakota, 1st; New London, Connecticut, 6th, 7th, 24th.

MISCELLANEOUS PHENOMENA.

*Botanical.*—Arkansas: Judsonia, ripe, 19th, blackberries; 25th, wheat; 26th, peaches ripening. Connecticut: New London, in bloom, 25th, snow-ball; leafing, 26th, polonia. Dakota: Olivet, all crops look favorable. Florida: Milton, in bloom, 21st, early corn; 31st, green corn fit for use. Georgia: Savannah, in bloom, 1st, magnolia. Illinois: Riley, 7th, planting corn. Iowa: Fort Madison, in bloom, 2d, snowballs; 3d, rose, spirea; 13th, locust; Monticello, in bloom, 1st, lilacs; 4th, snowballs; ripe, 20th, strawberries; Guttenberg, wheat injured by the chintz bug; grass in fine condition; Nora Springs, in bloom, 4th, lilacs; 20th, dandelions, strawberries, apples, mandrake; Vail, corn poor; small grains looking well. Indian Territory: Fort Gibson, ripe, 26th, cherries, blackberries; 28th, whortleberries. Kansas: Independence, ripe, 22d, barley; 27th, wheat; 13th, cherries; 25th, raspberries, dewberries; 27th, currants; 31st, gooseberries; 30th, oats heading. Maine: West Waterville, in bloom, 7th, plum, cherry; 10th, apple; Cornish, in bloom, 2d, shad bush; 5th, cherry; 8th, pear; 11th, apple; 13th, blueberry; 18th, horse-chestnut; leafing, 3d, forest trees, horse-chestnut. Massachusetts: Somerset, in bloom, 1st, pear, buttercups; 5th, wild columbine; 8th, apple; 12th, quince, lilac; 17th, bush honeysuckle; 20th, spirea; Waltham, in bloom, 1st, shad bush; 3d, white birch; 4th, blueberry and pear; 5th, apple; 7th, sassa-

fras; 16th, lilac; 23d, cherry; 24th, horse-chestnut; 25th, barberry; 27th, white thorn; 29th, blackberry; Fall River, in bloom, 1st, pear; 6th, apple; New Bedford, in bloom, 8th, dogwood; 10th, lilac; 20th, hawthorn; leafing, 9th, oak; Rowe, in bloom, 6th, cherry; 12th, apple. Michigan: Northport, fruit prospects favorable, hay and grain promise well; in bloom, 7th, cherry; 8th, plum; 9th, pear. Mississippi: Brookhaven, in bloom, 2d, lilies; 4th, persimmon; 5th, jessamine and magnolia; 20th, early corn; 26th, early cotton; ripe, 26th, oats; 10th, plums, whortleberries; 12th, cherries; 13th, blackberries; 31st, crops very promising. Missouri: Saint Louis, ripe, 5th, strawberries; Louisiana: ripe, 31st, raspberries; Mississippi County, 12th, wheat harvested; Sikeston, 24th, wheat harvested; Butler County, 29th, 30th, wheat harvested; Mexico, in bloom, 3d, wheat; Lebanon, ripe, 26th, cherries; 30th, blackberries. New Hampshire: Contoocookville, in bloom, 9th, pear, currant, strawberry; leafing, 8th, grape. New Jersey: Newark, in bloom, 5th, horse-chestnut. New York: Wappinger's Falls, in bloom, 10th, tulips; 14th, horse-chestnut; 18th, rye, roses; 20th, peonies; ripe, 18th, maple seeds; 21st, strawberries; leafing, 2d, maple; 14th, locust; 2d, grass sufficient for pasture, oats up; Palermo, in bloom, 3d, apple; 10th, lilac; 16th, horse-chestnut; 27th, yellow daisies; 30th, blackberry; 8th, planting corn; Nile, in bloom, 10th, apple; Waterburg, in bloom, 1st, pear, apple. North Carolina: Fayetteville, in bloom, 1st, magnolia; ripe, 14th, raspberries; Weldon, cotton seed rotting in ground, because of cold, damp weather. Ohio: Margaretta Township, in bloom, 2d, quinces; Ringgold, grass growing slowly; fruit prospects good; wheat the most forward for many years; potatoes very much advanced. Pennsylvania: Egypt, in bloom, 1st, apple; 6th, quince; Carlisle, heading, 8th, wheat; 28th, oats. Tennessee: Nashville, 11th, cotton and other crops fifteen days early. Texas: Clarksville, 31st, corn looks well; wheat harvested and oats ripe; cotton injured by wet weather; Melissa, wheat harvested several days earlier than for many years; 31st, corn in tassel, never known here so early before; notwithstanding the season has been cool, crops are further advanced than for twenty-six years. Virginia: Wytheville, ripe, 25th, strawberries; 30th, cherries, new potatoes; near Keswick, 31st, oats in fine condition; corn 12 to 18 inches high; cherries ripe; crops well advanced; near Johnsontown, in bloom, 1st, roses. Vermont: West Charlotte, in bloom, 1st, cherry; 7th, dandelions; Strafford, in bloom, 6th, plum; 9th, wild cherry; 15th, apple; Woodstock, in bloom, 3d, plum. Wisconsin: Embarrass, in bloom, 1st, strawberry; 2d apple, wild cherry, wild gooseberry; Wautoma, in bloom, 11th, lilac; 31st, roses; 31st, small grain looks very well; Milwaukee, in bloom, 19th, mandrake, ivy, and locust; leafing 19th, poplars.

*Birds.—Wild Geese:* Cornish, Me., 1st; Wappinger's Falls, N. Y., 1st. *Kingbird:* Monticello, Iowa, 21st; Cornish, Me., 8th; Waltham, Mass., 11th; Rowe, Mass., 8th; Plattsmouth, Nebr., 2d; Palermo, N. Y., 18th; West Charlotte, Vt., 21st; Embarrass, Wis., 7th. *Swallows:* Monticello, Iowa, 24th; Cornish, Me., 1st; Plattsmouth, Nebr., 4th; Woodstock, Vt., 1st; Embarrass, Wis., 2d. *Robins:* Clear Creek, Nebr., 13th. *Cuckoo:* Contoocookville, N. H., 24th; Palermo, N. Y., 23d; Strafford, Vt., 25th; Embarrass, Wis., 14th. *Orioles:* Cornish, Me., 1st; Somerset, Mass., 1st; Waltham, Mass., 4th; Rowe, Mass., 9th; New Bedford, Mass., 3d; Wappinger's Falls, N. Y., 5th; Palermo, N. Y., 8th; North Volney, N. Y., 6th; Catawissa, Pa., 2d; West Charlotte, Vt., 4th; Woodstock, Vt., 4th; New London, Conn., 3d; *Whippoorwill:* Southington, Conn., 5th; Monticello, Iowa, 8th; Cornish, Me., 6th; Waltham, Mass., 2d; Clear Creek, Nebr., 14th; Catawissa, Pa., 3d; Woodstock, Vt., 8th; Embarrass, Wis., 1st. *Bobolinks:* Southington, Conn., 17th; Monticello, Iowa, 27th; Cornish, Me., 6th; Somerset, Mass., 4th; Waltham, Mass., 7th; Rowe, Mass., 8th; West Charlotte, Vt., 21st; Strafford, Vt., 15th; Woodstock, Vt., 7th; New London, Conn., 6th. *Catbirds:* Cornish, Me., 1st; Waltham, Mass., 3d; New Bedford, Mass., 10th; Palermo, N. Y., 22d; Catawissa, Pa., 5th; West Charlotte, Vt., 21st; Strafford, Vt., 26th. *Hummingbirds:* Wappinger's Falls, N. Y., 22d; Palermo, N. Y., 7th; Catawissa, Pa., 19th; West Charlotte, Vt., 7th; Embarrass, Wis., 7th. *Martins:* Embarrass, Wis., 7th. *Thrush:* Waltham, Mass., 9th; Northport, Mich., 1st; Wappinger's Falls, N. Y., 12th; Woodstock, Vt., 8th. *Blackbirds:* Northport, Mich., 1st; Clear Creek, Nebr., 21st.

*Miscellaneous.—Frogs piping:* Southington, Conn., 5th; Embarrass, Wis., 5th. *Potato bugs:* Litchfield, Mich., 31st; New London, Conn., 6th; Morgantown, W. Va., 6th. *Rose bugs:* near Johnsontown, Va., 2d. *Fire-flies:* Southington, Conn., 28th; Logan, Iowa, 1st; Cornish, Me., 24th; North Volney, N. Y., 24th; Kensico, N. Y., 19th; Little Mountain, Ohio, 21st; Green Castle, Pa., 25th; Morgantown, W. Va., 23d. *Crickets:* Contoocookville, N. H., 16th; Wappinger's Falls, N. Y., 18th. *Bees:* Embarrass, Wis., swarmed, 7th. *Mosquitoes:* Embarrass, Wis., 28th. *Currant worm:* Bellefontaine, Ohio, 23d. *Apple worm:* Bellefontaine, Ohio, 31st. *Bats:* Strafford, Vt., 19th. *Grasshoppers:* Dodge City, Kans., 28th, appearing from the south, swarms not large; Winnemucca, Nev., 24th, myriads appeared in Paradise Valley, 20 miles NNE. of station, considerably damaging crops. Brackettville, Tex., 31st, 8 p. m., small black, hard-shelled bugs, resembling flying ant, appeared in such numbers as to make it impossible to stay within doors; at 9 p. m. had to close office in consequence.

*Polar bands.*—Maine, 16th, 24th, 25th, 31st; Connecticut, 8th; New Jersey, 7th, 19th,

27th; Virginia, 27th; Indiana, 6th, 19th, 22d, 24th, 31st; Iowa, 2d, 3d, 6th, 13th, 15th, 22d, 31st; Louisiana, 4th; Nebraska, 5th; Dakota, 27th.

*Prairie and forest fires.*—23d, Fort Union, N. Mex.; 29th, near Wareham, Mass., extensive forest fires; 31st, Bismarck, Dak.

*Meteors.*—Madison Barracks, N. Y., 27th; Judsonia, Ark., 6th, 9th, 19th; Southington, Conn., 6th; Mayport, Fla., 28th; Anna, Ill., 28th; Como, Ill., 26th; Iowa City, Iowa, 4th; Near Woodstock, Md., 1st, 5th, 6th, 10th, 18th, 21st, 23d, 29th; Rowe, Mass., 2d, 5th, 18th, 23d, 31st; Lebanon, Mo., 28th; Clear Creek, Nebr., 25th; Atco, N. J., 26th, 29th; Hector, N. Y., 16th, 8 p. m., brilliant meteor moved from W. to E., light very intense, appeared as large as full moon, with train about four times its own diameter; Waterburg, N. Y., 2d, 5th, 23d; Wappinger's Falls, N. J., 28th; Fayetteville, N. C., 22d; Cincinnati, Ohio, 27th; Hulmersville, Pa., 10th; Green Castle, Pa., 5th; Aiken, S. C., 25th; Dodge City, Kans., 17th; Davenport, Iowa, 21st (during bright moonlight); Fort Whipple, Va., 10th, 8.14½ p. m., brilliant meteor in the east, altitude 25°, leaving train of greenish hue; Baltimore, Md., 10th, 8.15 p. m., brilliant meteor in the SE., altitude 35°, bright greenish color, exploded like a rocket, leaving train visible several seconds. Tucson, Arizona, 30th, 10.20 a. m., a large meteor fell at base of mountains, 10 miles northeast of station, leaving train 1 mile in length; on striking ground a large volume of smoke ascended, which was plainly visible for ten or fifteen seconds.

*Zodiacal light.*—Daytona, Fla., 1st to 3d, 22d to 24th, 28th to 31st; Monticello, Iowa, 2d, 4th, 20th, 24th; Clear Creek, Nebr., 19th; Atco, N. J., 1st to 3d; Bellefontaine, Ohio, 22d; Wytheville, Va., 1st, 29th, 30th.

*Earthquakes.*—Steamer Australia (at San Francisco, May 22, from Sydney) reports heavy earthquakes at Tanna, in the New Hebrides; land rose 20 feet; harbor seriously injured. February 23, at Japan; shock lasting one minute; houses rocked. April 12 or 14, at 8.30 p. m., a severe earthquake occurred in Venezuela, destroying the town of Cua, in the valley of the Tuy, about thirty miles from Caracas, and burying at least 300 persons. The shock was felt at Caracas, and shocks also continued to be felt until May 4. About the 19th a portion of the town of Ocumare, 20 miles east of Cua, was thrown down; and on the 29th shocks were felt at Laguayra, Caracas, Porto Cabella, and Valencia; 28th, United States naval hospital, Yokohama, Japan, slight shock. May 8, Sacramento, Cal., 8.25 p. m., shock from N. to S., clocks stopped, pictures shook; also reported to have been felt in Colusa and Mendocino Counties. Red Bluff, 8.25 p. m., "vibration N. to S., lasting ten to fifteen seconds, clocks stopped," &c. 10th, United States naval hospital, Yokohama, Japan, at 9.10 p. m., slight shock. 11th, United States naval hospital, Yokohama, Japan, 7.40 a. m., slight shock.

*Sunsets.*—The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been obtained at all Signal Service stations. Reports from 104 stations show 3,210 observations to have been taken; of these 52 were reported doubtful; 2,543 cases, or 79.2 per cent., were followed by the expected weather and 667 were not.

## SOLAR PHENOMENA.

*Sun spots.*—The following observations, made by Mr. D. P. Todd, have been forwarded by Rear-Admiral John Rodgers, U. S. N., Superintendent of the United States Naval Observatory, Washington, D. C.:

| May, 1878. | Number of new— | | Disappeared by solar rotation. | | Reappeared by solar rotation. | | Total number visible. | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| | Groups. | Spots. | Groups. | Spots. | Groups. | Spots. | Groups. | Spots. | |
| 2 { 10 a. m. | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | Large group of faculæ. |
| 2 { 12 m. | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | |
| 2 { 2 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | |
| 3—10 a. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Faculæ and veiled spots. |
| 4—12 m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Veiled spots. |
| 7 { 4 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Veiled spots and faculæ. |
| 7 { 5 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 10 { 12 m. | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 2 | |
| 10 { 2 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | |
| 21 { 10 a. m. | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | |
| 21 { 1 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | |
| 22—12 m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Veiled spots. |
| 25— 3 p. m. | 2 | 3 | 0 | 0 | ..... | ..... | 2 | 3 | Brilliant faculæ. |
| 27—11 a. m. | 0 | 10 | 0 | 0 | 0 | 10 | 2 | 13 | |
| 28 { 11 a. m. | 0 | 5 | 0 | 0 | 0 | 0 | 2 | 18 | |
| 28 { 5 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 18 | |
| 29— 2 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 18 | |

Besides these Mr. Todd reports as follows:

None visible on the 1st at 11 a. m. and 4 p. m.; 3d, 1 p. m.; 5th, 3 p. m.; 6th, all day; 8th, 1 p. m.; 11th, 11 a. m.; 13th, 12 m.; 16th, 11 a. m.; 18th, 10 a. m., and 23d, 11 a. m. The spots visible on the 29th were recorded by the Signal Service observer at Fort Whipple, Va., as also visible on the 30th, 10 a. m.; and at Portsmouth, N. C., where they continued visible until June 2d.

Prof. G. Hinrichs, Iowa City, Iowa, reports: None seen 3d, 4th, 5th, 6th, 8th, 9th, 10th, 12th, 14th, 15th, 19th, 21st, 23d, 24th; 26th and 27th, one group of two spots; 28th, two groups of six spots. Big spot of 30th very remarkable; no penumbra proper visible, but an apparent depression of photosphere; depression sharply defined, large spot in center and two smaller on margin. These spots had almost disappeared on June 4th.

*Observations of the transit of Mercury, May* 6, 1878, *by Signal-Service assistants and observers.*—The following observations of the transit of Mercury were made by the observers and officers of the Signal Service, in accordance with special order and instructions. In all cases the observations were made by observing an image of the sun of from two to three inches in diameter, as cast by a field-glass of two inches aperture and erecting eye-piece upon a sheet of white paper, held by means of a suitable frame-work, ten or fifteen inches behind the ocular. The watch-times were reduced to Washington Observatory time by means of corrections afforded by the regular telegraphic noonday signals, sent from the observatory over Western Union lines. The predicted chances of fair observing weather agree well with the actual event; for out of fourteen stations three were wholly unsuccessful and four partly unsuccessful, owing to cloudiness, whence it is fair to estimate that $\frac{3+\frac{1}{2}4}{14} = 36$ per cent. of the observations were lost through cloudiness. The corresponding predictions, as given in the fourth column, average 60 per cent. successful, or 40 per cent. lost through cloudiness.

*Observations of the transit of Mercury, May 6, 1878, as reported to the Chief Signal-Officer.*

| Station. | Longitude. | Latitude. | Predicted chances of fair weather. | Contacts in Washington time. | | | | Letter-file number. | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| | | | .10 | 1. | 2. | 3. | 4. | | |
| | ° ″ | ° ″ | | | | | | | |
| Virginia City | +35 0 | 45 20 | 5 | Obscured. | Obscured. | Obscured. | Obscured. | 2779 | |
| Denver | 28 1 | 39 45 | 3 | Obscured. | Obscured. | Obscured. | Obscured. | 2633 | |
| Pike's Peak | 27 58 | 38 48 | 3 | Obscured. | Obscured. | Obscured. | Obscured. | 2780 | |
| Fort Richardson | 21 7 | 33 12 | 5 | | | | | | |
| | | | | *h. m. s.* | *h. m. s.* | *h. m. s.* | *h. m. s.* | | |
| Sandy Hook | − 3 2 | 48 28 | 7 | Missed. | 10 8 50 | 5 33 21 | 5 35 44 | 2525 | Planet half-way on, 10h. 7m. 38s. |
| Barnegat | − 2 54 | 39 48 | 7 | Missed. | 10 8 27 | Obscured. | Obscured. | 2688 | Planet ¼ on at 10h. 5m. 22s. |
| Atlantic City | − 2 38 | 32 22 | 7 | Obscured. | Obscured. | 5 32 45 | 5 35 35 | 2524<br>2904 | |
| Cape May | − 2 5 | 38 56 | 7 | Missed. | 10 8 37 | 5 33 30 | 5 36 12 | 2781 | Planet first seen at 10h. 6m. 48s. |
| Washington | 0 0 | 38 54 | 7 | Missed. | 10 7 26 | 5 33 9 | 5 36 14 | Misc. 832 | Planet well on at 10h. 6m. 0s.; on full diameter, 10h. 9m. 16s.; half-way off, 5h. 34m. 44s. |
| Fort Whipple | + 0 1 | 38 50 | 7 | Missed. | 10 7 13 | 5 31 48 | 5 36 3 | 2509<br>2870 | |
| Cape Henry | − 1 3 | 36 56 | 7 | Missed. | Missed. | Obscured. | Obscured. | 2598 | Record unintelligible. |
| Norfolk | − 0 44 | 36 51 | 7 | Missed. | Missed. | 5 35 10 | 5 37 53 | 2565 | Unsatisfactorily, through clouds. |
| Cape Hatteras | − 1 33 | 35 14 | 7 | | | | | 3198 | Planet not seen. |
| Cape Lookout | − 0 33 | 34 36 | 7 | Instructions received too late. | | | | 2973 | |
| Wilmington | + 1 7 | 34 11 | 7 | Missed. | Missed. | 5 29 32 | 5 36 22 | 2738<br>2948 | [Should not 29m. be 34m.?] |
| Smithville | + 0 58 | 33 51 | 7 | Obscured. | Obscured. | 5 32* 15 | 6 34* 18 | 2564 | Should probably be 33m. and 35m. |
| Portsmouth, N. C.* | − 0 30 | 35 30 | 7 | (*) | (*) | (*) | (*) | 2737 | |
| Colorado College, Colorado Springs | +27 46 | 38 50 | 3 | Missed. | Missed. | 5 32 56.2 | 5 35 49.3 | Misc. 900 | |

* Portsmouth observed the contacts at "watch time," 10h. 6m. 30s.; 10h. 9m. 40s.; 5h. 38m. 50s.; 5h. 43m. 0s., respectively; but not having received Washington telegraphic time-signals, those times cannot be reduced to the common standard.

NOTES AND EXTRACTS.

The following remarks by Hon. A. H. Stephens, of Georgia, as published in the Congressional Record of June 12, will be of interest to the observers co-operating with the Signal Service. The subject of the Signal Service being under discussion, Mr. Stephens, of Georgia, said:

"I move to amend the pending paragraph by striking out $325,000 and inserting $350,000. I do not desire to detain the House at all, but I think this is one of the most important branches of the public service. I learn from General Myer, who is in charge of this service, that if $350,000 be now appropriated he can extend this service considerably, far beyond the ratio of the additional amount, compared with the $300,000, the gross sum appropriated last year. He clearly explained how this could be done. I give an illustration which, I think, clearly presents his idea; it is just as if you had $300,000 invested in a factory with the steam-power or water-power already supplied sufficient to turn four times the machinery in use, and all that would be necessary to add to its efficiency would be the cost of the bands to set additional necessary machinery in motion. Thus, $25,000 additional to the amount in the bill, he assured me, would enable him so to extend the utility of the system now in operation. The House can readily, I think, understand the illustration. He ran the system with $300,000 last year, but with $350,000 he could set on one-fourth more bands to other machinery, if you please. The committee have allowed $25,000 additional. That is good as far as it goes, but $25,000 more will double the efficiency of that increase.

"I wish I had time to enlarge on this subject; but I do not wish to detain the committee. I have already said that, in my opinion, this is one of the most important branches of the public service. I would be willing to-day to vote $500,000 for this service. I am perfectly familiar with the origin of this system of observation. I will be excused, I trust, for saying that the first weather reports ever made were all founded upon Mr. Espy's Philosophy of Storms. His theory was repudiated by American scientists generally. Professor Henry was one of few exceptions. He fared no better with the Royal Society in England. In France he met with more favor. The learned Faraday recommended it to favor. I became acquainted with him (Professor Espy) here in 1852. I urged him to utilize his theory. He was in this employment at a salary of only $2,000. He had not the means to command the telegraph. At first we got the editors of the National Intelligencer and the Union—or maybe it was the Constitution; at any rate, the other leading paper in the city—to publish, without charge, short reports from different parts of the country, such as telegraph reports would send. Those reports at first were very meager. This was in 1854; and they were the first reports of this kind ever published in the world. From these beginnings sprang that grand system which now spans the continent, which is still in its infancy, and from which incalculable advantages to navigation, commerce, and agriculture have already been secured, and grander developments are yet in store.

"If we could estimate the value of property saved by these signals during the last year, it would not be less than $20,000,000. The value of human lives that have been thus saved, who can estimate? Then the advantages to the agricultural interests are incalculable. By an additional appropriation of $25,000 General Myer, as he told me, will be enabled to enlarge the number of stations very greatly; I forget the exact number, but it largely increases the ratio of the amount of the sum necessary to run the system as it was last year.

"Mr. BANNING. This would give him twenty-five additional men.

"Mr. STEPHENS, of Georgia. And it extends the Signal Service so as greatly to increase its utility. This grand system is but in its infancy. Originating in this country, it has extended over the civilized world; and the extent to which it may yet be carried is, in my opinion, incalculable. Let us give this additional $25,000. My word for it, the country will be benefited by it more than by the same amount expended in any other way."

Published by order of the Secretary of War.

ALBERT J. MYER,
*Brigadier-General (Brevet Assigned), Chief Signal-Officer, U. S. A.*

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PAPER 39.

## MONTHLY WEATHER REVIEW, JUNE, 1878.

INTRODUCTION.

In compiling the present review the following data, received up to July 13, have been made use of, viz: the regular tri-daily weather charts, containing the data of simultaneous observations taken at 114 Signal-Service stations and 12 Canadian sta-

tions, as telegraphed to this office; monthly journals and means, 119 and 135, respectively, from the former, and monthly means from 13 of the latter; reports from 25 special sunset stations; 240 monthly registers from voluntary observers; 49 monthly registers from United States Army post surgeons; marine records; international simultaneous observations; monthly reports of the weather services of the States of Iowa and Missouri; reliable newspaper extracts; special reports.

### BAROMETRIC PRESSURE.

Upon Chart No. II is shown the general distribution of the atmospheric pressure for the month by the isobaric lines. Compared with the means for June of previous years, the pressure for the present month averages lower in the Gulf and Atlantic States, and slightly higher in the Northwest and Upper Lake region.

*The local barometric ranges*, as reduced to sea-level, for the month, vary as follows: New England, from 0.70 of an inch at Burlington to 0.95 at Eastport; Middle Atlantic States, 0.65 at Lynchburg to 0.75 at Philadelphia; South Atlantic States, 0.50 at Jacksonville to 0.61 at Cape Lookout; Gulf States, 0.25 at Key West to 0.45 at Mobile, 0.29 at Galveston, and 0.56 at Jacksboro', Texas; Ohio Valley and Tennessee, 0.50 at Memphis to 0.80 at Pittsburg; Lower Lake region, 0.64 at Oswego to 0.74 at Toledo; Upper Lake region, 0.64 at Chicago to 0.90 at Marquette; Upper Mississippi Valley, 0.57 at Saint Louis to 0.77 at Saint Paul; Red River of the North Valley, 0.61 at Pembina to 0.76 at Breckenridge; Missouri Valley, 0.59 at Bismarck to 0.67 at Omaha; plains of Nebraska and Kansas, 0.72 at Dodge City to 0.76 at North Platte; Rocky Mountain region, 0.30 at Santa Fé to 0.54 at Denver; between Rocky Mountains and Pacific States, 0.28 at Pioche to 0.46 at Boise City; Pacific States, 0.21 at Campo, Cal., to 0.59 at Portland, Oreg.

*Areas of high pressure.*—Of these, nine are described. But one, No. II, was of decided interest, in that it produced destructive frosts on the 6th and 7th.

No. I.—This is a continuation of the high-pressure area described in the May review as No. VI. 1st, in the morning it was central in New England, with northeasterly winds and generally clear weather; minimum temperature on Mount Washington, 34° Fahr.; at Portland and Eastport, highest barometer, reduced to sea-level, 30.29 inches, or 0.33 inch above the normals. During the day it moved eastward off the coast. 2d, the pressure rapidly diminished in New England, as it withdrew to the eastward; p. m. barometer at Halifax 30.12, or 0.29 above the normal.

No. II.—1st, prevailed over California, with clear weather; p. m. barometer at San Francisco, 30.11, or 0.16 above normal. It extended north and eastward toward Oregon and Utah during the day. 2d, it was probably central in Utah by midnight, with barometer at Salt Lake City 0.13 above normal. During the night the temperature on Pike's Peak fell to 16°. 3d, it continued advancing eastward; by midnight it covered the country from the Rocky Mountains to the Missouri Valley; barometer at North Platte, 0.23 above normal. The minimum temperatures indicated frosts as far southward as the northern portions of Arizona and New Mexico the past three mornings; minimum temperature 35° at Cheyenne. 4th, frosts evidently occurred from Wyoming northward, and in northern portions of Dakota and Minnesota; minimum temperature at Pembina, 37°. By afternoon it was central in the Red River of the North Valley; barometer at Pembina 30.17, or 0.35 above normal. 5th, the frost-area probably reached from Northeastern Dakota to Northern Michigan. The highest pressure covered the Lake region, with cool, clear weather; p. m. barometer at Marquette 30.19, or 0.33 above normal. 6th, morning, it was central over the Lower Lakes. Minimum temperature at Rockliffe, Canada, 30°; with frosts from thence toward Michigan and the interior of the Middle States. At Bradford, Pa., heavy frosts are reported to have occurred. During the day the pressure rapidly diminished in advance of storm No. II. 7th, highest pressure in Northeastern New York. Morning, minimum temperature on Mount Washington 15°; Littleton, N. H., 26°; Quebec, 35°; Burlington, 37°. In Massachusetts, New Hampshire, Vermont, and Northern New York heavy frosts occurred, destroying potatoes, corn, vines, &c. It disappeared during the day.

No. III.—9th, developed over the Northwest. 10th, a. m. barometer at North Platte and Dodge City 0.14 above normal. It extended southeastward during the day, and, by midnight, was central in Arkansas. 11th, advanced to the Eastern Gulf States, but with the pressure only slightly above the normal. 12th, apparently dissipated.

No. IV.—11th, apparently advanced southeastward over Manitoba. 12th, it reached the Lake region, with cool, clear weather and northerly winds; midnight barometer at Marquette 30.21, or 0.32 above normal, and following morning 30.28, or 0.38 above. 13th, continued extending southeastward toward the Atlantic coast, but still highest over the Upper Lakes. 14th, by midnight, highest along the Middle Atlantic coast. 15th, it gradually disappeared in advance of storm No. V.

No. V.—14th, developed in the Rocky Mountain region, with minimum temperatures from Montana to Western Dakota, indicating light frosts; p. m. barometer at Virginia

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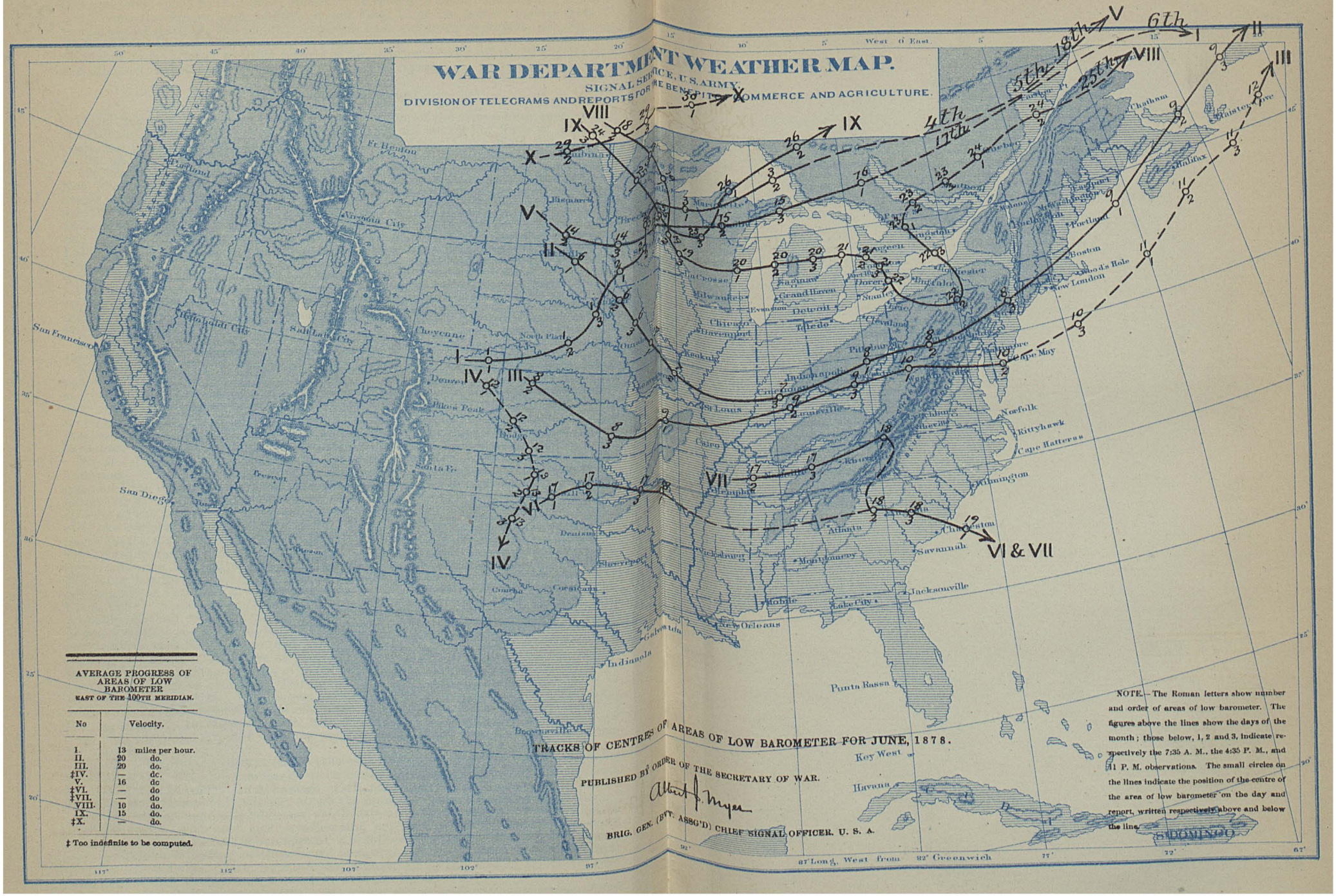
WAR DEPARTMENT WEATHER MAP.
SIGNAL SERVICE, U. S. ARMY.
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.
I
II
III
IV
V
VI & VII
VIII
IX
X
4th
5th
6th
17th
18th
25th
AVERAGE PROGRESS OF AREAS OF LOW BAROMETER EAST OF THE 100TH MERIDIAN.
No | Velocity.
I. 13 miles per hour.
II. 20 do.
III. 20 do.
‡IV. — dc.
V. 16 dc
‡VI. — do
‡VII. — do
VIII. 10 do.
IX. 15 do.
‡X. — do.
‡ Too indefinite to be computed.
TRACKS OF CENTRES OF AREAS OF LOW BAROMETER FOR JUNE, 1878.
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
Albert J. Myer
BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.
NOTE.—The Roman letters show number and order of areas of low barometer. The figures above the lines show the days of the month; those below, 1, 2 and 3, indicate respectively the 7:35 A. M., the 4:35 P. M., and 11 P. M. observations. The small circles on the lines indicate the position of the centre of the area of low barometer on the day and report, written respectively above and below the line.
87° Long. West from 82° Greenwich

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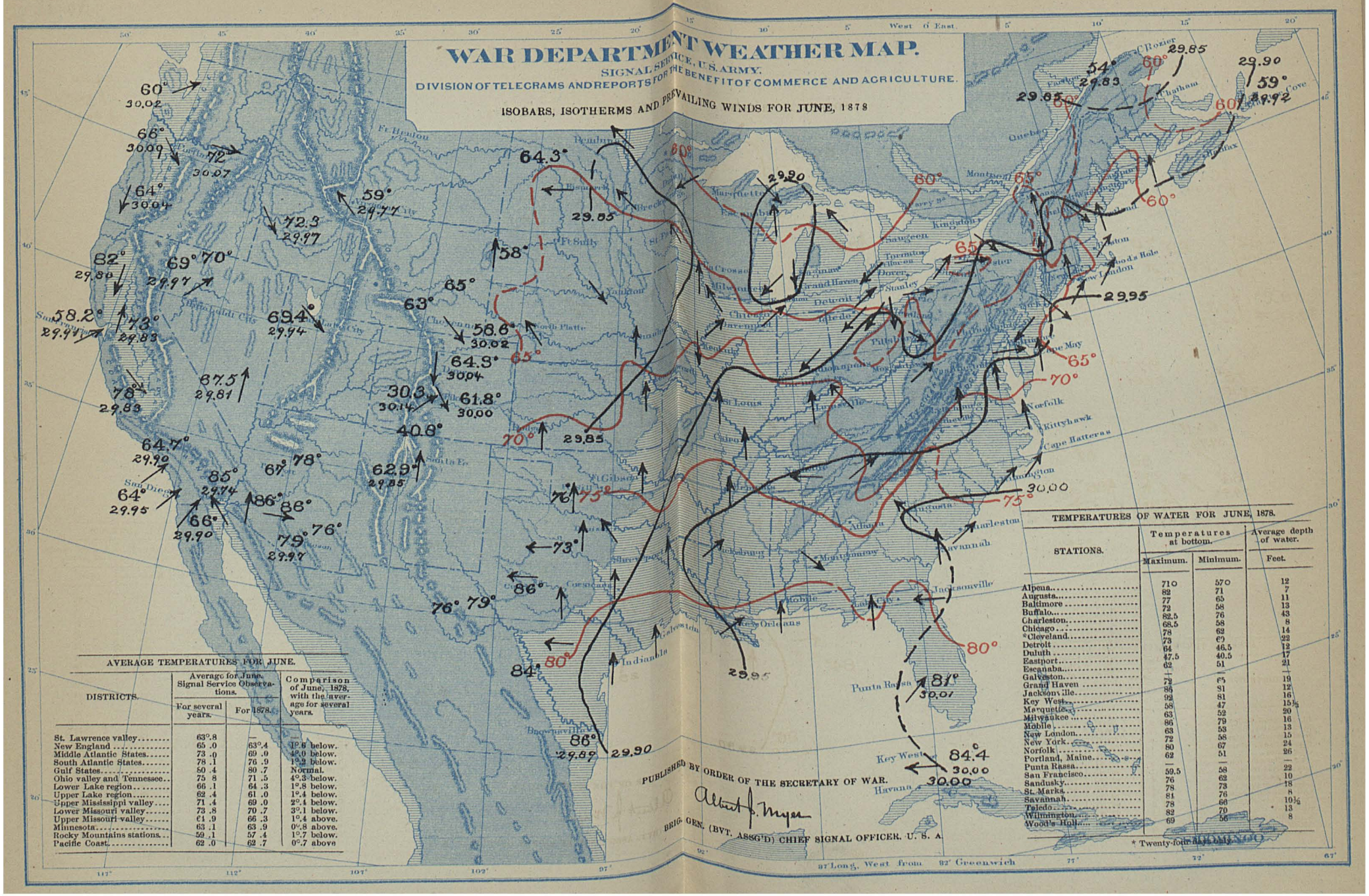
# WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U.S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

ISOBARS, ISOTHERMS AND PREVAILING WINDS FOR JUNE, 1878




## AVERAGE TEMPERATURES FOR JUNE.

| DISTRICTS. | Average for June, Signal Service Observations. For several years. | For 1878. | Comparison of June, 1878, with the average for several years. |
|---|---|---|---|
| St. Lawrence valley | 63°.8 | — | — |
| New England | 65 .0 | 63°.4 | 1°.6 below. |
| Middle Atlantic States | 73 .0 | 69 .0 | 4°.0 below. |
| South Atlantic States | 78 .1 | 76 .9 | 1°.2 below. |
| Gulf States | 80 .4 | 80 .7 | Normal. |
| Ohio valley and Tennessee | 75 .8 | 71 .5 | 4°.3 below. |
| Lower Lake region | 66 .1 | 64 .3 | 1°.8 below. |
| Upper Lake region | 62 .4 | 61 .0 | 1°.4 below. |
| Upper Mississippi valley | 71 .4 | 69 .0 | 2°.4 below. |
| Lower Missouri valley | 73 .8 | 70 .7 | 3°.1 below. |
| Upper Missouri valley | 64 .9 | 66 .3 | 1°.4 above. |
| Minnesota | 63 .1 | 63 .9 | 0°.8 above. |
| Rocky Mountains stations | 59 .1 | 57 .4 | 1°.7 below. |
| Pacific Coast | 62 .0 | 62 .7 | 0°.7 above |

## TEMPERATURES OF WATER FOR JUNE, 1878.

| STATIONS. | Temperatures at bottom. Maximum. | Minimum. | Average depth of water. Feet. |
|---|---|---|---|
| Alpena | 71O | 57O | 12 |
| Augusta | 82 | 71 | 7 |
| Baltimore | 77 | 65 | 11 |
| Buffalo | 72 | 58 | 13 |
| Charleston | 82.5 | 76 | 43 |
| Chicago | 68.5 | 58 | 8 |
| *Cleveland | 78 | 62 | 14 |
| Detroit | 73 | 60 | 22 |
| Duluth | 64 | 46.5 | 12 |
| Eastport | 47.5 | 40.5 | 17 |
| Escanaba | 62 | 51 | 21 |
| Galveston | — | — | — |
| Grand Haven | 72 | 65 | 19 |
| Jacksonville | 86 | 81 | 12 |
| Key West | 92 | 81 | 16 |
| Marquette | 58 | 47 | 15½ |
| Milwaukee | 63 | 52 | 20 |
| Mobile | 86 | 79 | 16 |
| New London | 63 | 53 | 13 |
| New York | 72 | 58 | 15 |
| Norfolk | 80 | 67 | 24 |
| Portland, Maine | 62 | 51 | 26 |
| Punta Rassa | — | — | — |
| San Francisco | 59.5 | 58 | 22 |
| Sandusky | 76 | 62 | 10 |
| St. Marks | 78 | 73 | 18 |
| Savannah | 81 | 76 | 8 |
| Toledo | 78 | 66 | 10½ |
| Wilmington | 82 | 70 | 13 |
| Wood's Holl | 69 | 56 | 8 |

* Twenty-four days only.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

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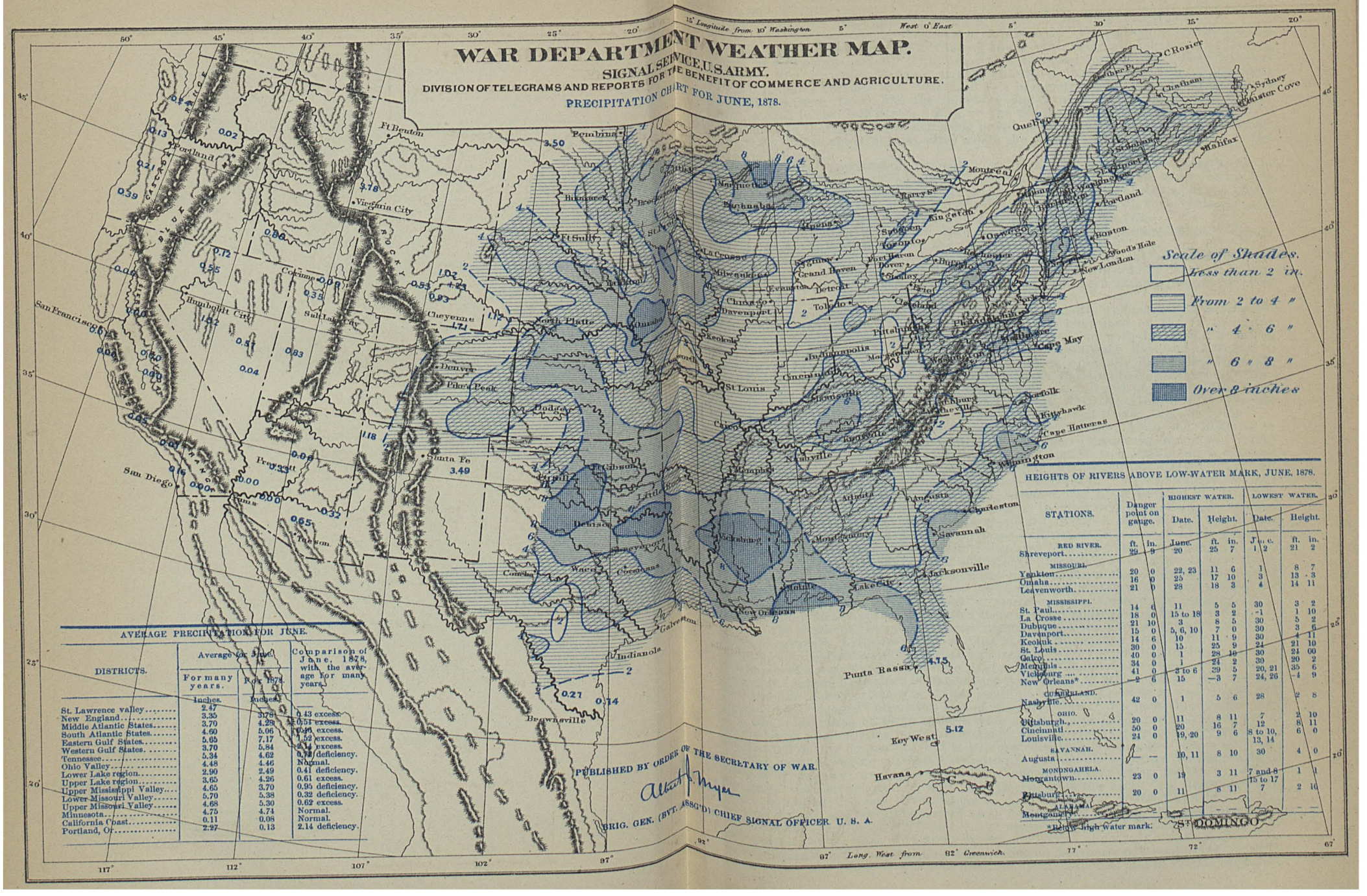
# WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U.S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

PRECIPITATION CHART FOR JUNE, 1878.




## AVERAGE PRECIPITATION FOR JUNE.

| DISTRICTS. | Average for June. For many years. | For 1878. | Comparison of June, 1878, with the average for many years. |
|---|---|---|---|
| | Inches. | Inches. | |
| St. Lawrence valley | 2.47 | 3.78 | 0.43 excess. |
| New England | 3.35 | 4.28 | 0.51 excess. |
| Middle Atlantic States | 3.70 | 5.06 | 0.96 excess. |
| South Atlantic States | 4.60 | 7.17 | 1.52 excess. |
| Eastern Gulf States | 5.65 | 5.84 | 0.14 excess. |
| Western Gulf States | 3.70 | 4.62 | 0.78 deficiency. |
| Tennessee | 5.34 | 4.46 | Normal. |
| Ohio Valley | 4.48 | 2.49 | 0.41 deficiency. |
| Lower Lake region | 2.90 | 4.26 | 0.61 excess. |
| Upper Lake region | 3.65 | 3.70 | 0.95 deficiency. |
| Upper Mississippi Valley | 4.65 | 5.38 | 0.32 deficiency. |
| Lower Missouri Valley | 5.70 | 5.30 | 0.62 excess. |
| Upper Missouri Valley | 4.68 | 4.74 | Normal. |
| Minnesota | 4.75 | 0.08 | Normal. |
| California Coast | 0.11 | 0.13 | 2.14 deficiency. |
| Portland, Or | 2.27 | | |

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER U. S. A.

## HEIGHTS OF RIVERS ABOVE LOW-WATER MARK, JUNE, 1878.

| STATIONS. | Danger point on gauge. | HIGHEST WATER. Date. | HIGHEST WATER. Height. | LOWEST WATER. Date. | LOWEST WATER. Height. |
|---|---|---|---|---|---|
| | ft. in. | June. | ft. in. | June. | ft. in. |
| RED RIVER. | | | | | |
| Shreveport | 29 9 | 20 | 25 7 | 1 2 | 21 2 |
| MISSOURI. | | | | | |
| Yankton | 20 0 | 22, 23 | 11 6 | 1 | 8 7 |
| Omaha | 16 0 | 25 | 17 10 | 3 | 13 3 |
| Leavenworth | 21 0 | 28 | 18 3 | 4 | 14 11 |
| MISSISSIPPI. | | | | | |
| St. Paul | 14 6 | 11 | 5 5 | 30 | 3 2 |
| La Crosse | 18 0 | 15 to 18 | 3 2 | 1 | 1 10 |
| Dubuque | 21 10 | 3 | 8 5 | 30 | 5 2 |
| Davenport | 15 0 | 5, 6, 10 | 7 0 | 30 | 3 6 |
| Keokuk | 14 6 | 10 | 11 9 | 30 | 4 11 |
| St. Louis | 30 0 | 15 | 25 9 | 24 | 21 10 |
| Cairo | 40 0 | 1 | 28 10 | 30 | 24 00 |
| Memphis | 34 0 | 1 | 24 2 | 30 | 20 2 |
| Vicksburg | 41 0 | 3 to 6 | 39 5 | 20, 21 | 35 6 |
| New Orleans* | 2 6 | 15 | —3 7 | 24, 26 | —4 9 |
| CUMBERLAND. | | | | | |
| Nashville | 42 0 | 1 | 5 6 | 28 | 2 8 |
| OHIO. | | | | | |
| Pittsburgh | 20 0 | 11 | 8 11 | 7 | 2 10 |
| Cincinnati | 50 0 | 20 | 16 7 | 12 | 8 11 |
| Louisville | 24 0 | 19, 20 | 9 6 | 8 to 10, 13, 14 | 6 0 |
| SAVANNAH. | | | | | |
| Augusta | — — | 10, 11 | 8 10 | 30 | 4 0 |
| MONONGAHELA. | | | | | |
| Morgantown | 23 0 | 19 | 3 11 | 7 and 8 15 to 17 | 1 1 |
| Pittsburg | 20 0 | 11 | 8 11 | 7 | 2 10 |
| ALABAMA. | | | | | |
| Montgomery | — — | — | — | — | — |

*Below high water mark.

City and Salt Lake City 0.18 above normals. 15th, advanced toward the Lower Missouri Valley; a. m. barometer at North Platte 0.17 above normal. 16th, extended to the Upper Lakes and Manitoba. 17th, central over the Upper Lakes; p. m. barometer at Marquette 0.19 above normal. 18th, under the influence of low-pressure areas VI, VII, and VIII, the pressure diminished, but continued highest in the Lake region, with a barometric ridge running from NE. to SW. 19th, it was dissipated.

No. VI.—18th, apparently developed in New Mexico. 19th, extended northward and probably united with a second advancing southward; midnight barometer at Denver 30.24, or 0.23 above normal. 20th, progressed eastward toward the Lower Missouri Valley. 21st, by midnight was central in Minnesota; barometer at Duluth and Saint Paul 0.13 above normal. 22d, continued as a barometric ridge running from Minnesota to Northern Texas, and the following day throughout the Mississippi Valley. 24th, moved to the Gulf States. 25th, to the South Atlantic coast. 26th and 27th, continued on that coast with increasing pressure. 28th, a. m. barometer at Wilmington 30.27, or 0.20 above normal, after which the pressure gradually diminished to the close of the month.

No. VII.—23d, appeared in Oregon. 24th, it rapidly extended southeastward; a. m. barometer at Portland 30.32, or 0.21 above normal. 25th, the pressure was highest from Oregon to western portions of Kansas and Nebraska. 26th, central in the Lower Missouri Valley, and then lost its identity on account of No. VI, then central on the South Atlantic coast and decidedly the more prominent of the two.

No. VIII was of little interest. 28th, appeared north of the Lower Lakes. 29th, a. m. barometer at Rockliffe 30.27; and then rapidly disappeared.

No. IX.—28th, advanced southeastward over Oregon; midnight barometer at Portland 30.29, or 0.20 above normal. 29th, moved eastward toward the Missouri Valley. 30th, by midnight was central in Nebraska and Southern Dakota; barometer 0.22 above normal at North Platte.

*Areas of low pressure.*—Ten of these have been sufficiently well marked to be charted. The storm described in the May review as No. XIV continued on the 1st along the coast from Southern New England to North Carolina, but with increasing pressure. Northeast to southeast gales prevailed north of Chesapeake Bay, and northeast to northwest gales thence southward. 2d, the winds gradually diminished to brisk. Cautionary signals were hoisted May 30 from North Carolina to New Jersey, and May 31 along the New England coast; all justified except on coast of Maine. Maximum hourly velocities: Kittyhawk, NE. 37; Cape Henry, NW. 36; Atlantic City, NE. 52; Barnegat, NE. 56; New Haven, NE., Wood's Holl, E., and Boston, NE., 32 miles.

No. I.—1st, threatening and rainy weather prevailed from Utah and Montana to Missouri, Illinois, and Wisconsin, with frequently heavy thunder-storms in the Northwest. In the morning the area of low pressure lay from W. to E., but by night changed so as to run from N. to. S.; midnight barometer at Omaha 29.51, or 0.30 below normal. A tornado formed in Western Missouri, between 2 and 3 p. m. A dense, muddy-looking, funnel-shaped cloud, obscuring everything beyond, was observed over the Missouri River about 1½ miles below Missouri City (about 14 miles west of Richmond); at same time another cloud was observed to the westward, distance between the two clouds about 2 miles; they passed off to the northeast, with a noise like that of a heavy freight train when running, and in the distance appeared to unite in one immense cloud and descend; day intensely sultry. As it approached Richmond, an observer states that the "two dense, black, funnel-shaped clouds appeared to unite, with small end down; objects were drawn upward and then scattered broadcast; it moved slowly." As it entered the city, about 4.05 p. m., from the south, it passed over the Conservator printing-office, where it hung for several seconds with a violent rotary motion, and then moved a little toward the south; it then passed direct north through the city, sweeping everything clean; heavy sills, 18 inches square and 16 feet long, were taken from the foundations of buildings and carried away; trees in every instance were twisted in a direction against the hands of a watch and hurled from west to east. The post-office was entirely swept away, and letters have since been returned from places 12 miles distant. On the east side the line of destruction was almost straight, while on the west it was looped and jagged; this "looped" formation was particularly noted. Its path through the city was about 250 yards or three squares wide and one mile long, in which space not a single house was left standing; this distance was traversed in less than five minutes; no rain fell during its passage, but it was preceded by a few minutes' heavy rain; ascending and descending currents were noticed. At the old cemetery (on the northern margin of the city), every tombstone was leveled, and many were broken to pieces; the grass was scorched as if by fire. It then rose from the earth, but descended two miles distant at Crooked River, where an iron bridge was doubled and twisted up, persons injured, and buildings carried away for two miles beyond. It passed over Morton (in eastern portion of Ray County), and again descended at Highsinger's, near Ray and Carroll County line. In Carroll County its course appeared to change from NE. to SE., being seen from Carrollton, where immense hailstones fell, containing, at their center, mud and grass; it was also observed from Norborne, and in Prairie township

destroyed 13 houses. In Richmond over 100 buildings were destroyed, 13 persons killed, and about 70 injured. A tornado also formed between 4 and 5 p. m., about six miles west of Clark's (on the Union Pacific Railroad), Nebr., and about one-half mile south of railroad track; passed from NW. to SE., demolished several buildings, and disappeared over the Platte River; lasted 20 minutes, and is described as a black column. At Adair, Iowa, during the afternoon, houses were blown down, two persons killed, and several injured; in Guthrie County (next north of Adair), great damage to buildings and crops by wind-storm. At Milwaukee, during p. m., very severe thunder-storm from south, during which ball lightning did much damage; telegraph lines were affected. 2d, the central pressure continued diminishing; midnight barometer at Breckenridge 29.38, or 0.39 below normal. Rainy weather prevailed from the Northwest to the Lakes, with heavy wind and thunder storms, especially in Iowa, where floods followed. 3d, as it passed into Canada, generally light rains fell in the Lake region, with high winds and gales. The three following days, the central depression passed north of the limit of the stations, but a barometric trough reached southward into the Gulf States, in which frequent thunder-storms occurred, with high winds and gales from North Carolina northward. Cautionary signals were ordered the 1st along Lakes Michigan and Superior; 2d, Lakes Huron and Erie; 3d, Lake Ontario; 5th, from North Carolina to Maine, except Connecticut, and very generally justified. Maximum velocities: Denver, S. 48; North Platte, NE. 72; Omaha, SE. 33; Breckenridge, NE. 32; Bismarck, NW. 36; Duluth, NE. 40; Milwaukee SE. and SW. 36; Alpena, W. 28; Sandusky, N. 34; Rochester, W. 28; Cape Lookout, NE. 86; Kittyhawk, N. 38; Cape May and Sandy Hook, NW. 36; Boston and Thatcher's Island, NW. 32; Mount Washington, NW. 60; Father Point, W. 34 miles.

No. II.—6th, this storm developed in the Northwest, with rainy weather and thunder-storms thence to Upper Lakes. On Pike's Peak light snow fell throughout the day. 7th, the central pressure rapidly diminished; midnight barometer at Louisville 29.55, or 0.38 below normal. Frequent rains were reported from the Upper Lakes to the Gulf and South Atlantic States. In Texas, as the winds shifted to northerly during the night, they increased to gales at many places. 8th, the rain-area extended to the Atlantic coast, with severe thunder-storms, increasing winds, heavy squalls, and lower pressure; near Fayetteville, N. C., a destructive hail-storm. Midnight barometer at Atlantic City 29.43, or 0.58 below normal. 9th, it rapidly moved northeastward over Nova Scotia. Signals were displayed the 6th along Lakes Superior and Michigan; 7th, Lakes Huron, Erie, and Ontario; 8th, along coast from North Carolina to Maine. The majority of those on Lakes Huron and Ontario and the New England coast were not justified. Maximum velocities: Denver, N. 36; Indianola, NE. 43; Knoxville, SW. 30; Duluth, NE. 30; Sandusky, NE. 30; Tybee Island, SW. 32; Smithville, SW. 32; Cape Lookout, SW. 42; Cape May, S. 30; New London, SE. 30; Eastport, NW. 40; Mount Washington, SE. 58 miles.

No. III.—6th, at midnight, the barometer at Portland, Oreg., reached its minimum, 29.73, or 0.34 below the normal. Clear or partly cloudy weather prevailed in the Pacific States. At Mare Island, Cal., the SW. wind attained an hourly velocity of 65 miles at 5 p. m. 7th, the pressure began diminishing in the Northwest. 8th, threatening weather, with generally light rains, was reported from Kansas northward. 9th, it increased in extent and force, with heavy rains in the Ohio Valley. In Georgia, South Carolina, and Virginia severe thunder-storms and tornadoes are reported to have been produced. In Richmond County, Georgia, tornado swept across lower end of Georgia Railroad; vicinity of Harlem and Belair, terrible storms, houses, fences, and stationary cars blown over; at Belair, large cotton factory demolished and crops ruined; near Berzelia every outhouse blown down. In Columbia County, Georgia, hailstones weighing from 1 to 3 pounds, killing cattle and hogs. In South Carolina, Currytown almost swept away; along Charlotte and South Carolina Railroad, cars overturned, houses blown down, crops and cattle destroyed; several deaths reported. Vicinity of Petersburg, Dinwiddie County, Virginia, four distinct thunder-storms from 4 p. m. to midnight, accompanied by heavy wind, hail, incessant lightning, and tremendous rain-fall; trees uprooted; crops in adjoining counties suffered severely. At Town Creek, N. C., severe hail-storm. Midnight barometer at Cincinnati 29.41, or 0.52 below normal. 10th, the rain-area reached from the Eastern Gulf and Atlantic States to the lower lakes, with frequent high winds and gales. 11th, it moved northeastward at some distance off the coast, preceded by easterly gales. Midnight barometer at Sydney, C. B., 29.54, or 0.44 below the normal. Signals ordered the 9th along the lower lakes and coast from North Carolina to Massachusetts were justified, except on Lake Ontario; those ordered the 10th, on the coast of Maine, were not justified. Maximum velocities: San Francisco, SW. 34; Pike's Peak, N. 40; North Platte, NW. 36; Louisville, S. 30; Sandusky, NE. 35; Capes Lookout and Hatteras, SW. 32; Cape May, S. 27 and N. 44; Sandy Hook, E. 40; Boston, NE. 28; Mount Washington, SE. 58 miles. At Accotink, Va., the wind is reported to have increased to hurricane force, from the east, at 1 a. m. of the 10th.

No. IV.—After the previous disturbance had passed eastward from the Pacific coast

the pressure again began diminishing in California. 9th, a. m. barometer at San Francisco 0.15 below normal. At Austin, Nev., thunder storms prevailed all night; at Virginia City, considerable hail. 10th, barometer at San Francisco 0.17 below normal. Light rains occasionally fell in California, Nevada, and Western Montana; on Pike's Peak, sleet. 11th, falling barometer and increasing southeasterly winds, over the country west of the Mississippi, indicated its approach. Light rains fell from Dakota to New Mexico and Western Texas. 12th, it moved southward over Kansas. Threatening and rainy weather prevailed from Utah, Montana, and Western Dakota to Indian Territory and Missouri, with frequently heavy thunder-storms; also from the Western Gulf States to the Lower Ohio Valley. 13th, rainy weather continued from Montana and Dakota southeastward to the Gulf States. 14th, thunder-storms were frequent in the Gulf States and Tennessee. Maximum velocities: Mare Island, Cal., SW. 56; Santa Fé, E. 26; North Platte, S. 46; Dodge City, S. 44; Pike's Peak, NW. 44; Bismarck, SE. 48; Indianola, S. 29 miles. For six days previous to the 15th a vessel was detained off San Francisco by heavy gales.

No. V.—14th, advanced southeastward over Dakota, with rainy weather, thence to Minnesota, and, at places, gales. 15th, frequent rains accompanied it in the Upper Mississippi Valley and Upper Lake region, with very brisk winds. 16th and 17th, as it passed eastward to the north of the stations, a barometric trough formed to the southwestward, in which frequent, but generally light, rains fell. Signals were ordered the 16th for the New Jersey coast, and 17th for the North Carolina coast, and justified. Those for the Southern New England coast were not justified. Maximum velocities: Pike's Peak, SW. 45; Bismarck, W. 36; Breckenridge, SE. 48; North Platte, S. 30; Dodge City, NE. 38; Fort Sill, NE. 50; Kittyhawk, SW. 28; Cape May, S. 30; Sandy Hook, SW. 27 miles.

Nos. VI and VII.—While the pressure continued low, with frequent rains and thunder-storms, in Texas and Indian Territory the 15th and 16th, after the passage of the two preceding low-pressure areas, it also began decreasing from Oregon southeastward; midnight barometer at Salt Lake City 0.19, and at Virginia City 0.18, below normals. 17th, rainy weather prevailed from the Gulf States to Kansas, Missouri, and the Ohio Valley. 18th, frequent rains continued from the Southwest to South and Middle Atlantic States. At Mooringsport (near Shreveport), La., a destructive thunder and hail storm was produced. 19th, the northeasterly winds on the North Carolina coast increased to gales, and the signals ordered the 17th instant were justified, but lowered too soon. Maximum velocities: San Francisco, SW. 32; Umatilla, Oreg., SW. 28; Salt Lake City, E. 32; Pike's Peak, NE. 44; Vicksburg, S. 32; Cape Lookout, NE. 35; Kittyhawk, NE. 33 miles.

No. VIII.—17th, light rains fell in Montana and Western Dakota, accompanying thunder-storms. 18th, they extended into Minnesota with increasing winds. 19th, as the center moved eastward a barometric trough extended southward. On its western side the gradient was steep, resulting in northwesterly gales, severe thunder-storms, and hail at places. 20th, it progressed slowly to the eastward, producing heavy rains and gales over the Upper Lake region. On Lake Michigan many vessels suffered severely. Midnight barometer at Alpena 29.49, or 0.39 below normal. 21st, a. m. barometer at Toledo and Port Huron, respectively, 29.47 and 29.45, or 0.46 and 0.45 below normals. Threatening and rainy weather prevailed from the lakes to the Eastern Gulf, South, and Middle Atlantic States, with high winds and gales at many places. 22d, the rain-area covered the Middle States, New England, lower lakes, and Lake Huron, with increasing winds on the coast. 23d to 25th, while progressing northeastward, frequent rains and high winds accompanied it. Signals were ordered the 20th along the upper lakes, but rather late; 21st, along Lake Erie, the North Carolina and New Jersey coasts, which were partly justified; 22d, along the Southern New England coast and at Eastport, also partly justified. Maximum velocities: Bismarck, SW. and N. 36; Pike's Peak, N. 48; Dodge City, N. 36; Leavenworth, S. 36; Escanaba, N. 34; Milwaukee, W. 28; Cape Lookout, SE. 36; Sandy Hook, SE. 28; New London, SE. 33; Thatcher's Island, SE. 32; Eastport, SE. 32; Quebec, NE. gale; Mount Washington, SE. 68 and NW. 75 miles.

No. IX.—21st, p. m. barometer at San Francisco fell to 29.79, or 0.18 below normal, with high SW. wind. 22d, light rains were occasionally reported from Arizona and New Mexico to Idaho and Montana, with high SE. wind at Pioche, Nev. The lowest pressure advanced northeastward toward Oregon; p. m. barometer at Portland 0.18 below normal. 23d, began advancing toward the Northwest, with occasional light rains and high winds from New Mexico to Nevada, Oregon, Idaho, and Montana, and with heavy rains and southerly gales in Western Nebraska. 24th, the central disturbance reached Manitoba, with a barometric trough reaching southward beyond Indian Territory, in which frequent rains and high southeasterly winds, shifting to northwesterly, prevailed. 25th, occasional rains fell in the Southwest, and frequent rains with high winds in the Northwest. 26th, a. m. barometer at Marquette 29.60, or 0.26 below normal. The center passed northeastward into Canada, followed at places by high SW. or NW. winds over the upper lakes and Lake Erie. Not any signals were

displayed. Maximum velocities: San Francisco, SW. 26; Pioche, SE. 26; Umatilla, Oreg., W. 36; Salt Lake City, E. 36; Virginia City, SW. 32; Pike's Peak, W. 64; Denver, N. 33; North Platte, S. 50 and NW. 48; Bismarck, NW. 45; Pembina, SE. 31; Milwaukee, W. 30; Cleveland, S. 28 miles.

No. X.—After high pressure No. VII had passed southeastward from Oregon on the 25th, the pressure rapidly diminished on the Pacific coast and reached its minimum the 26th; p. m. barometer at San Francisco 0.18 below normal. 27th, high winds prevailed in the afternoon at San Francisco and Red Bluff, Cal. The central depression advanced northeastward toward Dakota. 28th, p. m. barometer at Salt Lake City 0.25 below normal. Occasionally light rains fell from Oregon and Nevada to the northwest, with frequent high winds and gales; also frequent rains in the Southern States. 29th, the center continued northeastward over Manitoba, with a deep barometric trough extending southward over Texas, in which heavy rains and high winds or gales were frequent. The a. m. barometer at Bismarck read 0.36 below normal. 30th, the barometric trough advanced eastward and at midnight reached from Lake Superior southwestward to Texas. Maximum velocities: San Francisco, SW. 30; Red Bluff, NW. 27; Winnemucca, W. 41; Salt Lake City, NW. 32; Pike's Peak, NW. and SW. 44; Denver, SE. 33; North Platte, SE. 60, and NE. 44; Dodge City, S. 40; Bismarck, W. 36; Saint Louis, S. 30; Saint Paul, SE. 30 miles.

## INTERNATIONAL METEOROLOGY.

*February.*—12, 54° 52′ S., 64° W., severe SW. gale. 18, 11 a. m., off west end of Wollaston Island, Patagonia, "very hard blow" from WSW.

*March.*—3, 41° 23′ N., 66° W., fresh gale, heavy rain, SW. squalls and heavy sea. 22d, off Cape of Good Hope, heavy westerly gales, lasting ten days.

*April.*—8, 38° 31′ S. (?), 31° 28′ W., terrific NE. hurricane. 9th, 32° S., 29° W., very heavy "pampero," lasting 21 hours; lost sails, swept decks, bulwarks stove, &c.; 41° S., 37° W., bark Spirit of the Morning had chief officer washed overboard and drowned. 19th, off Port of San Nicholas, Parana River, South America, gale. 22d, Mauritius, Indian Ocean, from 23 to 28 inches of rain fell at a few stations in the southern part of island, in about 14 hours. 30th, 53° 20′ N., 30° W., heavy gale from NW. to WSW., lasted to May 17.

*May.*—2, Paramaribo, Dutch Guiana, South America, 11 a. m. to 12. 10 p. m., E. gale. 4th, off Tonala, Mexico, schooner Farragut parted anchor, drove ashore, and became a total wreck during a "norther." 4th to 9th, port of Rio Janeiro, South America, heavy SE. sea, swell inside port greater than known since 1855; nearly all vessels dragged anchors, one brig wrecked. 12th, while on Saya de Mahla Banks, bark Leatitia (whaler) experienced hurricane lasting 42 hours. 15th, 35° 50′ N., 67° 43′ W., 9 a. m., SE. gale, thick weather, and heavy seas: 2 p. m., increased to hurricane, veered to SW. with violent squalls, seas making clean breach over ship; 6 p. m., moderated and veered to WSW.; ship steered ENE. before sea during 16th with falling barometer and increasing winds; 17th, fearful seas, crew lashed to pumps; 8 a. m. gale moderating. Bark Advocate left New York 13th, was struck by hurricane on the 15th, lost all 3 masts afternoon of 16th, and was abandoned 17th 100 miles E. of Sandy Hook. 16th, 180 miles north of Bermuda, revolving gale lasting four days, lost jib-boom, fore and main masts, &c. 18th to 20th, 45° N., 59° W., very heavy gale. 20th, 40° 45′ N., 56° 49′ W., 7.35 a. m. (Washington mean time), moderate NE. gale, barometer 29.93; Turk's Island, Bahamas, heavy sea. 25th, 35° 18′ N., 60° 20′ W., heavy sea and squally. 26th, 35° 3′ N., 15° 28′ W., fresh NE. gale and heavy sea. 27th, 54° 47′ N., 19° 33′ W., NW. and NE., squally; 49° 50′ N., 17° 22′ W., WNW., fog, rain and high sea. 28th, 54° 00′ N., 28° 08′ W., NE. and SE., squally; 49° 16′ N., 23° 13′ W., NW., W., stormy; Paramaribo, Dutch Guiana, South America, 3.45 to 4.15 p. m., E. and NE. gale with heavy rains. 29th, 49° 11′ N., 31° 55′ W., SSE. and E. fresh gale; 54° N., 32° W., strong gales and high sea. 30th, 47° 18′ N., 37° 57′ W., high westerly sea; 46° 11′ N., 39° 11′ W., strong W. wind and high westerly sea; 49° 58′ N., 16° 06′ W., increasing SE. wind; Paramaribo, Dutch Guiana, South America, 2 to 3 p. m., E. and NE. gales with heavy rains. 31st, 47° 56′ N., 44° 0′ W., W. heavy squall, thick fog; 50° 37′ N., 25° 18′ W., fresh S. by E. gale, high sea; 45° 17′ N., 42° 53′ W., fresh WNW. gale, high W. sea; 44° 42′ N., 43° 38′ W., NW. storm, rain-squalls, very high sea; 49° 36′ N., 24° 41′ W., SE. wind increasing to moderate gale; 37° 50′ N., 69° 30′ W., heavy SE. gale. Valparaiso, South America, bark lost foremast in "norther."

*June.*—1, 49° 2′ N., 33° 11′ W., SSW. to W., squalls; 48° 56′ N., 32° 12′ W., heavy W. sea. 2d, 49° 33′ N., 39° 43′ W., NNW. strong gale, high W. sea; 46° 44′ N., 38° 26′ W., NW. strong; 49° 9′ N., 9° 29′ W., SSW. rain-squalls. 3d, 48° 06′ N., 36° 20′ W., NW. strong winds and squalls; 48° 50′ N., 17° 39′ W., rain-squalls; Island of Jamaica, West Indies, heavy showers, in some districts estimated at seven inches. 4th, 47° 19′ N., 44° 30′ W., N. to NW. squally; 47° 58′ N., 25° 12′ W., W. to S. wind and sea increasing. 5th, 48° 55′ N., 32° W., SW. squally; 47° 25′ N., 31° 52′ W., SW. stormy, rain, and heavy sea; 49° 25′ N., 7° 33′ W., fresh W. gale and rough sea. 6th, 48° 30′ N., 42° 49′ W., NE. to N. strong

winds, squally, rain; 46° 08′ N., 39° 12′ W., NNW., squally; 45° 28′ N., 38° 36′ W., fresh NW. gales, rain; 48° 55′ N., 15° 13′ W., W. and SW. wind and sea increasing, heavy rain during morning. 7th, 48° 27′ N., 23° 01′ W., SSW. winds and high westerly swell during morning, SE. to NE. rain-squalls during evening. 8th, 43° 54′ N., 56° 45′ W., heavy W. swell. 9th, 41° 50′ N., 60° 25′ W., NW. and SSW. squally, rain; 40° 33′ N., 66° 55′ W., 3 a. m., heavy squall from S., dismasted vessel. 10th, 40° 40′ N., 67° 12′ W., squally, rain. Bark *Serena*, from New Castle, New South Wales, at San Francisco June 10, reports, no date, latitude 38° 50′ N., 168° W., hurricane beginning at SSE., ending at W. by N., lasting 48 hours and blowing heavy for 4 days. 11th, schooner Speedwell, Trinidad to Boston, thrown by current on San Felipe Reef during night, total loss. 12th, 49° 50′ N., 5° 53′ W., W. stormy with rain. 13th, 42° 49′ N., 54° 28′ W., high W. sea; 50° 03′ N., 13° 50′ W., high westerly swell; 51° 04′ N., 42° 13′ W., SW. and NW. brisk gale, showers, heavy W. sea. 14th, bark Loch Doon, at San Francisco from New South Wales, reports gale in longitude 129° W., no date. 16th, 49° 30′ N., 11° 21′ W., NW. stormy. 20th, 49° 55′ N., 15° 54′ W., heavy NW. sea. 21st, 49° 39′ N., 23° 31′ W., heavy NW. sea. 22d, 48° 45′ N., 33° 30′ W., high westerly swell. 25th, 48° 30′ N., 23° 14′ W., heavy sea. 26th, 47° 54′ N., 30° 43′ W., strong NW. breeze and squally. 28th, 47° 48′ N., 46° 21′ W., heavy WSW. sea and thick fog; 45° 12′ N., 45° 03′ W., W. stormy, ship labored heavily, high sea; 51° 03′ N., 24° 16′ W., NW. fresh winds and squalls; 51° 02′ N., 14° 46′ W., fresh gale, rain, and high sea. 29th, 49° 59′ N., 33° 16′ W., squally, rain; 50° 25′ N., 21° 48′ W., strong NE. gale, rain, high, confused sea.

*Ice at sea.*—Steamer Polynesian, at Liverpool, June 24, from Montreal, reports collided with iceberg when in Straits of Belle Isle.

*Ocean currents.*—Steamship Pennsylvania, running between New York and Liverpool, reports, June 15, "strong current setting SW., one mile per hour, to the north of the Gulf Stream, extending from Fastnet Rock (south coast of Ireland) to George's Bank, since April 15; prevailing wind during same period NE. and E."

*Tornado in China.*—April 11, Canton, China, terrible tornado from SW. to NE.; average breadth of track 600 feet; came from the sea in form of waterspout; struck the settlement of Stameen and passed thence northeastward over Canton, where it caused immense damage to native portion of city; 10,000 persons reported killed. Considerable damage was also done and numbers of lives lost at the villages of Pah Hin-Hock and Pah Hock-Tang, about two or three miles north of Canton, and at Fatshan.

## TEMPERATURE OF THE AIR.

The isothermal lines on Chart No. II illustrate the general distribution of the temperature of the air for the month. The average of the mean temperatures is slightly higher than the normal for the Pacific Coast and Minnesota, about normal for the Gulf States, and below the normal in the other sections, especially in the Middle Atlantic States, Ohio Valley, and Tennessee.

*Minimum and maximum temperatures*, respectively: Maine—at Orono, 38° and 93°; Portland, 45°, 94°. New Hampshire—Mount Washington, 15°, 71°; Centocookville, 39°, 94°. Vermont—Lunenburg, 34°, 90°; Burlington, 37°, 94°; West Charlotte, 48°, 95°. Massachusetts—Waltham, 37°, 92°; Wood's Holl, 46°, 81°; Somerset, 43°, 94°. Rhode Island—Newport, 48°, 87°; Fort Adams, 51°, 78°. Connecticut—New Haven, 45°, 86°; Colebrook, 46°, 88°. New York—Madison Barracks, 33°, 95°; Rochester, 40°, 93°; New York City, 47°, 88°; West Point, 41°, 97°. New Jersey—East Orange, 43°, 90°; Long Branch, 50°, 92°; Atlantic City, 45°, 85°; Atco, 52°, 94°. Pennsylvania—near Franklin, 32°, 88°; Philadelphia, 49°, 90°; Pittsburg, 43°, 96°. Delaware—Dover, 58°, 90°. Maryland—near Woodstock, 43°, 90°; Saint Inigoes, 60°, 92°; Baltimore, 51°, 92°. District of Columbia—Washington, 48°, 95°. Virginia—Wytheville, 44°, 85°; Lynchburg, 51°, 93°; Norfolk, 56°, 97°. West Virginia—Morgantown, 41°, 90°. North Carolina—Roan Mountain, 40°, 72°; Weldon, 61°, 98°, Wilmington, 52°, 91°. South Carolina—Aikin, 56°, 93°; Charleston, 64°, 90°. Georgia—McPherson Barracks, 50°, 95°; Augusta, 58°, 96°. Florida—Saint Mark's, 63°, 94°; Key West, 74°, 94°; Houston, 74°, 100°. Alabama—Green Spring, 62°, 94°; Montgomery, 63°, 95°; Mobile, 67°, 95°. Mississippi—Vicksburg, 62°, 95°; near Brookhaven, 66°, 93°. Louisiana—Baton Rouge Barracks, 60°, 96°; Shreveport, 66°, 94°; New Orleans, 71°, 92°. Texas—Fort Griffin, 51°, 97°; Fort Concho, 58°, 102°; Eagle Pass, 62°, 101°; Indianola, 63°, 98°. Ohio—Westerville, 40°, 91°; Toledo, 47°, 92°; Cincinnati, 52°, 90°; Bellefontaine, 48°, 98°. Kentucky—Danville, 53°, 86°; Louisville, 54°, 91°; Cloverport, 57°, 94°. Tennessee—Knoxville, 47°, 93°; Memphis, 58°, 94°; Nashville, 52°, 94°. Arkansas—Mount Ida, 60°, 89°; Judsonia, 60°, 90°. Michigan—Fort Brady, 33°, 87°; Litchfield, 49°, 95°; Grand Haven, 40°, 87°; Detroit, 42°, 92°. Indiana—Vevay, 46°, 94°; Indianapolis, 50°, 91°; Richmond, 50°, 100°. Illinois, Riley, 44°, 89°; Chicago, 50°, 85°; Cairo, 57°, 89°; Anna, 57°, 94°. Missouri—Lebanon, 50°, 94°; Saint Louis, 53°, 90°; Corning, 54°, 92°. Kansas—Dodge City, 48°, 95°; Leavenworth, 49°, 91°; Fort Wallace, 54°, 95°. Indian Territory—Fort Gibson, 54°, 93°; Fort Sill,

58°, 92°. Wisconsin—Ashland, 32°, 90°; Milwaukee, 45°, 83°; La Crosse, 45°, 90°. Iowa—Logan, 44°, 86°; Keokuk, 50°, 89°; Dubuque, 45°, 91°; Guttenburg, 48°, 94°. Nebraska—Fort Hartsuff, 40°, 92°; Omaha, 46°, 89°; North Platte, 45°, 92°; near Genoa, 53°, 94°. Minnesota—Breckenridge, 42°, 89°; Saint Anthony, 53°, 88°; Duluth, 41°, 88°. Dakota—Fort Pembina, 35°, 87°; Yankton, 47°, 89°; Bismarck, 46°, 92°. Colorado—Pike's Peak, 15°, 44°; Denver, 43°, 93°; Fort Lyon, 48°, 99°. Wyoming—Cheyenne, 35°, 86°; Fort Fetterman, 37°, 92°. New Mexico—Fort Wingate, 35°, 58°; Santa Fé, 38°, 90°. Arizona—Yuma, 56°, 110°. Nevada—Winnemucca, 36°, 94°; Pioche, 39°, 90°; Camp McDermit, 40°, 100°. Utah—Salt Lake City, 45°, 93°. Montana—Virginia City, 35°, 85°. Idaho—Boise City, 43°, 96°. Oregon—Roseburg, 43°, 96°; Umatilla, 48°, 103°. California—Santa Cruz, 40°, 80°; Fresno, 55°, 106°; Red Bluff, 53°, 105°; Visalia, 47°, 101°; San Diego, 51°, 76°; San Francisco, 51°, 73°.

*Ranges of temperature.*—The monthly ranges will appear from an examination of above minima and maxima temperatures. The greatest daily ranges vary as follows: In New England, from 21° on Mount Washington to 31° at Burlington and Boston; Middle Atlantic States, 18° at Cape May to 29° at Norfolk; South Atlantic States, 19° at Cape Lookout to 31° at Augusta; East Gulf States, 14° at Key West to 28° at Saint Mark's; West Gulf States, 16° at New Orleans to 29° at Corsicana; Ohio Valley and Tennessee, 20° at Cairo to 32° at Knoxville and 36° at Morgantown; Lower Lake region, 24° at Sandusky to 29° at Rochester; Upper Lake region, 20° at Chicago to 31° at Marquette; Upper Mississippi Valley and Minnesota, 21° at Saint Louis to 32° at Dubuque and 40° at Pembina; Lower Missouri Valley, 26° at Yankton and Omaha to 29° at Leavenworth; Eastern Slope, from Dakota to Northwestern Texas, 25° at Fort Sill to 37° at Bismarck, Dodge City, and McKavett; Rocky Mountains, 18° on Pike's Peak, and from 33° at Virginia City to 39° at Denver; Western Plateau, 32° at Pioche to 41° at Winnemucca; California, 18° at San Diego to 40° at Visalia; Oregon, 36° at Portland to 45° at Umatilla.

*Frosts* occurred as follows: On the summit of Pike's Peak, every day; summit of Mount Washington, from the 5th to the 13th, 25th, 26th. In Montana, on the 1st, 2d, 3d, and 13th. Dakota (northerr portion), on the 4th. Iowa (northern portion), on 2d, 10th, 22d. Wisconsin (northern portion), on 8th, 9th, 12th, 21st; 22d, injured vegetation at Neillsville. Michigan (northern portion), on 4th, 5th, 6th, 8th, and 9th. Illinois (central portion) 22d. Ohio and Pennsylvania (interior), on 6th and 7th. West Virginia, 7th. New York (northern portion), 6th, 7th, and 26th injured vegetation. Connecticut (northern portion), 6th. Massachusetts, 5th and 7th, heavy, injured vegetation. Vermont and New Hampshire, 7th, severe, injured vegetation. Maine (northern portion), 2d and 7th.

*Ice* is reported to have formed at Summit, Colo., on the 30th, one-half inch in thickness.

## PRECIPITATION.

On Chart No. III is illustrated the general distribution of the rain-fall for the month. On the left side of same chart will be found a table giving the average precipitation for June by districts.

*Special heavy rains.*—1st and 2d, Guttenburg, Iowa, 3.70 inches; Plattsmouth, Nebr., 2.98 inches; Ames, Iowa, 3.43 inches; Clear Creek, Nebr., 2.58 inches; Independence, Iowa, 4.05 inches; Tabor, Iowa, 2.50 inches. 4th, Terrell, Kaufman County, Texas, 4th to 7th, 7.50 inches; Fort Griffin, Tex., 3d to 5th, 4.97 inches, 2.05 inches in 3½ hours. 7th, Smithville, N. C., 2.89 inches; Green Spring, Ala., 7th to 8th, 2.79 inches. 8th, Mill Village, N. H., 2.30 inches; Colebrook, Conn., 8th to 9th, 2.24 inches; Auburn, N. H., 3.00 inches. 12th, Yankton, Dak., 12th to 13th, 3.20 inches; Point Pleasant, La., 12th to 14th, 16.55 inches; Brookhaven, Miss., 12th to 13th, 3.70 inches; Terrell, Tex., 4.50 inches. 13th, Green Spring, Ala., 12th to 14th, 4.30 inches; Charleston, S. C., 2.39 inches; Montgomery, Ala., 12th to 13th, 4.20 inches in 24 hours; near Fayette, Miss., 3.40 inches. 14th, Breckenridge, Minn., 1.67 inches in forty minutes. 15th, Fort Barrancas, Fla., 14th to 17th, 9.50 inches. 16th, Austin, Tex., 2.50 inches in two hours. 17th, Goldsboro', N. C., 17th to 19th, 3.85 inches; Dover, Del., 3.00 inches; Atco, N. J., 17th to 18th, 2.68 inches; Mount Solon, Va., 17th to 18th, 2.55 inches; Danville, Ky., 5.00 inches; Vineland, N. J., 17th to 18th, 2.88 inches; Fort Whipple, Va., 17th to 18th, 4.01 inches; Barnegat, N. J., 17th to 18th, 3.10 inches; Louisville, Ky., 2.81 inches; Washington, D. C., 17th to 18th, 4.09 inches; Sandy Spring, Md., 17th, 18th, 3.59 inches. 18th, Cape Lookout, N. C., 3.17 inches; Dunbarton, N. H., 18th, 19th, 2.69 inches; Fort McKavett, Tex., over 2.00 inches in two hours. 19th, Fort Larned, Kans., 6.00 inches. 20th, Escanaba, Mich., 3.04 inches; Marquette, Mich., 5.76 inches; Iowa City, Iowa, 2.29 inches. 21st, Cumberland, Md., 2.20 inches; Colebrook, Conn., 2.87 inches; near Arlington, Ind., 20th to 21st, 2.25 inches. 22d, Springfield, Mass., 3.79 inches; New London, Conn., 1.95 inches in four hours. 23d, Mount Desert, Me., 23d to 24th, 2.70 inches; Orono, Me., 22d to 24th, 2.50 inches; Mechanics Falls, Me., 22d to 23d, 2.25 inches; North Platte, Nebr., 2.10 inches; Eastport, Me., 2.48 inches. 27th, Springfield, Mass., 27th to 28th, 2.40 inches; Austin, Tex., 27th to

28th, 4.04 inches. 28th, Independence, Iowa, 2.70 inches; near Melissa, Tex., 5.10 inches. 29th, Guttenburg, Iowa, 28th to 29th, 2.62 inches; Afton, Iowa, 28th to 30th, 4.45 inches; Corning, Mo., 29th to 30th, 4.30 inches; Logan, Iowa, 29th to 30th, 6.00 inches; Des Moines, Iowa, 2.73 inches; De Soto, Nebr., 28th to 29th, 4.59 inches; Ames, Iowa, 28th to 30th, 3.44 inches; near Howard, Nebr., 28th to 30th, 7.61 inches; Memphis, Tenn., 1.00 in 40 minutes. 30th, Tabor, Iowa, 29th to 30th, 2.97 inches; Lebanon, Mo., 2.95 inches; Plattsmouth, Nebr., 29th to 30th, 2.66 inches; Omaha, Nebr., 29th to 30th, 3.20 inches; Fort Barrancas, Fla., 3.00 inches.

*Largest monthly rain-falls.*—Point Pleasant, Tensas County, Louisiana, 18.23 inches; Terrell, Kaufman County, Texas, 17.13 inches; Fort Barrancas, Fla., 13.88 inches; near Melissa, Collin County, Texas, 13.59 inches; Trinidad, Colo., 12.82 inches; Clarksville, Tex., 12.50 inches; Jacksboro', Tex., 10.91 inches; Logan, Iowa, 10.61 inches; Clear Creek, Nebr., 10.22 inches; Fort Griffin, Tex., 10.19 inches; near Brookhaven, Miss., 9.75 inches; Plattsmouth, Nebr., 9.64 inches; near Howard, Nebr., 9.58 inches.

*Smallest monthly rain-falls.*—At Sacramento, Fresno, and Monterey, Cal., and Yuma, Ariz., none; Red Bluff, San Francisco, and Visalia, light sprinkles, too small to measure; Umatilla, Oreg., 0.02 inch; Pioche, Nev., 0.04 inch; Santa Barbara, Cal., 0.05 inch; Camp Verde, Ariz., 0.06 inch; Los Angeles and Yreka, Cal., 0.07 inch; Camp McDermitt, Nev., 0.12 inch; Portland, Oreg., 0.13 inch; San Diego, Cal., 0.16 inch; Olympia, Oreg., 0.24 inch; Rio Grande, Tex., 0.27 inch.

*Floods.*—June 1, Milwaukee and Menomonee Rivers overflowed banks. 2d, along Turkey River, Iowa, three bridges were washed away; also much damage along Platte River, Nebraska. 3d, Des Moines River, at Des Moines, Iowa, very high, indicating severe floods northward; railroad tracks overflowed and city partly flooded. Missouri River, 7th to 9th, at Omaha, 17 feet 6 inches (18 inches above danger line), railroad track submerged, flats covered, Omaha smelting and refining works flooded, current of river within 150 feet; at Leavenworth, 17 feet 2 inches, water nearly over island opposite city, threatening wheat crop here and at Kansas City. 11th, threatening to form a new channel at Kansas City. 13th, Omaha, flats covered until date; no serious damage to smelting works; current of river has changed to within 150 feet of said works. 20th to 22d, at Omaha, 17 feet 2 inches; flats covered; railroad tracks submerged; smelting works partly flooded; river full of logs. 23d, Omaha, river undermined old warehouse at foot of Fornan street, and about one-third of entire building went down river. 29th, Omaha, flats covered; railroad tracks submerged; smelting works flooded and fires extinguished.

*Drought.*—Jamaica, W. I., crops suffering from severe drought, the usual seasonal rains not having set in (excepting showers of the 3d). West Charlotte, Vt., 6th, vegetation nearly stopped growing; grass drying up.

*Hail.*—Fort Stevenson, Dak., 2d; Sidney Barracks, Nebr., 1st; Camp Sheridan, Nebr., 6th; Fort Wingate, N. Mex., 11th; Fort Union, N. Mex., 16th; Fort Griffin, Tex., 3d; Fort Fred Steele, Wyo., 2d, 10th; Fort Fetterman, Wyo., 10th, 17th, 21st, 28th; Summit, Colo., 4th to 8th, 12th, 15th, 17th, 23d; Olivet, Dak., 1st; near Forsyth, Ga., 4th; Gainesville, Ga., 9th; Como, Ill., 20th; Guttenburg, Iowa, 6th; near Fort Madison, Iowa, 20th; Iowa City, Iowa, 2d, 19th; Vail, Iowa, 29th; Nora Springs, Iowa, 1st; Point Pleasant, La., 17th; near Woodstock, Md., 4th; Fallston, Md., 12th; Owing's Mills, Md., 10th; New Bedford, Mass., 5th; Springfield, Mass., 12th; Fall River, Mass., 13th; Norfolk, Nebr., 29th; Plattsmouth, Nebr., 19th; Clear Creek, Nebr., 1st, 19th; near Genoa, Nebr., 2d, 29th; Contoocookville and Auburn, N. H., 13th; Starkey, N. Y., 6th; Wappinger's Falls, N. Y., 12th; South Hartford, N. Y., 13th; Goldsboro' and Wilmington, N. C., 9th; Fayetteville, N. C., 4th; Jacksonburg, Ohio, 6th, 7th; Westchester and New Castle, Pa., 11th; Chambersburg, Pa., 13th; Anderson, S. C., 9th; McMinnville, Tenn., 28th; Woodstock, Vt., 12th; Lunenburg, Vt., 12th, 27th; Newport, Vt., 23d; Mount Solon, Va., 28th; Wytheville, Va., 8th; Embarrass, Wis., 30th; Salt Lake City, Utah, 1st; Lead City, Dak., 1st, 2d, 17th, 30th; Cheyenne, Wyo., 13th, 25th; Pike's Peak, Colo. (sleet?), 4th, 8th, 10th, 11th, 17th to 19th, 21st, 25th, 27th; Dodge City, Kans., 12th, 15th; North Platte, Nebr., 8th, 12th; Castroville, Tex., 8th; Fort McKavett, Tex., 18th; Mobile, Ala., 4th; Pembina, Dak., 18th; Burlington, Iowa, 1st; Milwaukee, Wis., 14th; Morgantown, W. Va., 8th, 11th; Savannah, Ga., 8th; Mount Washington, N. H., 23d; New London, Conn., 12th; Virginia City, Mont., 9th.

*Rainy days.*—The number of days on which rain or snow has fallen varies, as follows: New England, 8 to 17; Middle States, 7 to 15; South Atlantic States, 6 to 14; Gulf States, 8 to 16; Ohio Valley and Tennessee, 9 to 15; Lower Lake region, 8 to 15; Upper Lake region, 9 to 13; Upper Mississippi Valley, 11 to 15; Lower Missouri Valley, 11 to 13; Eastern Slope, 9 to 19; Rocky Mountain Stations, 11 to 22; Western Plateau, 0 to 10; Pacific coast, 0 to 5.

*Cloudy days.*—New England, 6 to 15; Middle States, 6 to 15; South Atlantic States, 8 to 12; Gulf States, 4 to 13; Ohio Valley and Tennessee, 6 to 13; Lower Lakes, 7 to 12; Upper Lakes, 7 to 12; Upper Mississippi Valley, 8 to 14; Lower Missouri Valley,

6 to 13; Eastern Slope, 4 to 8; Rocky Mountain Stations, 1 to 12; Western Plateau, 0 to 4; Pacific coast, 0 to 13.

*Snow fell* on Mount Washington, 10th, 11th, and 12th. Like's Peak, Colo., on the 4th, 5th, 6th, 7th, 12th, 16th, 17th, 20th, 23d, and 27th; the snow-storm of the 16th was unusually heavy; average depth of snow on Summit Plaza at end of month, from numerous measurements, is 24 inches.

### RELATIVE HUMIDITY.

The average percentage of relative humidity for the month ranges as follows: New England, 62 to 80; Middle States, 62 to 83; South Atlantic States, 65 to 70; Gulf States, 65 to 80; Ohio Valley and Tennessee, 60 to 69; Lower Lakes, 62 to 71; Upper Lakes, 68 to 77; Upper Mississippi Valley, 61 to 71; Lower Missouri Valley, 64 to 72; Eastern Slope, 67 to 76; Western Plateau, 29 to 39; Pacific coast, 34 to 76. High stations report as follows: Mount Washington, 84; Pike's Peak, 68; Santa Fé, 36; Denver, 49; Cheyenne, 58; Virginia City, 48.

### WINDS.

The prevailing winds at the Signal Service stations are shown by the arrows flying with the wind on Chart No. II. The maximum velocities in miles per hour have been given in the description of the movements of low-pressure areas. On Mount Washington the highest velocity, NW. 84 miles, was recorded on the 6th, and the total movement of the air was not obtained.

*Total movements of the air.*—The following are the largest monthly movements recorded at the Signal Service stations, viz: Pike's Peak, 11,431 miles; Cape Lookout, 10,436; North Platte, 9,911; Cape May, 9,420; Barnegat, 9,010; Sandy Hook, 8,877; Dodge City, 8,752; San Francisco, 8,711; Sandusky, 8,302, and Indianola, 7,906. The smallest are: Lynchburg, 2,068 miles; Visalia, Cal., 2,213; Virginia City, Mont., 2,581; Knoxville, 2,658; Vicksburg, 2,842; Roseburg, Oreg., 2,858; Montgomery, 3,005; Lead City, Dak., 3,067; Nashville, 3,098; Leavenworth, 3,131; Augusta, 3,137; Los Angeles, 3,153, and Springfield, 3,247.

### VERIFICATIONS.

*Indications.*—As worked up and issued to the public three times daily, they have been carefully compared with the actual conditions during the succeeding twenty-four hours, with the following result: The percentage verified averages 84.2 for New England; 83.0, Middle Atlantic States; 86.6, South Atlantic States; 88.0, East Gulf States; 86.5, West Gulf States; 87.3, Ohio Valley and Tennessee; 87.6, Lower Lake region; 86.1, Upper Lake region; 88.0, Upper Mississippi Valley; 82.9, Lower Missouri Valley. For all the districts the average verified is 86.0 per cent. By elements the percentage verified averages 89.7 for the weather; 88.8, wind-direction; 83.3, temperature; 82.3, barometer. There were 15 omissions to predict (3 for weather, 3 for wind-direction, 6 for temperature, and 3 for barometer) out of 3,600, or 0.42 per cent. Of the predictions made, 2.7 per cent. are recorded as having completely failed; 3.3 per cent. as one-fourth verified; 14.3 per cent. as one-half verified; 6.5 per cent. as three-fourths verified; 73.2 per cent. as fully verified.

*Cautionary signals.*—During the month 147 cautionary signals were displayed; 115, or 78.2 per cent., were justified by subsequent hourly velocities of 25 miles or over at or within 100 miles of the station. Thirty-three cases were reported of winds of 25 miles or over where signals were not ordered.

### NAVIGATION.

*Stages of water in rivers.*—In the table on the right side of Chart No. III are given the highest and lowest readings of the Signal Service gauges for the month, with the dates. The changes in the Savannah, Monongahela, Youghiogheny, Ohio, Cumberland, Tennessee, Upper Mississippi, and Arkansas were unimportant. In the Allegheny, at Freeport, there was a sudden rise to near the "danger-line" on the 10th and 11th. The Mississippi was high and near the "danger-line" at Vicksburg and New Orleans during the first half of the month. At Shreveport the Red River rose quite steadily up to the 20th, and then fell to 24 feet 10 inches by the 30th. The Missouri was slightly above the danger-line at Brunswick, Mo., from the 27th to the close of the month. At Saint Joseph, Mo., it rose above the danger-line from the 6th to the 14th and from the 22d to end of month. It continued above the danger-line at Omaha from the 6th to the 13th and after the 19th.

### ATMOSPHERIC ELECTRICITY.

*Thunder-storms.*—1st, Utah, Dakota, Nebraska, Iowa, Illinois, Indiana, Wisconsin, Tennessee, Illinois, Minnesota. 2d, Dakota, Indian Territory, Iowa, Illinois, Indiana,

New Jersey, Missouri, Nebraska, Ohio, Wisconsin, Florida. 3d, Texas, Mississippi, Michigan, New York, Ohio, Pennsylvania, West Virginia, Kentucky, Indiana, Tennessee, Georgia, California, Illinois, Louisiana, North Carolina, South Carolina. 4th, Alabama, Texas, Indiana, Tennessee, Georgia, North Carolina, Virginia, Maryland, New York, Colorado, Illinois, Iowa, Kentucky, Massachusetts, Pennsylvania, Vermont, Florida, Indian Territory, Montana. 5th, Colorado, Alabama, Texas, Georgia, North Carolina, Maine, Maryland, Dakota, Minnesota. 6th, Indian Territory, Mississippi, Texas, Iowa, Wisconsin, Georgia, Florida, Colorado, Illinois, Louisiana, Nebraska, Dakota. 7th, New Mexico, Alabama, Texas, Missouri, Kentucky, Colorado, Illinois, Michigan, Dakota, Indian Territory. 8th, Nebraska, West Virginia, Georgia, North Carolina, South Carolina, Virginia, Colorado, Illinois, Kansas, Louisiana, Mississippi, Tennessee. 9th, Colorado, Nebraska, Ohio, Tennessee, Georgia, North Carolina, Virginia, Alabama, Illinois, Iowa, Kentucky, South Carolina, Nevada, Florida, Montana. 10th, Colorado, Alabama, Ohio, Michigan, Georgia, South Carolina, Florida, Illinois, Indiana, North Carolina, Texas, Wyoming, Nevada, Montana. 11th, Texas, Ohio, Michigan, New York, New Jersey, Pennsylvania, New Mexico, Wyoming, Nevada. 12th, New Mexico, Wyoming, Kansas, Nebraska, Alabama, New Jersey, New York, Massachusetts, Connecticut, Iowa, Louisiana, New Hampshire, Pennsylvania, Texas, Vermont, Virginia, Maryland, Dakota, Montana. 13th, Louisiana, Texas, Massachusetts, Maine, New York, Connecticut, Alabama, Florida, Nebraska, New Hampshire, New Jersey, Indian Territory. 14th, Nebraska, Texas, Iowa, Louisiana, Dakota, Minnesota. 15th, New Mexico, Kansas, Texas, Missouri, Iowa, Michigan, Indiana, Illinois, Ohio, Wisconsin, Dakota, Indian Territory. 16th, Kansas, Ohio, Indiana, Florida, Illinois, Kentucky, Missouri, Nebraska, New York, Texas, Dakota, Montana. 17th, Indian Territory, Texas, Virginia, New Jersey, Pennsylvania, Alabama, Colorado, Louisiana, Mississippi, Texas, Vermont, Dakota, Montana. 18th, Colorado, Dakota, Illinois, Mississippi, New York, South Carolina, Minnesota, Georgia, North Carolina, Montana. 19th, Wyoming, Colorado, Dakota, Kansas, Iowa, Minnesota, Georgia, Florida, Illinois, Missouri, Nebraska, Texas, Wisconsin, Indian Territory. 20th, Wyoming, Texas, Minnesota, Michigan, Ohio, Kentucky, Indiana, California, Colorado, Florida, Illinois, Iowa, Missouri, Indian Territory. 21st, Colorado, Texas, New York, Pennsylvania, Georgia, Virginia, California, Florida, Indiana, North Carolina, South Carolina, New Mexico, Montana. 22d, Colorado, Dakota, New Jersey, Pennsylvania, Massachusetts, Virginia, New Mexico, Florida. 23d, New Mexico, Colorado, Kansas, Nebraska, New Hampshire, Maine, Dakota, Vermont, Nevada, New York, Maine, Montana. 24th, Colorado, Dakota, Nebraska, Minnesota, Massachusetts, New York, Missouri, New Jersey, Pennsylvania, Indian Territory. 25th, Colorado, Indian Territory, Texas, Iowa, Dakota, Illinois, Missouri, Nebraska, Ohio, New Mexico, Wyoming. 26th, New Mexico, Nebraska, Michigan, Indiana, California, Colorado, Illinois, Missouri, Ohio, Indian Territory. 27th, Indian Territory, Texas, Alabama, Louisiana, Iowa, Ohio, West Virginia, Pennsylvania, Kentucky, New Jersey, Connecticut, New York, New Hampshire, Massachusetts, Maine, Florida, Georgia, Indiana, Missouri, North Carolina, South Carolina, Tennessee, Vermont. 28th, Mississippi, Louisiana, Missouri, Iowa, Minnesota, West Virginia, Tennessee, North Carolina, Virginia, Maine, Alabama, Illinois, Indiana, Louisiana, Maryland, Nebraska, New Jersey, South Carolina, Texas, Florida. 29th, Colorado, Dakota, Louisiana, Texas, Illinois, North Carolina, Indiana, Iowa, Kentucky, Missouri, Nebraska, South Carolina, Tennessee, Wisconsin, Florida, Georgia. 30th, Nebraska, Wisconsin, Missouri, Iowa, Ohio, Georgia, Louisiana, Alabama, California, Illinois, North Carolina, Tennessee, Virginia, Indian Territory.

*Auroras.*—Albany, Argyle, and North Volney, N. Y.; Cambridge, Mass.; Woodstock and Burlington, Vt., 3d. Auburn, N. H., 4th. Clear Creek, Nebr., 26th and 28th.

*Magnetic phenomena.*—Prof. G. Hinrichs, Iowa City, Iowa, reports the average magnetic diurnal range in declination as 8.28 minutes; largest range, 15.7 minutes, on the 3d.

*Telegraphic communication interfered with by atmospheric electricity.*—Santa Fé, greatly, 5th, 7th, 11th, 12th, 15th, 16th, 20th, 26th. Pike's Peak, 3d, considerable; 5th, severe; 10th, very intense during storm; 15th, intense; 25th, severe, wires cut out. Colorado Springs, Colo., 22d, shattered telegraph-poles and melted wires. Dodge City, 11th, atmosphere highly charged, wire from wind-vane emitted sparks. Fort Sill, 13th, obliged to cut out instruments; 30th, communication obstructed. Fredericksburg, Tex., 7th, powerfully electrified; 9th, greatly. Concho, Tex., 10th, 15th, 16th. Fort McKavett, Tex., 16th, screws on lightning-arrester fused. Pembina, wires considerably affected, 14th, 15th, 18th; wires unmanageable, 22d. Milwaukee, 6th, relays melted in telegraph-office. Cape Henry, Va., 28th, wires badly affected, cut out instruments. Portland, Me., 13th, heavy thunder-storm, communication seriously affected. Mount Washington, 23d, switch cut-out had to be drawn, wire burnt dark blue; 27th, wires so seriously interfered with that the switch cut-out had to be withdrawn.

OPTICAL PHENOMENA.

*Solar halos.*—1st, Ohio, Tennessee, Michigan, Kentucky. 2d, Illinois, Indiana, Mississippi, Ohio, Kansas, Kentucky, Tennessee. 3d, New York, Ohio, Pennsylvania, Mary-

land, Maine, Dakota. 4th, Nebraska, Ohio, Connecticut. 5th, Missouri, New Hampshire, New York, Indiana, Tennessee, Rhode Island, Connecticut. 6th, Illinois, Maryland, Ohio, Pennsylvania, Louisiana, Wisconsin. 7th, Connecticut, Indiana, New York, Pennsylvania, Maryland, Alabama, Louisiana, Ohio, Kentucky, Rhode Island. 8th, Maine, Rhode Island. 9th, Illinois, Iowa, Michigan, Wisconsin, New York, Ohio. 10th, Ohio, Michigan, California, Florida. 11th, Alabama, Wisconsin, Ohio, North Carolina, Vermont. 12th, Indiana, New Hampshire, Kentucky, Vermont, Maine, California. 13th, Connecticut. 14th, Ohio, North Carolina. 15th, Texas. 16th, Connecticut, Massachusetts, Nebraska, New Hampshire, New Jersey, New York, Maryland, Rhode Island, Texas. 17th, Connecticut, Nebraska, New Hampshire, New York, North Carolina, Virginia, Maryland, Ohio, South Carolina, Rhode Island. 18th, New Hampshire, New York, Maine. 19th, Virginia. 20th, Illinois, Indiana, Mississippi, New York, Maryland, Ohio. 21st, Maine, Massachusetts, New Hampshire, New York, Virginia, Maryland, Connecticut, Rhode Island, Vermont, Nebraska. 22d, Maine. 24th, Virginia. 25th, Illinois, Louisiana, Dakota, Ohio. 26th, Mississippi. 27th, Maine, New Hampshire, Ohio, Oregon. 29th, Alabama. 30th, Ohio.

*Lunar halos.*—3d, New Jersey, Virginia, Texas. 4th, Dakota. 5th, Indiana, Missouri, Virginia, Texas. 6th, New Jersey, Pennsylvania, Virginia, Indiana, North Carolina, Connecticut, Montana. 7th, Massachusetts, New Jersey, North Carolina, Missouri, Minnesota, Georgia, Virginia, Rhode Island, Texas. 8th, Mississippi, North Carolina, Virginia, Nevada, Florida, Texas. 9th, Illinois, New Jersey, New York, Texas, Iowa, Georgia, South Carolina, Connecticut, Minnesota, Idaho. 10th, Iowa, Virginia, Kansas, Minnesota. 11th, Massachusetts, New Jersey, Ohio, Louisiana, California, Florida. 12th, North Carolina, New Jersey, Kentucky, South Carolina, Texas. 13th, Indiana, Ohio, Virginia, New Jersey, North Carolina, Maine, Florida. 14th, Missouri, Virginia. 15th, Indiana, Missouri, Texas, California. 16th, Maryland. 17th, Texas. 19th, Indiana. 20th, Georgia. 21st, Virginia.

*Mirage.*—Pike's Peak, Colo., 9th, 24th; New London, Conn., 11th, 13th; New Bedford, Mass., 15th.

### MISCELLANEOUS PHENOMENA.

*Botanical.*—New Hampshire: Contoocookville, *in bloom 21st, red clover.* Vermont West Charlotte, in bloom, 9th, red clover; 17th, white clover; ripe, 11th, field strawberries. Massachusetts: Somerset, in bloom, 3d, locust; 4th, white fringe and mountain laurel. Waltham, in bloom, 3d, sheopberry; 7th, high bush blackberry; 14th, sheep-laurel; 16th, poisonfly; 18th, arrowwood; 29th, winterberry and alder; 30th, meadow-sweet. Connecticut: New London, in bloom, 6th, roses. Southington, in bloom, 3d, syringia. New York: Ardenia, 30th, rye nearly ripe, oats in full head, potatoes looking fair; season very early, crops maturing rapidly; Palermo, in bloom, 3d, white daisies and clover, 8th, wheat, 12th, locust, 16th, yarrow, 28th, sweet alder; ripe, 10th, strawberries, 25th, red raspberries. Waterburg, *ripe, 5th, strawberries; heading, 1st,* wheat, 16th, barley; 16th, hessian-fly damaging wheat. Starkey, 24th, oats heading. Vernon Centre, 15th, ripe strawberries and potatoes; 25th, haying commenced; 30th, apples promise a full crop, pears and plums somewhat blighted, other fruits in fair condition; hessian-fly and weevil injuring wheat. Wappinger's Falls, in bloom, 1st, blackberry, 3d, alder, 7th, moss-rose, june-pinks, 14th, snapdragon, 19th, potatoes; ripe, 1st, cherries, 16th, red and black currants; 20th, raspberries; 1st, wheat heading, injured by hessian-fly; 7th, green pease for table use; 10th, corn looks yellow and very small; 14th, hessian-fly injuring rye; 22d, oats heading. New Jersey: Vineland, 30th, grass, wheat, and rye in good condition; sweet potatoes and corn not as good as usual; peaches and apples fair; grapes injured by grape-rot; berries excellent. Freehold, 30th, hay crop very heavy and matured. Virginia: Near Keswick, harvesting, 7th, wheat, 20th, oats; corn on good land 3 to 5 feet high; hay, good and harvesting; ripe, 25th, tomatoes. Wytheville, ripe, 18th, wheat and currants. North Carolina: Fayetteville, ripe, 1st, plums and blackberries, 16th, tomatoes, 28th, peaches; 20th, green corn for table use. Bladen County, in bloom, 26th, cotton. Florida: Milton, ripe, 1st, watermelons, peaches, apples, pears, blackberries, and huckleberries; 21st, second crop of bush-beans. Daytona, ripe, 30th, figs, large crop. Mississippi: Near Brookhaven, in bloom, 15th, cotton; 9th, corn in silk. Texas: *Near Melissa, 30th, corn prospect good, cotton backward by reason of cool, wet weather;* grass very fine. Tennessee: Near Cleveland, 14th, grapes and early peaches rotting. 8th, wheat badly damaged by rust. Ohio: Ringgold, wheat, best for thirty years, corn fair, oats very good, and tobacco three weeks early, hay-crop and fruits of all kinds extra. Milford Valley, 29th, wheat all harvested. Lancaster County, 29th, harvesting wheat, yield extremely large. Middletown and Circleville, 29th, wheat nearly all harvested, crop very fine. Jacksonburg, ripe, 10th, cherries, 24th, early rose potatoes, gooseberries, and red currants; harvesting, 5th, barley, 24th, wheat, 15th, red clover; 6th, green pease for table use. Indiana: Vevay, 8th, vegetation and fruits suffering from injurious insects; 18th, wheat harvested; 24th, yield far above the average; in bloom, 18th, chestnut. Rising Sun, 29th, wheat harvested, excellent crop. Illinois: Noble, 28th, wheat harvest completed, quality

excellent, yield good. *Missouri*: Corning, 20th, corn in silk. Lebanon, 3d, wheat-harvest commenced; ripe, 16th, blackberries, 19th, peaches. Springfield, 4th, corn in silk; ripe, 11th, peaches; 30th, harvesting finished. Oregon, in bloom, 11th, may-weed; 13th, dogwood; 20th, catnip; ripe, 1st, raspberries, 10th, early apples, 12th, cottonwood-seeds, 22d, peaches, 26th, blackberries; 1st, spring-wheat heading; 12th, wheat harvesting; 20th, early corn for table use. Michigan: Litchfield, 30th, spring crops looking fair, but rather backward; insects injuring wheat and potatoes. Wisconsin: Embarrass, 2d, plums and apples a total failure; in bloom, 5th, white clover; 30th, grass, wheat, and oats in extra condition, corn only fair. Wautoma, 15th, green pease; 28th, new potatoes; 30th, rye, oats, and wheat looking very well, corn poor. Iowa: Guttenburg, 30th, wheat injured by rust, chintz-bug doing some damage; corn looking quite favorable, but not as forward as last year; ground is too wet for working; oats moderately good; potatoes fair; grass in fine condition. Minnesota: Corn backward on account of cold and wet; potatoes suffer slightly from Colorado bug. Dakota: Pembina, ripe, 25th, field strawberries. Olivet, in bloom, 10th, wild roses; ripe, 13th, strawberries; heading, 2d, wild oats, 12th, barley, 20th, spring wheat. Colorado: Summit, 14th, turnips and radishes up. California: Visalia, ripe, 5th, apricots, 13th, peaches, 18th, blackberries, 22d, apples; 4th, harvesting grain. Los Angeles, 22d, hay-crop unusually large.

*Birds.*—*Swallows:* Monticello, Iowa, 9th. *Cuckoo:* Monticello, Iowa, 4th. *Hummingbird:* Baxter Springs, Kans., 2d. *Eagles:* Wappinger's Falls, N. Y., 2d. *Catbirds:* Wappinger's Falls, N. Y., 7th. *Whippoorwills:* Wappinger's Falls, N. Y., 2d. *Redbirds:* Wappinger's Falls, N. Y., 2d. *Pigeons:* Palermo, N. Y., 1st. *Bobolinks:* Wappinger's Falls, N. Y., 2d.

*Miscellaneous.*—*Butterflies:* Summit, Colo., 28th; Pike's Peak, 13th, 24th. *Tree-toads:* Wappinger's Falls, N. Y., 2d. *Fire-flies:* Afton, Iowa, 24th; Monticello, Iowa, 12th; Somerset, Mass., 16th; Fall River, Mass., 24th; Palermo, N. Y., 2d; Freehold, N. J., 3d; Newark, N. J., 20th; Vernon Centre, N. Y., 20th; Wappinger's Falls, N. Y. 13th; West Charlotte, Vt., 22d; Woodstock, Vt., 9th; Wytheville, Va., 3d; Embarrass, Wis., 2d. *Bees:* Summit, Colo., 25th; Vernon Centre, N. Y., 3d, swarming. *Frogs piping:* Pembina, Dak., 25th. *Mosquitoes:* Tybee Island, Ga., 30th; Van West, Ohio, 29th. *Seventeen-year Locusts:* Afton, Iowa, 19th; Des Moines, Iowa, 3d, hatching by millions, all bearing the letter "W" on their wings. *Crickets:* Somerset, Mass., 2d. *Army Cotton-Worm:* Columbus, Tex., 27th. *Grasshoppers:* Clear Creek, Nebr., 21st; Salt Lake City—from the Salt Lake Herald the following is reported: "11th, southern train stopped at Sandy by grasshoppers; 20th, numerous on bench-lands and many killed by a small worm; 29th, eighteen to twenty grain farms destroyed by grasshoppers at Heber City, Utah." Dodge City, 18th, 11 a. m., from S. to N.; 19th, 2 p. m., S. to N.; Pembina, 25th. *Potato Bugs:* Somerset, Mass., 30th, numerous eggs laid on all kinds of vegetation; Contoocookville, N. H., 3d; Mill Village, N. H., 29th; Wappinger's Falls, N. Y., 19th; Blooming Grove, Pa., 30th; Mount Washington, N. H., on summit, 15th, 21st; Wautoma, Wis., 28th.

*Meteors.*—Vevay, Ind., 26th, 30th; near Arlington, Ind., 1st; Monticello, Iowa, 2d; Independence, Iowa, 27th; near Woodstock, Md., 5th, 13th, 19th, 22d; Springfield, Mass., 13th; Rowe, Mass., 18th; near Fayette, Miss., 20th; Emerson, Nebr., 29th; Clear Creek, Nebr., 28th; Waterburg, N. Y., 2d; Wappinger's Falls, N. Y., 28th, 29th; South Hartford, N. Y., 4th; Vernon Centre, N. Y., 2d; Westerville, Ohio, 28th; near Melissa, Tex., 20th; Wytheville, Va., 20th, 22d; Colorado Springs, Colo., 23d. Detroit, 1st, 2.50 a. m., brilliant meteor from N. E. to S., altitude 60°, color mostly blue, leaving train lasting two to three minutes, but no cloud. Savannah, Ga., 12th, 7.15 p. m., brilliant meteor from E. to W., leaving train lasting twenty minutes. Dubuque, Iowa, 28th, 2 a. m., brilliant meteor from S. to N., exploded about 30° from N. horizon, color bright orange or red, about ½ mile high, making vicinity as light as day. Indianola, 16th, from N. W., altitude 45° to 60°, motion S. W., and downward; at altitude 20° to 25° in the S. W. it exploded, fragments of bluish color; duration, 5 to 10 seconds; no cloud.

*Polar bands.*—New Corydon, Ind., 1st, 4th, 11th; Muscatine, Iowa, 10th; Iowa City, Iowa, 5th, 6th, 16th, 17th, 23d, 28th; Tabor, Iowa, 27th; Auburn, N. H., 4th, 7th, 22d; Freehold, N. J., 21st; Wytheville, Va., 5th, 6th, 12th to 14th; Woodstock, Vt., 26th.

*Zodiacal light.*—Daytona, Fla., 1st, 2d, 17th, 21st to 28th; Clear Creek, Nebr., 3d.

*Earthquakes.*—April 23d, at Loreto, on Gulf of California, 10 a. m., severe shock, lasting two or three seconds, the first of a series lasting until May 3d, occurring principally at night. May 21st, San Bernardino, Cal., "pretty sharp shock." June 4th, San José, Costa Rica, 12.28 p. m., light shock. 9th, San José, Costa Rica, 4.34 p. m., very strong shock; Liberia, 4.45 p. m., large and strong shock. At Los Angeles, Cal., four distinct shocks occurred on June 11th and 12th, as follows: 11th, 11.12 p. m., a distinct shock, duration over a second, awakened people from sound sleep; 11.20 p. m., violent shock, duration five seconds, motion from N.W. to S.E., a slight upheaval was first felt, followed by three shocks of a trembling character, the second of which was

the most violent, glassware was broken and plastering shaken down; 12th, 2.30 a. m., light shock; 6.30 a. m., slight tremble. 14th, at Cimarron, N. Mex., slight shock of short duration; window-panes broken.

*Sunsets.*—The characteristics of the sky, at sunset, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal-Service stations. Reports from 115 stations show 3,427 observations to have been made, of which 57 were reported doubtful. Of the remainder, 2,752, or 81.7 per cent., were followed by the expected weather.

*Sun spots.*—The following observations, made by Mr. D. P. Todd, have been forwarded by Rear-Admiral John Rodgers, U. S. N., Superintendent United States Naval Observatory, Washington, D. C., viz:

| June, 1878. | No. of new— | | Disappeared by solar rotation. | | Reappeared by solar rotation. | | Total number visible. | | Remarks. |
|---|---|---|---|---|---|---|---|---|---|
| | Groups. | Spots. | Groups. | Spots. | Groups. | Spots. | Groups. | Spots. | |
| 3—2 p. m. | 1 | 10 | 0 | 0 | 1 | 10 | 3 | 28 | |
| 4—2 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 12 | |
| 5—1 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | |
| 7—5 p. m. | 0 | 0 | 1 | 5 | 0 | 0 | 0 | 0 | |
| 11— 12 m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Faculæ. |
| 12— 12 m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Faculæ. |
| 13— 12 m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 14—1 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 15— 12 m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 19— 12 m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 20— 12 m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Faculæ. |
| 24— 12 m. | 1 | 2 | 0 | 0 | 1 | 2 | 1 | 2 | |
| 25— 12 m. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 26— 12 m. | 1 | 8 | 0 | 0 | 0 | 0 | 1 | 8 | |
| 27—5 p. m. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 8 | |

Prof. G. Hinrichs, Iowa City, Iowa, reports: None observed on the 5th, 6th, 10th, 11th, 17th, 18th, 19th, 22d, 23d; 1st, two groups and four spots, two rather large spots; 3d, two groups, three spots, very much smaller; 4th, one group, two spots, quite small; 26th, one group, two spots, both spots large; 27th, one group, three spots. The Signal-Service observer at Portsmouth, N. C., reports none observed on the 16th; three groups on the 3d.

Published by order of the Secretary of War.

ALBERT J. MYER,
*Brigadier-General (Bvevet Assigned), Chief Signal-Officer, U. S. A.*

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PAPER 40.

## RAIN AND DRY WINDS COMPUTED FOR DIFFERENT GEOGRAPHICAL DISTRICTS. (REFERENCE TO DISTRICT MAP.)

### MIDDLE ATLANTIC STATES.

(New York, New Jersey, Pennsylvania, Delaware, Maryland, District of Columbia, and Virginia as the Middle States; and that part of those States lying east of the Alleghanies as the Middle Atlantic States.)

During the month of January, winds blowing from the southeast or northeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of February, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of March, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of April, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of May, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of June, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of July, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of August, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of September, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of November, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of December, winds blowing from the southeast or northeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

## LOWER MISSISSIPPI VALLEY.

(The Lower Mississippi Valley includes a belt of country two hundred miles broad from Cairo to Vicksburg. Below Vicksburg the character of the country so changes that it is no longer described as a valley.)

During the month of January, winds blowing from the south-southeast or east-northeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of February, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of March, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of April, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of May, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of June, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of July, winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds most likely to be followed

by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of August, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of September, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of November, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of December, winds blowing from the southeast or northeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

### TENNESSEE.

During the month of January, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of February, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

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During the month of June, winds blowing from the west or south, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of July, winds blowing from the west or south, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of August, winds blowing from the west or south, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east-southeast or north-northeast, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of September, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

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### LOWER LAKE REGION.

(Lower Lakes means Lakes Erie and Ontario, with adjacent territory.)

During the month of January, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

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During the month of September, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north-northwest or east-northeast, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

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### SOUTH ATLANTIC STATES.

(North Carolina, South Carolina, Georgia, and Northern and Eastern Florida, as the South Atlantic States.)

During the month of January, winds blowing from the southeast or northeast, or from directions between those points, are found to be the winds most likely to be fol-

lowed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

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During the month of December, winds blowing from the east or north, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

### NEW ENGLAND STATES.

(Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island, as the New England States.)

During the month of January, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of February, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of March, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of April, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of May, winds blowing from the southwest or southeast, or from

directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of June, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of July, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of August, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of September, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of November, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north-northwest or west-southwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of December, winds blowing from the east or north, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

FOR THE DISTRICT BETWEEN THE UPPER LAKE REGION AND THE OHIO VALLEY, INCLUDING PORTIONS OF WESTERN OHIO, CENTRAL INDIANA, AND EASTERN ILLINOIS.

During the month of January, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of February, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of March, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of April, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of May, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north-northeast or west-northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of June, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east-northeast or north-northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of July, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of August, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed

by rain. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of September, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of November, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of December, winds blowing from the west-southwest or south-southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

## UPPER LAKE REGION.

(Upper Lakes means Lakes Superior, Huron, and Michigan, with the adjacent territory. The Lake Region includes the Upper and Lower Lakes.)

During the month of January, winds blowing from the west-southwest or south-southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of February, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of March, winds blowing from the southeast or northeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of April, winds blowing from the southeast or northeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of May, winds blowing from the southeast or northeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of June, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of July, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of August, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of September, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of November, winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of December, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

### OHIO VALLEY.

(The Ohio Valley includes the belt of country about two hundred miles broad from Pittsburgh to Cairo.)

During the month of January, winds blowing from the south-southwest or east-southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of February, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of March, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of April, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of May, winds blowing from the west or south, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of June, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of July, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east-northeast or north-northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of August, winds blowing from the west or south, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of September, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of November, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of December, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

### EASTERN GULF STATES.

(Eastern Mississippi, Alabama, and Northwestern Florida as the Eastern Gulf States.)

During the month of January, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of February, winds blowing from the south or east, or from direc-

tions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of March, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of April, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of May, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of June, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of July, winds blowing from the southwest or southeast or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of August, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of September, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of November, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north-northwest or west-southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of December, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

### WESTERN GULF STATES.

(Western Mississippi, Louisiana, and Eastern Texas, as the Western Gulf States.)

During the month of January, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of February, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of March, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of April, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north-northwest or west-southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of May, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of June, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of July, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of August, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of September, winds blowing from the southeast or northeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of November, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of December, winds blowing from the southeast or northeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

## UPPER MISSISSIPPI VALLEY.

(The Upper Mississippi Valley includes the belt of country, about two hundred miles broad, from Saint Paul to Cairo.)

During the month of January, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of February, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of March, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of April, winds blowing from the south-southeast or east-northeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of May, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of June, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of July, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of August, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of September, winds blowing from the south-southwest or east-

southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of November winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of December, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

## MISSOURI VALLEY.

(The Missouri Valley includes a belt of country 200 miles broad, from Fort Sully to Saint Charles, Mo.)

During the month of January, winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the west or south, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of February, winds blowing from the east or north, or from directions between those points, are found to be the winds most likely to be followed by rain or show. Winds blowing from the west or south, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of March, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the west or south, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of April, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of May, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of June, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of July, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north-northwest or south-southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of August, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of September, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of November, winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the west or south, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of December, winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the west or south or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

MIDDLE PACIFIC SECTION.

During the month of January, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of February, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of March, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of April, winds blowing from the west or south, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of May, winds blowing from the west or south, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of June, winds blowing from the west-southwest or south-southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of July, winds blowing from the west-southwest or south-southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east-southeast or north-northeast, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of August, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of September, winds blowing from the west or south, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of November, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of December, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

NORTHEASTERN ROCKY MOUNTAIN SLOPE.

During the month of January, winds blowing from the north-northeast or west-northwest, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the south-southeast or east-northeast, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of February, winds blowing from the east or north, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the west-northwest or south-southwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of March, winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds most likely to be followed

by rain or snow. Winds blowing from the west or south, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of April, winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of May, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of June, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of July, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the west-northwest or south-southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of August, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north-northwest or west-southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of September, winds blowing from the south-southeast or east-northeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north-northwest or south-southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the north-northeast or west-northwest, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the south or east, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of November, winds blowing from the north or west, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the south or east, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of December, winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the south-southwest or east-southeast, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

NORTHERN PACIFIC SECTION.

During the month of January, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of February, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north-northeast or west-northwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of March, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of April, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of May, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east-southeast or north-northeast, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of June, winds blowing from the west-southwest or south-southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the southeast or northeast, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of July, winds blowing from the west-southwest or south-southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east-northeast or north-northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of August, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the southeast or northeast, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of September, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the west-southwest or south-southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the southeast or northeast, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of November, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of December, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

SOUTHERN PACIFIC SECTION.

During the month of January, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of February, winds blowing from the west or south, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of March, winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the southeast or northeast, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of April, winds blowing from the west or south, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of May, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of June, winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of July, winds blowing from the east or north, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north-northwest or west-southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of August, winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the south or east, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of September, winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the west or south, or from direc-

tions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the south-southeast or north-northeast, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of November, winds blowing from the west or south, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of December, winds blowing from the south-southeast or north-northeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

### MIDDLE EASTERN ROCKY MOUNTAIN PLATEAU.

During the month of January, winds blowing from the west-northwest, or south-southwest, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of February, winds blowing from the west-northwest, or south-southwest, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of March, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the southeast or northeast, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of April, winds blowing from the east or north, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of May, winds blowing from the west or south, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of June, winds blowing from the east or north, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of July, winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of August, winds blowing from the east or north, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the west or south, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of September, winds blowingfrom the northwest or southwest, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the south or east, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the north or west, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the west or south, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of November, winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the south or east, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of December, winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the west or south, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

SOUTHEASTERN ROCKY MOUNTAIN SLOPE.

During the month of January, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of February, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of March, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of April, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of May, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north-northeast or west-northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of June, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north-northwest or west-southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of July, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of August, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of September, winds blowing from the southeast or northeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of November, winds blowing from the southeast or northeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of December, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

MIDDLE ROCKY MOUNTAIN PLATEAU.

During the month of January, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of February, winds blowing from the west or south, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of March, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of April, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain.

Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of May, winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east-southeast, or north-northeast, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of June, winds blowing from the southeast or northeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the west or south, or from directions between those two points, are found to be the winds least likely to be followed by rain.

During the month of July, winds blowing from the north or west, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of August, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of September, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of November, winds blowing from the west or south, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of December, winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

SOUTHERN ROCKY MOUNTAIN PLATEAU.

During the month of January, winds blowing from the north or west, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the south or east, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of February, winds blowing from the west or south, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east-southeast or north-northeast, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of March, winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of April, winds blowing from the west or south, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of May, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of June, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north-northeast or west-northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of July, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of August, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of September, winds blowing from the southwest, or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of November, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north-northwest, or west-southwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of December, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east-northeast, or north-northwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

NORTHERN ROCKY MOUNTAIN PLATEAU.

During the month of January, winds blowing from the west-southwest or south-southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of February, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north-northeast or west-northwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of March, winds blowing from the west or south, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the southeast or northeast, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of April, winds blowing from the west or south, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northeast or northwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of May, winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the south or east, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of June, winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of July, winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the east or north, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of August, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of September, winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the south or east, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the west or south, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the southeast or northeast, or from directions be-

tween those points, are found to be the winds least likely to be followed by rain or snow.

During the month of November, winds blowing from the southwest or southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the east-northeast or north-northwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of December, winds blowing from the west-southwest or south-southeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

RIO GRANDE VALLEY.

During the month of January, winds blowing from the east or north, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the west or south, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of February, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of March, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of April, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of May, winds blowing from the south-southeast or east-northeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of June, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of July, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of August, winds blowing from the south or east, or from directions between those points, are found to be winds most likely to be followed by rain. Winds blowing from the north or west, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of September, winds blowing from the southeast or northeast, or from directions between those points, are found to be the winds most likely to be followed by rain. Winds blowing from the northwest or south, or from directions between those points, are found to be the winds least likely to be followed by rain.

During the month of October, winds blowing from the south or east, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the west or south, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of November, winds blowing from the southeast or northeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the west-northwest or south-southwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

During the month of December, winds blowing from the southeast or northeast, or from directions between those points, are found to be the winds most likely to be followed by rain or snow. Winds blowing from the northwest or southwest, or from directions between those points, are found to be the winds least likely to be followed by rain or snow.

PAPER 41.

*List of lake disasters during the year ending June 30, 1878.*

JULY, 1877.

1.—Schooner Garibaldi struck bottom and sunk at mouth of Pike Creek; Lake Saint Clair; raised.
Scow Grand Army capsized and sunk near Kelley's Island, Lake Erie.
Barge Wm. Vannatta water-logged off Charity Islands.
Scow Iasco lost her jibboom on Lake Erie.
Schooner H. D. Root sprung a leak and was run ashore at Tremont, Ohio.
3.—Tug Burton ran into and damaged schooner Josephine off Chicago.
Barge Dart destroyed by fire at Sandwich.
4.—Schooners Peerless and Folger damaged by collision on Lake Ontario off Oswego.
5.—Schooner David Vance damaged the schooner Great West by collision at Chicago.
6.—Tug Starke Brothers ran into and damaged the scow Sea Star at Milwaukee.
Schooners P. S. Marsh and Jason Parker lost portions of their canvas in squalls on Lake Michigan.
7.—Propeller Empire State disabled by a break in her machinery on Lake Huron.
Steamer City of Toronto broke her shaft on Lake Ontario.
Schooner Portland lost her jibboom by collision with propeller B. W. Blanchard at Chicago.
Bark A. P. Nichols and schooner Ostrich lost portions of their rigging in squalls on Lake Michigan.
Steamer Milton D. Ward damaged by collision with a raft on Saint Clair River.
Schooner Ellen Spry was towed into and damaged the propeller City of Duluth at Chicago.
8.—Scow Nellie Church lost her staysail and small boat in a squall on Lake Michigan.
Herbert Hammond, a sailor on barge Banner, lost overboard and drowned in Lake Huron.
9.—Propeller Vanderbilt ran into and damaged propeller Alpena at Chicago.
10.—Schooner James Couch ashore in the straits; released.
Steam-barge S. S. Ellsworth destroyed by fire at Stony Island.
Schooner B. Parsons lost her jibboom by being towed into an elevator at Chicago.
11.—Schooner Katie Brainard dismasted by collision on Maumee Bay, Lake Erie.
12.—Barge Wenona and schooner Tom Paine damaged by collision at Chicago.
Scow D. R. Holt and schooner J. V. Jones damaged by collision on Lake Michigan.
Schooner Otter damaged by collision with a bridge at Chicago.
Schooner Victor towed to Garden Island in a leaky condition.
13.—Schooner Mary G. Larned ashore near Sandusky, Lake Erie.
14.—Pleasure steamers Dwight Cutler and Centennial damaged by fire at Grand Haven, Mich.
Bark Two Fannies had her rigging damaged by a squall on Green Bay.
16.—Schooner Speedwell damaged by collision with steamer Magnet at Oswego.
Schooner Peoria lost her jibboom by collision at Chicago.
18.—Tug J. P. Clark lost her smokestack by collision on Lake Huron.
Tug J. L. Higgie damaged by collision at Chicago.
19.—Schooner Portland had her mainmast destroyed by lightning on Lake Huron.
21.—Schooner City of Toledo damaged by collision with schooner Moonlight on Lake Michigan.
22.—Schooners C. H. Hackley, Albatross, and Willie Loutil arrived at Chicago with damaged rigging.
Scow William Bates and schooner Myrtle damaged by collision in river at Chicago
24.—Schooners Porter and Alleghany damaged by collision at Chicago.
26.—Tug Mystic sprung a leak and sunk at Windsor.
27.—Tug Parker and schooner Ostrich damaged by collision at Chicago.
30.—Steamer Ivanhoe destroyed by fire at Houghton, Mich.
Steamer Evening Star broke her connecting-rod at Detroit.
Steamers Fortune and Hope damaged by collision at Detroit.

AUGUST, 1877.

1.—Schooner Ætna damaged by collision with a bridge at Chicago.
Tug A. B. Ward broke her crank-pin at Chicago.
Schooner Mary Collins damaged by collision at Chicago.
2.—Steam-barge Favorite ran into and sunk the schooner Grace A. Shannon, on Lake Michigan, near Milwaukee. A young son of A. L. Graham went down with schooner Grace A. Shannon.

2.—Schooner Pauline and propeller Montgomery damaged by collision at Chicago.
Scow Kittie damaged and sprung a leak by striking the dock at Marblehead.
John Powers, sailor on schooner Golden Harvest, drowned at Grand Haven, Mich.
Henry McAllister lost overboard from barge M. B. Spaulding and drowned in Lake Erie.
3.—Schooner R. C. Crawford sprung a leak on Lake Erie.
Scow Mountain Maid capsized and sunk at mouth of Black River.
Tug McClellan lost her wheel in river at Chicago.
4.—Scow Kitty capsized by a squall on Lake Erie.
5.—Schooners Mystic Star and E. P. Doer damaged by collision in the harbor at Oswego.
Schooner Julia Millard sprung a leak on Lake Erie.
6.—Schooner Lillie Parsons sunk in Saint Lawrence River.
7.—Schooner E. J. Peters sprung a leak and water-logged on Lake Ontario.
8.—Schooner J. G. Worts ran ashore on Pigeon Island, Lake Ontario; released.
9.—Schooner Geo. B. Sloan struck a rock and sunk in Welland Canal; raised.
Schooner Unadilla ashore in the straits; released.
Fireman named Monahan drowned from a tug at Alpena.
10.—Schooners Higgie and Jones damaged by collision with a bridge at Chicago.
Steamer Clinton disabled in her machinery on Lake Huron.
11.—Schooner Kearsarge damaged by collision with schooner Kingfisher at Chicago.
Schooner Arcturus lost her foretopmast on Lake Michigan.
Tug American Eagle and schooner J. N. Foster damaged by collision at Chicago.
12.—Schooner Joseph Paige lost her jibtopsail in a squall on Lake Michigan.
Schooners J. G. Masten and Maria Martin damaged by collision in Detroit River.
13.—Schooner Saint Andrews lost some of her canvas and rigging on Lake Michigan, off Chicago.
William Ryan, sailor on propeller Champlain, fell overboard and was drowned off Chicago.
Schooner Samuel L. Mather sunk by collision with schooner Mary Copley, near Fox Islands, Lake Michigan.
Schooner Mary Copley badly damaged by collision with schooner Mather on Lake Michigan.
Tug Kate Williams ran into and sunk the schooner Mary Garret in the Saint Clair Flats Canal.
Tug Kate Williams damaged by collision at Detroit.
14.—Schooner Minnie Corlett badly damaged and lost portion of her deck-load by striking the pier at Michigan City.
Bark Lottie Wolf put into Chicago leaking.
Schooner C. Harrison missed the piers during a gale and run ashore at Michigan City; released.
Schooners Lucerne and Magara and tug American Eagle damaged in rigging, and schooner L. B. Shepard and tug L. B. Johnson sprung leaks, in a gale at head of Lake Michigan.
Schooner B. F. Wade damaged by collision with a bridge at Chicago.
15.—Tug Saint Mary sprung a leak and sunk at Milwaukee.
Propeller Empire State damaged by collision with schooners Winslow and Nevada at Buffalo.
Schooner Ostrich ashore in the straits; released.
R. W. Haskins, mate of schooner Sherwood, fell overboard and was drowned in Lake Ontario.
Thomas Brady, sailor on schooner Hattie Johnson, fell overboard and was drowned at Buffalo.
David Petersville fell overboard from steamer Flora and was drowned in Lake Erie.
16.—Schooner Kingfisher and propeller Alaska damaged by collision with bridges at Chicago.
17.—Propeller City of Madison destroyed by fire on Lake Michigan.
Schooner Lumina destroyed by fire at Brighton.
18.—Propeller Buckeye disabled in her machinery on Lake Michigan.
William Anderson, sailor on schooner Champion, fell from aloft and was killed.
19.—Tugs Bob Anderson and L. L. Lyon damaged by fire at Windsor, Ont.
Propeller Eighth Ohio destroyed by fire at Windsor, Ont.
20.—Schooner Silver Crest foundered and sunk during a gale on Lake Huron.
21.—Bark Great West damaged by lightning and a squall at Oconto, Lake Michigan.
22.—Schooner D. A. Wells lost her mainmast and maingaff on Lake Michigan, off Port Washington.
23.—Schooner C. North sprung a leak on Lake Michigan.
Schooner Alrina damaged by a squall on Lake Saint Clair.

24.—Schooner Bolivia struck bottom and sunk at mouth of Sand Beach Harbor of Refuge, Lake Huron; raised.
Schooner P. S. Marsh lost a portion of her canvas in a squall on Lake Huron.
Schooner Sophia J. Luff ran into and damaged the bark Lewis Day at Chicago.
Tug C. W. Parker and the schooners Hattie Wells and Gracie M. Tiler damaged by collision at Chicago.
Propeller Atlantic went ashore during a fog on Lake Superior.
Tug Mary E. Perew sprung a leak at Buffalo.
25.—Schooner Hippogriffe damaged by collision with tug Prince Alfred on Lake Huron.
Frederick Brandon, sailor on steam-barge T. W. Snook, knocked overboard and drowned at Malden.
Schooner Correspondent sprung a leak on Lake Ontario.
26.—Propeller R. C. Brittain struck a log and broke her wheel in Kalamazoo River.
Schooner Magnolia sprung a bad leak on Lake Michigan.
27.—Schooner Brightie lost her foretopmast by lightning at Milwaukee.
29.—Schooner Helvetia damaged by collision with schooner Guido Pfister at Chicago.
Schooners Nellie Gardner and Elma damaged by collision at Bay City.
Schooner Evening Star towed into Goderich in a waterlogged condition.
30.—Schooner Barbarian sprung a bad leak on Lake Michigan.
Schooner Racine lost some of her rigging in a squall on Lake Michigan.
Schooner Bertie Calkins lost some of her canvas in a squall on Lake Michigan.
Schooner Josephine sprung a leak and waterlogged on Lake Michigan. Entire cargo jettisoned. Loss, $5,000.
31.—A deck-hand on steamer Bertschy fell overboard at Cleveland and was drowned.
Tug Goodenow was struck by a squall at Port Huron and was driven into a ferry-boat, severely damaging the latter.
Propeller Peerless disabled by a break in her machinery on Lake Michigan.
Schooner Mary Collins dismasted on Lake Michigan.
Schooner Snow Bird went ashore during a squall on Fish Point, Lake Ontario.
Scow Royce capsized off Ottawa City.
Schooner Maggie lost her mainsail in a squall on Lake Huron.
Schooners E. P. Door, Florida, and Grace Whitney lost portions of their canvas in a squall on Lake Erie.

SEPTEMBER, 1877.

1.—Scow Monitor and schooner San Jacinto put into Manitowoc in damaged condition
Propeller Argyle struck the harbor pier at Port Burwell, Lake Erie, and sunk.
Barge Little Jake was struck by lightning at Bay City and lost two spars.
Propeller Maine struck a rock and sunk in Sault Ste. Marie passage.
Schooner Australia damaged by striking harbor pier at Milwaukee.
Schooner Maria Martin sprung a leak on Lake Huron.
Wrecking-tug Leviathan broke her cylinder-head on Lake Michigan.
2.—Tug American Eagle damaged by collision in Chicago harbor.
Schooner Grace Murray put into Manitowoc leaking badly.
3.—Propeller S. D. Caldwell damaged by collision at Chicago.
Schooner Riverside went ashore at Four Mile Point, Lake Ontario.
Schooner Samana arrived at Port Colborne leaking.
4.—Schooner Golden West split her topsail on Lake Erie.
5.—Barge Contest damaged by a collision with a bridge at Chicago.
6.—Steamer Sheboygan ran into and damaged the tug Ewing at Chicago; amount, $600.
Schooner William Crosthwaite arrived at Chicago leaking.
Schooners Morning Light and F. D. Barker arrived at Chicago leaking.
Schooner Lumberman lost her jibboon by collision at Chicago.
7.—Schooner North Star arrived at Chicago in a waterlogged condition.
Schooner Guide waterlogged on Lake Michigan and was towed into Chicago.
10.—Schooner Union went ashore during a gale at Waukegan, Lake Michigan.
11.—Barges Dubuque and Rio Grande ashore west of Long Point, Lake Erie; total loss.
13.—Propeller Lawrence ashore at Forty Mile Point, Lake Huron.
14.—Schooner Hippogriffe sprung a leak at foot of Lake Michigan.
15.—Schooners Two Katies and Quickstep damaged by collision off Sheboygan.
16.—Tug Red Ribbon destroyed by fire at Port Huron.
Schooner Willie Keller aground in Detroit River.
Schooner H. A. Kent lost her jibboom in the straits.
Schooner Saveland lost some of her canvas in the straits.
17.—Scow Mermaid arrived at Chicago minus her jibboom.
Schooner Winslow arrived at Detroit, leaking.
Schooner R. J. Noyes grounded in Oswego Harbor; released.
Henry Johnson, sailor on scow Flying Cloud, drowned at Oswego.

17.—Schooner Bermuda driven ashore at Fairhaven.
18.—Scow Success water-logged on Lake Michigan.
Schooner Madison ashore and water-logged near White Lake.
Barge Lottie Wolf damaged by a gale on Lake Michigan.
19.—Scow Madison ashore at White Hall, Mich.
The Bermuda missed the harbor entrance and went ashore at Buffalo.
Schooner Delos De Wolf arrived at Kingston in a damaged condition.
21.—Schooner C. Harrison arrived at Milwaukee leaking.
Schooners C. J. Rolder, J. Y. Jones, and Pulaski, and steam-barge William Crippen damaged by collision in river at Chicago.
Schooner Japan arrived at Chicago leaking.
22.—Schooner Odin sprung a leak and water-logged on Lake Michigan.
Tug Winslow disabled in her machinery on Lake Huron.
Scow Lydia sprung a leak and sunk at Port Stanley; loss, $3,000.
23.—Steamer Northwest destroyed by fire at Green Bay.
Andrew Hanscomb, sailor on schooner Monguagon, drowned at Port Colborne.
26.—John Johnson, sailor on schooner Hattie Earl, fell from masthead and was killed.
Schooner Kate Kelley ashore at Tibbet's Point; released.
27.—Schooner Emma L. Coyne ran into and sunk schooner Hippogriffe off Kenosha, Lake Michigan; total loss; amount, $8,000.
Schooner Havana damaged by striking the pier at Oswego.
28.—Schooner Maggie McRea sprung a leak on Lake Erie.
30.—Propeller Colorado ashore at Alabaster; released.

OCTOBER, 1877.

1.—Steam-barge Forest City broke her rudder on Lake Huron.
Schooners Bertha Barnes and C. Mears damaged by collision at Chicago.
Tug John Martin ran into and damaged the schooner City of the Straits in Detroit River.
Schooner Emma L. Hutchinson damaged by collision at Buffalo.
Schooner C. K. Dixon driven ashore near Middle Island, Lake Huron; total wreck; loss $1,000.
2.—Propeller Messenger damaged by collision with schooner San Diego in a fog off Chicago.
3.—Schooner P. Hayden waterlogged and lost her deck load in a gale on Lake Michigan.
Steamer Union blown ashore at Saint Joseph, Lake Michigan; released.
Brig Fashion ashore at Saugatuck and a total loss; amount, $2,000.
Bark Winona damaged by collision with an unknown vessel on Lake Erie.
Tug Martin Green, and schooner Christine Nilsson, damaged by collision at Chicago.
4.—Schooner Eveline Bates struck the pier at Grand Haven and went ashore.
Scow Nellie driven ashore at Cleveland during a squall.
Schooner San Jacinto broke her jibboom in a gale on Lake Michigan.
Schooner Mary Merritt returned to Port Huron minus her main and mizzen sails.
Schooner H. P. Murray and scow Lander driven ashore on Point au Pelee Island, Lake Erie.
Propeller City of Fremont aground in the Nebish Rapids; released.
Tug Merrick ran into and damaged the schooner David Sharp at Baby's Point.
Schooner Maggie blown ashore in Detroit River; released.
Schooner Gerritt Smith damaged by a gale on Lake Erie.
Schooner Planet struck the piers at Whitehall and capsized.
Schooner A. Plugger ashore at Saint Joseph.
Schooner South Haven damaged by collision with a bridge at Saint Joseph.
Schooner Hope ashore at Muskegon.
Schooner Industry ashore at Whitehall, Michigan, and a complete wreck.
Schooner Nettie Weaver wrecked on Lake Huron; two lives lost; value of vessel, $7,500.
Bark British Lion ashore at Long Point, Lake Erie.
5.—Steam-barge Tioga destroyed by fire on Lake Erie; loss $18,000.
Steamer Corona broke her shaft on Lake Michigan.
Scow D. G. Williams lost her jibboom by collision at Chicago.
Schooner Eclipse towed into Manitowoc in a water-logged condition.
A sailor named Daville lost overboard from schooner Charger and was drowned in Lake Erie.
Schooner Star damaged by a gale on Lake Erie.
Schooner O. M. Bond lost her fore boom on Lake Ontario.
6.—Schooner W. H. Hinsdale damaged by a gale on Lake Michigan.

6.—The following vessels have reached Chicago in a damaged condition: Schooner Carrier, minus fore mainsail and foremain gaff; Mears, staysail gone; Nabob, jib blown away; A. P. Nichols, square-sail ruined and canvas more or less damaged; Kate L. Bruce, minus foresail and mainsail; Sunrise, foremast sprung; Francis Palms, fore gaff broken; Sardinia and Golden Fleece, jibs torn.

7.—Schooner Wells Burt damaged by collision at Chicago.

8.—The barges C. P. Williams and Fostoria went ashore during a gale at Leamington, Ont., and five men and one woman drowned; total loss.
Schooner Wacousta ashore at Port Dover.
Schooner Lem Ellsworth damaged by collision at Port Huron.
Propeller James Davidson damaged by a gale on Lake Erie.
Scow D. W. McCall sprung a leak, water-logged, and went ashore at Port Barwell; loss, $7,000.
Schooner Lewis Ross ashore at Port Stanley.
Schooner Thomas Gawn lost her canvas in a gale on Lake Erie.
Schooner Gazelle badly damaged by a gale on Lake Ontario.
Schooner Portland beached on False Presque Isle during a gale.
Steamer Seymour ashore on Lonely Island.

9.—Schooner Colonel Cook struck bottom in Alpena Harbor and sprung a leak.
Schooner Reindeer arrived at Manitowoc in a disabled condition caused by a gale.
Schooner Madeira disabled on Lake Erie.
Bark Naiad and propeller R. C. Brittain damaged by collision at Chicago.
Schooner Magnolia driven ashore during a gale near Saint Joseph, Lake Michigan.
Propeller Badger State ran into and damaged the schooner Helen Blood off Chicago; amount, $1,000.
Schooner Alice broke from her moorings during a gale at Manitowoc, struck a bridge, and sunk.
Scow Hunter put into Manitowoc leaking and minus her deckload of wood.
Schooners Lake Forest and J. B. Ketcham badly damaged by a gale on Lake Huron; one of the crew of the former killed.

10.—Schooner Bessie Boalt damaged by a gale on Lake Michigan.
Scow Planet damaged by a gale on Lake Michigan.
Tug Prindeville, and lighter D. Provost driven ashore on False Presque Isle during a gale; total loss.
Scow L. Painter beached near Saint Joseph, Mich.
Scow Edgar Master ashore at Rond Eau.
Scow Mary Lydia, schooner A. G. Morey, and a barge ashore at Hackett's Dock, Lake Erie.

11.—Schooners Eliza Turner and Madeira ashore at Long Point, Lake Erie; two persons drowned; both total wrecks. Loss: Madeira, $12,000; Turner, $14,000.
Schooner Niagara disabled by a gale on Lake Erie.
Schooner Gifford arrived at Buffalo leaking.
Schooner Horace Greeley sprung a leak and sunk at Kenosha.
Schooner Golden Fleece damaged by a gale on Lake Erie.
Schooner Moonlight lost her mainsail in a gale on Lake Erie.

12.—Schooner Comanche lost some canvas and put into Chicago.
Schooner Jennie Graham arrived at Chicago leaking.
A large number of crafts reached Chicago more or less damaged. Among them the schooner Loveland, with squaresail yard broken; Chester B. Jones, minus rudder, maintopmast, and some canvas; B. F. Bruce, foresail and jibs gone, and bulwarks knocked out; Montana, 70,000 feet of lumber washed from deck; main sail torn to shreds and minus bulwarks; C. L. Johnson, leaking and part of deck-load gone; John Magee, main boom broken and bulwark smashed; the Republic and Jennie Mullen are each minus their foresail, the Clara her mainsail, the Amaranth and Peoria their staysail, and the Moss her jibboom, mainsail, and 6,000 feet of lumber.
Schooner Bay State, grain-laden, sprung a leak in Chicago Harbor and went into dry-dock.
Schooner John Tibbits also sprung a leak and sunk at her dock in the North Branch.
Propeller Holland arrived at Cleveland in a damaged condition.
Steam-barge Red Jacket sprung a leak and sunk near Dresden.
Barges Nellie McGilvra and R. J. Carney arrived at Detroit, leaking and in a water-logged condition.
Schooner Almeda arrived at Windsor leaking.

13.—Barges Saginaw and G. Kelly, ashore at Bar Point.
Schooner W. Y. Emery and a barge ashore at Colchester; released.
Barge Geo. E. Kelly arrived at Detroit in a water-logged condition.
Propeller Roanoke arrived at Chicago with damaged cargo.

13.—Schooner Ontario put into Kingston leaking badly; schooner Marengo and bark Red, White and Blue damaged by collision off Bar Point, Lake Erie.
Propeller Saint Louis struck a rock and sunk at Sault River.
14.—Schooner C. K. Ninis arrived at Milwaukee in a disabled condition.
15.—Schooners Albatross and J. R. Benson ashore on Middle Island, Lake Huron.
Scow Curlew ashore at Fairport.
Schooner J. R. Noyes arrived at Oswego in a damaged condition caused by a gale on Lake Erie.
16.—Schooner Leo and Steamer Alpena damaged by collision at Grand Haven.
17.—Schooner Alabaster ashore on Middle Island, Lake Huron.
Robert Abbey, sailor on scow Seabird, fell overboard at Saugatuck and was drowned.
Frank G. Norce, sailor on schooner Golden Fleece, fell overboard at Buffalo and was drowned.
18.—Schooners Conquest, Shandon, W. H. Vanderbilt, Ella Ellenwood, City of Tawas, Jennie Mullen, Seventh Ohio, Ottowa, E. M. Davidson, Carrier, and Kate Gillet arrived at Chicago in a damaged condition, caused by a gale on Lake Michigan.
19.—Sloop W. S. Sherman sunk at Four Mile Point.
Scow Planet sprung a leak and lost her rudder in a gale on Lake Michigan.
20.—Schooner E. P. Beals driven ashore during a gale at Erie.
Schooner Senator ashore at Detour; released.
21.—Schooner Wells Burt arrived at Buffalo in a damaged condition.
Schooner Mary Jane ran ashore near Turtle Light, Lake Erie.
Schooner-yacht John Bender wrecked near Toledo.
Scow Vision sprung a leak and water-logged on Lake Erie.
Propeller Milwaukee ran into and damaged the steamer Chief Justice Waite at Put-in-Bay.
23.—Schooners Mystic Star and Geo. G. Houghton damaged by collision at Milwaukee.
Schooners Annie Vought and Francis Palms damaged by collision at Buffalo.
24.—Propeller John Pridgeon ran into and damaged the bark Winona at Chicago.
Schooner Starke ashore on Mackinaw Reef.
Scow St. Joseph sprung a leak on Lake Huron.
Schooner Comanche sprung a leak on Lake Ontario.
Schooner Grantham arrived at Sheboygan full of water.
28.—William Williams, cook on schooner Pride, lost overboard and drowned in Lake Michigan.
Schooner Mary Lyon broke her main-boom on Lake Michigan.
29.—Schooner Rising Star ashore on Long Point; released.
Steam-barge Sparta and cargo damaged by fire at Buffalo.
Barge Concord ran into and damaged the schooner Unadilla on Saint Clair Flats.
30.—Schooner J. V. Jones and propeller Wissahickon damaged by collision at Chicago.
John Silbrook, seaman on schooner Sam. Cook, killed by breaking of a line on Lake Huron.
Schooner St. Andrew ashore on North Point, Lake Huron; released.
Bark City of Tawas sprung a leak and went ashore at Saint Joseph, Mich.; total loss; amount, $7,000.
Scow J. P. DeCondres struck the pier and went upon the shore at Holland, Mich.; released.
Schooners Erastus Corning, Brightie, J. P. Marsh, J. O. Shayer, and Sunnyside damaged by collision at Lime Kiln Crossing.
31.—Barge John Marks ashore at Manistee, Mich.

NOVEMBER, 1877.

2.—Schooner Henrietta Esch capsized on Lake Michigan.
Scow Flora beached at Grand Haven.
Schooner P. Hayden ashore at Union Pier, Lake Michigan; total loss; value, $1,500.
Schooner Col. Hegg ashore on east shore of Lake Michigan; total loss.
Schooner Hartford struck the pier and went upon the reef at Port Colborne; released.
Schooner Almeda ashore at Port Glascow.
Schooner Eliza White struck the pier at Port Hope and lost both of her masts.
Schooner Anna struck the bar at Port Hope and sunk; total loss.
Steam-barge Young Hickory sprung a leak and sunk off Bar Point; total loss.
Brig E. Cohen ashore at Bay View, Lake Erie; total loss.
Steam-barge Rocket dragged her anchor and went on the beach at Buffalo.

2.—Barge Ironton and schooners Anna, P. Grover, and William Jones reached Buffalo in damaged condition, caused by a gale.
Schooner Jane C. Woodruff ashore near Kingston.
Schooner Benedict lost her masts in a gale on Lake Erie.
Schooner Gipsey Bride foundered off Rollo Bay and all hands lost.
3.—Schooner Gold Hunter ashore on Graham Shoals, Straits of Mackinac.
Schooner J. and A. Stronach ashore at Manistee.
Steam-barge Swallow ashore at Port Stanley.
Schooners New Hampshire and George Suffee, and scows Starlight and Helen, ashore at Leamington.
Scow Evergreen beached near Pentwater.
Scow Sanders and schooner Florida damaged by a gale on Lake Erie.
Schooner Wacousta damaged by a gale on Lake Erie.
Schooner Ben Franklin on a reef near Green Island, Lake Erie; total loss; value, $4,500.
4.—Schooner Rob Roy ashore at Waukegan; total loss; value, $3,000.
Scows Emma Leighton, D. R. Owen, and Alaska lost deck-loads, and schooner and scow Monitor had rigging damaged in a gale on Lake Michigan.
Bark Nelson and schooner David Ferguson damaged by a gale on Lake Michigan.
Schooners Ithaca, C. North, and Years reached Chicago in a water-logged condition.
Schooner Fisher ashore at Michigan City; total loss; valub, $2,000.
Schooner Bessie Boalt ashore at Frankfort.
Barge Celt ashore near Holland.
Schooner J. B. Chapin ashore at South Chicago; total loss; value, $1,000.
5.—Schooners F. B. Gardner and Seventh Ohio ashore at Chicago; total loss. Value of Gardner, $7,500; Seventh Ohio, $3,500.
Schooner E. M. Portch ashore at Hyde Park, near Chicago.
Schooner Coral ashore at Kenwood; released.
Schooner Geo. Penington ashore at Chicago; total loss; value, $3,500.
Bark Constitution ashore in Little Sturgeon Bay.
Schooner Mary Booth sunk during a gale on Lake Michigan; total loss; value, $2,000.
Schooner Snow Bird lost her jibboom and bowsprit in a gale on Lake Ontario.
Schooner J. J. Hill struck the pier and went upon the beach at Sodus Point, Lake Ontario; released.
6.—Schooners O. S. Storrs and Flying Scud ashore at Point Frederick, Lake Ontario; released.
Four vessels, names unknown, ashore on Wolfe Island.
Scow J. B. Chapin ashore at south end of Lake Michigan; total loss; value, $1,000.
Schooner Delos De Wolf ashore near Charlotte, Lake Ontario.
Peter Stowdutch fell overboard from a tug in Sandusky and was drowned.
7.—Scow Sandy Morrison arrived at Manitowoc in a leaky and damaged condition.
8.—Schooner Hibernian and scow Clara White ashore at Dalphinstown, Bay of Quinte.
Scow Dunham arrived at Milwaukee in a water-logged condition.
Schooners Reuben Doud and Arab damaged by a collision during a gale at Racine.
Schooner Sea Gun damaged by collision with a dock at Racine during a gale.
Schooner Bridgewater beached near Petoskey, Michigan.
Schooner Kate E. Howard struck the pier and went ashore near Michigan City.
Schooner Ætna sunk at Long Tail Point, Green Bay.
Steam-barge D. W. Powers ashore near Detour.
Schooner Crawford lost all her canvas in a gale on Lake Huron.
Schooners Narragansett and William B. Ogden damaged by a gale on Lake Huron.
Schooner Japan arrived at Luddington in a damaged condition.
9.—Propeller Montgomery and schooner Florida damaged by collision during a gale at Port Huron.
Schooners Goshawk, New Dominion, and bark Red, White and Blue more or less damaged by a gale on Lake Huron.
Scow D. C. Williams struck the pier at Chicago and went to pieces; total loss; value, $4.000.
Schooner Magellan sunk by a gale on Lake Michigan; total loss; value $15,000; eight persons drowned.
Bark Great West water-logged and went ashore near Chicago.
Schooner Berlin sunk near Grindstone City, and Captain Johnson and four sailors drowned.
10.—Schooner Charles Hinckley ashore at North Point, Lake Huron.
Scow C. G. Meisel ashore at Point au Sable, Lake Huron.

10.—Schooner Empire State and bark Sunnyside ashore on North Point Thunder Bay.
Steamship Amazon ran into and damaged the schooner Blackhawk in Lake Michigan.
Schooner Monterey ashore near Alcona, Lake Huron.
11.—Bark Lotus ran into and sunk the scow Milton off Port Washington, Lake Michigan.
Propellor City of Concord arrived at Milwaukee leaking.
17.—Schooners Thomas Gawn and Peshtigo dismasted on Lake Huron by a gale.
18.—Schooner Kate L. Bruce and crew of eight lost on Lake Huron; value $14,000.
Schooner Peters ashore at Port Colborne.
Schooners Elwina, Hoboken, O. M. Bond, Lasco, H. W. Oades, New London, Trade Wind, Mary Annette, and Starling damaged by a gale on Lake Ontario.
Schooner Telegraph lost her mainmast on Lake Erie.
19.—Schooner Four Brothers damaged and beached by striking the bar at Holland.
20.—Steamer Enterprise destroyed by fire at Dodge's wharf, Lake Ontario; value, $6,000.
26.—Schooner Dick Somers ashore on Poverty Island; total wreck; value, $6,500.
Schooner Favorite disabled by a gale on Lake Huron.
Schooners Fayette Brown, J. R. Pelton, John Jewett, and scow F. L. Jones more or less damaged by a gale on Lake Erie.
Tug Thomas Thompson destroyed by fire on Lake Erie; value, $4,500.
28.—Tug Fanny White destroyed by fire at East Saginaw; loss, $3,000.
29.—Schooner Surprise damaged by a gale on Lake Erie.

DECEMBER, 1877.

2.—Schooner Evening Star missed the piers and went ashore at Manistee, Mich.
Schooner Ida Belle beached near Point au Pellee.
Captain Harrison, of steam-barge Kershaw, drowned in Lake Huron by being washed overboard during a gale.
4.—Schooner Elm City ashore at Holland, Mich.
6.—Schooner Wayne struck the piers at Oswego and went to pieces; total loss; value, $14,000.
7.—Sloop Alice wrecked on North Point, near Racine, Lake Michigan.
11.—Schooner G. Barber ashore on Racine Reef, Lake Michigan.
12.—Schooner E. R. Blake sprung a leak on Lake Michigan.

JANUARY, 1878.

No disasters this month.
Navigation suspended.

FEBRUARY, 1878.

No disasters this month.
Navigation suspended.

MARCH, 1878.

16.—Schooner Orkney Lass forced ashore by ice at Escanaba; released.
18.—Scow Planet lost two jibs in a squal on Lake Michigan.
23.—Schooner Experience and Sea Gun damaged by collision during a gale at Racine.
Schooner Pride and scow Mermaid damaged by collision with a bridge at Racine.
Scow Minnie Corlett driven ashore at Chicago during a gale, and one of the crew drowned.
Schooners Athenian and Charlie Crawford damaged by collision on Lake Huron.
Schooner Cuyahoga broke her steering gear in a gale on Lake Michigan.
28.—Scow Three Bells struck the dock and sunk at Milwaukee.
Schooner Eagle driven ashore during a gale at Racine; total loss.

APRIL, 1878.

1.—Schooner Bonetta and scow Rover beached at Mud Bay, Lake Michigan.
Steam-barge Snook bent her shaft at Muskegon.
Tug St. Mary sunk at Manistee.
Schooner J. G. Andrews put into Manitowoc leaking.
Schooners Topsy and City of Toledo damaged by collision at Chicago.
2.—Steamer Chicago disabled in her machinery on Lake Michigan.
9.—Schooner Isabella Sands lost her jib-boom on Lake Michigan.
Schooner W. W. Brigham went ashore during a gale at Jacksonport.
10.—Tug J. T. Hayden damaged by collision at Chicago.

10.—Schooner Belle Brown ashore on Bark River, Lake Michigan.
Schooner Helvetia damaged and disabled by a gale on Lake Michigan.
Schooner E. P. Royce damaged by a gale on Lake Michigan.
11.—Bark Vanderbilt dismasted and otherwise damaged on Lake Huron.
Propeller Portage run into and damaged the tug R. K. Hawley at Cleveland.
Tug Cora lost her wheel at Pinconning, Mich.
12.—Schooner Goshawk struck a sunken wreck near Point au Barques, sprung a leak.
13.—Schooner Andrew Jackson lost her jibboom by collision with a bridge at Milwaukee.
14.—Scow Hercules sprung a leak on Lake Michigan.
Schooner Eagle Wing struck a rock and sunk on Bar Point, Lake Erie.
Schooner F. A. Morse dismasted on Lake Erie.
15.—Propeller Gordon Campbell burst her safety-valve on Lake Michigan.
17.—Steam-barge William Crippen broke her shaft on Lake Michigan.
18.—Schooner B. F. Bruce grounded on Ballard's Reef, Grosse Isle.
Schooner Joses lost her jibboom by collision at Chicago.
19.—Steamer John A. Dix and scow-brig Express collided on Lake Michigan. Steamer damaged and brig sunk.
Barge Yosemite burst her steam-pipe and throttle on Lake Erie.
Schooner Espindola damaged by collision with schooner Lillie Pratt off Port Washington.
20.—Schooner H. M. Score and barge Contest lost some of their canvas in a squall off Chicago.
Schooner Mary damaged by striking the piers at Chicago.
21.—Schooner D. E. Bailey and scow Iasco damaged by a squall on Lake Huron.
Schooner B. F. Wade put into Manitowoc leaking.
Schooner F. C. Leighton grounded at mouth of Saint Clair Flats Canal.
Steam-barge Emma C. Thompson broke her crank on Lake Huron.
Schooners City of Chicago and Thomas W. Ferry damaged by collision near Point au Pelee.
22.—Barge Gould ran into and damaged the steamer Riverside at Malden.
Propeller B. W. Blanchard ran into and damaged the schooner Columbian at Detroit.
Samuel Morrison, mate on schooner Pelican, fell overboard in the straits and was drowned.
23.—Schooner Sunny-Side ashore on Colchester Reef.
24.—Schooner Halsted dismasted by a squall on Lake Erie.
Schooners Maize and Anglo-Saxon damaged by a squall on Lake Erie.
Scow Hercules damaged by striking the pier at Montague.
Schooner Home damaged by a gale on Lake Erie; amount $300.
25.—Schooner City of Sheboygan dismasted on Lake Erie.
Schooners Herbert Dudley, David Stewart, and E. M. Davidson damaged by a squall on Lake Michigan.
26.—Steambarge Fletcher towed into Erie in a disabled condition.
Schooner John Miner arrived at Buffalo minus her jibboom.
27.—William Moran, wheelsman on tug A. G. Vans Charck, killed at Chicago by a line fouling.
28.—Schooner Thomas Gawn lost her jib-boom by a collision at Cleveland.
Schooner Belle Stevens arrived at Detroit in a badly damaged condition caused by a gale.
29.—Schooner Conneaut damaged by collision with an unknown vessel in a fog on Lake Erie.
30.—Schooner St. Lawrence destroyed by fire on Lake Michigan; two lives lost.
Scow Moses Gage damaged by collision at Chicago.
Schooner Mary R. Ann lost her foremast off Waukegan, Lake Michigan.

## MAY, 1878.

1.—Schooner B. W. Folger lost her jib-boom by collision with a bridge at Oswego.
2.—Schooners Gamecock and Belle Brown damaged by collision at Chicago.
3.—Steambarge Alice Strong damaged by collision with a bridge at Cleveland.
Steambarge Anna Smith damaged by collision with schooner Joseph Paige at Milwaukee.
Wrecking-steamer Prince Albert sunk at Windsor.
Barge Mars and schooner Alalhalla damaged by collision off Little Point Sauble, Lake Michigan.
4.—Scow Dan Sickles water-logged and capsized on Lake Michigan.
5.—Schooner R. B. King arrived at Chicago minus her mainsail.
Schooner Gardiner lost her jib-boom by collision in Saint Clair River.
Barge Northerner ran into and damaged the schooner C. K. Nims at Bay City.

6.—Schooner William Crosthwaite and scow Aunt Ruth damaged by collision off Sturgeon Point, Lake Huron.
Schooner Nellie Gardiner lost her jib-boom by a squall on Lake Erie.
7.—Schooner Mary lost her foresail and a jib in a squall on Lake Michigan.
Tug Shields broke her shoe at Chicago.
Schooners Jennie Miller and Rouse Simmons damaged by collision at Chicago.
Propeller Lowell burst her feed-pipe near Port Huron.
Schooner W. H. Rounds lost a mast by a stroke of lightning on Lake Erie.
8.—Schooner Our Son ashore on Saint Helena Island, Straits of Mackinaw.
Schooner Swallow damaged by a collision with a bridge at Chicago.
Tug Ferry broke her wheel at Chicago.
Steambarge Plymouth Rock disabled in her machinery on Lake Huron.
9.—Barge Lathrop sunk and schooner A. B. Moore damaged by collision in Detroit River.
Schooner Otonobee lost her jib-boom by striking a dock at mouth of Saint Clair River.
10.—Propeller Scotia and schooner Pauline damaged by collision at Chicago.
Tug Harrison broke her shaft at Chicago.
Schooner Lyman Davis lost her jib-boom by collision with propeller Colorado at Chicago.
James Patterson, mate on steambarge Lothair, fell overboard and was drowned in Lake Michigan.
11.—Steambarge Forest City ran into and damaged the schooner Jennie Graham at Port Huron.
Steambarge Tempest broke her cylinder-head off Chicago.
13.—Tug Little Giant broke her crank off Chicago.
Schooner Major Ferry lost her main-boom by collision at Chicago.
14.—James H. Langenfelter, mate on schooner Belle Mitchell, fell overboard and was drowned in Lake Michigan.
15.—Schooner James C. Harrison ashore near Put-in-Bay, Lake Erie; released.
Steambarge Yosemite arrived at Detroit in a disabled condition.
16.—Tug Sandford Davis ran into and damaged the barge Lothair off Collingwood Harbor.
18.—Schooners Mariner and E. J. McVey damaged by a squall on Lake Michigan.
Schooner J. S. Minor sprung a leak and sunk at Bay City.
19.—Propeller Smith slightly damaged by fire at Bay City.
20.—Schooner Fellowcraft damaged by fouling with schooner Albatross at Port Colborne.
Schooners Lumberman and Jason Parker damaged by collision at Chicago.
Schooner Reed Case lost two jibs in a gale on Lake Michigan.
21.—Barge Wm. McGregor damaged by striking a reef in Sault River; amount $700.
22.—Schooner Wells Burt slightly damaged by fire at Milwaukee.
James Keyes, master of schooner Ramadaez, drowned off Kenosha, Lake Michigan.
Tug Clements burst her cylinder-head off Manitowoc.
23.—Propeller Menomonee and schooner Stampede slightly damaged by collision off Two Rivers Point, Lake Michigan.
24.—Schooner Typo lost her foresail in a squall on Lake Michigan.
25.—Schooner City of the Straits and propeller Manistee damaged by collision at Chicago.
26.—Barge J. O. Hale and schooner Columbian damaged by collision at Detroit.
Schooner Louisa McDonald lost some canvas in a squall off Chicago.
27.—Schooner A. Rust ashore and leaking on Pilot Island.
31.—Steambarge Portsmouth burst the flues of her boilers on Lake Ontario.

JUNE, 1878.

1.—Propeller Portage ran into and damaged the schooner B. F. Wade at Chicago.
Schooner Anna Foster damaged by collision with barge Tuscarora at Kingston.
2.—Schooner Guide beached during a squall near Grand Haven.
Barge Wolverine and schooner Annie Vought damaged by a gale on Lake Michigan.
4.—Schooner Ida had her jib-boom broken by collision at Chicago.
Steambarge Egyptian, consort Pelican, and a schooner aground in Sault Ste. Marie passage.
5.—Schooner H. D. Root missed the piers and went ashore at Cleveland.
Schooners Jane C. Woodruff and M. L. Breck returned to Port Colborne in a damaged condition. Schooners San Diego, E. M. Davidson, Nellie Wilder, and Stewart damaged by grounding in Saint Clair River.
Schooner W. H. Cadis lost her center-board on Lake Ontario.

6.—Schooner Mary Ann went ashore during a gale at Goderich; released in a damaged condition.
7.—Tug Champion and schooner H. M. Score damaged by collision in Detroit River.
8.—Schooner Sam. Flint arrived at Port Huron leaking badly.
9.—Propeller Montgomery totally destroyed by fire at Point Edwards dock.
Steamer Carrie H. Blood broke her shaft on Lake Huron.
16.—Schooner James Scott capsized by a squall on Lake Erie and three persons drowned.
20.—Schooner Alice B. Norris damaged by collision with a barge in Milwaukee Bay.
The following damages were caused by a gale on Lake Michigan:
Schooner B. F. Bruce's bulwarks knocked out.
Propeller Caldwell, schooners Colonel Cook, Salina, and Sardinia sprung leaks.
Schooner H. Rand lost main-boom and some canvas.
Schooner Oliver Culver lost her small boat off Racine, and the schooner M. Mitchell had her jibs blown away and jib-boom broken.
21.—Steamer J. Hotel destroyed by fire near Port Huron.
Scow Sandy Morrison missed the pier and went ashore at Saint Joseph.
Schooner Arrow damaged by a gale on Lake Michigan.
Schooners Mary B. Hale and J. J. Case lost some canvass and rigging in a gale on Lake Michigan.
Tug Prindville broke her wheel, tug Martin Green bent her shaft, and steam-barge Davidson broke her wheel at Chicago.
Scow Rosa capsized on Lake Huron during a gale.
Scow W. M. Parks struck a snag in Saginaw River and sunk.
22.—Schooners J. M. Hutchison and E. S. Judd damaged by collision at Buffalo.
23.—Schooner Ella Morton arrived at Oswego with a broken center-board.
24.—Tug Favorite burst her boiler at Detroit; barge Northern Light towed into Buffalo in a water-logged condition.
26.—Schooners St. Andrews and Peshtigo collided on Lake Huron and both vessels sunk. Two lives lost.
Schooner Ardent water-logged and capsized off Sheboygan, Lake Michigan.
Schooner Melvina damaged by a gale near the Foxes.
28.—Propeller City of New Baltimore arrived at Detroit in a disabled condition.
30.—Schooner Delaware ashore on Pilot Island.
Schooner Clipper City put into Milwaukee in a leaky condition.

SAMUEL W. RHODE,
*Sergeant Signal Corps U. S. A.*

*Recapitulation.*

| | 1877. | | | | | | 1878. | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | July. | August. | September. | October. | November. | December. | January. | February. | March. | April. | May. | June. | Total. |
| Sunk | 2 | 8 | 4 | 3 | 10 | 2 | .... | .... | 1 | 2 | 3 | 3 | 38 |
| Damaged, disabled, &c | 12 | 18 | 9 | 61 | 31 | .... | .... | .... | 2 | 23 | 17 | 23 | 196 |
| Ashore and aground | 2 | 7 | 11 | 44 | 48 | 4 | .... | .... | 3 | 0 | 3 | 8 | 130 |
| Sprung a leak | 3 | 13 | 11 | 12 | 3 | 1 | .... | .... | 3 | 4 | .... | 6 | 56 |
| Collisions | 20 | 10 | 7 | 22 | 3 | .... | .... | .... | .... | 12 | 21 | 7 | 111 |
| Damaged by fire | 4 | 2 | .... | 1 | .... | .... | .... | .... | .... | 1 | 2 | .... | 10 |
| Destroyed by fire | .... | 3 | 2 | 1 | 3 | .... | .... | .... | .... | .... | .... | 2 | 11 |
| Water-logged | 1 | 2 | 5 | 8 | 7 | .... | .... | .... | .... | .... | 1 | 4 | 28 |
| Struck by lightning | 1 | 2 | 1 | .... | .... | .... | .... | .... | .... | .... | 1 | .... | 5 |
| Dismasted | 1 | 1 | .... | .... | 3 | .... | .... | .... | .... | 4 | .... | .... | 9 |
| Exploded boiler | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 |
| Lives lost | 1 | 2 | 3 | 17 | 13 | 1 | .... | .... | 1 | 2 | 3 | 3 | 55 |

SAM'L W. RHODE,
*Sergeant Signal Corps U. S. A.*

PAPER 42.

## REPORT ON TORNADOES OF FEBRUARY 7 AND 8, 1878, RICHMOND AND BURKE COUNTIES, GEORGIA.

AUGUSTA, GA., *August* 23, 1878.

GENERAL: In complying with your telegraphic orders to investigate the tornado which passed through this city February 8, 1878, and the further one, to determine whether or not it had divided into two portions, I discovered that there had been a previous one, which occurred about 8 p. m. of February 7, 1878.

The reports of both are herewith transmitted, and are accompanied by a map of the country traversed by both; that of the 7th having its course marked in blue color, and that of the 8th in red. Also a chart of the path through Augusta, and diagrams designated as A. B. 1, 2, 3, 4, and 5.

All directions, distances, and courses, and all damaged places are reliably and accurately placed in reference to points of the compass, and can be relied on as being just as the objects they represent

Very respectfully, your obedient servant,

HUGH R. STOCKMAN,
*Private Signal Corps U. S. A.*

The CHIEF SIGNAL-OFFICER U. S. A.,
*Washington, D. C.*

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*Tornado of* 8 *p. m., February* 7, 1878.

The first trace I found was in a grove of young pine trees in Burke County, equidistant from Briar Creek and an unnamed branch, and two miles from their junction. This grove is on a hill averaging 25 feet in height; which is almost surrounded by boggy land and marshes; and this place is characteristic of the whole country for miles around.

For 100 yards from S. to N. the track of the tornado is distinctly marked 30 yards in width. From the main track there are several divergences toward the NW., which average 6 yards in width and 15 in length.

After leaving this grove the tornado struck two trees and a fence, at an unoccupied house midway between the grove and T. P. Griener's. The fence is down for 200 yards; at the western part, toward NNE.; at middle to N.; at E., to NW. The two trees are at the W. side of the track; the one S. of the fence is uprooted and laid to NNE.; and the other broken 10 feet from ground and the top lying to NE.

Griener's was next struck, and diagram A will show that here the damage was much greater. The fences, as shown by the arrows, are down toward all directions. Trees are generally from SE., ESE., and SSE. The pillars of the piazza and the *débris* of the smoke-house are carried to ESE., and the *débris* of the lint-house to WNW.

The tornado then passed into Richmond County and struck two trees one-half mile N. of McBean Creek, near McCollough's, which it broke off 25 feet from the ground, and laid their tops to the NNW. These trees were at the top of a ridge.

The tornado then jumped a mile and a half and struck some trees S. of houses marked A, B, and C, and laid five of them inward toward its track, which was 60 yards wide here. Then it struck fence of house marked A and laid it toward NNE.

From here it passed over a cleared field for three furlongs, struck some trees that stood on a ridge, passed down the declivity to marshy ground at the bottom, and from there tore a track from 100 to 300 yards wide, through a grove of trees, three-quarters of a mile, and struck Little Spirit Creek.

In its course it crossed the track of a tornado that must have occurred a year or two ago; and which was traveling to the westward. Through these gullies there was hardly a tree left standing in its track.

A noticeable feature here was the occurrence of occasional divergences similar to the ones mentioned at Briar Creek; but there they occurred only on the W. side; here they were on both; there they were short, here much longer, the longest being one furlong. From here it jumped across Little Spirit Creek, struck two trees W. of Hancock's and laid them toward the NW.

It then jumped one-half of a mile farther to the woods and made a track through them to Boggy Branch, differing in no material particulars from the one at the grove of pine trees at Little Spirit Creek.

The next place struck was William Sego's. (See diagram B, which will show what appear to be two tornadoes separated by one-fifth of a mile at the widest, and converging to and meeting each other nearly a furlong beyond.) Here the fence and trees,

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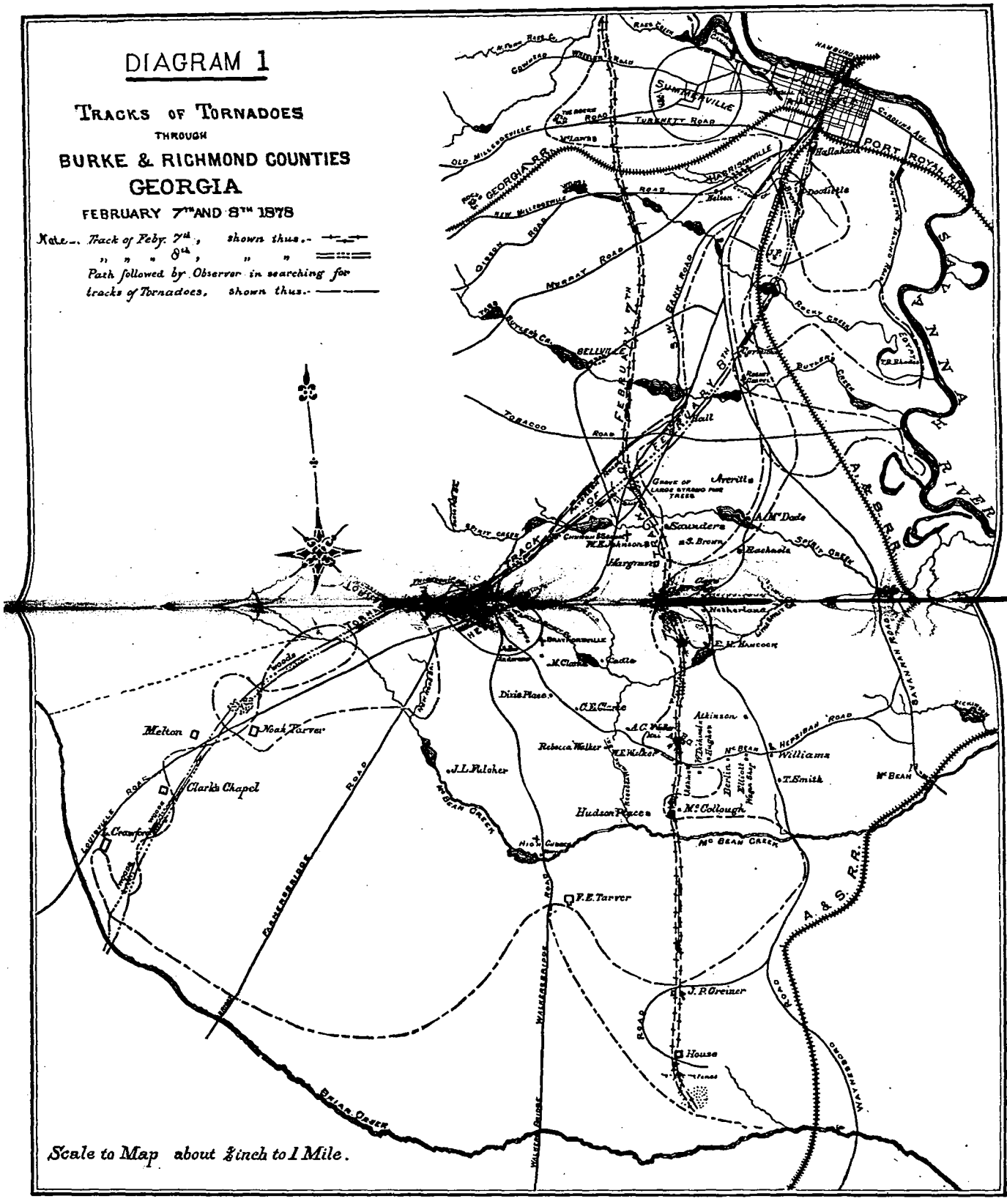


DIAGRAM 1
TRACKS OF TORNADOES
THROUGH
BURKE & RICHMOND COUNTIES
GEORGIA
FEBRUARY 7TH AND 8TH 1878
Note.- Track of Feby. 7th, shown thus.-
" " " 8th, " "
Path followed by Observer in searching for tracks of Tornadoes, shown thus.-
SUMMERVILLE
PORT ROYAL R.R.
GEORGIA R.R.
SAVANNAH RIVER
A. & S. R.R.
Hall
Averitt
Saunders
Rachaels
Netherland
Williams
Melton
Noah Tarver
Clark's Chapel
Crawford
J.L. Fulcher
Hudson Place
McCollough
F.E. Tarver
J.P. Greiner
House
Scale to Map about ⅝ inch to 1 Mile.

marked respectively A and B, were on the crest of a ridge and about 75 feet higher than the gully through which the main track passed.

I accounted for the peculiarity here by supposing the main tornado to have been accompanied at its east side by a minor one whose funnel reached low enough to break off these trees and induce a surface wind strong enough to blow down the fence. This would make the lower part of the minor funnel 90 feet higher than the main one.

In the main track the part of fence marked C was laid from S. and SSE., and trees numbered 1, 2, 3, 4, 5, and 6, in towards the center, while tree No. 7 was lying toward NNW. and the west edge of the path, pointing toward the gully through which Branch No. 2 passes. Here the path was three furlongs wide.

Trees numbered 1 and 2 are 2½-feet pines (10 inches diameter of trunk), are uprooted and laid to WNW.; 3 is a 2-feet pine laid to NW.; 4 is a 2-feet pine, whose trunk 30 feet from ground is splintered for a length of 3 feet, and the top lies 30 feet NNE. of root inclining toward the NNW. These trees are on the west part of the hill that forms the east and south boundaries of the circular basin in which the track is so wide, and the following ones are on the western rise. No. 5 is a 2½-feet pine, presenting 125 square yards surface. It is uprooted and blown toward the north. This was a remarkably large, strong tree, with immense roots imbedded in heavy, tenacious soil, and must have required a wonderful strain to have snapped off the roots and torn them and soil up, as I found it. No. 6 is a 2-feet red oak, uprooted and lying to NE. No. 7 is a 2-feet pine, uprooted and lying toward NW. and the gully of Branch No. 2. Two other trees to W. are lying from W. and WSW., and the stalks in cornfield No. 2 are pointing backward and nearly at a right angle to tree No. 7, showing, I think, that the tornado lingered near this marshy ground and the gully of Branch No. 2 before being controlled to follow that of No. 1.

Leaving this point it traversed the valley and extended up to the top of the ridge, the width of track here being 275 yards.

On the west side of the ridge it tore down a great many, but not all, of the trees; and laid them from ESE. to SE., S. in towards the center, and showed its path very plainly by the stalks in cornfield No. 1.

On the top of the ridge, the great majority of the trees are broken or twisted off 30 or 40 feet from the ground, and the tops carried toward the W. and the storm center. All the splits are at the western side. I hunted in vain for an exception.

At the junction of the two branches there is a clump of saplings which are lying towards SSW.; but all of the larger, stronger trees in this neighborhood are in the opposite direction—that is, to NNE.

At Brooks's house there is another example of the same feature; all the strong trees lying towards the NNW., and the weak ones to SSE. This house, which was a frame one on a brick foundation, was totally demolished, and the débris and all the fencing carried to SSE. A hay-cutter, weighing 200 pounds, and presenting as it stood only 2 square feet of surface, was carried from SE. 17 yards to the house; and a wagon that stood at the house was lifted and broken, and the body of it deposited with the débris of the house, while one of the wheels was carried and sunk two-thirds of its diameter in the boggy ground near tree No. 7, and the other, in the opposite direction, to the spring. Brooks had taken hold of the door of this house to prevent its being blown in; he and it were carried and deposited 75 yards to SSE.; he was greatly bruised, more than he could have been by simply falling to the ground; and two of his ribs were broken. Under ordinary circumstances his injuries would have confined him to his bed and back, but fear or terror had such an effect on him that he ran all over the plantation for hours afterwards, yelling like a madman.

Two hundred and fifty yards NNE. of Brooks's is Ned Williams's house, which occupies the crest of a ridge. The house itself is intact; while large, strong trees all around it are uprooted; those to S. and E. of it are lying towards NNE., and those N. and W. from ENE., and SE.

On the north side, just below the crest of the ridge that Williams occupies, there are several trees broken about 20 feet from the ground, their tops being carried or laid towards NNW.

From this ridge and these trees the tornado jumped 300 yards to near the crest of the ridge to the north, striking it at the same height from the surface of the meadow as it left the Williams ridge. Across the branch from Williams's is cornfield No. 3, in which the stalks are all pointing towards the center row in the field, as though one of the minor tornadoes had passed through there; but they are nearly all standing, and Brown's house is intact.

When the tornado struck the ridge where Amos Wright's house is, it caught a 3-feet pine tree, 70 yards SSW. of the chimney of the house, twisted the top off the trunk 20 feet from the ground, and laid the top and the attached part of the trunk 1 foot SSW. of the root, the top pointing toward Wright's. I carefully examined this twist, and found it in that expressed by "contrary to the hands of a watch," that is from N. by E. then S. to N. again.

The house here is completely wrecked. The only vestige left standing is the chim-

ney that was at W. side, and it inclines so much toward the W. that it will probably fall. Parts of the *débris* of this house are in Saunders's field, parts are scattered along the path between here and there, and parts cannot be found. Around this house, with it for a center, and a radius of 50 yards, the trees are piled and form a nearly perfect circle; the directions are the same as in the case of the twisted tree.

From here the tornado passed through a grove of trees on the ridge and on the northern declivity of it, throwing down one here and there, inward toward its center, until it reached trees marked A and B. These are just south of the road, which is the low-ground level; tree A is at the W. side of the track and is thrown toward it, and the tree C, at the SW. corner of Saunders's field. Tree B is at the E. side of the track and is laid toward NNE.

*Saunders.*—Here the walls are left standing, and the roof, doors, windows, and steps are blown to W. and NW., and the main path is marked by the inclination of the stalks in cornfield.

The timber at the west end of Buck Pond is uprooted and broken, and is all laid toward the WNW.

A comparison of trees A, B, C, and these at Buck Ponds leads me to think that there was a divergence here of a minor from the main tornado, as shown on diagram B.

From this cornfield the tornado passed on to a tree at the SE. corner of the barn, uprooted it, and laid it toward the NNW. The *débris* of the barn is scattered for 100 yards along the track of the tornado to the N. One hundred yards beyond the last piece the tornado enters the grove of pine trees, through which it makes a path over 150 yards wide, and lays the trees inward toward the center, until it reaches trees marked A and B. A is uprooted and lying toward SW. and B nearly opposite it, toward SE. This grove is on rising ground, and the center has followed around the lower part of the rise, making an arc of a circle.

Two hundred yards beyond trees A and B commences a hollow which the storm jumps and strikes the rising ground beyond.

Southwest of the house in this grove of trees there are two dead trees which are broken and lying toward NW. and WNW.

The storm, after striking the rise just mentioned, passed over its crest and on to Butler's Creek, prostrating a tree here and there in its course. Here it appears to have ceased being a tornado, and to have become a severe thunder and hail storm, traveling onward toward the Savannah River. At the locks there I found two trees blown down from SW. I judge a very brisk wind would have been sufficient to have felled them.

*Augusta tornado of* 1 *a. m., February* 8, 1878.

The first trace I got of this tornado was in the woods north of Briar Creek, and half a mile S. of Crawford's, in Burke County. In a track from SW. to NE., about a furlong long, through these woods, the tornado broke off 5 trees and uprooted 3 others, laying them all towards the N. From the first to the last one struck is about one-eighth mile. For a quarter of a mile onward there is no damage done.

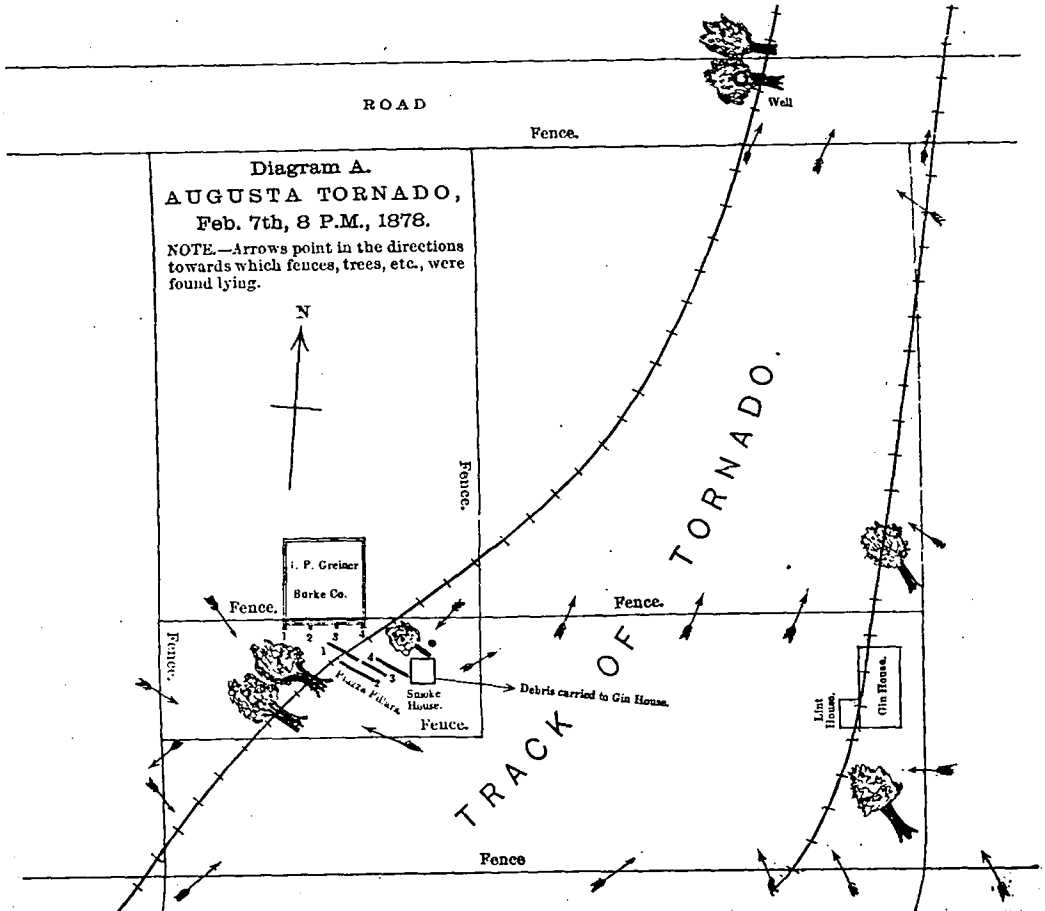
We have now reached the fence that bounds Crawford's plantation at the N., and which extends E. and W.; 300 yards of this fence was laid to NE., and for 100 yards farther towards the W. it was laid to NW. This fence is nearly three-quarters of a mile E. of the house.

There is no trace of the tornado between this and the woods S. of Clark's Chapel. Here about a dozen smaller trees are down in a line that extends 500 yards backwards from the fence at the NW. corner of the lot. At the beginning of this path through the woods a 1½-feet pine tree is twisted off from the E. side and its top laid to the N. From here some trees are broken off and some uprooted, and there is no apparent regularity or order; but farther on toward the chapel this peculiarity disappears, and they are found in nearly a straight line, and lying towards the NNW. and NNE.

The mentioned twisted tree was at the crest of the ridge, and from there the path is down the declivity to the chapel at its foot. The eastern part of the fencing here is piled in heaps outside of the lot which they inclosed, and toward the NNE.

The next place struck was the woods, which covered 40 acres of ground, three-quarters of a mile NW. of Noah Tarver's. The tornado tore a path 450 yards wide through the whole extent of them, from SW. to NE., leaving not a single tree standing in its track. They all were laid towards the center of the path. It then jumped one-half a mile and struck a cleared and fenced field in which were 3 trees. The trees and fencing it laid to the NE., and passed up the side of a hill, felling a tree here and there, and passed a few yards over the crest, laying the trees inwards towards its path. This crest is half a mile S. of McBean Creek, which is the boundary between Burke and Richmond Counties.

I got no trace of the storm between this point and just W. of the village of Hepzibah, where some fencing is down to the NW. and WNW. From here to the woods N. of Butler's Creek, and about half mile NE. of Carmichael's, a few dead trees are lying to northeastward. Between this place and Doolittle's, just south of Augusta, I trav-


ROAD
Fence.
Well
Diagram A.
AUGUSTA TORNADO,
Feb. 7th, 8 P.M., 1878.
NOTE.—Arrows point in the directions towards which fences, trees, etc., were found lying.
N
Fence.
I. P. Greiner
Burke Co.
Fence.
Fence.
Fence.
Piazza Pillars.
Smoke House.
Debris carried to Gin House.
Fence.
TRACK OF TORNADO.
Lint House.
Gin House.
Fence

Augusta Tornado.

DIAGRAM 2.

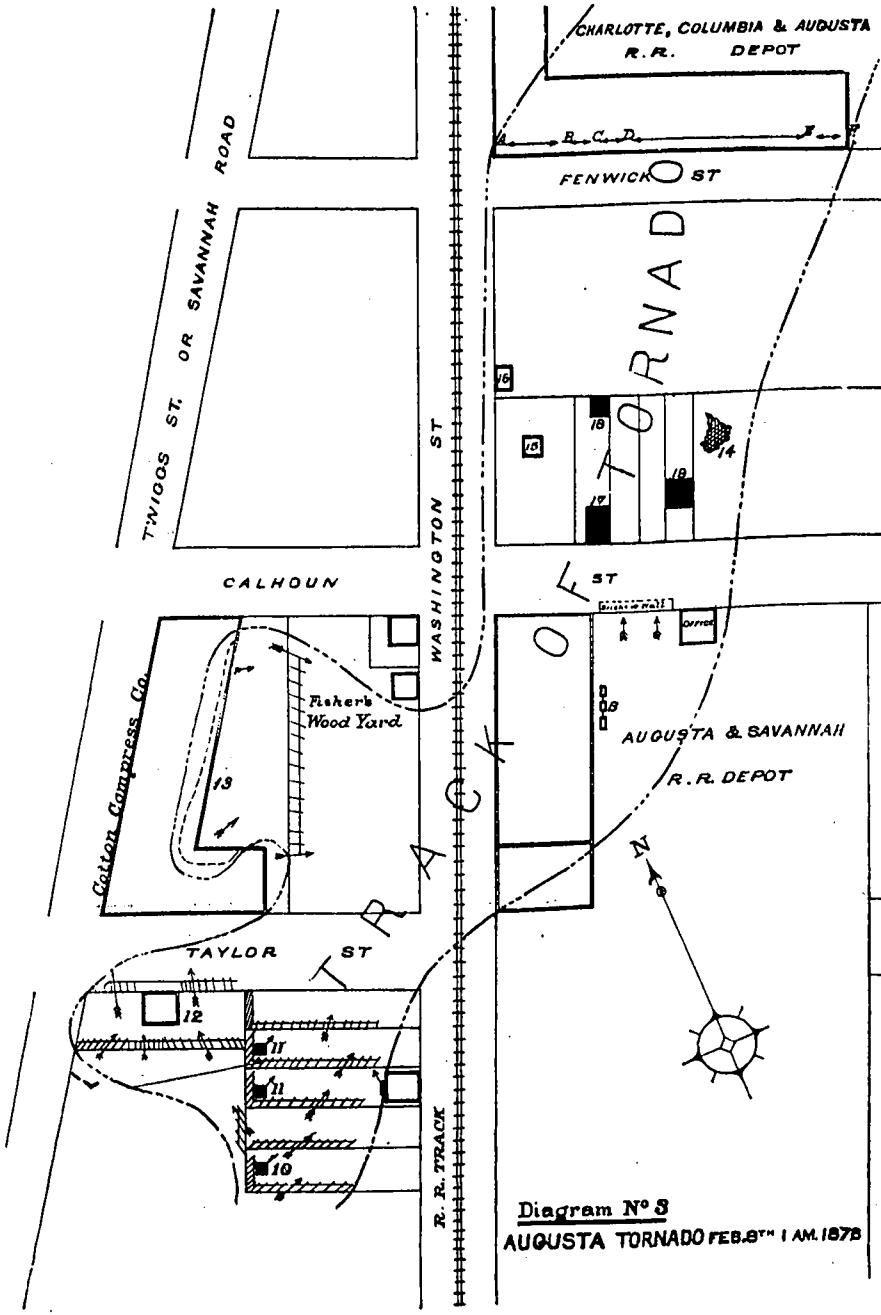
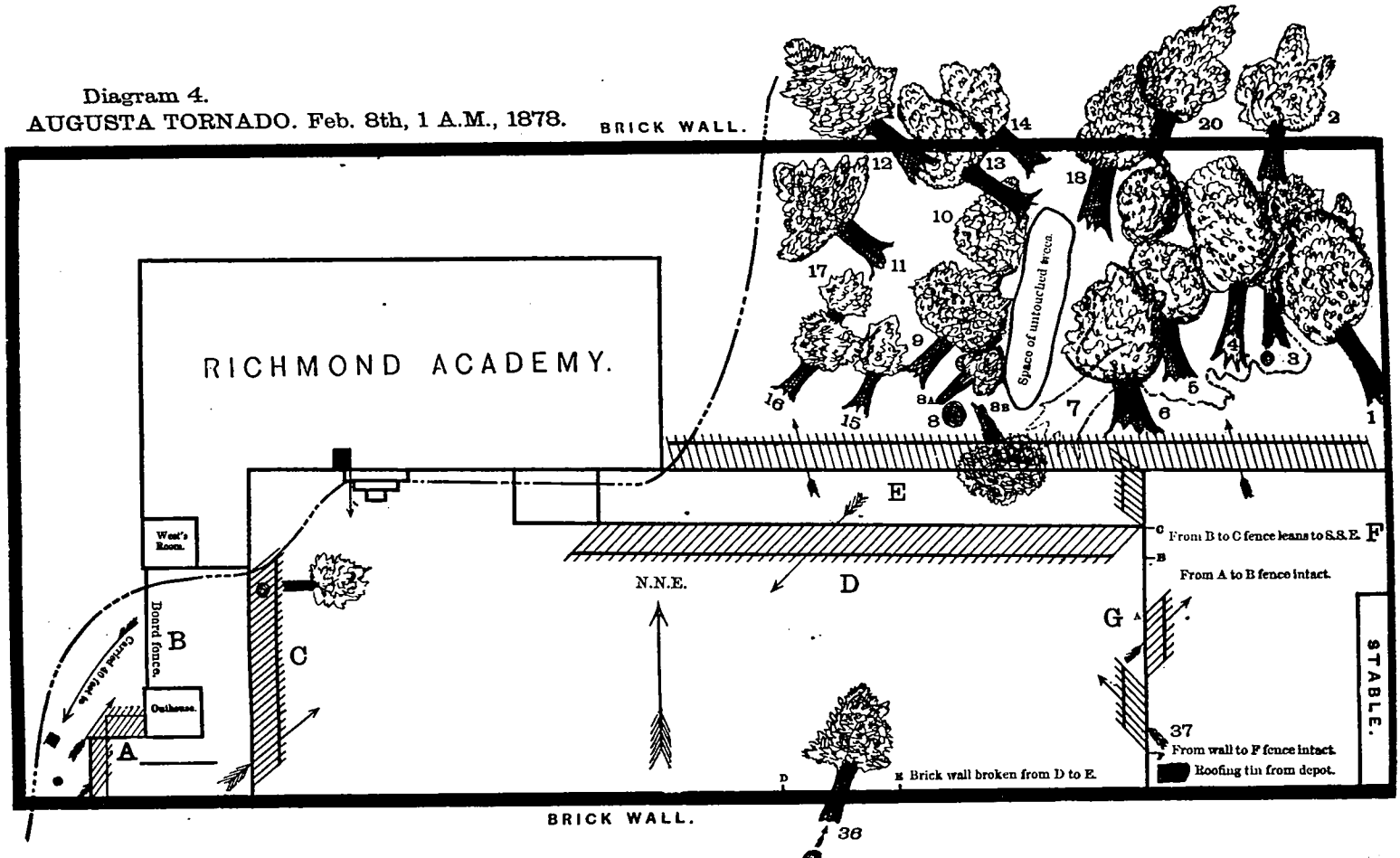



Diagram N° 3
AUGUSTA TORNADO FEB. 8TH 1 AM. 1878

Diagram 4.

AUGUSTA TORNADO. Feb. 8th, 1 A.M., 1878.



cled back and forth through swamps, creeks, and a great deal of low, wet land, but could find no trace of the tornado.

Chart No. 1 and the accompanying diagrams marked 1, 2, 3, 4, and 5, will show the course and the damage effected in its passage through Augusta, from Doolittle's and Brown's, better than the map; and all references will be made to them from this point to the Savannah River.

At Doolittle's the only damage was to the fencing (see diagram 1), which was laid toward the N. Just west of here is Susan Brown's, where only 9 yards of fencing, which was S. of the house, is down, those extending N. and S. being intact. The storm lifted a hay-rick which was 60 yards SSW. of the house and deposited it at the door, and lifted the covering off the bed and tangled it among a pile of wood to the NE. It then passed onward to W. B. Moore's (see diagram 2). The fencing at the southern part of the lot is laid from S. and at the northern from W. The house was unroofed and the *débris* struck 18 feet to NNE., and then plowed a track along the ground to the ENE., where a portion of it was found, 40 yards from where it struck. House A, to the NW., was piled in a heap toward the ENE., its chimney to NE., and all its fencing toward the E.; two of the children that were sleeping in it were mixed up with the *débris* and the other inmates were left on the floor, which was unmoved. House B, 70 yards NE., fences here at back and front were down toward NE., and the southern one leaned to NE. The house itself was unharmed. House C was parallel with the railroad track; it remained standing but was twisted out of position, the NE. corner being 6 yards toward the E., and the SE. one 18 yards due N. The storm curved more to the northward and began the ascent of a slight hill.

From this house southward the ground is low and wet for miles; to the eastward and just beyond the railroad is a very wet meadow, but N. of it, extending as far as house J, is a hill that is 60 feet maximum height above the railroad track. The storm in passing up this rise demolished houses marked D and E and carried their *débris* to the NE. Then on to house F, from that to Quinn's is the top of the hill. Here houses marked G, H, I, and J are down, showing the spreading of the tornado so as to inclose a larger damaged space.

When I reached Quinn's they had been at work some hours, and had partly cleared away the *débris*. They state that some of the roofing and fencing was carried to the railroad track ESE., and that fencing was laid in all directions. But what I saw remained unmoved, and a lamp that had stood in the middle of the yard, was carried or laid to E. and N., with the exception of some fencing at the NW. corner of the lot which was either leaning or laid down toward the W.

Next to Quinn's (the place numbered 2) I found one-third of the fencing that was at W. side of lot laid toward the NW., and the remaining two-thirds to SE.; and of a light fence that extends N. and S. portions were both E. and W. of the former position. A small outhouse, 60 feet SE. of this fence, seemed to have caved in, the *débris* being laid in a heap on top of the foundation, none of it scattered.

At No. 1, across from Quinn's, at the junction of the Savannah and Turknett Springs roads, a small portion of the fence at the N. and E. corners is down to the E., and that at the SW. side to W. At this place and Quinn's there appears to have been a dividing of the tornadoes into two portions, as shown on the chart.

Following the western portion, the next damage is found at Watkins's wagon-yard, where a small portion of high, close-boarded fence at the E. side is laid to the NE. From here there are several small, weak houses and cabins that would require very little to overturn them, but there is no damage until corner 3 is reached. Here outhouses and fencing are laid from the W. An outhouse and fencing at the S. side of lot numbered 4, an outhouse and some fencing, are laid from the SE.

From this place to Pendleton's there are a few houses on the commons, but they are all unharmed. Returning to the track of the main tornado, at house numbered 5, next to Quinn's, this was totally demolished, and the *debris* of it and the chimney piled 30 feet to ENE.

From here it passed to two trees, marked X and Z, whose tops were twisted off and laid to the E. Then to Pendleton's there is no damage done. From Pendleton's, following southward, what appears to be a third tornado track, Mrs. Hallahan's is reached. Here there are 4 strong fruit-trees and much fencing blown down and lying from the south. Then backwards, through Fraser's Hill, where weak fences and trees are down toward the N., but no damage done to the houses, though many are so rickety that I imagine a wind 40 miles per hour would topple them over. Then on to Doolittle's, between which and Brown's there is a distance of 1,700 feet.

The space included between these two houses and the two tracks of tornado is a low, boggy meadow, bounded E. by Fraser's Hill and Mrs. Hallahan's ridges, and W. by the hill from house C to Quinn's. It has fencing on it, which would show the track of a tornado had any passed over it. Pendleton's (marked 6) was a strong, newly-erected frame planing and machine shop. Here the bottoms of the large timbers that formed the perpendicular posts, and which rested and were fastened to brick foundation pillars, are 13 and 15 feet NE. of their pillars; and all the *débris* of the building is in the same direction. All that was left standing here was the brick pillars.

From here the tornado passed NE. over the commons to the Macedonian church, marked 7. This was a substantial two-story frame building, resting 2 feet from ground on brick pillars. The pillars at SE. and SW. corners are still standing; and all others are laid toward the N. This building was lifted bodily from the foundation. The floor dropped 8 feet beyond the building-line, the upper story 35 feet, and the roof 75 feet toward the NE. The fences at E. side of the lot were carried to NE.

The next damage done was to the fences of Crescent Mill, marked 8, which were carried to E. Then it passed to house on Hale street, marked 9, whose fences and outhouses are laid toward the NE. and ENE. Then across the street and through the square, bounded N. by Taylor street. Almost all the fencing, three outhouses, and one chimney are down, as shown by the arrows in diagram No. 3. The places are marked 10, 11, 11, and 12. Through this square, particularly that part traversed by the tornado, the ground is so boggy that a horse sinks over fetlock deep.

Just N. and NE. of Taylor street here, there was as much or more fence exhibited by the tornado than at any other place, and it will be noticed that here it is much wider than usual.

The next place was the cotton compress marked 13, where it left W. and E. and N. parts standing, and tore away 50 square yards of the roof and 200 feet of the E. side of the wall, as shown by the red lines in diagram 3, which incloses the damaged portion. The most of the *debris* was carried into Fisher's wood-yard. Here the only damage done was the prostrating of the W. fence, as shown by the arrows, and the littering of the yard with *debris* from the compress and depot buildings.

At this depot of the Augusta and Savannah Railroad not a vestige of the roof above the braced beams remains; but the building which is brick, is uninjured. Here a loaded train of freight-cars, marked B, was standing on the track with all the brakes on; it was moved along the track 55 feet to the N. The street fence here was a brick wall 4 feet high; is blown to NE. and distributed over the pavement in front. The roof was of tin on a board sheathing. Portions of the tin are in Fisher's wood-yard, other portions in yard of his dwelling-house; another portion, marked 14, is in square to N.; others scattered all along the path; and it is just as probable that the piece of roofing-tin at the river-bank and Centre street, marked 41, is from here as any other place. It exactly corresponds to the portions that I know are from here. A piece of the boarding or sheathing of the roof 1 inch thick, 12 wide, and 14 long, is driven through the SW. half of roof of house, marked 15, and inclining from the NE. Through the same part of house 16 there is a piece of scantling 4 by 4 inches, by 12 feet long, driven and inclining in the same manner as at house 15; this was from Fisher's house. Through the second story S. wall of 86 Walker street, which is frame, lathed and plastered, is a piece of the same boarding, and of the same dimensions as stated in case of house 15.

Across Calhoun street, NE. of the depot, is B. S. Fisher's new 2-story frame house, marked 17, which is totally demolished. The *débris* of the walls is piled to WNW. in the yard, and that of the roof to NNW. At the back of the lot is the beam, marked 18. This, also, was a very strong building; contained four mules, a great deal of forage, and was therefore quite weighty. The S. front is inclining to N. 15° from perpendicular; and the whole building is twisted, racked, and moved about 1 foot from its foundation, the E. side being twice as far as the W., and toward the NW. The SE. corner is bulged out 3 feet from the corner-post, and the S. side about 4 inches from the beams. These things I cannot account for by the weight of the roof.

From Fisher's to house 19, and from that 100 feet to eastward, the only damage done is to fences. E. of 19 they are laid from SW., and W. of it from SE.

House 19 was a 1-story frame, with a loft or attic. The chimney was in the middle of the house, and the bed occupied the NW. corner. In the loft slept three children, and in the bed the man, wife, and infant. The loft and children were lifted from the lower story and deposited unhurt on the ground 10 feet NE. of the N. building-line. The W. wall is laid 9 feet from the line to NW. The E. wall laid to E., and N. wall to NE., and the S. wall atop the floor and toward NNE. The man and wife were killed by the falling timber, and the infant between them was unscathed.

The tornado passed through the rest of the square, leaving all houses unimpaired, and laying the fencing inward to its track; then struck the Charlotte, Columbia & Augusta Railroad depot, which it greatly injured, as shown on diagram No. 3. This was a strong brick building. The roof and all such lighter parts are carried to NE. and NNE., while the bricks of the wall are both N. and S. of their former position, though the greater part is to the NE.

The storm passed through the open yard and then reached Watkins street, where the trees marked 20, 21, 22 are filled with pieces of tin, shingles, and boards, all apparently lodged there from the SSE. There is also a 12-feet piece of scantling from the A. and S. depot.

Nos. 23, 24, and 25 are trees blown down from SW., and 26, 27, and 28 are trees down from ESE.; 28 B is a lamp-post in the middle of street, around the east side of which is lodged a large quantity of much-twisted roofing-tin from one of the railroad depots. The lamp itself is blown toward the NE. No. 29 is a house, the upper story of

which bears a large dent made by a piece of scantling. The following I did not see, but get from reliable authority. In the yard of house marked 30 there was found an oil lamp burning in a tree. This was from some street-lamp. No. 31 is an old rickety barn, which is inclined to the NE., but still standing. Its doors and windows are blown to NE.

Almost the whole of this square is covered with *débris*, which is thickest between tree 22 and house 115. The fences surrounding 113 and 115 are laid from SSE., Walker street. The E. limit of destruction here is at house marked 32, where two trees, marked 33 and 34, are down from SW. In front of them is lodged tin from the roof of A. and S. R. R. depot. There is no further damage until house 85 is reached. The W. fence is a low brick wall, which is down from SE. One chimney is down, the bricks lying to NW., and the top of another in the same direction. Across the street is tree marked 36, which is lying across the wall of the Richmond Academy grounds. On the E. side of Center street is tree marked 31, in which a piece of scantling from the A. and S. R. R. depot is lodged, and parallel with the street.

The storm passed into the academy grounds, and the details are shown on diagram 4. A fence marked as A, was blown down and is lying to NE., while fence B, which was a close board one that offered more surface, is torn away and laid 40 feet to the SW. The outhouse was uninjured. Through the wall and into Mr. West's room there passed a board similar to the one mentioned for No. 85 Walker street. At the SW. corner of the building is a tree down from WNW. and the fence from SW. Fence D is all down from ENE. and fence E. from SSW. Fence F and the stable are uninjured, and fence G toward both directions shown.

The following is a description of damage done in the grove of trees, commencing at the SE. corner of it: No. 1, 1½ feet in diameter, lying to N. and resting on roots and trunk of No. 2, which is the same size and lying to NNW. No. 3, 2½ feet, broken off 25 feet from ground, the broken part lying from SSW. over Nos. 1 and 2 and under No. 4, which is 2 feet 8 inches diameter, and lying to NE. Nos. 5 and 6 are 1½ feet, are uprooted, and are lying to N. No. 7 is 3½ feet diameter, the largest in the grove, and one of the strongest and finest of trees, is uprooted, and measures 12 feet across the broken roots, which contain enough earth to fill 8 carts. The largest of the broken roots measures 18 inches, and is not split, but snapped off. This tree lies across 3, 4, 5, 6, and 22, and at right angles to them; 19 is under 5 and 7, and lying to NNE. Nos. 18 and 20 are lying across the N. wall, toward NE. No. 21 is also across the N. wall and lies to NNE. All the trees are E. of a space in which no trees were injured, as shown in diagram. No. 8 is broken 30 feet from the ground into two pieces. Piece 8*a* lies to N. of trunk, inclining from WSW. Piece 8*b*, which is much larger, lies to S. of trunk and inclining from N. No. 9 is 1½ feet and No. 10 2 feet. Both of these are lying to ENE., No. 10 being a degree or two more N. than 9. No. 11 is lying to NNW. Nos. 12, 13, and 14 in same direction and across the wall. No. 15 from SW., and 16 and 17 from WSW. All these trees are oak.

In Sibley's yard there is a limb broken from a large tree that stood near the fence, and it is lying to N. At SE. corner of Telfair and Centre streets there is a limb broken from the NW. side of an oak tree and lying to NNE. (See diagram No. 5 for this and what follows.) Along Centre street to the next corner some trees are down to NNE.; those at west of street inclining more to E. and at the E. side more to W.

Corner of Greene and Centre streets: A limb here is broken from a tree and leaning from SSE. In the grove in Greene, 100 feet from Centre, there is a tree down from ESE., and, in front of the house next to the corner, a very large one from SE. At Mrs. Clanton's the iron railing is down from S., and the four pillars that formed the veranda over the door were as follows: the most westerly one, No. 1, was moved towards NW.; Nos. 2 and 4, blown inward and from SSW., and lean against house; No. 3, unmoved.

Following up Centre street, the next damage is to a tree at the middle of block, which is to NNE.; then to Levy's, where the fencing and chimney is down from SE., a tree in yard from E., and a fence (B) behind the tree from E., and the glass of a conservatory at S. side of house blown inward and from SW. A tree here, which was at the pavement of Centre street, is blown across the street to WNW.

At Brenner's, the SW. corner, two chimneys are down; one from NE., and one from ENE.; a tree in the yard is down from SSW.; one at the E. side on the street, and one at the corner, are down from SW.

In Levy's yard, a plank 7 feet long, 12 inches wide, and 1 inch thick was lifted from the ground, carried 8 yards to WNW., and driven into a piazza post endwise (No. 38). At the NW. corner of these streets is a two-story brick house, the roof and all intact, except the E. wall of the garret, the whole of which is blown outward and to the ESE., disclosing the interior arrangement of the room.

On Ellis street the E. limit of destruction is a 2-feet tree in front of House No. 89. It is uprooted and lying from SSW. W. of that is a 9-inch limb broken from a tree and lying toward the N., and marked 39. Tree marked 40 is uprooted, and that marked 41 is broken off 6 feet from the ground; both of these are lying from SE. At

Small's, which was a brick building and very much shattered, the chimney is down from S., and the fence from SE. The awning that was at W. side of house was torn away and lodged in tree marked 45.

The SW. part of the roof of blacksmith-shop, marked 46, was blown to SW. The new three-story brick houses, marked 47, 48, and 49, were unroofed.

At Broad street, the W. limit of destruction was Hahn's (marked 50). Back of main building was a two-story brick bake-house; 200 square feet of the roof and the upper story was torn away. The bricks of the walls are laid to both sides, but the greater part is on the floor and ground to the NE. of their former positions. One of the rafters and a portion of the roofing-tin is lodged in a tree about 300 yards to WNW., and other portions of the tin is on top of house marked 51. A portion of the gable containing about 200 bricks is laid unbroken on top of the house marked 52 at a greater elevation than it formerly occupied.

The outhouse back of Gherken's, marked 53, was blown to NE. The front walls of 100 and 102 Broad street were blown out to NNE. and all the fencing of 100 down in the same direction. In the rear of No. 100 was the warehouse, which was unroofed, and portions of the roof lodged in tree marked 54.

No. 55 is a 2½-feet oak tree down from SSW.; 56 and 57 are limbs broken from trees in the grove and pointing from S. and SE. No. 58 is a 2-feet tree down from SSE. and 59 a fence in the same direction. There was also some minor damages done here, and to the alley marked 60. The market, marked 61, was totally demolished, and the *débris* piled over the street toward the ENE.

The tornado then made a path through the square bounded N. by Reynolds street, leaving outhouses, fences, trees, and everything pointing toward it, and reached 98. This was a 2½-story brick house, and No. 100 B adjoining, a one-story frame. Of No. 98 the whole western wall of the garret was blown out; and the *débris* fell on 100 B, demolished it, and very severely injured one of the inmates.

No. 62 is an outhouse, of which the doors and windows are blown from SE. No. 63 is a 2-feet tree uprooted and pointing to N. No. 64 is same size and same direction. No. 65 is five trees down from SE. and ESE.. In this same yard all the fencing is toward the same direction. The passage that connected this house with its back kitchen and was 50 feet E. of trees, blown from E.; at No. 89 tree 66 is blown from SW., and some fences in the same direction; at No. 83 some flower stands and protectors are lying in the garden, pointing from SE. and S.

On Bay street, the W. limit of destruction, where was a tree and fencing down from SW. and a chimney from S. In front of No. 15, there are five trees down, the westernmost one from SW. and the others from S.; the front fence from E.; and in the yard the trees are from SE. and E.; those from E. stop those from SE.

At No. 13 a limb was broken from a tree and laid to N. At 12 a tree down from S., and the guttering of the house from SE.

From here there is no damage till you reach tree No. 67, which was a 3-feet China tree, broken off at the roots and laid to NE.; several of the roots are 1 foot in diameter.

At J. Sibley's, at the E. side of the house, there are limbs and trees up to 15 inches in diameter broken and laid from SE. and S. A larger tree at the street was laid from the SW.

At the corner of Bay and Centre streets, there is a large piece of roofing-tin, marked 68, which was brought from one of the depots in the center of the city.

The steamer Rosa was moored to one of the wharves, and was torn loose, and drifted the river.

The newspapers for a day or two subsequent to these tornadoes contained reports of damage done in South Carolina about 10 miles N., but whether or not it was a continuation of either of these tornadoes, I could not determine.

In concluding this report, and following the instructions conveyed on page 1046 of your report of 1873, I am constrained to state that the observations of clouds and all such features are very meager. In this connection it will be remembered that these tornadoes occurred after dark, and the only persons who noticed the sky were the few exceptional ones that were habituated to it.

The general course of the Augusta tornado was from SW. to NE.. and that of the 7th from S. to N.

In inclosing the damaged places within lines, as I did on the map, &c., several curvatures of the paths appear. It will be noticed that these are coincident with the appearances of the minor tornadoes, which in the previous part of this report I termed divergences. The map will show several comparatively large bodies of water and many streams; besides these there is a great deal of marshy, boggy land; but in the whole course of the investigation I did not see a distinct deviation of either of the tornadoes toward any of them. There was apparent some slight deviations caused by hills and ridges; but my observation leads me to believe that these accompanying minor tornadoes were the prime cause of all the curvatures of the track of destruction.

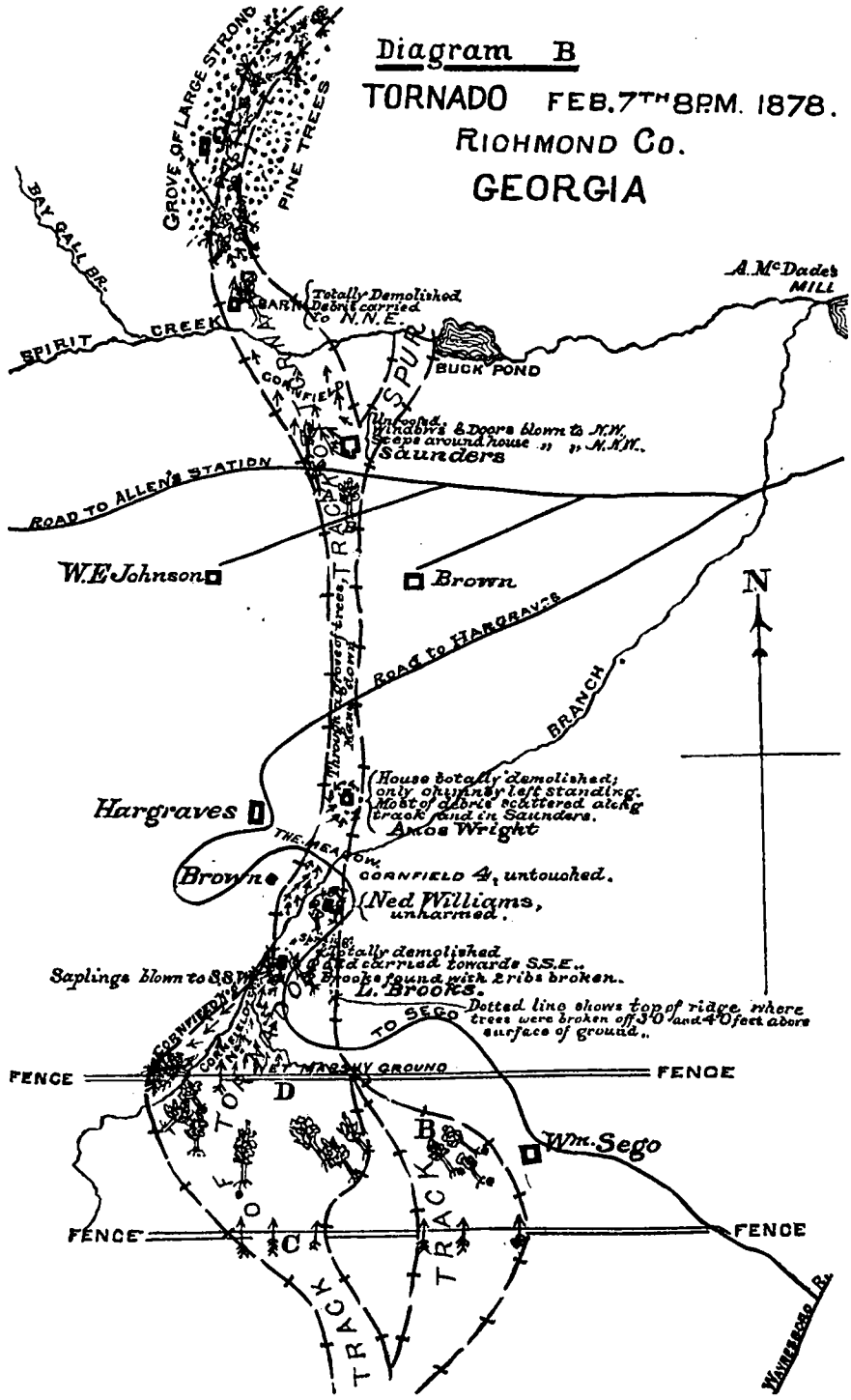


Diagram B
TORNADO FEB. 7TH 8 P.M. 1878.
RICHMOND CO.
GEORGIA
GROVE OF LARGE STRONG
PINE TREES
BAY GALL BR.
SPIRIT CREEK
BARN
Totally Demolished
Debris carried
to N.N.E.
A. McDade's
MILL
BUCK POND
SPUR
CORNFIELD
Unroofed.
Windows & Doors blown to N.W.
Steps around house " " N.N.W.
Saunders
ROAD TO ALLEN'S STATION
TRACK
W.E. Johnson
Brown
N
ROAD to HARGRAVES
BRANCH
House totally demolished;
only chimney left standing.
Most of debris scattered along
track and in Saunders.
Amos Wright
Hargraves
THE MEADOW
Brown
CORNFIELD 4, untouched.
Ned Williams,
unharmed.
Totally demolished
Saplings blown to S.S.W.
Brooks found with 2 ribs broken.
L. Brooks.
Dotted line shows top of ridge where
trees were broken off 3'0 and 4'0 feet above
surface of ground.
TO SEGO
CORNFIELD
FENCE
WET MARSHY GROUND
FENCE
D
B
Wm. Sego
FENCE
C
FENCE
TRACK
TRACK
WAYNESBORO R.

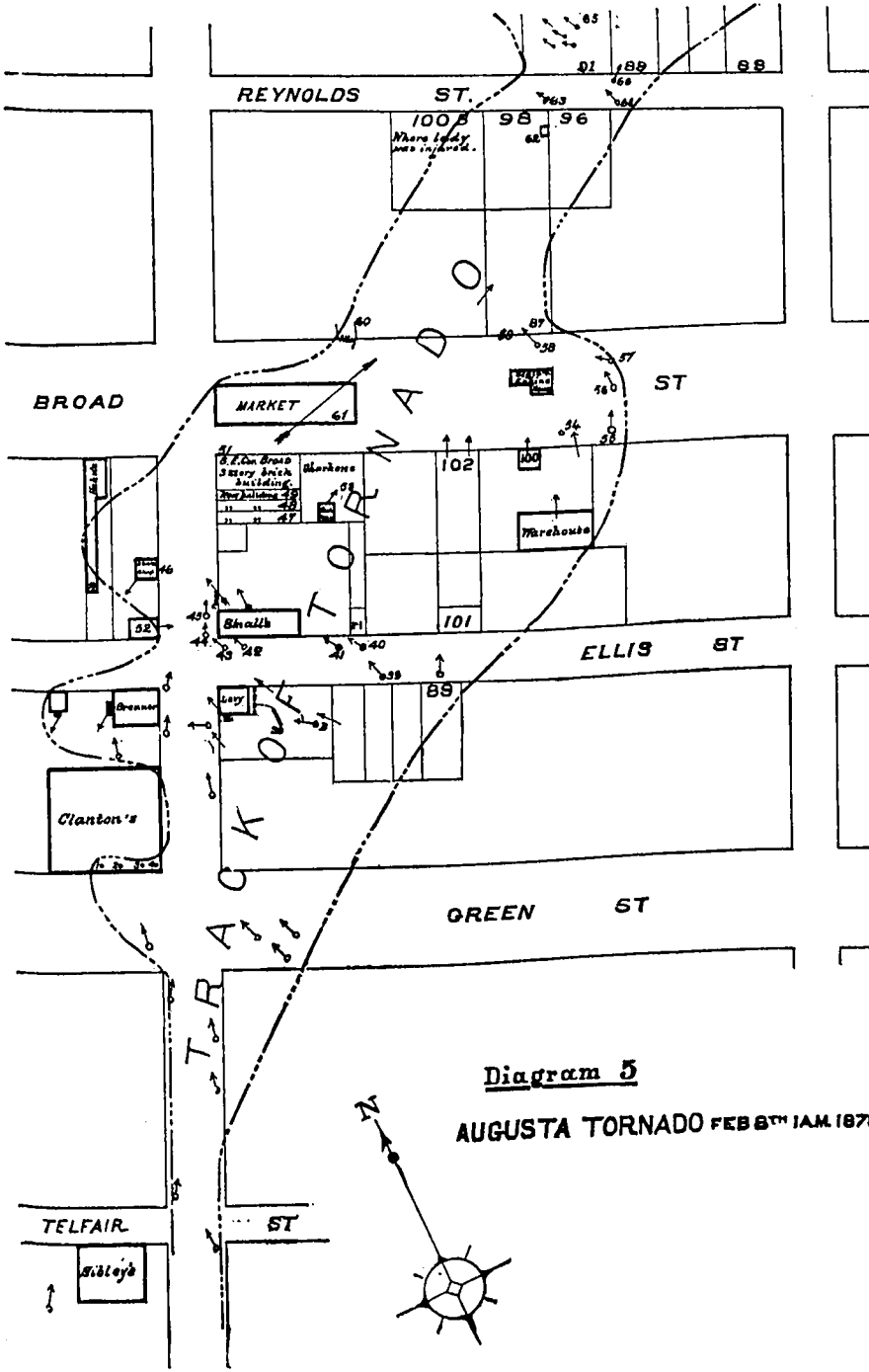



Diagram 5

AUGUSTA TORNADO FEB 8TH 1AM. 1878

The best examples furnished by the Augusta tornado of the force and velocity of wind in the whirl was at Hahn's. Here a portion of gable of the bake-house, containing about 200 bricks and weighing 1,250 pounds, which presented 8.34 square feet surface to the perpendicular wind and 3¾ square feet to the horizontal was carried 150 feet to SSE. This gives hourly velocities of 150 miles to the perpendicular and 320 miles to the horizontal.

At Levy's a plank 12 inches wide, 1 inch thick, and 7 feet long, estimated to weigh 45 pounds, was carried 24 feet to WNW. and driven through a piazza post (wooden) in a straight line 2½ feet above the position formerly occupied. Any calculation I make of the force required to do this is above 600 miles per hour. This I judge to be entirely too high; but when you remember that the gable at Hahn's was laid on a roof at the same height that it was originally, and that neither roof nor piece of gable was broken, it will appear that these were just sufficientto have done that, and fully enough to have effected all other damage done.

In the 8 p. m. tornado the mean of all the calculations made gave a mean of 310 miles per hour, these calculations being made on the basis of the weight and surface presented by the bodies to the horizontal wind.

No facts were observed that could not be accounted for on the supposition of the objects having been whirled with the whirl of the tornado and carried less, generally, than half a mile high.

I saw nothing that was carried farther beyond the path of the tornado than the piece of scantling marked 31 and the roofing-tin marked 68, which were about 300 feet. The former showed no signs of bruising, but the latter did; the former was laid in a tree, and toward the NNE., and the latter on the ground.

There are no trees stripped of their bark entirely, and none in which the stripping would not have been effected by the wrenching off of their tops and limbs without the exhibition of any other force.

In answer to the question, did houses explode outward, I point to the description of damage done to the upper walls of houses marked 98 Reynolds street, 100 and 102 Broad street, and 52 on the corner of Centre street. I can account for the peculiarities there in no other way, and that theory does not satisfactorily do so. I could find no one who had observed the formation of the tornadoes; but all agree that in the neighborhood of McBean and Briar Creeks it had been a cloudy, dark day, with frequent drizzling rains, which became very infrequent in the section south of Butler's Creek, and which did not occur north of that until near sunset. Through the whole course of both tornadoes heavy rains began on an average of 35 minutes before the large hail, which is described as about the size of black walnuts (that is, 1½ inches in diameter), and that the hail preceded the tornadoes and lasted 15 minutes.

They describe the lightning as having been remarkably vivid and incessant, the thunder deafening, and the noise of the approaching tornado like that of a train of cars. All agree that the tornadoes were followed in 35, or less, minutes by clear, starlighted, beautiful weather and the remarkably noticeable scent peculiar to pine trees. This clear, calm weather seems to have been general, and to (just after the extremely heavy rain that accompanied the end of the tornado and its center) have began as though the S. ending of the tornado-clouds had been more sharply defined than is usual with storms.

The tornadoes crossed water frequently in their courses, but I found no evidences of water-spouts; from the statements of those citizens near their tracks, it can be safely admitted, however, that the rainfall in such places was heavier than it had been before reaching them.

For 5 miles on each side of the tracks the wind is described as very strong; how much farther this condition extended I do not feel justified in stating, for the records of the wind on the anemometer sheets show the maximum to have been only 18 miles; and the station was only three blocks west of the Augusta tornado, and the anemometer working perfectly.

Of the fact of there having been nothing but in-blowing winds there can be no question. A few persons were impressed with the fact that a thunder-storm threatened them, but there was not a single one that expected anything more severe.

The duration of the tornado is so variously estimated by those near its track that I judge it best only to give the answers of those most capable to do so reliably. Mr. Morse, at Hargrave's plantation, states that from the time that he was able to distinguish the noise of falling trees at Brooks's house until it had reached and began devastation at Wright's was not more than a minute. Mr. Greiner says it had passed his plantation before he had realized what it was. Mr. Tarver, and all those in this city who remarked the noise of the Augusta tornado, say, in substance, that when they had noticed the noise they stopped, listening only a moment before it reached them.

The actual width of belt affected by the tornadoes are shown at both their widest and narrowest parts on the diagrams, and are from 25 or 30 feet to one-third of a mile at Sego's, at two different points, one on each path. They told me of having had "light-wood chunks"—which are the roots and knots of the yellow-pine trees—in the fire-

place, and of their having been whirled around in the chimney and hearth. At one of the places—Brown's, just S. of Augusta—they were laid in the floor, the marked places shown me being three feet to NE. of the hearth. The example at Saunders's, just S. of Buck Pond, differed in their being carried up the chimney and into the field to the NW. Careful and persistent questioning revealed, beyond the shadow of a doubt, that these "chunks" laid in the direction of from N. through E., then S., and then W.

I was told by the darkies of globes of red fire and similar things, which I have not enough faith in to report.

The beginning of the tornado of the 7th was in woods. It is impossible to get the time, there being no houses or dwellers there. Mr. Greiner states, and, I judge, reliably, that the thunder, lightning, and heavy rain began at 6.30 p. m., and that the tornado struck his house at 7 p. m. Mr. William Sego and Mr. Morse are just as reliable, and give the time of beginning at the fence and three trees (marked B) at Mr. Sego's as 7.30 p. m. Mr. Nelson reports the passing his house of a severe rain, hail, and thunder storm at 8 p. m.; that the rain began moderately heavy, was followed in fifteen minutes by large hail which lasted two minutes, and says that the hail was followed by rain, which poured down intensely for a quarter of an hour. This gives this tornado a velocity of 18 miles per hour.

The beginning of the Augusta tornado is open to some doubt. Mr. Crawford gives it as about 11 p. m., and Mr. Melton and Mr. Noah Tarver as 12.30 a. m. This latter time is corroborated by so many other persons that I feel justified in thinking it correct. Of its passage through this city at 1 a. m. there can be no doubt. This gives the Augusta tornado a velocity of 20 miles per hour. This velocity was maintained through its whole course, as proven by the comparison of the times that it struck different portions of the city.

My residence is less than half a mile east of the path through this city, and I am easily awakened; but neither I nor any of my neighbors heard it, or knew of its passage until the next morning.

Very respectfully, your obedient servant,

HUGH R. STOCKMAN,
*Private, Signal Corps, U. S. A.*

The CHIEF SIGNAL-OFFICER, U. S. A.,
*Washington, D. C.*

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PAPER 43.

## NOTES ON THE WALLINGFORD TORNADO OF AUGUST 9, 1878, TO ACCOMPANY MAPS A AND B, BY W. A. GLASSFORD, SERGEANT SIGNAL CORPS, U. S. A.

The meteor known as the Wallingford tornado was by no means confined to the village of Wallingford, but a long strip of country extending nearly the entire length of Connecticut felt the effect of the disturbance, which here developed such great energy. The first appearance seems to have been at South Kent; the last near Watch Hill, on the Sound. Wallingford occupies a place about midway between these places, but whether or not the track of the tornado observed at other points is a continuation of the Wallingford track, I have been unable to verify by observation, but am inclined to think, from accounts given and study of positions upon the map, a zone favorable to the formation of tornadoes existed, and that the occasional appearance of these meteors was within this zone and in the same or parallel to each other's tracks. Appearing first near South Kent, here striking near the summit of a hill, its movements are said to have been a little south of east forward to Kent Mountain and over it; thence passing into the valley south of New Preston. Near this place, 30 miles northwesterly from Wallingford, the tornado followed a narrow track about 40 rods long and 20 feet wide, being in the head of the valley about one-fourth of a mile south of the village; houses and barns were blown down and unroofed; many very large trees torn up by the roots. In one instance the great power of the wind at this place is illustrated by the carrying of a large oak tree so far that its place of growth cannot be found; persons witnessing it said that two currents of air appeared to unite at this point, where the valley grew narrow. Rain fell in torrents, and the thunder rolled continually, and the lightning was terrific. Next it appears to the north, resuming its original course, crossing the Shepaug River and Railroad passing about 3 miles, it rose from a deep valley, and no other trace is found in this district. Continuing over the land, no traces are known till Waterbury is reached, 15 miles northwesterly from Wallingford; to the west of Waterbury about 2 miles one roof was taken off and limbs of trees broken occasionally; in the village chimneys were toppled over and a very strong wind existed.

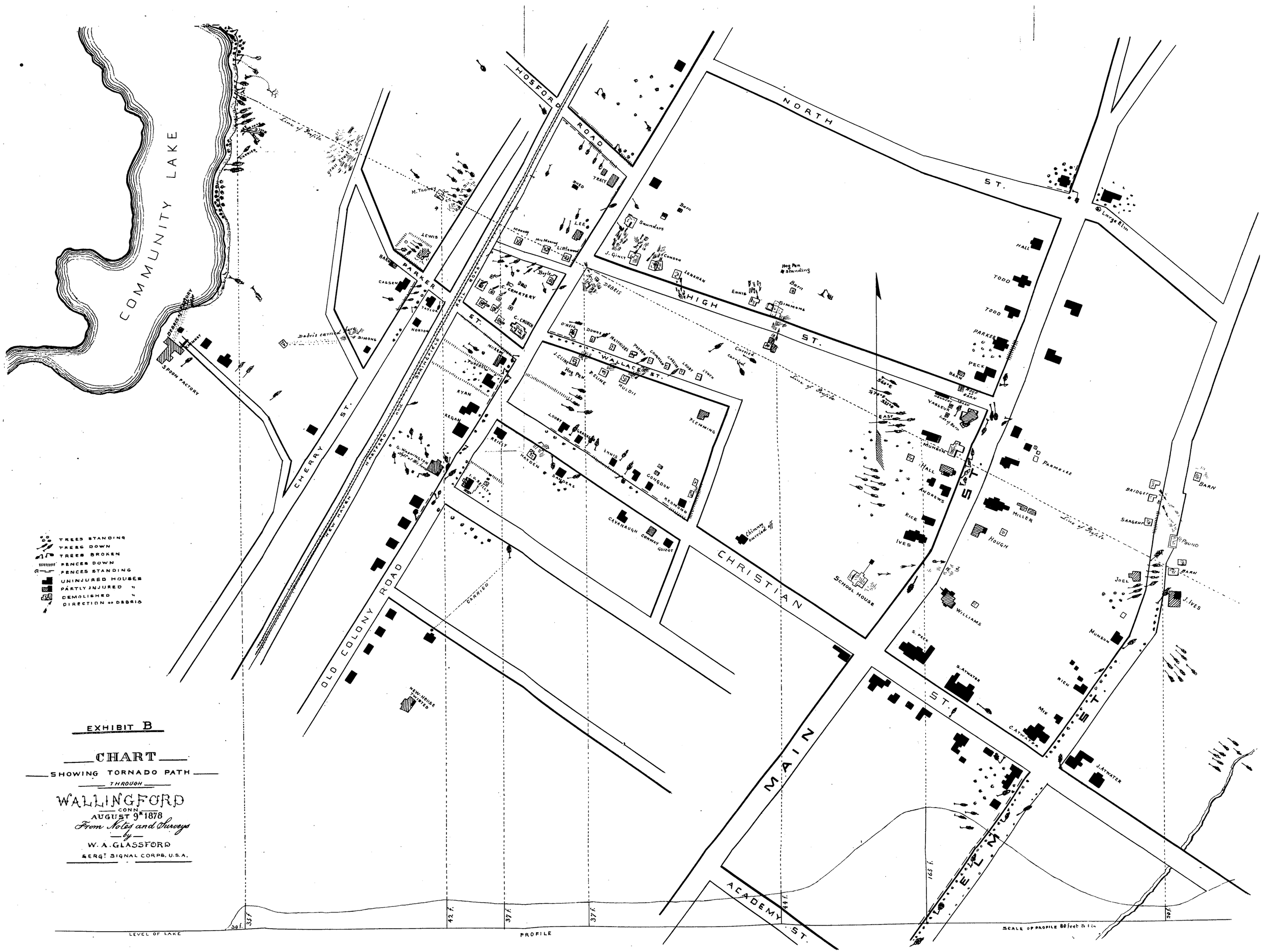


EXHIBIT B
CHART
SHOWING TORNADO PATH
THROUGH
WALLINGFORD
CONN
AUGUST 9th 1878
From Notes and Surveys
by
W. A. GLASSFORD
SERGT SIGNAL CORPS, U.S.A.
TREES STANDING
TREES DOWN
TREES BROKEN
FENCES DOWN
FENCES STANDING
UNINJURED HOUSES
PARTLY INJURED "
DEMOLISHED "
DIRECTION OF DEBRIS
COMMUNITY LAKE
HOSFORD ROAD
NORTH ST.
HIGH ST.
WALLACE ST.
CHERRY ST.
OLD COLONY ROAD
CHRISTIAN ST.
MAIN ST.
ACADEMY ST.
ELM ST.
PARKER ST.
SPOON FACTORY
SCHOOL HOUSE
LEVEL OF LAKE
PROFILE
SCALE OF PROFILE 80 feet to 1 in.

A very intelligent observer describes one cloud of great size and very high, black, and rolling in immense folds, with scud moving in four directions in as many strata and around the cloud, showing different direction of currents at varying heights. At Cheshire, about 6 miles from Wallingford, a similar cloud is described to have passed overhead, attended by a very heavy surface wind. Some little damage was done. A mile onward in its course, near the Cheshire Copper Mines, I observed an orchard prostrated, but no particular evidences of whirlwind action, the trees being thrown forward; next, passing over a range of hills, the storm passed down the valley toward Wallingford, to burst on that beautiful village with all the horrors that accompany the most of these unwarned visitants of nature. Passing over this spot at present we pursue its course beyond through the towns (townships) of Durham and Killingworth, where some of its violent nature was shown in its sweep for over a mile between two mountains; here some houses and barns were wrecked and a grove of large chestnut trees swept down. At Killingworth the same thing was repeated, by unroofing houses, blowing down barns, and damaging orchards. The effect of the tornado was also felt at North Guilford and North Madison. From this point the meteor took an aerial flight till reaching the sound off Watch Hill, where the steamer Franconia encountered it. In this aerial course the storm could be traced over Essex, and persons near the cloud describe it as being greatly agitated; a great roaring noise was heard some distance, but no effect upon the surface. The time of its visitation at these places is very indefinitely given, but the earliest developments took place in Western Connecticut, successively visiting the places lying in its course to the southeast; it passed over Wallingford a few minutes past six o'clock in the evening and struck the steamer Franconia before 8 p. m. The points of visitation are shown upon the accompanying plan of the State on Exhibit A.

The village of Wallingford lies upon the sloping hill-side near and within the valley of the Quinipiac River. The valley extends nearly north and south, skirted upon the west by somewhat precipitous and high hills, of which Mount Tom (also known as Mount Lamentation) is immediately to the west. A bend in the valley to the northwest occurs just north of this mountain, and there is a gap between it and other hills to the southwest of Wallingford. After crossing over the ridge the tornado followed the valley, hugging the hills, and met, over a mill-pond or lake, another storm coming from the southwest. All who saw the tornado say there was a meeting of two clouds over Community Lake, at the base of Mount Tom, and to the northwest of the village. The cloud coming from the northwest is described as very black and threatening, while the other was of less importance. Previous to the tornado the wind was from the southwest and gentle, with a heavy bank of dark clouds to the north, accompanied by heavy thunder and lightning. It was expected this storm would go to the north, as others had done; but the wind, about 5.30 p. m., shifted to the west and increased in force, then followed by light showers of rain and a gale of wind driving a scud-cloud at a very rapid rate; but the gale at the surface lasted a very short time, after which it rained quite hard, but no hail. Where the clouds came in contact a whirl was observed, and some say a water-spout; others dispute this. However, there must have been spray lifted from the lake, doubtless having the appearance of a water-spout. I saw no evidence of fish, or any great quantity of water taken from the lake; only the occasional appearance of houses spattered with mud, which, when examined, has no appearance of having come entirely from the lake, or even from the ground, although fish were reported. Of the many factories here but one was struck, that being the spoon-shop of Mr. George Grasser, which was badly damaged, apparently by a minor tornado or gust to the southwest of the main track. This seems the first building touched; its roof was carried over a barn and garden and landed on the edge of the lake. The barn over which it was carried, though old and not firm, was just slightly moved from its foundations. A windmill near by was carried away. These effects might be accounted for by a polar current coming down the valley over the lake, the topography of which was favorable for its wedging itself under the warmer opposing current, which, at this juncture, reached forward to fill the higher displaced space of cold current, thus taking the shop roof and elevating it above the barn and barely touching it. Probably the formation of the whirl took place at this inrush of air, the configuration of the ground playing a part in the direction of the currents. But it was not till the meteor had ascended the lake bluff and passed near the railroad that the serious work of destruction commenced. Upon the bluff incline were trees thinly scattered; some thrown down, others broken off. The trees escaping were mostly small oaks, which easily bent to the blast; others that would not yield were, in many cases, pulled up by the roots, and in some instances dragged many feet upward on the bank and plowing it. Here seems the most positive evidence of the lifting effect of the meteor. Very few instances are found of the crossing of prostrated trees; one occurs here near the center of the track. After leaving the bank a bare tract occurs, upon which was nothing but the flexile grass to show the tornado path; hence an absence of any marks here occurs. Corn near the railroad track only showed a forward inclination. Considerably south of the track, toward the spoon factory,

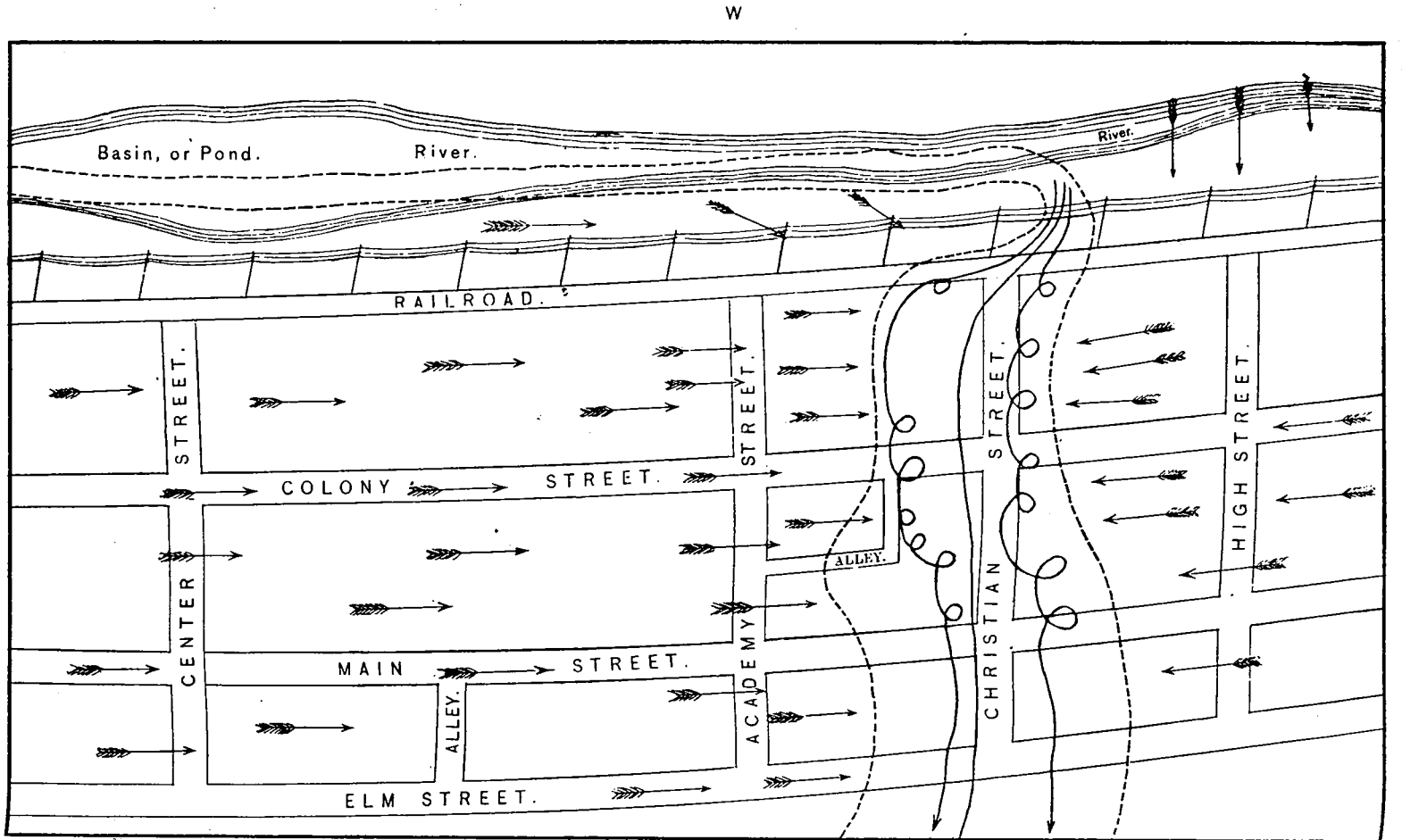
was a shell of a house, whose frame and all its parts were lifted up and carried some distance by a southerly indraught.

At the depot the wind was sufficiently strong to overturn a wagon; Michael Toohey's house was utterly demolished, Mrs. Toohey being carried about 700 feet to the eastward beyond the railroad track; her mutilated remains were found cut by telegraph lines. This house was near the center of the vortex, the *débris* being carried forward and promiscuously distributed. The trees shown near the spot were bent forward as illustrated, and the bark perforated with sand and gravel, making the tree look scorched; the limbs were chafed and broken, and the stems of the leaves only remaining; but this occurred on the upper part of the prostrated trees only. The Catholic church and cemetery were a little south of the vortex center, and the monuments thrown generally northeast, the heaviest weighing about 1,875 pounds, which, with cap and statue, would weigh at least a ton. These monuments were not broken, but seemed partially lifted from their pedestals and dropped upon their sides; at least the force against them was sufficient to throw them clear without chipping corners or otherwise showing contact with the bases upon which they rested; in other words, they seem thrown a little distance by a tremendous laterally-exerted force. Head-stones were laid flat and some broken, probably by flying missiles; not a single timber of the church remained standing; the wind's force was exerted from the southwesterly, and moved the foundation, timbers, and floor forward, the whole having the appearance of a heap of rubbish. A boy walking upon the railroad track was carried 400 feet, dashed against a house, and killed.

Other indraughts to the right of the track occurred at Old Colony street and upon the plain, the latter reaching a long distance, and moving a newly-built house from its foundations. This is undoubtedly the same current that overthrew the wagon at the depot. The indraught reaching down Old Colony street was severe enough to take large elm trees and wrench them off at some distance from the ground. Along this street, where the roots of trees were strong and well planted, the limbs only were affected, the appearance being that the force was exerted some feet above the surface. The Lewis House, just south of the track, was moved from its foundation, apparently bent, and dragged by a force exerted at the top of the building. "Wallace's Row" was so thoroughly destroyed that only thickly-spread *débris* showed the place where the houses once stood. These houses could not have much escaped the center, as the houses became heaps and were thrown northeasterly.

Upon the corner of Old Colony and High streets was dropped *debris* that was carried from the three houses to the west, and some in this pile was recognized as part of Michael Toohey's house, which I believe correct, as Mrs. Toohey was carried near this point. The trees I have shown north of the track as prostrated cannot be considered as strong or hard to throw down, as they were fruit trees in mellow earth, and their roots not deep enough to withstand much force. Tracy's house was not damaged other than having part of its roof on the east side torn off. The Saunders house was totally demolished, moved to southerly and twisted, *débris* scattered toward High street, and one side of the house carried 107 feet. The houses of Ginly and Condon were badly demolished; their *debris* carried northeasterly; the Ginly house moved about 10 feet and twisted to the left; battered by mud and missiles on south and east side. The east side of the Condon house burst outward and moved to the northeast. Fowls were observed here half plucked, as also near the cemetery. The house of Mr. Simmons is probably the most curious of all; it moved from its foundation to the northeast, then seems to have burst outward, its walls lying flat upon the ground, as if having been turned upon hinges at their lower edge; the roof and other *debris* from within was carried northeasterly only a short distance; partitions within the building were twisted, but remained standing. Near by stood a barn that a man saw carried, as he describes, "bodily away." No parts have since been recognized. The tree shown in Exhibit B, near this, was small, and probably is useful to show the directive force of the wind. Near the barn a hog-pen was left untouched. Upon the opposite side of the street a house was twisted, and its north and east sides thrown outward, with roof and *débris* laid across High street to the northward. Only a few fences and small bushes exist in the hill ascent, till the orchard is reached, near Main street, close to the rear of houses fronting on that street. The orchard was mostly swept down, but the direction of the trees was generally forward, the variation in their direction not sufficiently distinct to allow examination to the soft earth in which they were planted and the shape of top or roots; the fact that some trees remained unhurt, shows that the tornado abated its violence somewhat. No vortex center can be distinctly traced upon the brow of the hill, as shown on Exhibit B; the swath of tornado effect upon Main street is shown quite wide, with intervals where little damage was done. At the Rice place the chimneys were not even toppled over, whereas most disastrous results occur on either side; in the common phrase, it seems to have divided into two parts.

At the corner of High and Main streets, at the residence of Samuel Peck, no damage was done to his house except the loss of his chimneys, but his barn roof was laid in the street, and Mr. Peck says he saw the whirlwind strike his barn, which seemed to




*Track of Tornado through Village of Wallingford, Conn., August 9, 1878.*

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send the whirlwind up, and to each side of the house, breaking on the north and south sides only, but again uniting east of the house, and there twisting trees and throwing down the fence. Immediately opposite on High street, Mr. Vasseur's house was terribly wrecked, the balcony blown away, the house lifted, and the parlor-floor arched upward. The wind broke in at the west window and carried some partitions; a plank was dashed through the side of the house; the house was moved as it were on a pivot at the southwest corner about six feet to the southeast. Upon the three chimneys of the house were flagstone slabs; one of each was carried in the three directions, west, east, and south. The appearances at this house show decided evidence of the existence of a whirl, and also that the force must have been exerted at a few feet distance from the ground, as a chicken-coop about 8 feet high was not in the least injured. The barn owned by this gentleman was carried about 80 feet and then reduced to fragments, the south side of which was carried probably 100 feet farther, and the roof landed on the opposite side of the street near Mr. Hough's house. In the rear of Mr. Vasseur's house, a tree was uprooted and carried north, while trees in the street were thrown southerly. I was told that fish were found in the back yards of the Vasseur and Munson houses and that they were covered with mud. I failed to interview the party seeing this and verify by his own words the truth of the statement.

Mr. Munson's house probably suffered more than any other on this street. This gentleman says that upon going to his back door he saw Mr. Hall's barn flying toward him from the southwest, followed by Mr. Vasseur's barn from the north. The house seemed pushed over apparently by a force at the top, leaving the upper story most whole, while the timbers of the lower part were broken and terribly shattered; the house was moved diagonally across the foundation and probably lifted, and then set down with a crash, parting the second story and landing it on the sidewalk. On the west side of Main street the house of Mr. Hall was shattered, yet the house of Mr. Andrews, very near, escaped with the loss of the west windows.

The school-house, a large brick building some distance outside of the center of the track, was very badly damaged, the upper portions swept away and distributed to the northeast; while the upper portions suffered so much, the lower story was but little damaged, the windows even on the west side but little broken; the indraught from the southwest that carried away the *débris* seems to have exerted its force at some height as here shown.

Upon the east side of Main street considerable loss was sustained by unroofing houses and the twisting of trees, but the great violence seems to have suspended action till the descent of the hill to Elm street; on this street, which is on the eastern declivity of the hill, large elm trees were stripped or torn up. One elm tree was broken off above the ground about 9 or 10 feet, measuring 9 feet in circumferance; the trees between Christian and Academy streets generally lie from north 25 to 40 degrees east. A very large tree here prostrated measures 10 feet in circumference at 4 feet from the ground; breadth of roots 20 feet, with earth on roots to same width. I regard this elm tree phenomena as a most distinguishing feature of the southerly indraughts. The center of tornado track in its passage over Elm street was most violent and seems to have been near the "Sargent" house; this house, and those on the north and on the opposite side of the street, were shattered in the most remarkable manner, and scattered in the utmost confusion; the parts of the houses mixed together in such a manner that it was impossible to distinguish the parts of one house from the other. This phenomena would certainly establish the fact of a whirl existing here, and so confusing the objects in its way. Besides the features of the locality spoken of in the "Journal abstract," of August 10, but little can be added, except the Joel house, which is there described as battered with mud and bombarded with missiles; within the house the dust permeated everywhere and blinded the inmates; the dishes were so covered that not a spot free from dust could be found.

These notes cover the portion of the tornado track shown on Exhibit B. Further than this my time would not allow me to more than hastily pass over, but I observed that the track does not continue in a direct line after leaving Elm street, but shifts to the north and continues with fully the violence as at any point I have described.

Respectfully submitted.

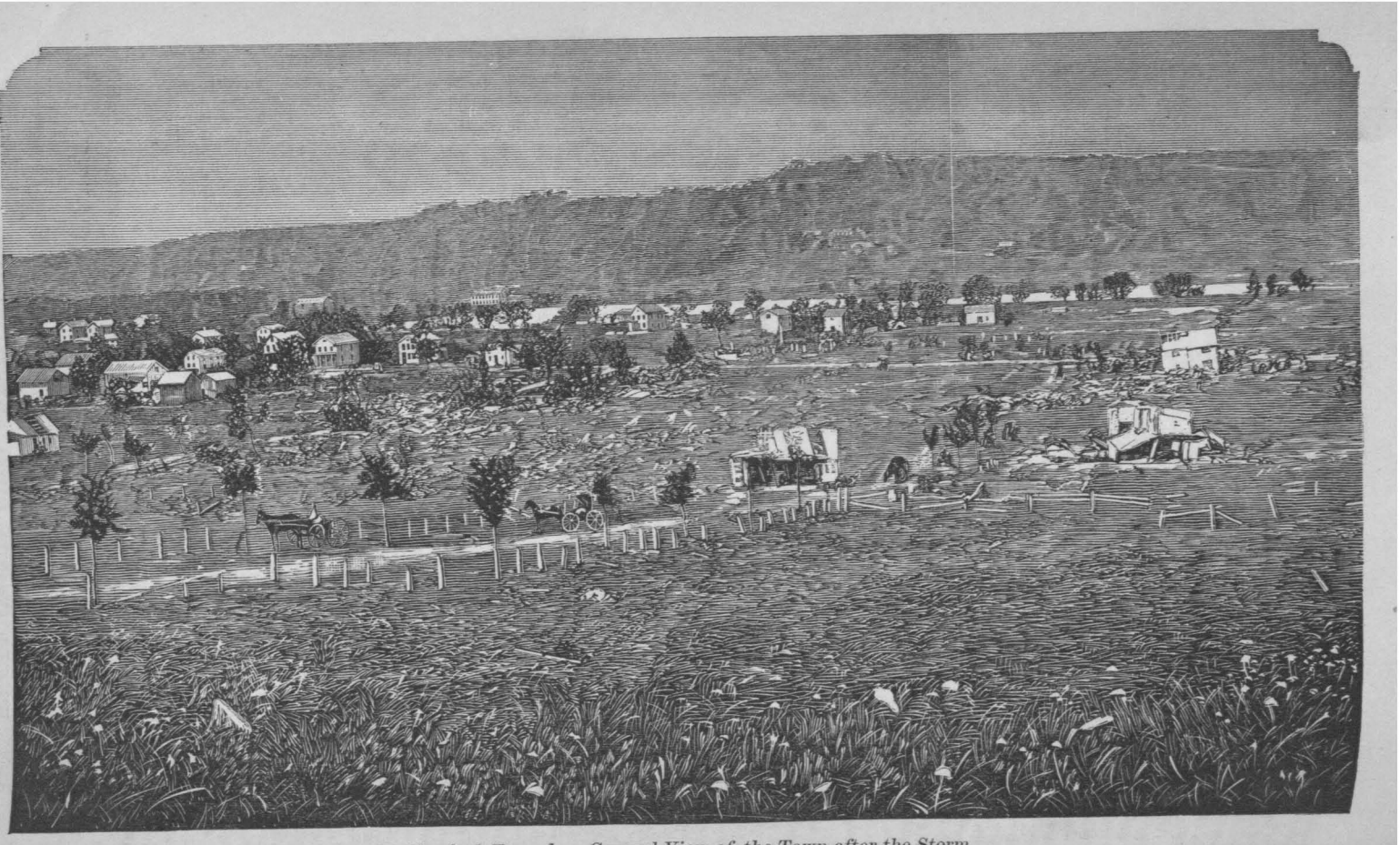
W. A. GLASSFORD,
*Sergeant Signal Corps, U. S. A.*

PAPER 44.

## REPORT OF TORNADO AT WALLINGFORD, CONN., AUGUST 9, 1878, BY I. A. REED, SERGEANT SIGNAL CORPS, U. S. A.

From all the data that I could obtain from eye-witnesses of the tornado, in it, and near it, and on both sides of it, I conclude as follows: That a cumulus-stratus cloud, extending around the horizon from northeast to north, with apparently slender peaks extending above the cloud and stretching from one end of it to the other, the highest peak appearing to be 10 to 15 degrees, the others averaging 8 to 10 degrees in height, was first observed to begin forming during the p. m. northeast of the village of Wallingford, apparently near Meriden. Near the eastern extremity of this cloud a ray of light appeared that brought into view, by this peak, a small detached cloud. As the cumulus-stratus appeared to move the small one would move also, but at its assumed distance. When the dark cloud, as it had now become, reached west peak of Mount Lamentation, about 4½ miles north of the village of Wallingford, the ray of light disappeared and the cloud itself appeared to suddenly turn bottom side up and grow black and blacker in color. Electricity of the most terrific and intense kind began to fill the air. No zigzag flashes of lightning were seen as in ordinary thunder-storms, but straight rods of fire came down from the sides of the cloud to the earth. Peal after peal of distant heavy thunder, in quick succession, was now distinctly heard. About 5.45 p. m., from the several manufactories, the employés began to go to their respective homes. The dark cloud was now getting closer to the village and hung low, heavy, and compact, confining itself to the width of the river. About 6 p. m. it reached the basin or pond of water, and was met by another dark cloud that had suddenly and unexpectedly come in sight from the southwest, and that had not been observed until a short time before its junction with the dark cloud from the north. The meeting of the two clouds occurred about one-eighth of a mile above the spoon manufactory buildings of Wallingford Community and over the pond or basin of water. About the time the southwest cloud reached the spoon manufactory buildings a white scud appeared in front of it that appeared to move from right to left and around the cloud. At the moment or about the time the two clouds joined with each other the water of the basin or pond became very agitated and disturbed and a volume of water, about as much as a barrel would contain, arose in a cylindrical shape and suddenly connected itself with an inverted cone-shaped cloud that now hung down from and that was attached to the dark cloud. The violent, rapidly-revolving, whirling motion of the inverted cone-shape portion of the cloud very soon caused it to assume a funnel shape, that, as the dark cloud went forward in a northeast direction, went spinning around and around like a top would do. The cloud possessed a most intense black appearance. Several small dark gray colored clouds were observed revolving around the sides of the funnel-shape portion of the dark cloud, the point of the funnel appearing to be below them. Some persons thought that they observed curls of whitish steam issue from the cloud as is sometimes seen to issue from the stack of a locomotive engine; that streams of muddish water would at times appear to spurt out from the funnel-shaped cloud. An observer on the front and south side of the track of the tornado said to me that as the dark cloud moved across the plains from west to east it appeared as if it possessed on its top three layers of scud cloud that appeared to extend about a quarter of a mile from a southwest direction to an easterly one, and that these layers of this scud cloud appeared to possess numerous small rounded clouds that were apparently struggling and twisting and tussling with each other.

The first damage done by the tornado was at the eastern edge of the pond or basin of water, and was the complete destruction of Grasser's building, a small shop one and a half story, 22 feet front, 25 feet long, and 28 feet high—spoon manufactory—loss about $600 to $800. A small barn belonging to Mr. Palmer Foster was moved by the wind northeast about 4 feet from its foundation; a few apple trees uprooted in Mr. Foster's yard. Mr. Foster had just returned home, and was at his barn unhitching his horse from a light lumber wagon, when, by the force of the wind, the man, horse, and wagon were thrown down the bank of the pond 30 feet. The apple trees that were uprooted in Mr. F.'s yard were lying towards the northeast. About an eighth of a mile above the junction of the two clouds, the direction of the dark cloud is almost due east. Why it is that the direction of the path of the destroyer was changed from NE. to E. I cannot say, unless it was that the circular motion of the northern side of the dark cloud was greater than it was on the southern side. Soon after the change of direction the path of the destroyer is plainly visible, striking first the house of Mr. Mooney, where so many persons lost their lives; then a short distance as you go east, on the north side, are a few houses that were destroyed and where several persons were killed; and on the south side the Catholic church, a one and a half story building 75 feet front by 100 feet in length, was destroyed, completely demolished, and the monuments and marble slabs in the cemetery broken off and flattened to the ground. A short distance east of the Catholic church stood a row of nine houses connected and



*Wallingford Tornado. General View of the Town after the Storm.*

disconnected, known as Wallace's row. Here it was in the narrow limits of 35 acres that so many persons lost their lives, and so many others were wounded, and twelve houses completely destroyed.

Passing on east from this sad spectacle of ruin and desolation, we come to the up-rooted apple trees of the once fine orchard in the immediate rear of Mr. Hermann Vasseur's and John Munson's. The apple trees, as well as all other trees, are lying in an easterly direction. After passing through the orchard grounds to the residence of Mr. Hermann Vasseur, the spot is reached where once stood the two and a half story residence of Mr. John Munson, on Main street. Here, in the space of 250 feet wide by 125 feet deep, there seems to have been at least two small whirlwinds, each of about 50 feet in diameter. East of Main street, 750 feet, the tornado's fury appears to be somewhat withheld; the trees that are uprooted are lying in an easterly direction. On the west side of Elm street a few houses are destroyed; evidence of more whirlwinds appear here. Easterly of Elm street the tornado seems to have spread out; on leaving the ground passed off east a few degrees to the south. The trees on the northern side of the track of the tornado are lying to the south; on the southern side they are lying to the north. On Elm street large elm trees 4 and 5 feet in diameter are uprooted and are lying to the north.

It was very difficult for me to obtain approximatingly correct dimensions of the dark cloud that marked the track of the tornado; but, from the information I could get, I place the dimensions of the cloud at 75 to 100 yards wide and from 500 to 800 feet high. Elbridge Doolittle says that it moved so rapidly that it was almost impossible for him to tell the dimensions of the cloud. It passed through the air over the village with a rolling motion and with such a rumbling, roaring noise that it was startling to witness such a sight.

Mrs. William M. Foster stated to me that as the dark cloud passed over her residence it seemed to envelope them in a mist or fog; spattering sand against the blinds; she could not state its dimensions. Thinks that it was about three minutes in passing. When the roaring noise ceased, the rain set in. The house in which she resides is situated immediately upon the pond. Mrs. Samuel D. Bidwell, who lives in the adjoining house to Mrs. William M. Foster, said to me "that she was in the kitchen with her two grand-children, respectively two and four years of age, ready for and waiting tea for Mr. Foster, her son-in-law, when, about 6 p. m., the tornado-cloud struck their house, and simultaneously came rain and sand against the blinds. It did not occur to her that the house would fall. The damage the house sustained was the loss of a few tops off of the chimneys. In the yard one or two apple-trees were blown down. Did not see any hail. She could not say what were the dimensions of the dark cloud; it seemed to be close down to the ground; it was misty or foggy; did not last beyond two or three minutes."

Dr. Harrison, whose house is about 175 or 200 yards on the south side of the center of the track of the tornado, on Main street, said to me that he was about taking tea with his family when he heard a great noise, as the rumbling of a wagon over cobble-stones—crashing, crushing, roaring noise, as the waters of the Niagara going over the falls. It was very dark; black as night. He looked out and saw the maple-tree tops breaking off and falling. Could not state the dimensions of the dark cloud; did not have a good view of it. Saw no hail. After the dark cloud left the river and entered the plains I am inclined to believe, from evidences of the width of spots of destruction along the track of the tornado, that the cloud contracted and widened alternately, as in the vicinity of the Catholic church the area of destruction is greater than farther up the hill. Mr. Vassner's and Mr. Munson's, on Main street, the path of destruction is narrower than it is at Elm street, where the tornado left the earth. The length of the path of destruction is about 1¼ to 1½ miles; its width varies from 425 to 450 yards; the center of the track of the tornado from 75 to 90 yards. On each side of the track of the tornado, from 150 to 175 yards from the center to the edge on each side, houses were blown down, trees uprooted, and chimney-tops blown off. The general direction of the tornado was from west to east, nearly a due course; from the time it appeared on the plains, in rear almost of the Catholic church, from where the two clouds joined over the pond to where it entered on the plains, its course was from southwest to northeast. After leaving its eastern boundary line on the east side of Elm street, its course was east a few degrees south, on through Durham, on through to the coast of the Atlantic Ocean.

In a few instances only in the path of destruction where the greatest force of wind was displayed were the houses moved and left standing in a good condition or slightly damaged. I name Mr. Wm. M. Foster's barn, a small one and one-half story house, 18 feet front on the lake, 16 feet high, and 20 feet in length, and weighs about 9,000 pounds. Mr. H. Vassner's house, two and one-half stories high, 35 feet high, 30 feet wide, and 38 feet front on Main street; weighs about 50,000 pounds. It is a well-built house, heavy hewn timbers, substantially erected, moved 3 feet from its foundation on three sides. Other houses that were moved, and not completely destroyed, were Mr. McGinty's, about 32 feet high, 25 feet wide, and 35 feet long, weighs about

30,000 pounds; Mr. L. Gutte's, about 20 feet wide, 25 feet high, and 23 feet in length, weight about 20,000 pounds, were moved respectively 10 and 24 feet. From these I had to measure the square yards of surface presented to the mind, estimating the weight of the houses. The instances given were in the direct center of the track of the tornado and in the edges of the whirls, and may be an overestimate of the wind's velocity; yet from what I observed I must believe that the wind's force at certain places, viz, Grasser's building, on the pond, at the Catholic church; Wallace's row, McGinty's and Gutte's, and at Mr. Munson's and Mr. Vassner's must have been 150 miles per hour. Pieces of timber and scantling were imbedded in apple trees so far, fully 6 or 7 inches deep, that in my efforts to pull them out they were broken off. A sharp-pointed piece of scantling 8 feet long, from 1½ to 4 inches wide, ½ inch thick, I pulled out of the ground at the foot of Mr. Munson's hill, in rear of his orchard, where it was bedded quite 2½ feet deep in the earth.

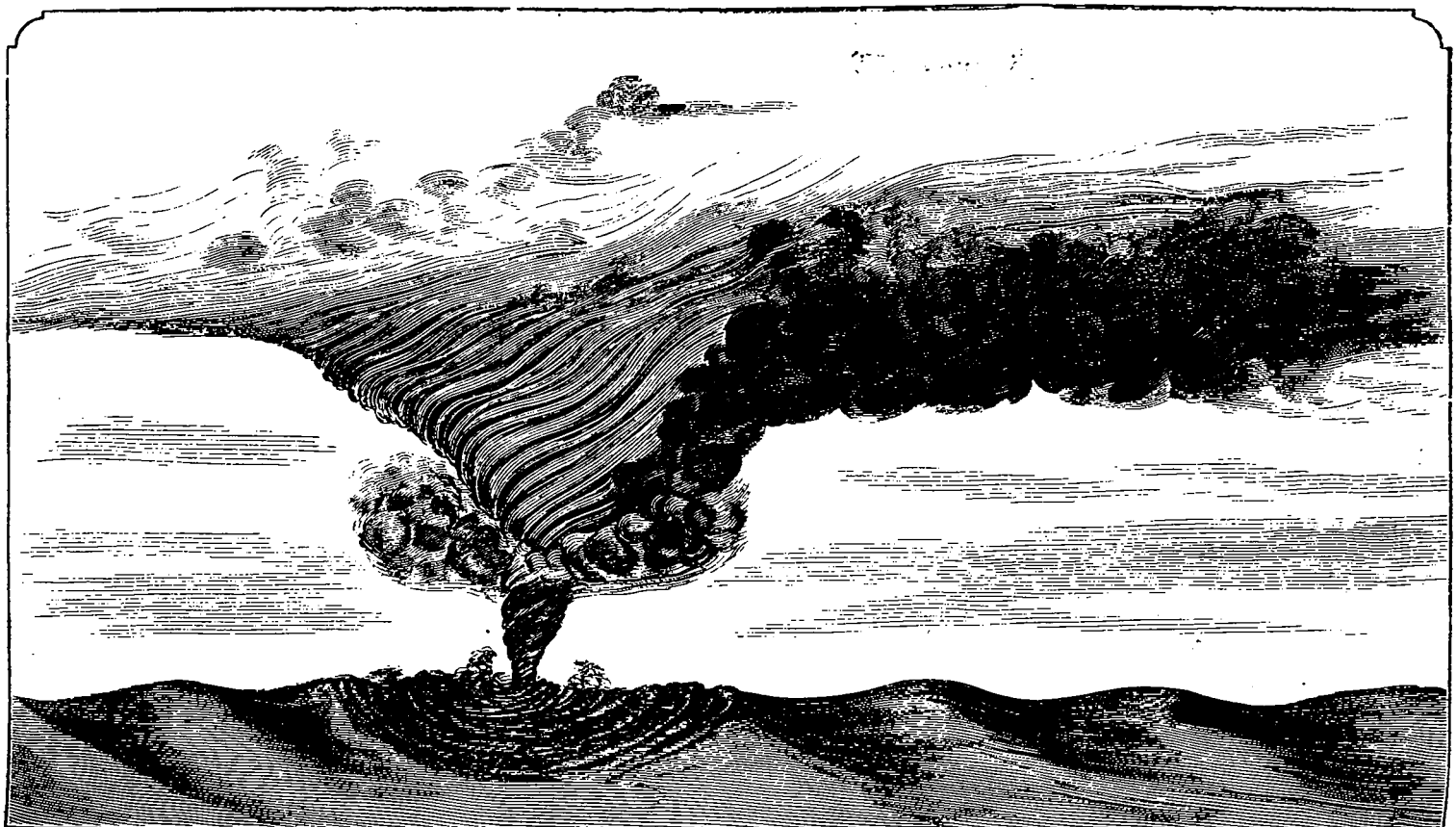
Taking the statements of those who observed the dark cloud from the time the two clouds met and joined over the pond, and who watched its passage, and the length of time that it occupied in passage over the village, the dimensions above given are not very far out of the way. The length of the track of the tornado at 1½ miles; 2½ minutes in passing that distance; 30 miles per hour would be the progressive velocity of the tornado. Statements made to me by Mr. Vassner, and corroborated by other witnesses, and the fact that trees were twisted at their tops force me to assume that in the area of the storm-center-winds they were of a circular motion and with extreme radius of 90 yards, that the duration of these winds at any named point was from 7 to 8 seconds.

The direction of the whirl was very evidently from left to right by way of the south, and from right to left by way of the north, conforming to the general law of storms in the northern hemisphere. On the southern side of the whirls things went eastward, on the northern side they went westward. It was asserted that Mr. McGinty's house was struck by lightning and the fire put out by the rain which fell in torrents for a short while; houses were also spattered from top to bottom with a yellowish-looking sand. I do not doubt that the air was filled with electricity before and during the tornado's passage over the village, and that more or less electricity exists in almost every tornado, and did in this one, as the electric occurrences at the Western Union Telegraph office showed.

A statement made to me by a young man who was on the railroad track, south some distance from the path of the tornado at the time of the passage, was that the rails of the railroad track seemed to draw the lightning to such an extent that flashes of fire could be plainly seen. The steel rails, I have no doubt, aided the intensity in appearance of the electricity, but I did not discover any satisfactory proof to lead me to believe that Mr. McGinty's house was struck. Had it been I would have seen some signs of it.

An iron row-boat, said to weigh about 80 or 85 pounds, was lifted from the water of the pond and carried by the force of the wind 225 feet. One of the rowlocks was picked up near the small spoon-manufactory buildings of Mr. Grasser, on the side of the lake, a different direction from the boat. A garment, with a letter to Mrs. John Munson in it, was found 3 miles from the scene of the tornado. A chestnut blind from the school-house was said to have been found 8 miles from that building. Farmers living 3 and 4 miles and nearer to the village, not knowing that any calamity had befallen the village and its inhabitants, finding window-blinds, trunk-tops, and other fragments, came to the village to ascertain what had occurred. A receipt for money paid out by Mr. P. Clyne was found in Peacedale, R. I., 65 miles distant from Wallingford; attached to this report will be found the necessary proof that the piece of paper was wafted to the Narragansett shore. It is not improbable, from these occurrences, that fragments and objects were carried great distances, notwithstanding assertions that they could not have been, as the rain fell in torrents. The area of heavy rain-fall was a narrow and limited one compared with the general amount of rain-fall during the passage of the tornado, and it is as likely that the heavy rain-fall occurred after as it is that it occurred during the passage of the tornado. The statement of Dr. Harrison, and the amount of rain-fall as shown by the gauge, and that objects from the scene of the tornado were picked up great distances away, is ample testimony that not very much rain fell during the passage of the tornado.

Mr. Herman Vassner's house and barn, and other instances wherever the whirls took place, furnish strong evidence of the existence of powerful upper currents. Mr. Vassner says that his barn, 16 feet front, 25 feet long, and 20 feet high, stood west of his residence. It was carried 100 feet due south, the roof of the barn carried about 30 feet east of it. A large apple tree, that will weigh nearly 1,500 pounds, was carried 20 feet due north. Two chimneys, one on the main house and the other on the L part of the house, had each a blue flagstone, 3 by 2 feet, 2 inches thick; one was carried east and the other carried west. Mr. Vassner was with his family in the house. He said he felt the house reel back and forward, as a drunken man would. It seemed to swing around on a pivot; that he could see very plainly objects caught up and wafted away,



*Wallingford Tornado. Junction of Clouds over Pond of Water.*

ascending in the air in their flight, at the same time having a whirling motion. Mr. John Munson's house was completely demolished. It presented to the wind about the same surface as did Mr. Vassner's house. It was not so substantially built as Mr. Vassner's house, which was well constructed and admirably put together. Timbers from Mr. Vassner's barn were found in Mr. Munson's yard; fragments from Mr. Munson's yard were found in Mr. Vassner's yard.

I am not fully satisfied that downward currents existed because I observed timbers and pieces of boards and scantling driven into the ground. There is every chance that the velocity such objects would attain in their descent to the ground from a considerable height and influenced by horizontal currents would cause them to penetrate the ground to various depths. The fact that tops of elm and oak trees are broken off by the wind before it had reached the plains furnishes me with more conclusive proof that they did exist. If they did not why should these tree-tops along the bank of the Quinnipiac River be broken off as much as an eighth of a mile above the entrance of the tornado on to the plains? And, if not, why was it that the leaves of the trees that were left standing in the track and edges of the track of the tornado after its passage have the appearance of being singed off at respective lower depths as flames of fire do in spreading from high to lower houses during a large conflagration? Pieces of scantling were planted in the earth at different angles; bricks from the school-house to the opposite side of the street from it, and the carriage of a sill 16 feet long, 6 by 6 inches in length and breadth through the south side and middle portion to one of the northeast rooms of Mr. Gutte's house are facts enough to confirm the belief that downward and horizontal currents did exist.

I called on Dr. Harrison, who had all the instruments necessary to give me information relating to temperature of the air, humidity, and barometric pressure, had they been observed. He expressed his regrets at not having observed them before, during, and after the passage of the tornado. The information I received from him was the amount of rain-fall, .58 of an inch. The pluviometer used was Greene's, of the Smithsonian Institute. Mr. Thomas Pickford, apothecary, whose store is in Wallace's block, near the corner of Center and Main streets, a short distance from Dr. Harrison's residence, gave me the temperature of the air as follows: 5.30 to 6 p. m., 86°; 6 p. m., 65°, 87°; this fall and rise occurred during the passage of the tornado. From 7 to 9 p. m. 8°; says that the first wind felt of the tornado was NW. and N.; a lull occurred then, long enough for him to go outside and, with rapidity, secure two window-shutters; felt a decided change of temperature during lull; observed clear sky—this about 6 p. m., after the lull of wind; the wind blew violently from the SW. The afternoon was close and oppressive; experienced great difficulty in breathing during almost the entire day. After the passage of the tornado the atmosphere, during the remainder of the evening, until 9 p. m., was close and sultry; some lightning. After 9 p. m. the stars appeared, sky became clear, and the atmosphere as mild as if nothing had occurred. I ascertained that there was no intermission of the light rain that fell during the passage of the tornado from the time it began, about 6 p. m., until 6.15 p. m., except during the lull. After the tornado had passed over the village, for fifteen or twenty minutes there was a very quiet stillness. Afterward, for a very short while, a very light rain occurred. On the north side of the track of the tornado I could get no information relating to temperature of the air, humidity, and barometric pressure. I did not observe trees with different layers. In some places the apple as well as other trees were lying a little more north or a little more south than the general direction. This I attributed to some roots being implanted in the ground more firmly and better than others. The mean direction of the trees was to the east; on the north side of the center of the track the trees lay toward the south; on the south side they lay to the north. Thirty persons lost their lives, and seventy others more or less injured. Fifty-five houses and barns were completely and partly demolished; careful estimates of loss of property destroyed by the tornado, $250,000.

No other tornado was coexistent with that at Wallingford.

I. A. REED,
*Sergeant Signal Corps, U. S. A.*

PAPER 45.

WAR DEPARTMENT,

# Office of the Chief Signal Officer,

*WASHINGTON, D. C., January 1, 1878.*

## CIRCULAR.

On and after January 1, 1878, an additional Cautionary Storm Signal will be displayed, as occasion may require, at all active Signal and Display stations of the Signal Service. The signal will be displayed at and on the regular place and staff, and will consist of *a white flag with a square black centre*, shown above *a red flag with a square black centre* by day, or a *white light* shown above a *red light* by night. This signal will be known as the "CAUTIONARY OFF-SHORE SIGNAL," and will indicate, when shown, that while the storm disturbance is considered, at the office of the Chief Signal Officer, as not yet passed for the port or place at which the signal is displayed, and the winds may yet be high, and there may be danger, the winds are expected to blow from a northern or western direction, or "off-shore," at or near the port or place where the signal may be.

The display of this signal will often follow, and must be distinguished from, the display of the usual "Cautionary Signal," *i. e.*, a square red flag with a square black centre by day, or a red light shown at night—which retains, whenever shown alone, its usual meaning. The display of either signal is always cautionary.

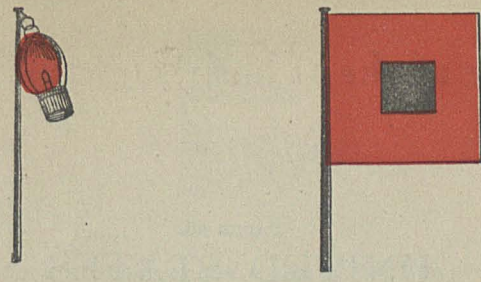
The "CAUTIONARY SIGNAL," *i. e.*, a red flag with black square in the centre by day, or a red light by night, calls for caution in view of an approaching storm, and is so "CAUTIONARY" WITH REFERENCE TO WINDS BLOWING FROM ANY DIRECTION.

The CAUTIONARY OFF-SHORE SIGNAL, *i. e.*, a white flag with black square in the centre, shown above a red flag with black square in the centre, by day, or a white light shown above a red light by night, is "CAUTIONARY" WITH REFERENCE TO WINDS EXPECTED TO BLOW FROM A NORTHERN OR WESTERN DIRECTION, OR OFF-SHORE AT OR NEAR THE PLACE AT WHICH IT MAY BE.

Albert J. Myer

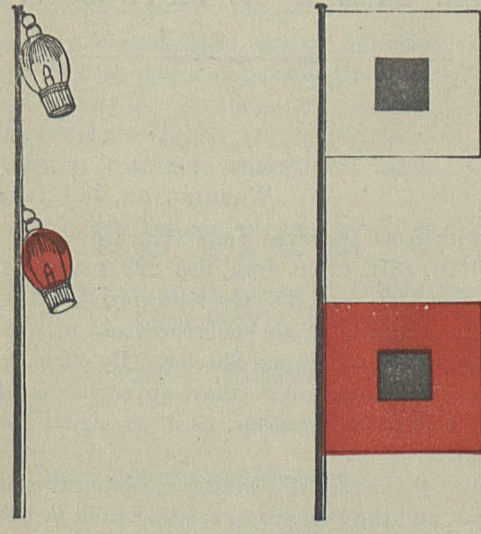
*Brig. Gen. (Bvt. Asst'd,) Chief Signal Officer, U. S. A.*

POST THIS UP IN A CONSPICUOUS PLACE.



THE CAUTIONARY SIGNAL.

Cautionary against Approaching Storm, and against Winds from any direction.



THE CAUTIONARY OFF-SHORE SIGNAL.

Cautionary against Rough Weather, and against Winds expected to be in a Northern or Western direction, or "Off-Shore."

The order "Up Signals" retains its present meaning.

The order "Hoist Off-shore Signal" requires that the "Off-shore Signal" be at once displayed, the "Cautionary Signal" being either lowered, and the two flags or two lights of the "Off-shore Signal" hoisted in its place, or the flag or light of the "Cautionary Signal" may be left displayed, while the additional proper flag or light needed to complete the "Off-shore Signal" is shown above it.

"Signals Down" lowers any or all signals.

PAPER 46.

# UNITED STATES

# COAST SIGNAL SERVICE

## OFFICIAL DANGER OR DISTRESS SIGNALS.

WAR DEPARTMENT,
OFFICE OF CHIEF SIGNAL OFFICER,
WASHINGTON, D. C., *January* 19, 1878.

In compliance with Acts approved June 21st, 1860, (Rev. Stat., Sec. 1,195, page 212,) June 10th, 1872, (Rev. Stat., Sec. 222, page 35,) and March 3rd, 1873, (Rev. Stat., Sec. 223, page 35,) the following Partial Code of Signals is published for the information of all concerned, and will be recognized by all sea-coast Signal Stations of the Signal Service. By official co-operation of the Life-saving Service the same signals (those appearing on this paper) will be recognized at all Life-saving Stations, used as signal stations, in time of "danger or distress."

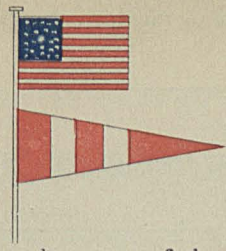
It is recommended that every ship-master receiving this paper at once paste this Code of signals, and the letter-press relating to it, in his signal book.

The attention of ship-masters and crews, or Signal Service men and others signalling from the land, is called to the following:

Copies of this paper are at every Signal Service and Life-saving station on the coasts of the United States.

The alphabetic letters designating the flags to be hoisted as signals, and the flags to be hoisted for signals appearing on this paper, are similar to those adopted for the INTERNATIONAL COMMERCIAL CODE of signals for the use of all nations. The following signals are to be found in the International Signal Book by the same letters, under the headings "Danger or Distress," "Assistance," "Danger or Accident," "Danger or Caution," "Direction for Saving Crew," and "Wants," and are to be displayed by the same flags as those signals already published for the same purpose in the INTERNATIONAL COMMERCIAL CODE.

To open communication by this Code, show the ensign with the following pennant under it, thus—



This signal is acknowledged on the coasts of the United States by showing the same pennant (as given above) *alone*.

This pennant hoisted alone also means, when signalling, "signals seen and understood," and is to be shown in answer to every signal as soon as such signal has been seen and recognized.

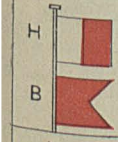
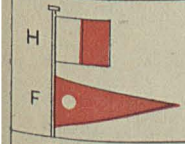
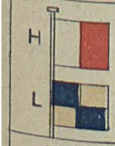
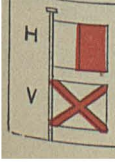
Communication may then be commenced, and any message following in this paper, or found under the heading "Danger or Distress" in the International Code Signal-book, may be exchanged, strictly following the INTERNATIONAL COMMERCIAL CODE and the instructions here given below.

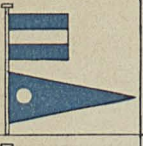
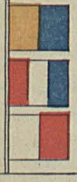
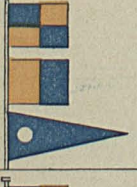
The above signal, asking to open communication, should be shown in every case of distress by the shore station, for it may be that the vessel has the INTERNATIONAL CODE, but, until seeing this signal, will not know she can use it.

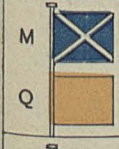
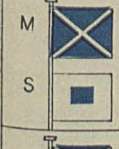
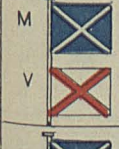
# SECTION 1.

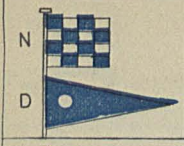
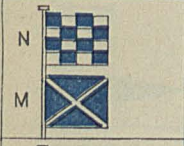
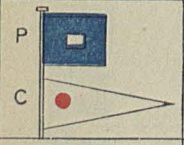
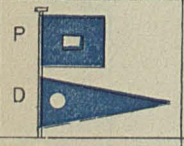
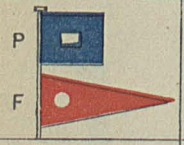
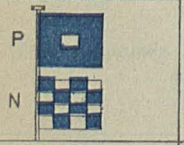
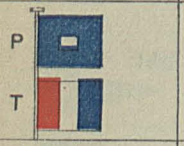
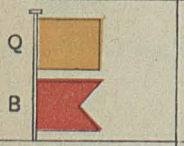
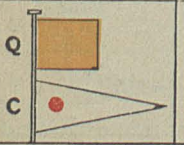
SIGNALS ADOPTED FROM AND TO BE FOUND IN INTERNATIONAL COMMERCIAL CODE SIGNAL BOOK.

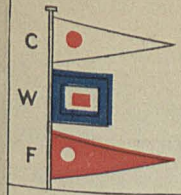
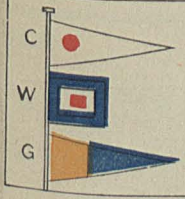
## DAY SIGNALS.

| | |
|---|---|
|  | Want immediate assistance. |
|  | We are coming to your assistance. |
|  | Do not attempt to land in your own boats. |
|  | Damaged rudder; cannot steer. |

| | |
|---|---|
| H W | Engine or machinery disabled. |
| J D  | You are standing into danger. |
| J P | Heavy weather coming; look sharp. |
| K P | Bar impassable. |
| K S Q | Cast off. |
| K T H  | Make fast. |
| L K D  | Slack away. |
| L M | The berth you are now in is not safe |
| M F | Hold on until high water. |

| | |
|---|---|
| | Remain by the ship. |
| | Quit the vessel as soon as possible. |
| | Do not quit the ship until the tide has ebbed. |
| | Landing is impossible. |
|   | Look out for a line. |
| | Endeavor to send a line. |
|   | Do the best you can for yourselves; no assistance can be given. |
| | Lookout will be kept on the beach all night. |
|   | Lights or fires will be kept at the best place for coming on shore. |
| | Keep a light burning. |

| | |
|---|---|
|   | I must abandon the vessel. |
|   | I am on fire. |
| | I am sinking. |
|   | **Want assistance; mutiny.** |
|   | **Want immediate medical assistance.** |
|   | Want boat immediately. |
|   | Want a steam tug. |
|   | Want a pilot; can one be obtained? (Answer, "*Yes*" or "*No*".) |
|   | Enquires Name of Signal Station. |
|   | Repeat your signal, or place it in a more conspicuous position; it is not understood. |

| | |
|---|---|
|   | Signal not understood, although the flags are distinguished. |
|   | I cannot make out the flags. |

(End of Section 1.)

# Introduction to Section 2.

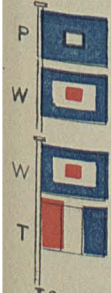
Additional Signals for the Coasts of the United States made with the Letters and Flags of the International Code, but not to be found in the International Code Signal Book.

* * * * * *

The following additional signals do not appear in the International Code, but are added signals and meanings, adopted for the coasts of the United States, and to be used on occasions of shipwreck, danger or distress. The letters and flags used are the letters and flags of the International Code.

It being ascertained that the vessel has and can use the International Code, and it being desired to use any additional signals, as given in this paper, the following signals must be shown:

Very great care must be had by Shipmasters, Signal Service men and others that there may be no mistake about these signals.



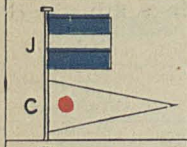
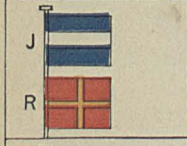
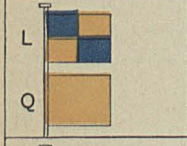
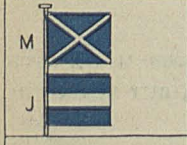
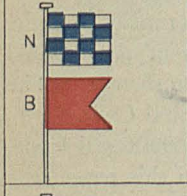
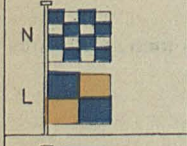
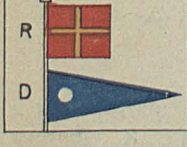

Have you the Signal Service Sea-coast Danger or Distress Code of Signals, and do you know how to use them?

Yes; we have the Signal Service Sea-coast Danger or Distress Code of Signals, and know how to use them.

If no Signal is made in answer to Signal P. W., as given above, or it is answered that it is not understood, haul it down, show the flags B. K. which means Attention! International Code, and as soon as it is answered as understood, go on signalling, using, however, *no signal not found under Section 1 of this paper.*

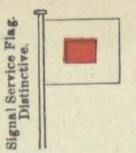
If Signal W. T. (given above) is made in answer to Signal P. W., then any of the following signals and messages under Section 2 may be sent or exchanged.

# SECTION 2.

| | |
|---|---|
|   | Lookout will be kept on the beach all night. Hold on until daylight, will then send on board Life-Saving apparatus. |
|   | Endeavor to send a line by boat, cask or spar. |
|   | Beach where people are assembled, or as near there as possible. |
|   | Haul away. |
|   | Make the tail-block or the end of this line fast to the lower mast, well up. If masts are gone, then to the best place you can find; then cast off the shot line, see that all is clear; and show signal by flag or lantern to the shore. |
|   | Make the hawser fast about two feet above the tail-block or hauling line, see all clear and show signal by flag or lantern to the shore. |
| | Cannot comply with last signal. |
|   | Make a signal when you want a boat. |

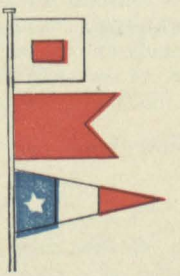
[End of Section 2.]

UNITED STATES SIGNAL SERVICE STATION AT LIFE-SAVING STATIONS.

The following flag, thus—  shown over any station number flags, will be used to designate a full signal station of the United States, from which any communication received will be transmitted by telegraph to destination. This flag will always be hoisted above the station number flags when the station number of such full station is shown Thus:



No. 8.



ANY MESSAGE signalled by the International Code, as adopted or used by England, France,* America, Denmark, Holland, Sweden and Norway, Russia, Greece, Italy, Germany, Austria, Spain, Portugal and Brazil, received at these telegraphic Signal Stations, will be transmitted and delivered to the address on payment, either at the Station or at place to which addressed, of the telegraphic charge. All messages received from or addressed to the War, Navy, Treasury, State, Interior or other official department at Washington, are telegraphed without charge.

Ships' official numbers, shown and recognized at stations thus designated, are reported to Washington by telegraph.

The flag flown below the United States national colors indicates a full signal station connecting by telegraph, but not a Life-Saving Station.

General messages to be telegraphed will be taken only at stations flying either three flags, as first given above, or the American flag with the Distinctive "Signal Service Flag," as above stated.

The Distinctive Signal Service flag flown ALONE indicates a United States Signal Service station anywhere, not necessarily, however, connecting by telegraph.

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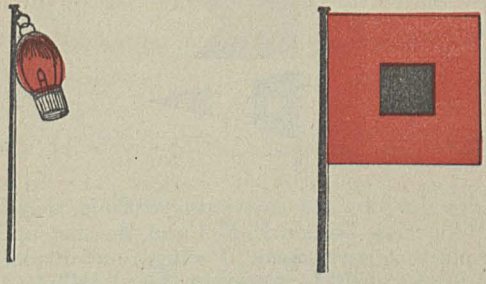
From and after January 1, 1878, an additional Cautionary Storm Signal will be displayed, as occasion may require, at all active Signal and Display stations of the Signal Service. The signal will be displayed at and on the regular place and staff, and will consist of *a white flag with a square black centre*, shown above *a red flag with a square black centre* by day, or a *white light* shown above a *red light* by night. This signal will be known as the "CAUTIONARY OFF-SHORE SIGNAL," and will indicate, when shown, that while the storm disturbance is considered, at the office of the Chief Signal Officer, as not yet passed for the port or place at which the signal is displayed, and the winds may yet be high, and there may be danger, the winds are expected to blow from a northern or western direction, or "off-shore," at or near the port or place where the signal may be.

NOTE.—A reprint of the International Code has been published by the United States Navy Department.

The display of this signal will often follow, and must be distinguished from, the display of the usual "Cautionary Signal," *i. e.*, a square red flag with a square black centre by day, or a red light shown at night—which retains, whenever shown alone, its usual meaning. The display of either signal is always cautionary.

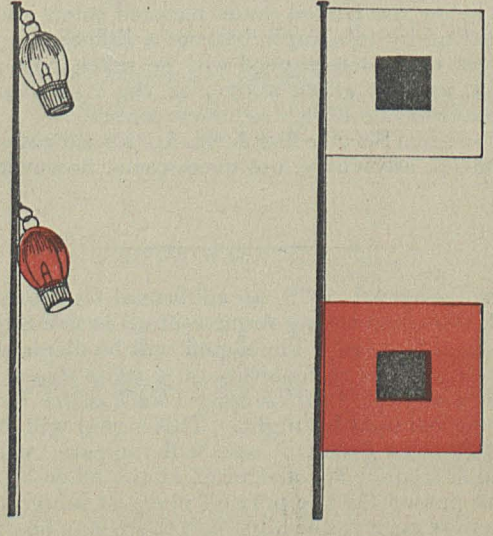
The "CAUTIONARY SIGNAL," *i. e.*, a red flag with black square in the centre by day, or a red light by night, calls for caution in view of an approaching storm, and is so "CAUTIONARY" WITH REFERENCE TO WINDS BLOWING FROM ANY DIRECTION.

The CAUTIONARY OFF-SHORE SIGNAL, *i. e.*, a white flag with black square in the centre, shown above a red flag with black square in the centre, by day, or a white light shown above a red light by night, is "CAUTIONARY" WITH REFERENCE TO WINDS EXPECTED TO BLOW FROM A NORTHERN OR WESTERN DIRECTION, OR OFF-SHORE, AT OR NEAR THE PLACE AT WHICH IT MAY BE.



THE CAUTIONARY SIGNAL.

Cautionary against Approaching Storm, and against Winds from any direction.



THE CAUTIONARY OFF-SHORE SIGNAL.

Cautionary against Rough Weather, and against Winds expected to be in a Northern or Western direction, or "Off-Shore."

The order "Up Signals" retains its present meaning.

The order "Hoist Off-shore Signal" requires that the "Off-shore Signal" be at once displayed, the "Cautionary Signal" being either lowered, and the two flags or two lights of the "Off-Shore Signal" hoisted in its place, or the flag or light of the "Cautionary Signal" may be left displayed, while the additional proper flag or light needed to complete the "Off-shore Signal" is shown above it.

"Signals Down" lowers any or all signals.

These Cautionary Signals, whenever displayed on the coasts of the United States, have the above given meanings.

They will never however be displayed without orders direct from the Office of the Chief Signal Officer, or an authorized representative of the Signal Service.

* * * * * *

All signal duty of every description will be done by officers, non-commissioned officers or privates of the Signal Service, when any member of that service is present for duty at any signalling station. They will endeavor to transmit any message necessary to aid the crews or the Life-Saving Service.

In showing flags or pennants as signals, each flag or pennant should be displayed at a distance equal to at least two feet more than its own length from any other flag or pennant in the same hoist.

It may sometimes happen that the ship can read signals shown on shore, but cannot, from carrying away of masts or other distress, *answer*. It is therefore in all cases desirable to show any important signal desired to be made known to the crew for a sufficient length of time, even when they make no answer. Very great care must be taken, even in this case, about using any signal of SECTION 2, as they may confuse the crew, and, not being found in foreign books, lead them to distrust all the other signals. As a general rule, the additional signals given under SECTION 2 should never be used unless it is known the communicating vessel has this paper, or, as a last resort in cases of such emergency, that every chance must be taken.

Proper Flags, Signal Lights, Apparatus, &c., &c., will be supplied on requisition through proper authorities to any station for any performance of Official Signalling. The material must be carefully cared for, and will be subject, under proper regulations, to the inspection of the officer or agent of the Signal Service, whose duty it will be to report any imperfections to the Chief Signal Officer.

The following are published for the information of all concerned:

"The Secretary of War shall provide, in the system of observations and

reports in charge of the Chief Signal Officer of the Army, for such stations, reports and signals as may be found necessary for the benefit of agriculture and commercial interests. (Stat. at Large, sec. 222, page 35.)

"The Secretary of War is authorized to establish signal stations at light-houses, and at such of the life-saving stations on the lake or sea-coast as may be suitably located for that purpose, and to connect the same with such points as may be necessary for the proper discharge of the Signal Service by means of a suitable telegraph line in cases where no telegraph lines are in operation, to be constructed, maintained, and worked under the direction of the Chief Signal Officer of the Army, or the Secretary of War and the Secretary of the Treasury; and the use of the life-saving stations as signal stations shall be subject to such regulations as may be agreed upon by said officials." (Stat. at Large, sec. 223, page 35.)

The Chief Signal Officer is, subject to the direction of superior authority, charged with and responsible for the character, condition and instructions for the use of electric lines and instruments, semaphores, signals, equipments and apparatus, codes, &c., for all official Coast Signal Service on the coasts of the United States.

Communication may be addressed, officially, to this office at any time by any party desiring explanation or information on these subjects.

The suggestion of additional "danger or distress" signals is requested.

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Life-Saving Station and District Number flags, have been furnished by the Superintendent of the Life-Saving Service, as follows:

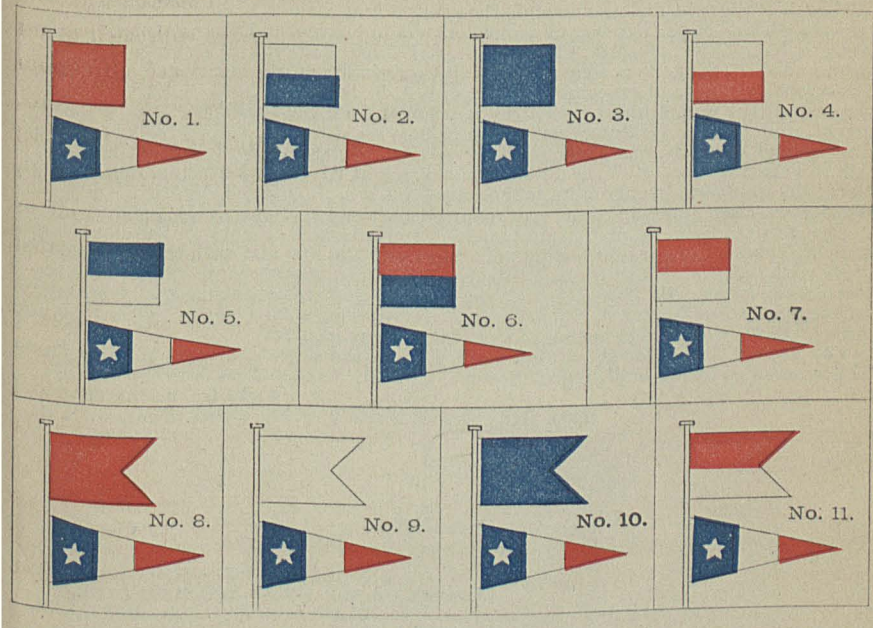
# UNITED STATES LIFE-SAVING STATIONS.

## DISTINGUISHING FLAGS.

District No. 1 embraces coast of Maine and New Hampshire.
District No. 2 embraces coast of Massachusetts.
District No. 3 embraces coast of Rhode Island and Long Island.
District No. 4 embraces coast of New Jersey.
District No. 5 embraces coast of Cape Henlopen to Cape Charles.
District No. 6 embraces coast of Cape Henry to Cape Fear.
District No. 7 embraces coast of Florida.
District No. 8 embraces Lakes Ontario and Erie.
District No. 9 embraces Lakes Huron and Superior.
District No. 10 embraces Lake Michigan.
District No, 11 embraces Pacific Coast.

COLOR and FORM of flags, as shown below, indicate NUMBER OF DISTRICT. NUMERAL displayed in centre of flag will indicate NUMBER OF STATION.

## DISTRICTS.




NOTE.—This partial code is for immediate uses. A more complete code, providing night signals and additional danger or distress signals for day and night uses, will issue from this office with as little delay as practicable.

Albert J. Myer

*Brig. Gen. (Bvt. Assg^d.,) Chief Signal Officer, U. S. A.*

PAPER 47.

[Signal-Service Orders No. 8.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF SIGNAL-OFFICER,
*Washington, D. C., February* 8, 1878.

The Chief Signal-Officer commends the prompt and zealous action, during the "Metropolis storm," of the non-commissioned officers in charge, and their assistants, at the stations Kittyhawk, Norfolk, Cape Henry, and Cape Hatteras, of Privates T. B. Harrison and F. E. Seegelken, sent respectively to re-inforce Cape Henry and the Metropolis wreck station, and especially of Corporal A. T. Sherwood, who notified this office the instant the report was received by messenger from the wreck at 6.50 p. m., January 31, and Private William Davis, Signal Service, U. S. A., who, under immediate direction of Corporal Sherwood, starting on horseback, fully equipped, within fifteen minutes after the receipt of the notice of the wreck at Kittyhawk Station, rode through the night and storm twenty miles to the scene by 3.20 a. m., opened station on the Signal Service sea-coast telegraph-line, and reported for service at the wreck, sending a condensed report at 4 a. m., and there remained continuously on duty on the open beach, keeping constant telegraphic communication along the line and with this office, acting thus with faithful accuracy and intelligence for an uninterrupted tour of duty of twenty-six hours. By this action of the soldiers and stations named, all telegraphic information from the wreck which reached the superior authorities or appeared in the press, and on which steps for relief were taken, was secured.

For prompt and soldierly action, fidelity, and good service, Private William Davis is promoted to be corporal, Signal Service, U. S. A., to date from January 31, 1878.

ALBERT J. MYER,
*Brig. Gen. (Brevet Assigned), Chief Signal-Officer, U. S. A.*

PAPER 48.

WAR DEPARTMENT,
OFFICE OF THE CHIEF SIGNAL-OFFICER,
*Washington, D. C., August* 15, 1878.

*Instructions for shipmasters comparing barometers with the Signal-Service standard at the Maritime Association Building in New York.*

The upper surface of the mercury in the cistern of the large standard barometer is 11 feet and 6 inches above mean tide. The ship's barometer should be hung alongside and at the same elevation. A table for reducing the barometric readings to 32° Fahrenheit (freezing) will be found at the barometer desk. To all readings of the large standard barometer allow for the reduction to freezing to obtain the true reading. The difference between this corrected reading and the reading of the ship's barometer, similarly reduced to freezing, will be the correction to be always applied (that is, to be added to or subtracted from) to the readings of the ship's barometer, in order to make sure that these readings are correct. To illustrate by an example: The reading of the standard barometer reduced to freezing is, say, 29.985, and the reading of the ship's barometer to be compared, reduced to freezing, is, say, 29.970; in this case the standard is the higher, and the difference (.015) is to be added to all readings of the ship's barometer to obtain the standard reading. As another illustration: Let the reading of the standard be, as above, 29.985, and the reduced reading of the compared ship's barometer 30.01; in this case the standard is the lower, and the difference (.025) is to be subtracted from all readings of the ship's barometer to obtain the standard reading. The comparisons are similarly made, though not so closely, and the correction determined, though the ship's barometer may not be scaled to very close readings, or of thousandths. The correction for the instrumental error of each ship's barometer, as thus determined, must be applied whenever corrected readings are desired.

For all reports made to this office, if such are made by any vessel, it will be sufficient to give, when a mercurial barometer is used, 1st, actual reading of barometer as read off; 2d, correction for instrumental error determined as stated above; 3d, reading of the attached thermometer; 4th, height (as nearly as possible) of barometer, as hung on shipboard, above the sea-level. These ought to appear on each separate form or report sent to this office.

Aneroid barometers are compared with standard mercurial barometer by first reading the mercurial barometer and correcting this reading for temperature only; that is,

reducing the reading to what it would be if the temperature of the barometer was 32° Fahrenheit. Then read the aneroid and take the difference between the corrected reading of the mercurial and the actual (uncorrected) reading of the aneroid, which will be the correction to be applied to the aneroid; this correction to be added if the aneroid reads lower than the mercurial, and subtracted if it reads higher.

On all reports made for this office, when an aneroid barometer is used, the record should give, stated on the form, 1st, actual reading of the barometer as read off; 2d, correction for instrumental error, determined as above; 3d, reading of attached thermometer, if there is one, or of a thermometer in the room; 4th, statement whether the barometer is "compensated" or not; 5th, height (as nearly as possible) of the barometer, as hung on shipboard, above sea-level.

A sergeant or assistant of the Signal Service will be in attendance at the Maritime Association Building each day, from 12 to 1 p. m., to give any necessary information as to mode of making comparisons. The barometer case and the door of the screen will be opened at the hours named only, unless in instances of especial need, and always in the presence of the sergeant or assistant.

Shipmasters of all nations are invited to make use of the Signal Service standard for the purpose of comparing their ships' barometers. The superintendent of the room of the Maritime Association will take charge of ships' barometers to be compared at any time they may be left with him for the purpose. They will be duly delivered by him to the sergeant or assistant in charge of the standard. Ships' barometers can be most conveniently returned to owners at the hour between 12 m. and 1 p. m.

ALBERT J. MYER,
*Brig. Gen. (Brevet Assigned), Chief Signal-Officer, U. S. A.*

## PAPER 49.

S. S. ———

*Bulletin for the* ——— *half of the month of* ———, 18—, *of simultaneous international meteorological observations, taken each day at 7.35 a. m., Washington mean time* (43′ *p. m., Greenwich mean time*).

| Day. | Station. (Harbor or latitude and longitude at 7.35 a. m., Washington time.) | Barometer. —— feet above sea-level. | Attached thermometer. | Temperature (Fahrenheit). | | Wind. | | Clouds. | | Rain-fall in 24 hours. | Sea-swell. | | Weather. | Ship's course and distance sailed since last report. | Signature of observer. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Dry bulb. | Wet bulb. | Direction from which coming. | Force. | Amount. | Direction from which coming. | | Character. | Direction from which coming. | | | |
| | | | | | | | | | | | | | | | |

Barometer error, ———.

Last comparisons at ———.

NOTES.

1. *These observations must be taken and recorded each day, without fail, at the precise hour, 7.35 a. m., Washington mean time (43′ p. m., Greenwich mean time).*

2. *The mercurial barometer is to be used when possible. When the aneroid barometer is used, as, for instance, on account of the ship's motion, a letter (a) is to be placed after the reading, and the aneroid is to be regulated at all times by the mercurial barometer.*

3. When, from stress of weather or other causes, all the observations cannot be made, part of them must be invariably given. For instance, if it is not possible to say more than "violent gale," let that be said.

4. The *direction of the wind* is to be given by compass point (corrected for variation) as closely as possible. *Wind force* may be given by Beaufort scale of numbers 0 to 12, or in velocity of miles per hour or pressure per square foot, where there are anemometers.

5. One of these blanks, filled out for the first fifteen days of the month, to be mailed on the 15th day of each month, or as soon thereafter as practicable, and one, filled for the remaining days of the month, to be mailed on the 1st day of the month, or as soon thereafter as practicable, addressed to the Chief Signal-Officer of the Army, Washington, D. C.

6. Commanding officers of vessels will cause frequent comparisons of barometer-readings to be made with those of the Signal Service whenever practicable, and as frequently as may be found necessary to obtain correct results—the comparisons, of course, to be made at precise common time, as, for instance, at 7 a. m., 2 p. m., and 9 p. m., for several days together, and at whatever of the signal stations may be convenient at the time.

7. Whenever in foreign waters, like comparisons will be made, if practicable, with the barometers of United States naval vessels, wherever the commanding officer has reason to believe additional accuracy can be obtained. On every report forwarded the barometer error (+ or −) will be noted and *not applied to the observations.* (See space at foot of blank.)

8. The reading of the attached thermometer must be given with all readings of the mercurial barometer. The blank for height of barometer above sea-level must be filled on shipboard by finding the height, in feet, of the cistern of the barometer, as hung in the ship, above the water-line, whenever the ship is in port. Give reading of barometer as *read off*, leaving all corrections and reductions to be made elsewhere.

9. Clouds, amount, must be reported as follows: Sky clear, 0; one-fourth covered, one-half covered, three-fourths covered, four-fourths covered.

10. Sea-swell may be reported as follows: Smooth, moderate, long, rough, cross, heavy, and very heavy.

11. WEATHER: Use words clear (when sky is less than one-fourth covered), fair (sky from one to three-fourths covered), cloudy (sky more than three-fourths covered), sprinkling, drizzling, light (or heavy), rain, sleeting, hailing, thunder-storm, foggy, misty, hazy, threatening, clearing, &c. The above to express the state of weather, as the case may be, at the *moment of observation.*

12. If any observation is not taken, write in the space the word "blank."

It is requested the above directions be strictly complied with.

ALBERT J. MYER,
*Brigadier-General (Brevet Assigned), Chief Signal-Officer, U. S. A.*

O

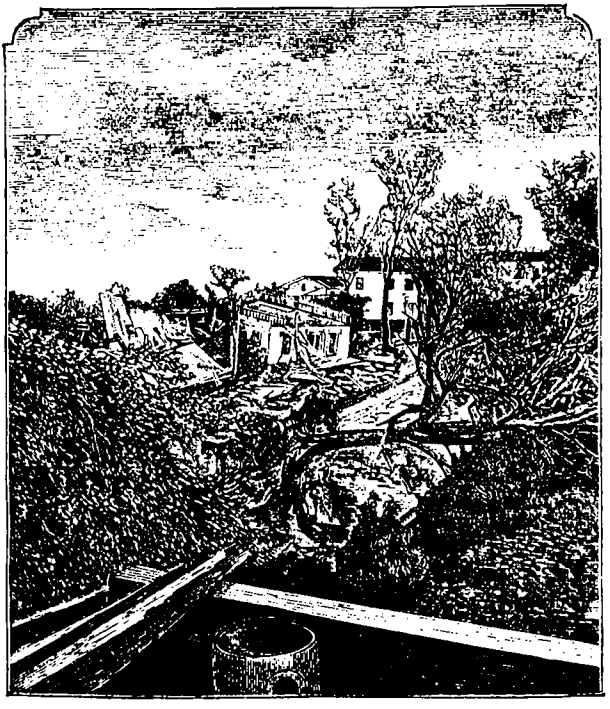
No. 1.

Wallingford Tornado.

No. 2.

Wallingford Tornado.

No. 3.



Wallingford Tornado.

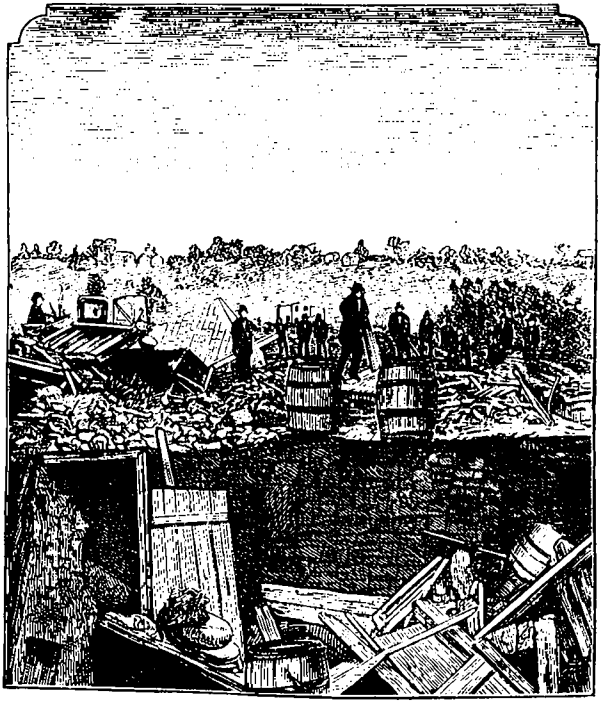
No. 4.

Wallingford Tornado.

No. 5.

Wallingford Tornado.

No. 6.



Wallingford Tornado.

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# Monday 11 P.M. (Washington time) November 19th 1877.

A. III. Barometer

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*Monday 11 P. M. (Washington time) November 19th 1877.*

B III. Cloud. Temperature and Humidity.

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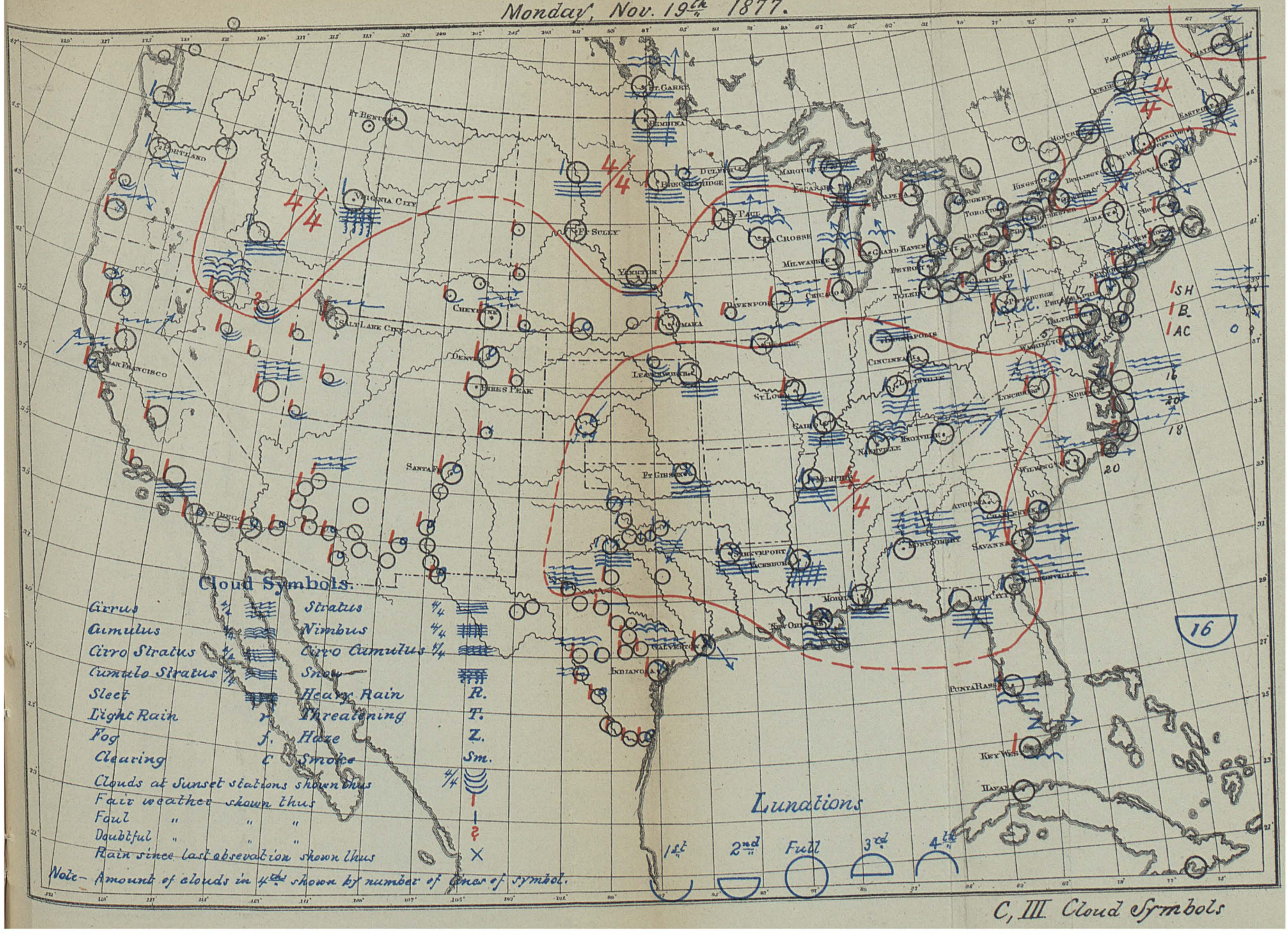
# Sunset Chart.

## Monday, Nov. 19th 1877.




C, III. Cloud Symbols

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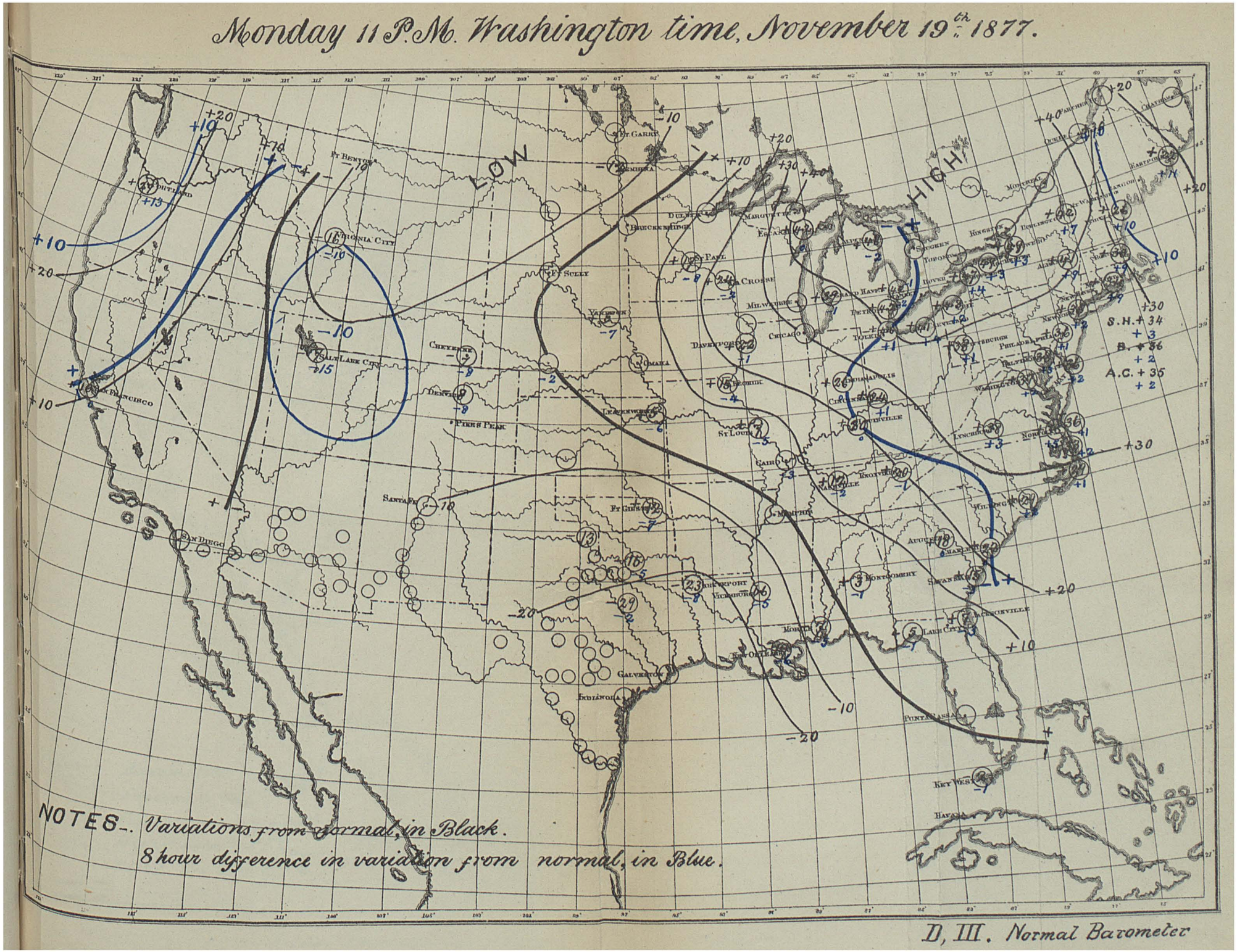
# Monday 11 P.M. Washington time, November 19th 1877.




D, III. Normal Barometer

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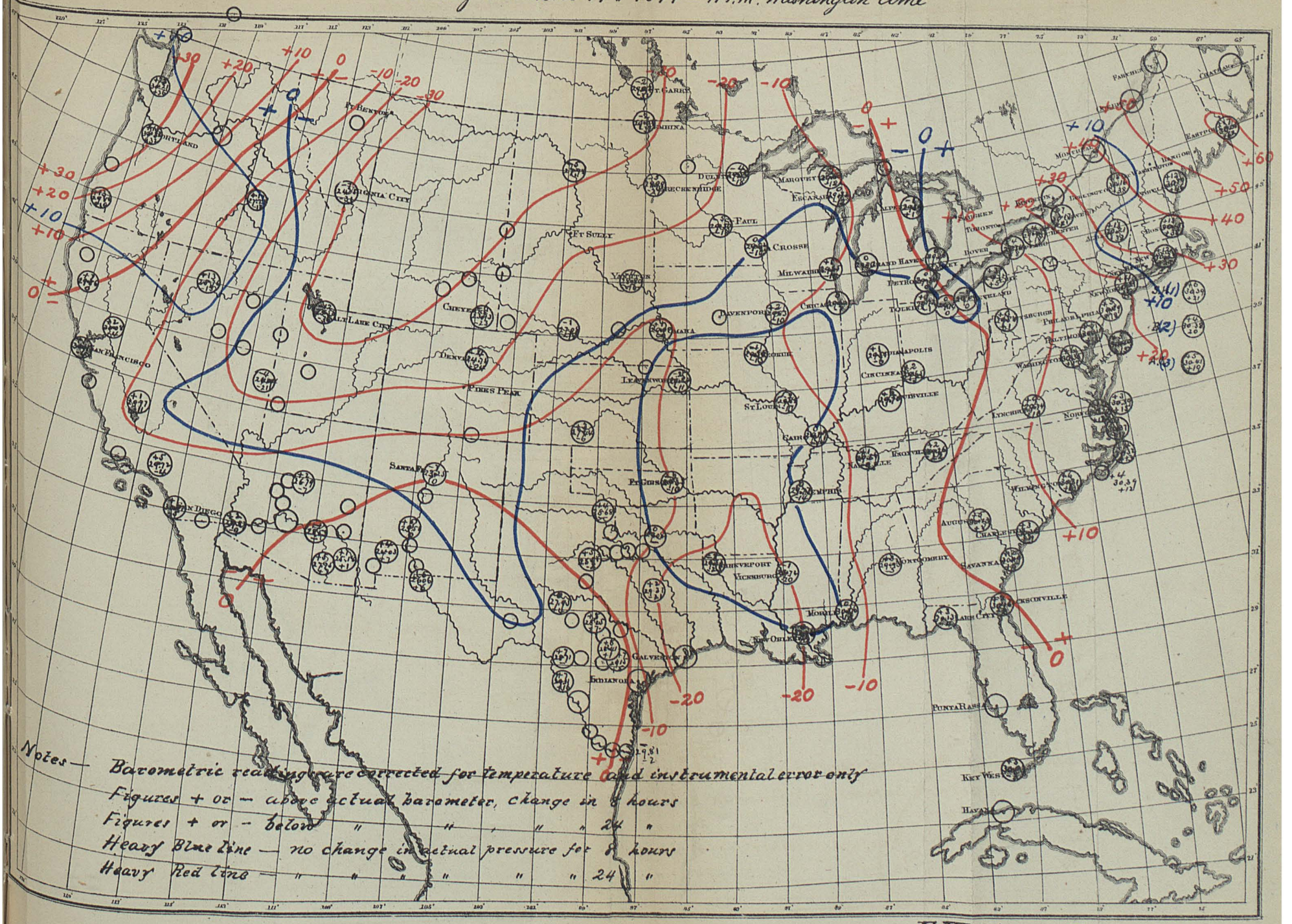
# Actual Barometer Variation

Monday November 19th 1877 – 11 P.M. Washington time




E, III. Actual Barometer Variation

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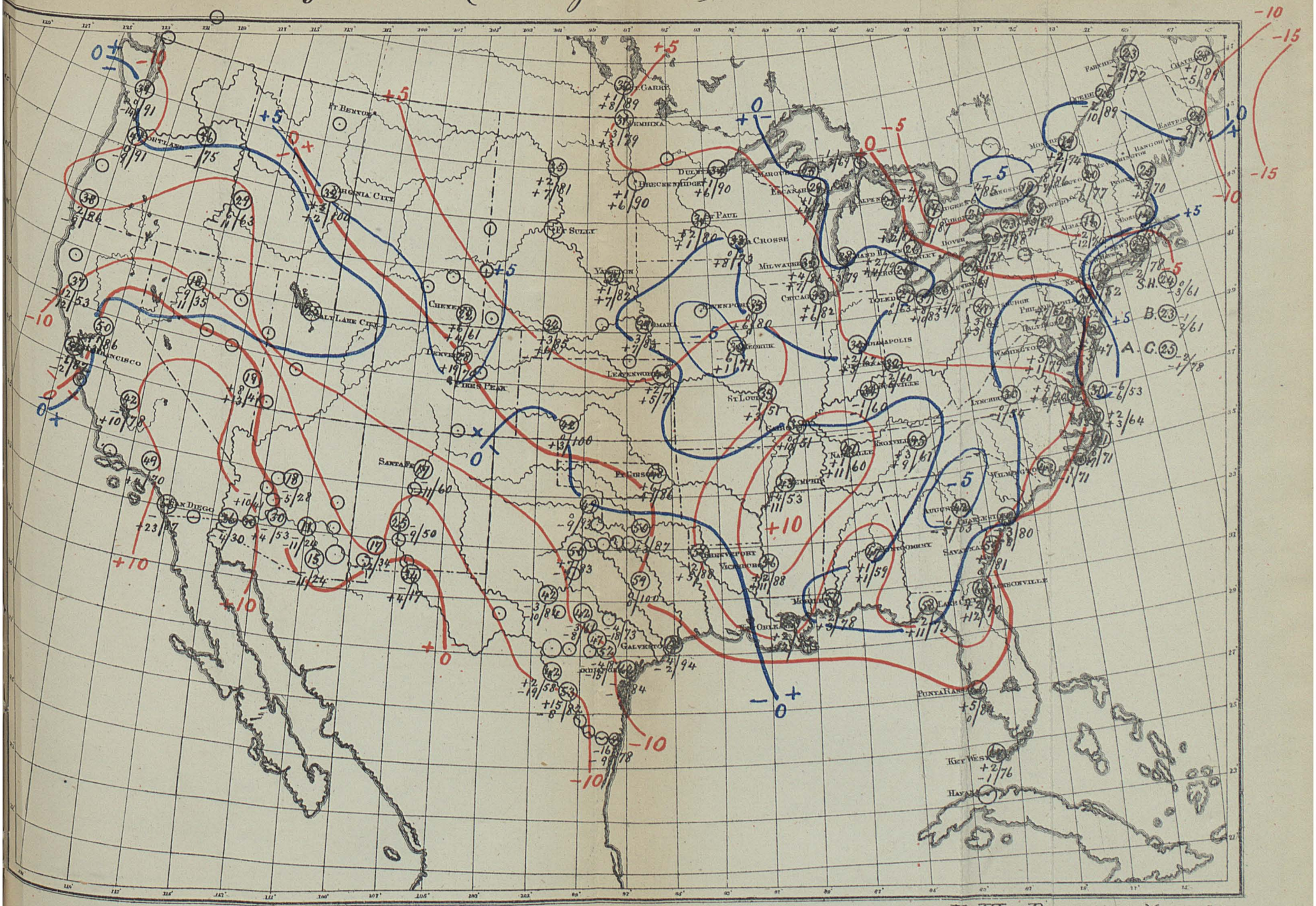
# Monday 11 P.M. (Washington time) November 19th 1877.




F, III. Dew-point Variation.

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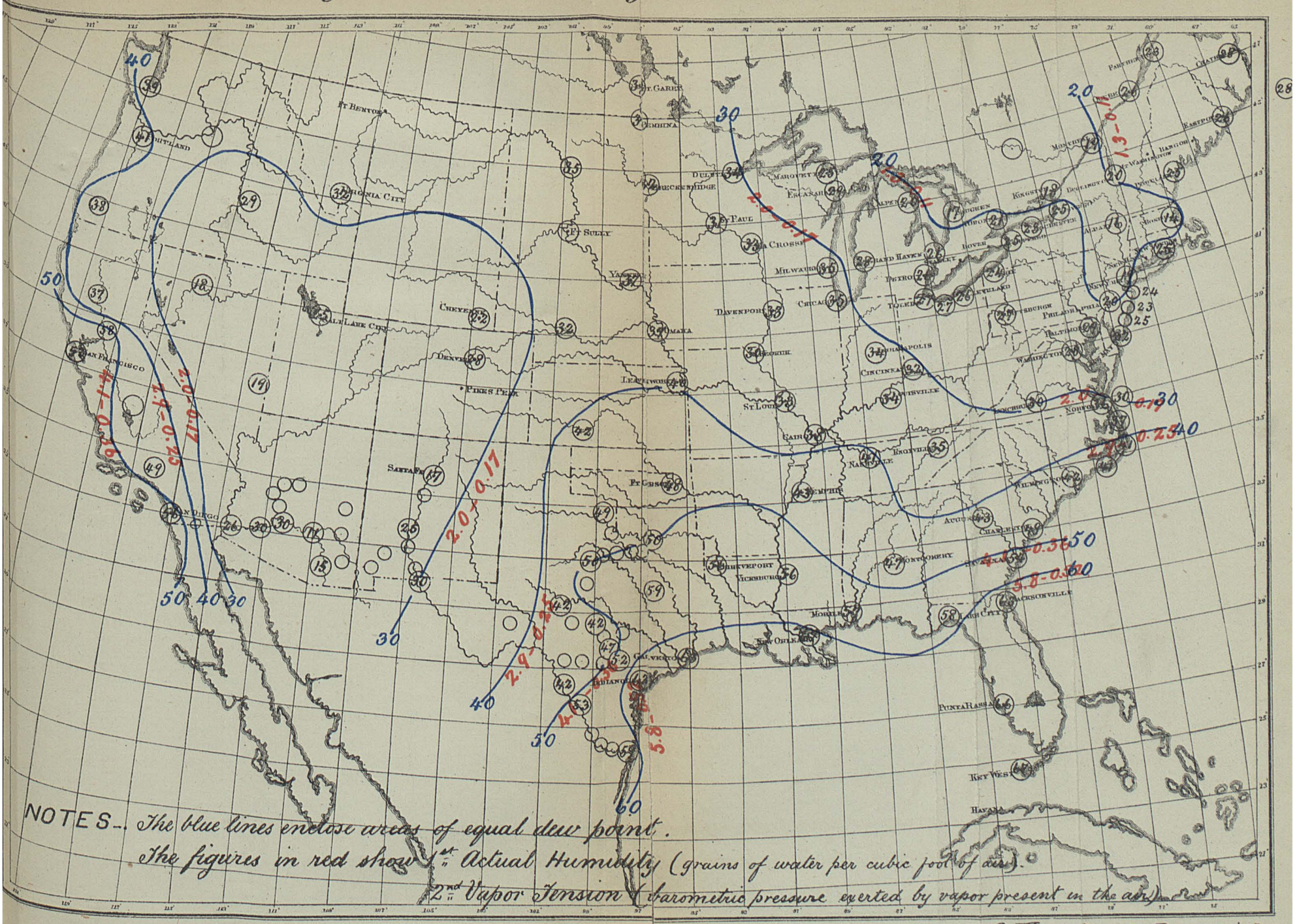
Monday 11 P. M. (Washington time) November 19th 1877.




NOTES.- The blue lines enclose areas of equal dew point.
The figures in red show 1st Actual Humidity (grains of water per cubic foot of air).
2nd Vapor Tension (barometric pressure exerted by vapor present in the air).

G. III. Equal Dew-point Vapor Tension and Actual Humidity

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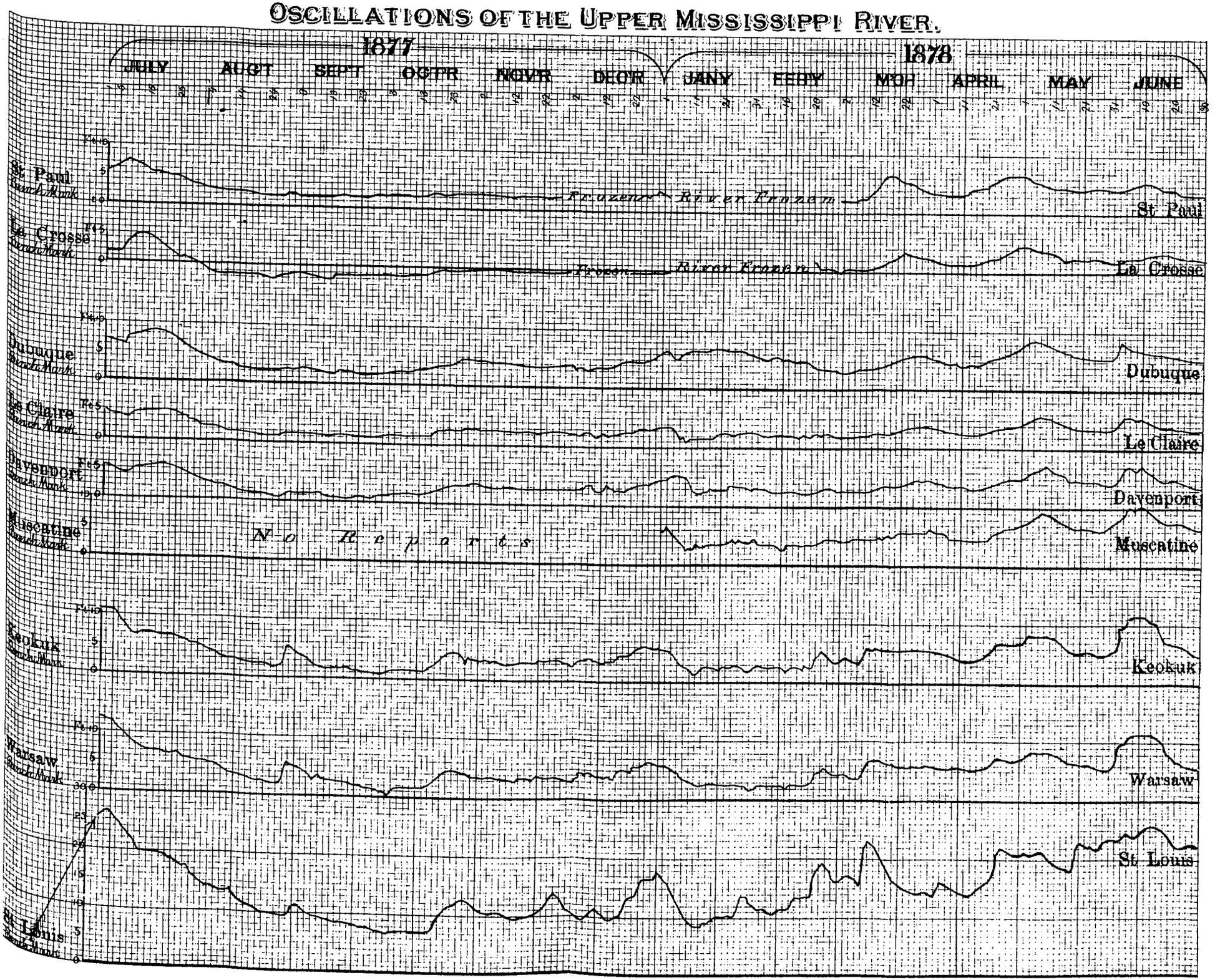
# Oscillations of the Upper Mississippi River.



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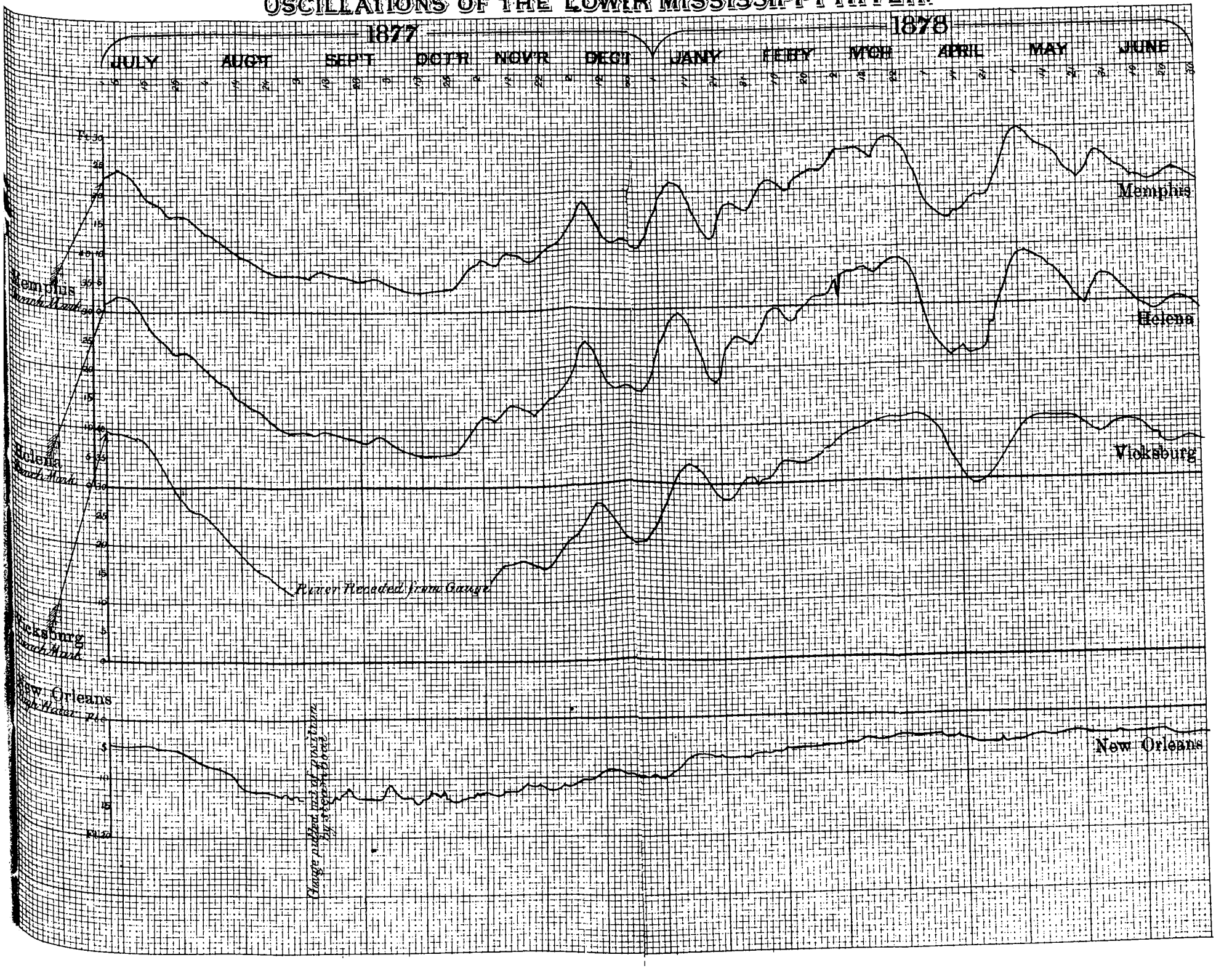
# Oscillations of the Lower Mississippi River.



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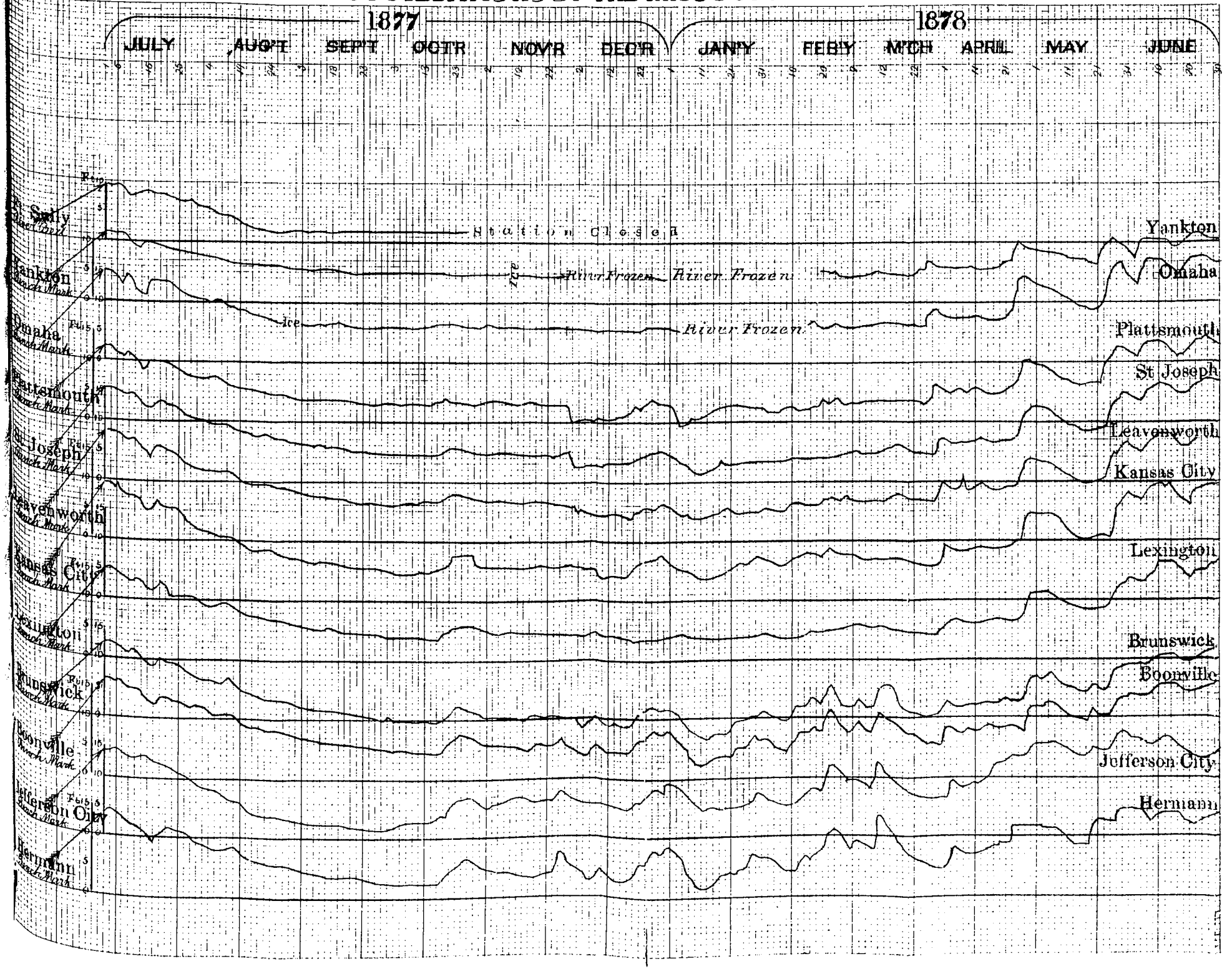
# OSCILLATIONS OF THE MISSOURI RIVER.



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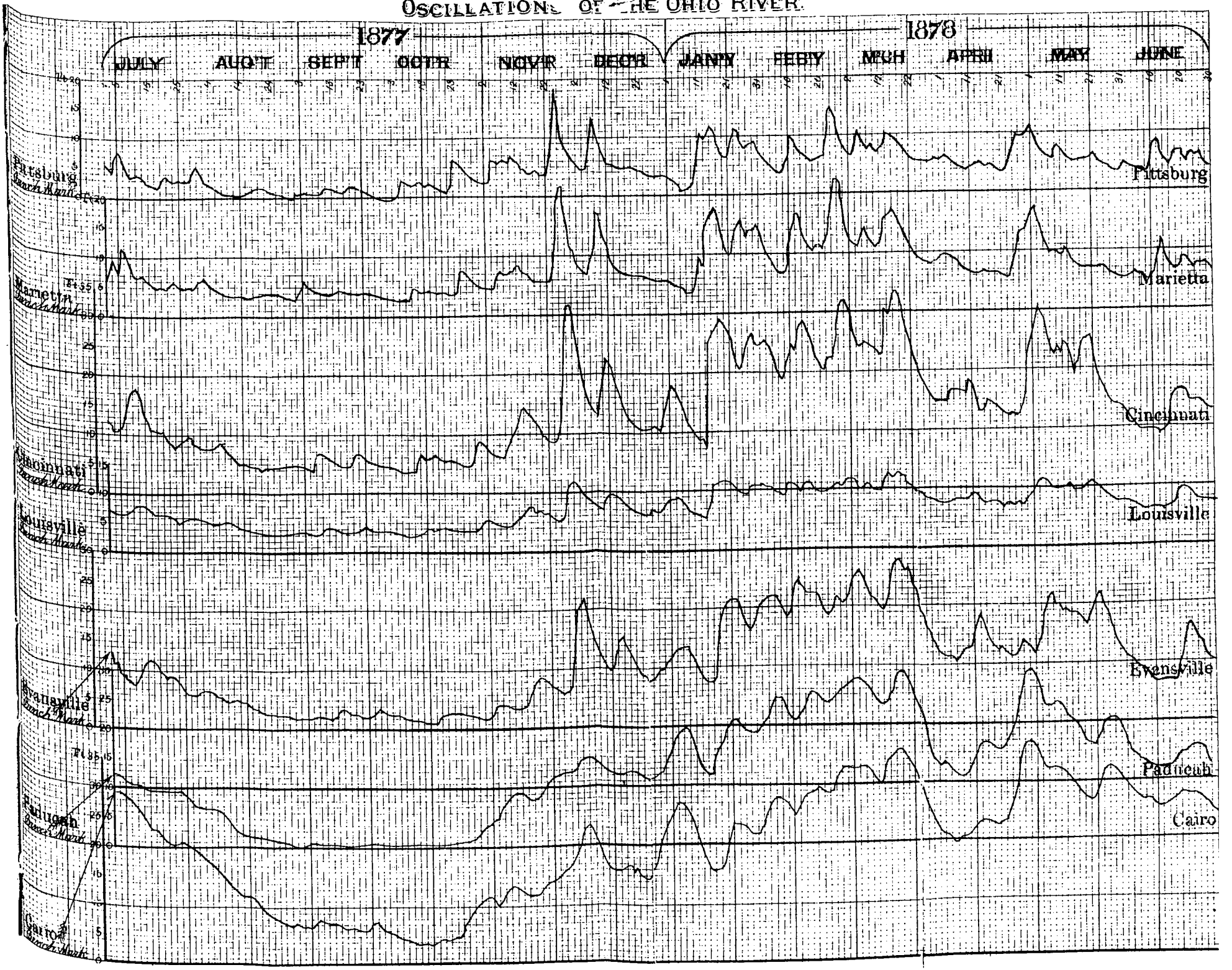
# Oscillations of the Ohio River.



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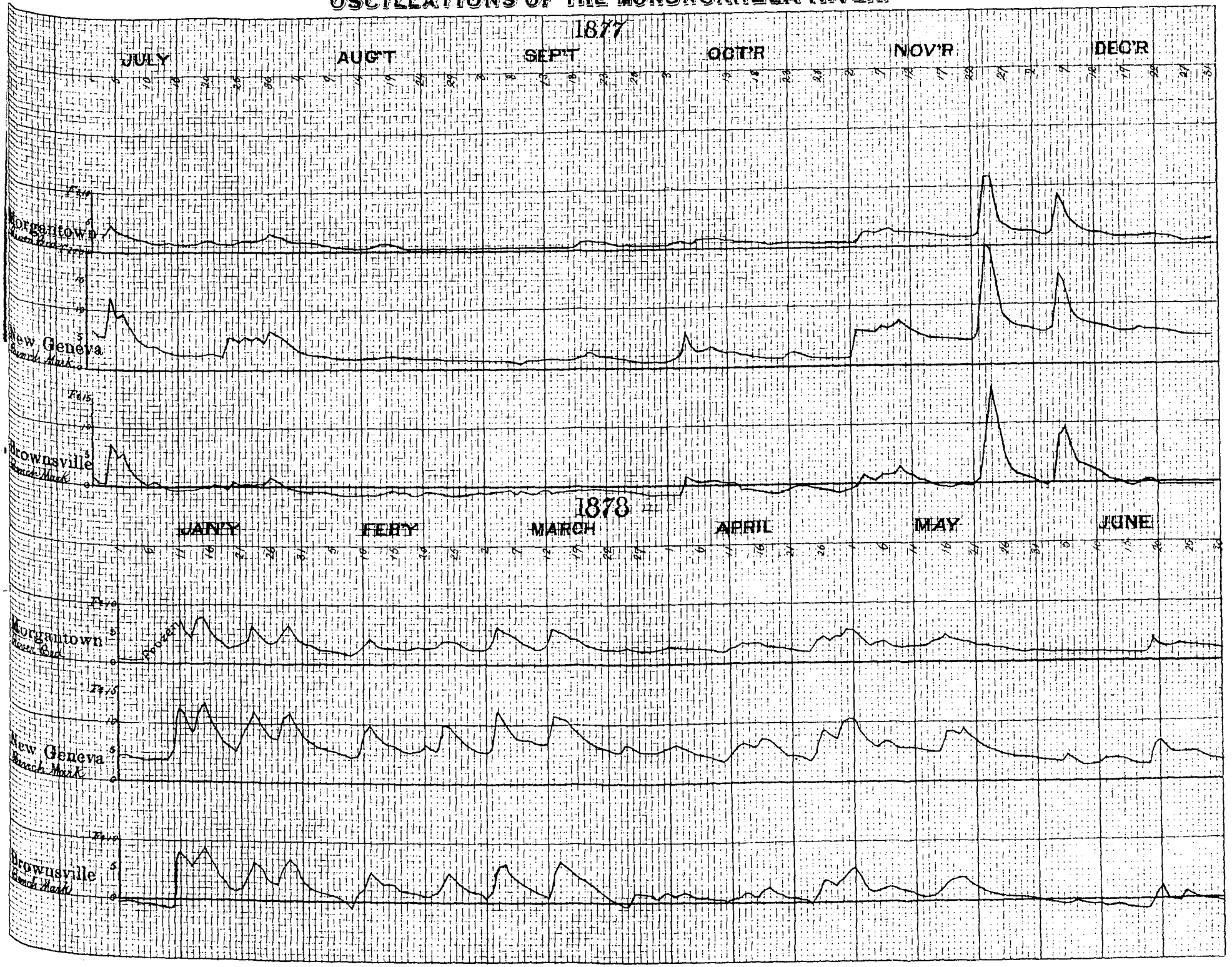
# OSCILLATIONS OF THE MONONGAHELA RIVER.



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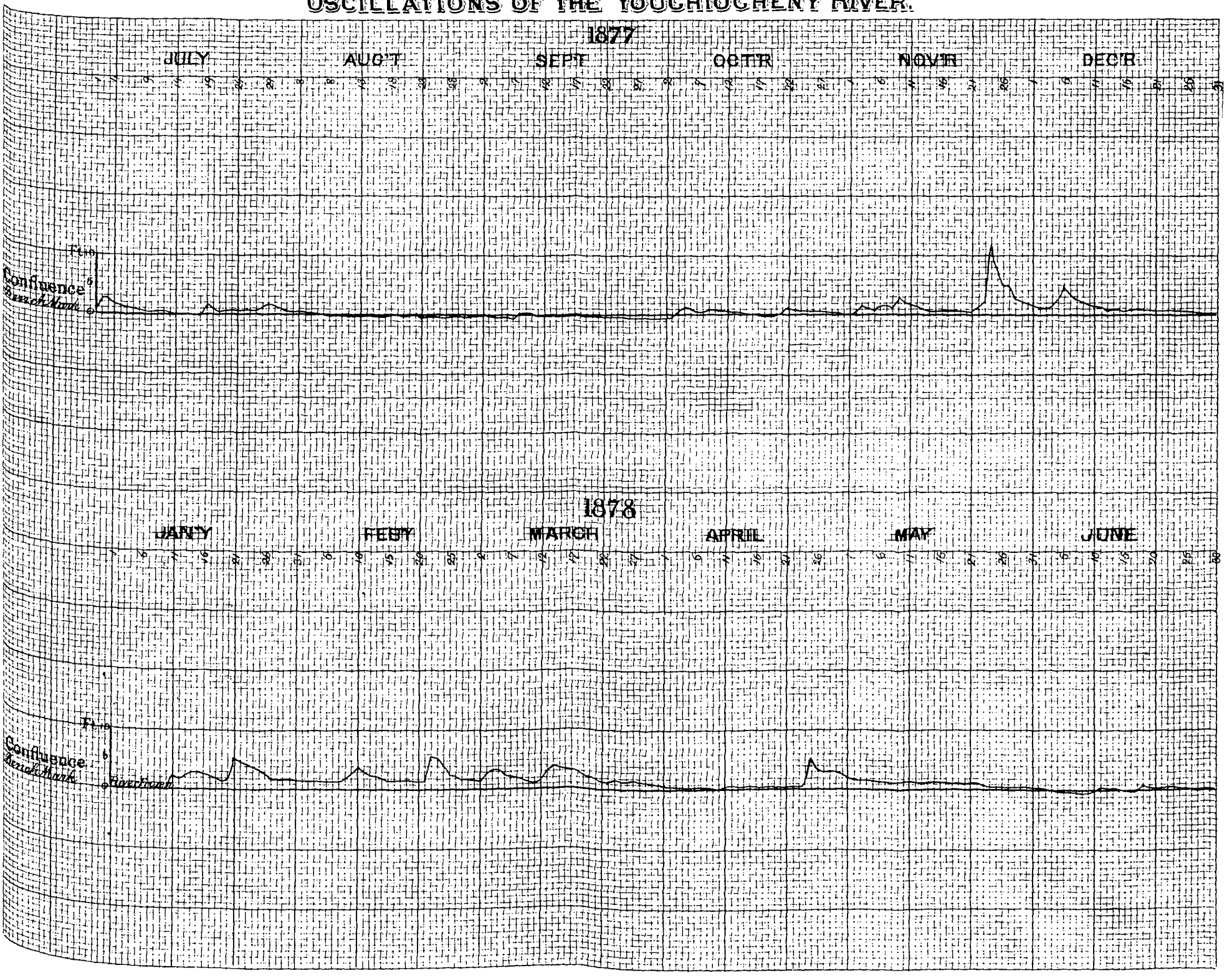
# Oscillations of the Youghiogheny River.



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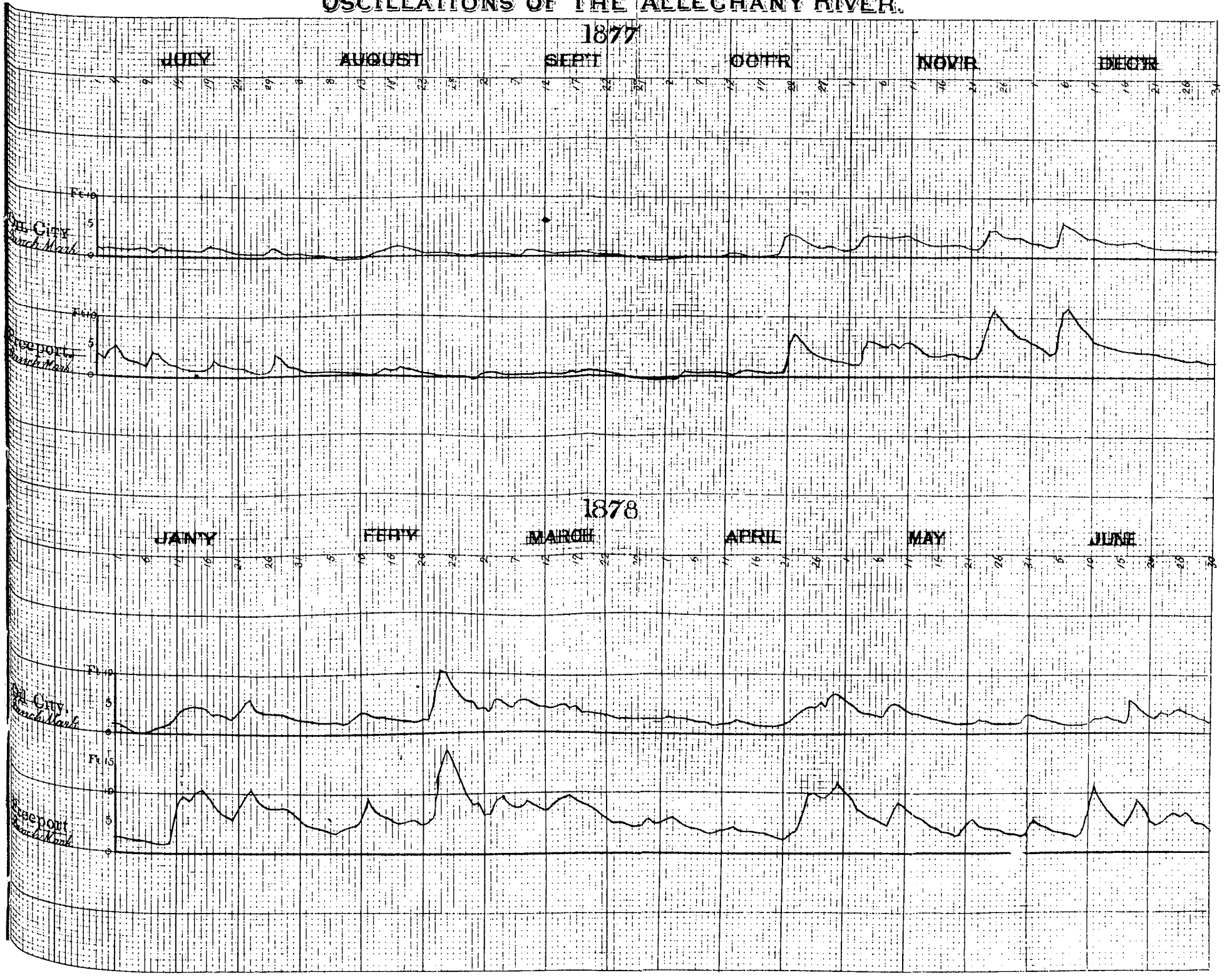
# Oscillations of the Allegheny River.



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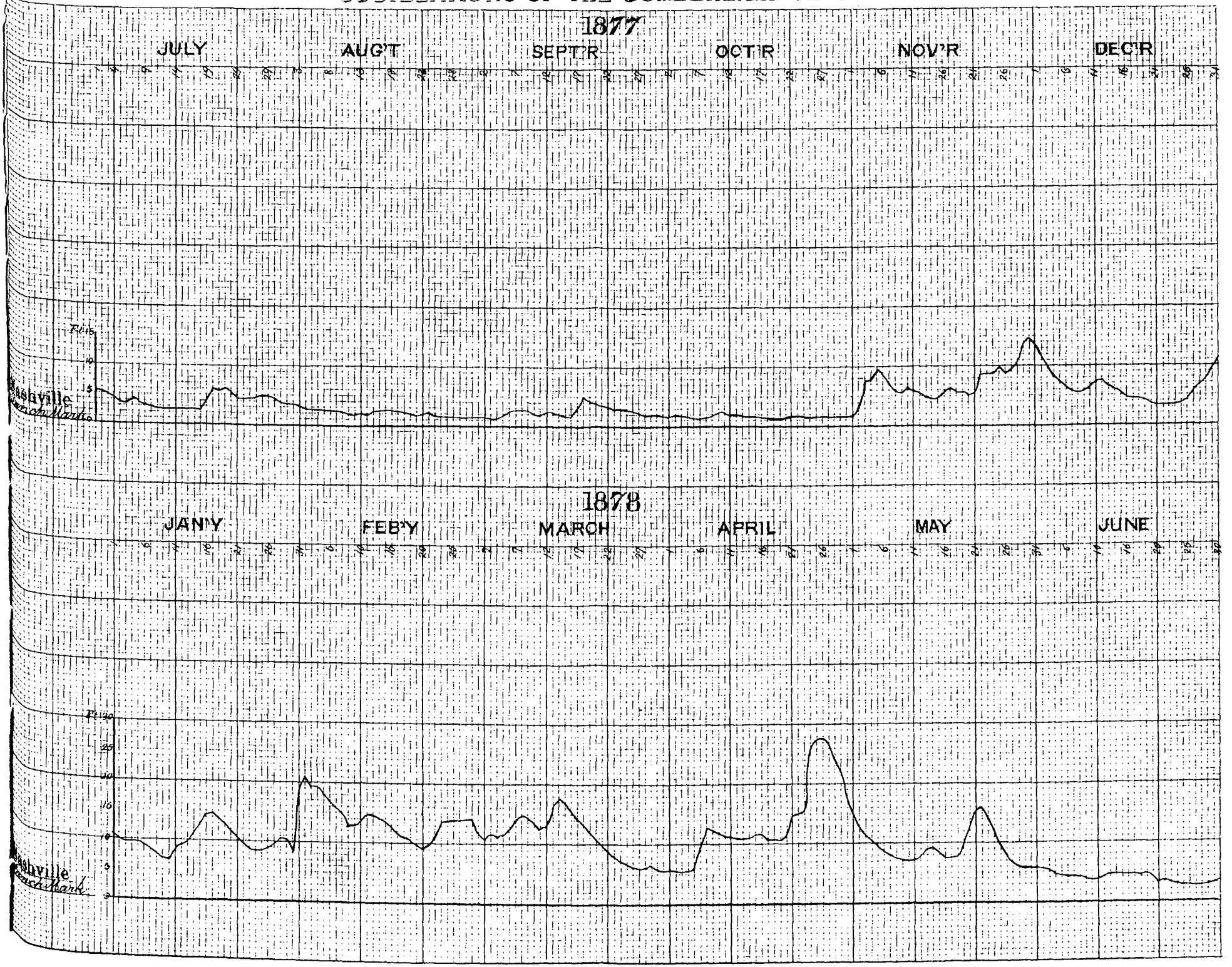
# Oscillations of the Cumberland River.



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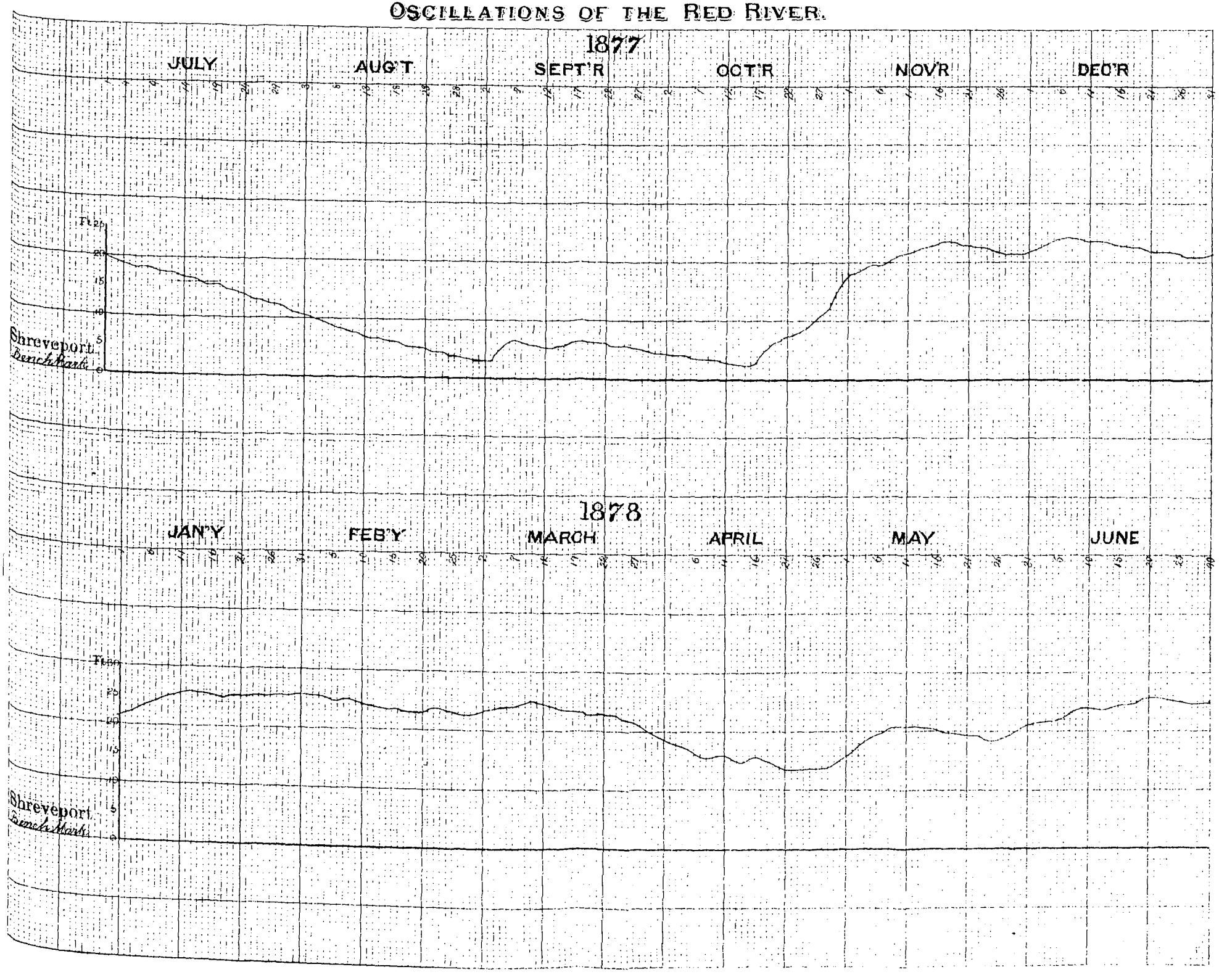
# OSCILLATIONS OF THE RED RIVER.



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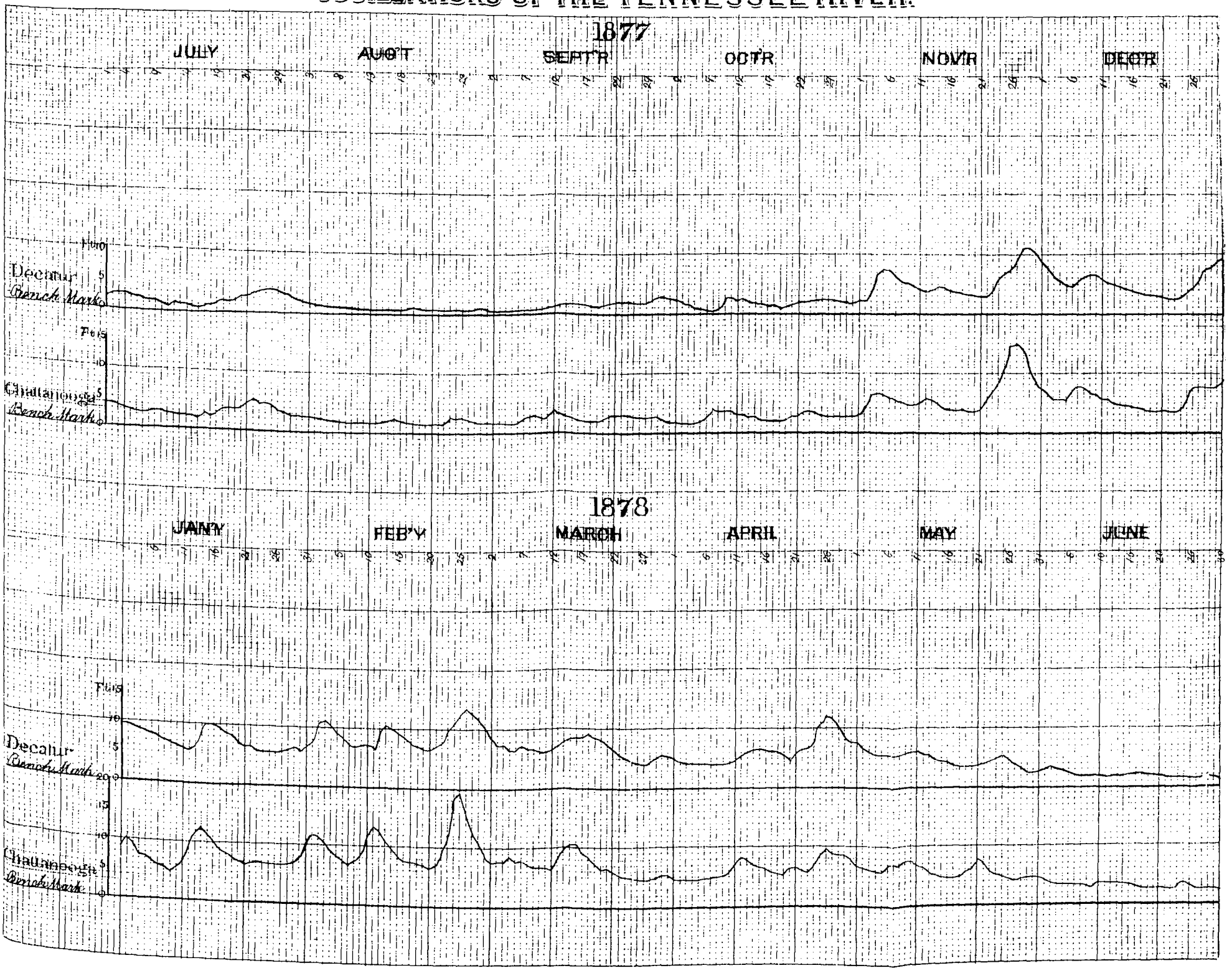
# OSCILLATIONS OF THE TENNESSEE RIVER.