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CHIEF SIGNAL-OFFICER.

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

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REPORT

OF

THE CHIEF SIGNAL-OFFICER.

WAR DEPARTMENT,
OFFICE OF THE CHIEF SIGNAL-OFFICER,
Washington, D. C., November 1, 1875.

SIR: Instruction in military signaling and telegraphy, meteorology, and the Signal-Service duties at stations of observation and report, together with the drills of the Signal-Service with arms, has continued at the established school of instruction and practice at Fort Whipple, Va. The building for instruction purposes, and the other structures at the post, have, under the order of the Secretary of War, been much improved during the year. The apparatus for the different branches to be taught, for the necessary study and practice with instruments for the meteorological duties at stations of observation, the equipment for the drill in field-signaling, the drill with the field-telegraph train, the construction drill for permanent telegraph-lines, and the duties on signal and telegraphic stations are completed, and have permitted the courses to be pursued thoroughly and with advantage. The drills with arms, and in the usual military forms, have been steadily pursued. The duties at the post are conducted under strict military rule. Experiments with new-formed apparatus for the purposes of field-signaling by ærial or electric telegraphy are here conducted. The course at the school of instruction and practice at Fort Whipple is intended to furnish a force of selected enlisted men, at once disciplined as soldiers, and fitted by special instruction for the different special duties of the Signal-Service. There have been instructed during the year eighty men as assistant observers, and forty-two for promotion to the grade of sergeant. The enlisted men on duty at the different stations, together with those of the service employed upon the telegraphic works in charge of the Office, have, with but few exceptions, been here instructed, and are detailed hence to their different posts. The very extensive duties devolving upon the service during the year have rendered it impossible to keep at the post the full force required for all the exercises.

The plan of instruction requires all officers and enlisted men of the Signal-Service to pass the course of drill, study, and practice, and serve regularly at the post of Fort Whipple before being put upon any other duty.

The act approved March 3, 1875, maintaining the Signal-Service as then organized, and providing for one hundred and fifty sergeants, thirty corporals, and two hundred and seventy privates, has been productive of good results. The men who have enlisted under it are of superior quality. (Paper 6.)

The course by which men to be enlisted for the Signal-Service are

first required to pass a preliminary educational examination before they are accepted, are then sent to the post to be drilled, are instructed, tested by practice, instructed later in higher branches, again examined, and again tested before being intrusted with the management of stations, has continued to furnish a force of soldiers of superior education and good character at the many stations throughout the United States. The details of the procedure by which the soldiers appear before different boards and are examined as to qualification for each grade of duty to which they are to be assigned at stations before they are intrusted with it, and before they are promoted, were carefully set forth in the last annual report of the Chief Signal-Officer.

The number of enlisted men on duty at Fort Whipple has varied during the year from one hundred and forty-two to sixty-three, and the number of officers from two to nine. The average number of enlisted men for duty for the last three months of the year ending June 30, 1875, has been seventy-three. The morning report of the post for June 30, 1875, exhibits ten non-commissioned officers and fifty-eight privates as present for duty. Of the number of privates, four were candidates for promotion, and under special instruction. First Lieut. R. P. Strong, acting signal-officer, has continued in charge of the post, and First-Lieut. C. E. Kilbourne, acting signal-officer, has served as instructor. Both officers have well discharged their duties. Acting Assistant Surgeon L. W. Ritchie, U. S. A., has been in charge of the hospital. One officer has completed the full course of instruction during the year past, and six officers are still under instruction at the date of this report. (Papers 1 and 2.) Forty-two enlisted men, who had previously served as assistant observers at stations for six months, have been ordered to Fort Whipple as candidates for promotion to the grade of sergeant during the year. Of this number, thirty passed a satisfactory examination and were promoted; two failed to pass the examination; two were dropped from instruction for misconduct; three were discharged from the service before completing the course of study; and five are still under instruction. (Paper 3.) Eighty enlisted men have passed the course of instruction and practice during the year, to fit them for the duties of assistant observers. (Paper 4.) The plans for the instruction, the practice, and for the different examinations the enlisted men are required to pass, reported upon in the last annual report of the Chief Signal-Officer, have remained unchanged.

The instruction in the duties of the Signal-Service elsewhere than at Fort Whipple has been as follows: One of the officers at the Military Academy at West Point is designated as instructor in military signaling and telegraphy, in addition to other duties, but no reports have been received from him showing the amount of time devoted to this duty, or the progress made by the cadets. In the Department of the Missouri, Second Lieut. Philip Reade, Third United States Infantry, was succeeded as instructor, August 6, 1874, by Capt. C. S. Ilsley, Seventh United States Cavalry, and A. D. C., from whom reports for September and October, 1874, have been received. In the Department of Dakota a form of instruction has been maintained, and monthly reports are made with regularity, but no information is had as to actual results hitherto derived from the work. In the Department of the Atlantic, instruction has been given at Fort Wadsworth, New York Harbor, by Lieut. R. D. Potts, acting as post signal-officer. Details of officers to serve as instructors in signaling have been made in several other military departments and at numerous military posts, but no details of officers who have been themselves properly qualified to act as instructors,

by passing the full course of study and practice at Fort Whipple, Va., have been reported to this Office. 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 first instructed at this post before being put upon detached duty.

The work done at this Office has been extensive, covering a wide field of operations, with many and complicated details, each requiring to be carefully elaborated for each day, and each limited for its discharge to fixed and very brief periods of time. The steadily-improving organization of the service has permitted each branch of duty to be carried on with regularity.

The correspondence of the Office in its several divisions is of large amount. Fifty-eight thousand one hundred and ninety-three communications have been sent, and eight hundred and eight thousand eight hundred and sixty-five have been received, during the year. The record of this correspondence, much of which is formal, is classified in Paper 5.

The aggregate of the correspondence is eight hundred and sixty-seven thousand and fifty-eight letters and documents sent and received, exclusive of publications and telegrams.

The numerous requests for information on very varied subjects, many of them only indirectly connected with the duties of this Office, require of themselves much attention.

The Office is in communication with numerous foreign correspondents, having now official relations with scientists and the chiefs of meteorological services of nearly every prominent power in the northern hemisphere.

Brevet Lieut. Col. Garrick Mallery, acting signal-officer and assistant, has continued in charge of records, general correspondence, and orders, with the superintendence of enlistments and other duties especially assigned to him. Recruiting for the Signal-Service has been conducted at this Office under the general supervision of this officer.

The amount of work in the property-division of the office has increased during the year. First Lieut. Henry Jackson, acting signal-officer and assistant, has remained in charge as property and disbursing officer.

The average cost of maintaining each station of observation during the year has been $489.86. This amount is exclusive of the cost of telegraphing reports.

In addition to other duties, Lieutenant Jackson, as in charge of the map-room, has supervised the preparation of numerous maps and charts, and has continued during the year the collection of statistics for obtaining the accurate elevation of the several stations of observation. Sixty-nine lines of levels, to be used in connection with this work, have been received from civil engineers during the year. One hundred and sixty-nine dollars and thirty-two cents have been received during the year from the sale of maps and other office publications, in accordance with the act of Congress approved March 3, 1874, authorizing such sales. Six hundred and twenty meteorological instruments have been purchased since last report, and three hundred and eight issued.

The library of the Office now contains three thousand and twelve bound volumes, and has upon its files many valuable pamphlets, maps, and charts. The works are selected with reference to their value to the scientific branches connected with the duties imposed upon the Office. A large number have been obtained without expense to the United States, through the system of exchanges established. Paper 7 exhibits a list of exchanges.

Brevet Captain H. W. Howgate, acting signal-officer and assistant, has continued to have general charge of instruction and general supervision of non-commissioned officers and assistants on station duty, and of the receipt, record, and publication of the weather reports, together with other duties especially assigned him. The following is the record of stations reported by this officer:

ALBANY, NEW YORK.

[*Official number*, 16.]

Latitude	42° 40′
Longitude	73° 45′
Mean barometer for the year ending June 30, 1875	30.023
Mean temperature for the year ending June 30, 1875	44°.06
Amount of rain-fall for the year ending June 30, 1875	34.69 inches

Sergeant A. Donhauser remains in charge of the station, with six assistants, two of whom are printers and one a telegraph operator. The care of the astronomical instruments in the observatory and of the buildings requires the constant services of one man, while the distance of the station from the business part of the city renders an additional assistant necessary to get the reports to press and post-office in time for publication and distribution. A liberal amount of space is devoted by the local papers to the publication of the daily reports in tabulated form. One assistant was transferred to the central office, being the only change made during the year in the working force—a fact alike creditable to sergeant and assistants.

Three hundred and twenty post-offices are supplied regularly with the farmers' bulletin.

All instruments in use are of the standard pattern, except the self-register for anemometer, which is one devised by Professor Hough, and in use at the station when first occupied. All are in good order. The station was inspected in July, 1874, and found in excellent condition. Standard time continues to be given to the New York Central Railroad, to the telegraph-offices in the city, and to several private citizens, as stated in the last annual report. No change has been made in the location of office. All reports are received at this station over a wire belonging to the Signal-Service, which connects the observatory with the main telegraph-office in the city, and is thrown into the regular circuit at report hours.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Farmers' bulletins	162,627
Manifold bulletins	11,800
Miscellaneous	1,359
Total	175,786

ALPENA, MICHIGAN.

[*Official number*, 85.]

Latitude	45° 05′
Longitude	83° 28′
Mean barometer for the year ending June 30, 1875	20.995
Mean temperature for the year ending June 30, 1875	33°.6
Amount of rain-fall for the year ending June 30, 1875	22.56 inches

Sergeant Bayes was relieved July 15, 1874, by Sergeant T. S. Collins, who remained until June 7, 1875, when he was transferred to another station, and succeeded by Sergeant William Baber, who remains in charge. There is one assistant at the station, who has been on duty throughout the entire year, and given satisfaction. No change has been made in the location of office, but one is contemplated at an early date. Twenty-four cautionary signals have been displayed, of which number twenty are reported as justified at the station.

In reference to these displays, the sergeant remarks as follows:

In regard to display of Cautionary Signals, I have it from Messrs. Avery, Gilchrist, and the Hon. W. L. Churchill, extensive dealers and shippers of lumber, that they will not allow vessels in which they have any risk to leave port during the display of signals.

But few vessels have left port while the signal was flying, or until the gale which it predicted has passed. Captains and owners of vessels invariably call at this office when a signal is flying, to ascertain the action of the local instruments before leaving port. No wrecks have occurred at this port.

September 19–20, 1874.—Steamer Saint Joseph encountered high wind and rough weather coming from Mackinaw. Steamer John Sherman left port at 8 a. m., for Bay City, but had to put back; heavy rain accompanied the display.

September 26–27, 1874.—Lumber-vessels laid in harbor all day. Wind not dangerous at station, but very brisk on the lake.

October 1–2, 1874.—No vessels left port. The United States mail-steamer Dunlop remained in harbor on account of signal.

November 5, 1874.—Mail-steamer detained. No vessels left port.

November 14–15, 1874.—Shipping remained in harbor on account of signal.

November 22–24, 1874.—Only one vessel left port during display, the steamer Marine City, which returned after having gone about a mile.

December 8–9, 1874.—All vessels remained in port. No disasters.

As telegraphic reports from all other stations are not received here, the only publications made are of the local observations, which have been published regularly. Telegraphic communication with the station has been interrupted on several occasions during the year, when communication was of especial importance, but the causes of these interruptions appear to have been in each instance beyond the control of the telegraph company.

The station was inspected in August, 1874, and found in good condition, and all standard instruments in good working order.

ATLANTIC CITY, NEW JERSEY.

(*Official number*, 116.)

Latitude	36° 22′
Longitude	74° 25′
Mean barometer for the year ending June 30, 1875	30.084
Mean temperature for the year ending June 30, 1875	49°.07
Amount of rain-fall for the year ending June 30, 1875	36.16 inches

Sergeant William F. Slater was relieved January 20, 1875, for discharge, and was succeeded by Sergeant C. Cramer, who still remains and has one assistant. One man was relieved for misconduct February 25, 1875, and one transferred to another station May 13, 1875, since which date the present assistant has been on duty. No change has been made in the location of office. Forty cautionary signals have been displayed during the year, of which number twenty-seven are reported as fully justified, and one partly justified at the station. The station is on the coast signal-line, and connected with the central office by telegraph, and the men on duty are necessarily operators. A special report is made daily during the months of July, August, and September for the Philadelphia press of the extremes and means of temperature and the

mean humidity. One hundred and forty-five Bulletins and one hundred and eighty-six manifold copies of the Synopses and Probabilities have been displayed, and reports furnished regularly to the local press. The station was inspected in January, 1875, and found in good condition, and all instruments and apparatus at that date in working order. The sergeant at this station is required to keep the telegraph-line in repair from the north side of Great Egg Harbor to the south side of Little Egg Harbor, a distance of thirty-six and one-half miles. A part of the line runs across the salt marshes, and includes several cables, and during the stormy seasons interruptions are frequent.

The following marine disasters have been reported from this station over the coast-line:

June 11, 1875.—A schooner, name unknown, ran aground at entrance to inlet, but got off safely the same day.

June 28, 1875.—A schooner, name unknown, stranded on Brigantine Shoals in the evening, but got off safely the next morning.

AUGUSTA, GEORGIA.

[*Official number*, 23.]

Latitude	33° 28′
Longitude	81° 54′
Mean barometer for the year ending June 30, 1875	30.105
Mean temperature for the year ending June 30, 1875	63°.4
Amount of rain-fall during the year ending June 30, 1875	61.51 inches

Sergeant Henry Bessant remains in charge, with three assistants, one of whom is a printer. One assistant was ordered in for discharge, December 28, 1875, and one as a candidate for promotion, March 12, 1875. No change has been made in the location of office. Seventy-seven post-offices are supplied regularly with the farmers' bulletin. The local newspapers devote a liberal amount of space to the publication of the various reports. The citizens take special interest in the reports from the stations in the cotton-growing States. The station was inspected in November, 1874, and found in good condition so far as the records and instruments were concerned. The location of the office was reported to be objectionable, and the exposure for the thermometer a poor one. Efforts to remedy these faults have been made, but so far without success. Augusta is a transfer station for reports exchanged between the Gulf and Coast circuits, and for probabilities sent to Montgomery for issue of Farmers' Bulletin. The sergeant has performed his duties faithfully and rendered all reports, both mail and telegraphic, regularly and promptly.

PUBLICATIONS.

(*Year ending June 30th*, 1875.)

Farmers' bulletins	39,599
Bulletins, manifold	4,189
Maps, manifold	2,338
Local reports	628
Form 22	44
Total	46,798

BALTIMORE, MARYLAND.

[*Official number*, 18.]

Latitude	39° 18′
Longitude	76° 38′
Mean barometer for the year ending June 30, 1875	30.082
Mean temperature for the year ending June 30, 1875	53°.9′
Amount of rain-fall for the year ending June 30, 1875	35.84 inches

Sergeant Hiram Penrod was in charge of station until discharged from the service, at his own request, September 12, 1874. He was succeeded by Sergeant W. T. Boyd, who remained until April 24, 1875, when he was relieved by Sergeant J. Kabernagle, who still remains, and whose management of the station has been satisfactory. There are three assistants on duty, one of whom is a non-commissioned officer. Three assistants have been transferred to other duty during the year. The station is on the coast circuit, connected with the central office, and all matter passing over that circuit is dropped here, and, in consequence, the men on duty are required to be practical telegraph operators.

Reports are received from the Cape Henry signal-station of all vessels passing that point, and are furnished to the press and to the chamber of commerce, for the information of all concerned. Eighteen cautionary signals have been displayed during the year, of which number, seven are reported as wholly justified at the station, and two partially justified.

The sheltered position of the city protects it from violent winds, and several of the signals reported by the sergeant as not justified immediately at the station were fully justified by the presence of high winds down the bay. Signals continue to be duplicated by Mr. Dudley, at the Marine Observatory on Federal Hill, with good results.

The public interest in the service continues unabated, and the local reports are published in most of the daily newspapers, together with the probabilities, and selections from the reports of other stations. During the exhibition of the Maryland Institute a display was made of the instruments used in the service, and attracted marked attention.

Sixty-one copies of the morning map printed at the central office are received here by 2 p. m., daily, (except Sundays,) and promptly distributed to the leading public offices and places of business. All reports passing over the New York and Washington circuit are received and bulletined here. The station was regularly inspected in January, 1875, and found in poor condition. The irregularities reported by the inspector were promptly corrected, and at the present time office records and instruments are in good condition. Several informal inspections have been made with beneficial results. No change has been made in the location of the office.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Manifold form 15	1,932
Bulletins, manifold	8,130
Local reports	2,665
Form 22	127
Total	12,854

BANGOR, MAINE.

[*Official number*, 111.]

This station does not make meteorological observations, having been established for the purpose of printing and distributing the Farmers' Bulletin.

Sergeant John T. Downes has been in charge during the year with one assistant, both men being printers. One assistant was ordered in

for promotion, February 8, 1875, and his successor still remains. The work has been well and promptly done and the bulletins issued regularly. One hundred and seventy-five offices are supplied, and the total issue for the year has been 84,082 copies. The copy for the bulletin is sent from New York immediately upon its receipt at that station from the central office, and there have been only two failures to issue during the year, both caused by telegraphic delays. The station was inspected in November, 1874, and the office found well located, the station property in good condition and the conduct of the men on duty satisfactory.

The inspecting officer reported that the copy for the bulletins was usually received by 2 a. m., and the entire work finished by 5 a. m., or an hour before the time of closing the mail. No change has been made in the location of office.

BARNEGAT, NEW JERSEY.

[*Official number*, 115.]

Latitude	39° 48′
Longitude	74° 09′
Mean barometer for the year ending June 30, 1875	30.024′
Mean temperature for the year ending June 30, 1875	49°.1
Amount of rain-fall for the year ending June 30, 1875	46.02 inches

Sergeant F. Mangels was relieved August 8, 1874, for neglect of duty, and punished by reduction to the rank of a private soldier. He was succeeded by Sergeant E. D. Holbrook, who remained until May 13, 1875, when he was transferred to the Long Branch station, and succeeded by Sergeant W. H. Ray, who still remains. One assistant is allowed the station. During the year one man deserted and a second was transferred to another station. The present assistant has been on duty since January 5, 1875. Both men are telegraph-operators, as this station is on the coast line and in telegraphic communication with the central office. The sergeant in charge is required to keep the line in repair from Barnegat Inlet to the north side of Little Egg Harbor, a distance of twenty-seven miles. Thirty-six cautionary signals have been displayed, of which number twenty-one are reported as justified at the station. The office was removed May 25, 1875, to life-saving station No. 17, on the south side of the inlet, and is in the south room of the upper story of the building. The size of the office is 18 by 21 feet, with one window facing southwest, affording a fair view of the sea. The cautionary signal flag-staff is erected on the east end of the building. The anemometer is placed on a post forty yards northeast of the building, on a sand-hill, and the rain-gauge is twelve feet south of the anemometer. The instrument-shelter is fastened to the northern end of building, about two feet from the ground.

The removal of the office to its present location facilitates the repair of the telegraph-line, and affords the men better opportunities for getting their mail. The cost of getting mail-matter to the old station became so great that it was necessary to limit the number of times for which its transmission would be paid by the Government. A special report is made daily during July, August, and September, of temperature and humidity for the Philadelphia press, by which it is regularly published. The station was inspected in February, 1875, and found in fair condition. The irregularities pointed out by the inspector were ordered to be corrected, and at present it is believed that the instruments and records are in good condition.

The following disasters have been reported from this station:

1. *September* 8, 1874.—Schooner Ellen Osborn, of Squan, struck wreck off Barnegat Inlet.
2. *December* 5, 1874.—Sloop Joe, from New Rochelle, swamped in Barnegat Inlet, with two men on board, one of whom was drowned.
3. *December* 22, 1874.—Steamer South Carolina went ashore on Barnegat Shoals, from Charleston, with cargo of cotton for New York. Part cargo thrown overboard; six passengers, all saved. Got off at high water with aid of wrecking-vessels on the 25th.
4. *December* 30, 1874.—Sloop aground on Barnegat Shoals, name unknown; got off at high water same date.
5. *January* 22, 1875.—Propeller Mediator, from New York to Port Royal, with assorted cargo, went ashore on Barnegat Shoals. No passengers; no lives lost; crew brought ashore in life-boats; cargo saved by aid of wrecking steamer; vessel lost.
6. *March* 24, 1875.—The yacht James Nelson, which has been lying in Barnegat Inlet all winter, struck on a sunken wreck in main channel of Barnegat Inlet. Seven passengers; all saved; bound for New York; value of vessel, $1,200; cargo, household goods; value, $400. Sunken wreck was under water and could not be seen; vessel partly filled with water and was run ashore; assistance was rendered by life-saving crew. Those on board found shelter in life-saving station.

Information of each disaster was, in every case, promptly furnished to the press and to the owners of vessel and cargo.

BENTON, WYOMING TERRITORY.

[*Official number*, 71.]

Latitude	47° 52′
Longitude	110° 40′
Mean barometer for the year ending June 30, 1875	29.993
Mean temperature for the year ending June 30, 1875	41°.4
Amount of rain-fall for the year ending June 30, 1875	10.70 inches

Sergeant William McGillivray remains in charge of the station, and has made all reports regularly by mail, without assistance. No telegraphic reports have been received from this station during the year; but it is understood that the line connecting it with Virginia City is to be put in repair at an early date, when such reports can be resumed. The office was moved, November 7, 1874, from the fort to the town of Benton, and is located in a log-house, one story in height, containing two rooms. The wind-vane and anemometer are exposed from the roof, and the rain-gauge twelve inches above the ground, 45 feet from the nearest building, and 34 feet from the nearest fence. The window in which the instrument-shelter is placed faces north 33° east, and is the best that could be obtained. The nearest building is more than 100 feet distant.

Mr. Francis Tressalt has been selected by the sergeant to make observations and reports in the event of his sickness or disability. No inspection has been made of this station since September, 1872, but so far as known the condition of the instruments is good. All reports have been forwarded promptly and in proper form by the sergeant, who has not permitted the isolation of the station to divert his attention from duty. No publications have been made at this station during the year.

BISMARCK, DAKOTA TERRITORY.

[*Official number*, 104.]

Latitude	46° 48
Longitude	100° 38′
Elevation of barometer above sea-level	1,677 feet

The station was established in September, 1874, and the first report was sent on the morning of the 15th of that month. The office is well located, on Main street between Second and Third. The exposure for

instruments is good. The shelter is of the standard model, and projects from a window facing north. Sergeant J. H. Smith has been in charge since establishment of station, and has made all reports without assistance.

The station was inspected in June, 1875, and found in good condition. No reports are received here, and the only publications consist of the local reports, which are printed weekly in the local newspaper.

The telegraphic reports from this station have been frequently delayed by interruptions in the telegraphic communication, as at all other frontier stations. No change has been made in the location of office, nor is any considered necessary at present.

BOSTON, MASSACHUSETTS.

[*Official number*, 13.]

Latitude	42° 21′
Longitude	71° 04′
Mean barometer for the year ending June 30, 1875	30.029
Mean temperature for the year ending June 30, 1875	47°.6
Amount of rain-fall for the year ending June 30, 1875	46.86 inches

Sergeant D. C. Ralston remains in charge of station, and has three assistants, two of whom are printers. One assistant was removed for misconduct and one transferred to another station during the year. Sergeant M. F. Tighe was in temporary charge during absence of Sergeant Ralston for one month. No change has been made in location of office, but it is proposed to move into the Equitable Life-Assurance Building as soon as it is ready for occupancy. Farmers' bulletins are issued regularly to seven hundred and twenty-five post-offices, and the work has been well and promptly done. The work of addressing wrappers for the bulletins has been facilitated at this station by having the names printed in sheets on plain paper and then gumming them on as needed. Thirty-three cautionary signals have been ordered, of which number sixteen are reported as fully justified, and two partly so, at the station. In reference to these displays the sergeant remarks as follows:

September 29–30, 1874.—The signal was noticed by over fifty (50) vessels in the harbor; no damage as far as heard from.

November 23–24, 1874.—No vessel left port until signal was lowered; brig capsized in harbor, and one man lost overboard; chimneys blown down at Somerville. On morning of the 23d a strong southeast wind prevailed, and the tide rose to a height not known for years, flooding very many cellars, &c.

November 29–30, 1874.—During the storm a schooner in the harbor capsized; one man lost; no damage reported other than a general demolishing of chimneys in the path of the storm.

December 20–21, 1874.—No damage reported, as the shipping in the harbor was well protected.

January 9–10, 1875.—No knowledge of any injury; shipping remained quietly in port during display of signal.

January 24–25, 1875.—Very severe snow-storm.

January 29–30, 1875.—Vessels remained in harbor; no knowledge of any injury.

February 11–12, 1875.—No knowledge of any injury; the Portland steamers remained in port during the gale, which was very severe off the coast.

February 25–26, 1875.—Owing to the high northwest wind it was impossible for vessels to leave the harbor.

February 27–28, 1875.—Owing to the timely warning, no damage resulted from storm at this station.

March 3–4, 1875.—No knowledge of any injury; storm very severe outside the harbor.

April 12–14, 1875.—A heavy northeast snow-storm, the most severe of the season; no knowledge of any injury.

May 12–13, 1875.—When the signal-indicator at the Board of Trade and Merchants' Exchange was hoisted, they got their boat and men ready and rendered good assistance in the harbor.

The station was inspected in October, 1874, and found in as good condition as the location and size of the office would permit.

Capt. Nathaniel Spooner, chairman of the Meteorological Committee of the Merchants' Exchange, has shown a marked interest in the service, and the inspector remarks that "any plan calculated to extend or widen the sphere of usefulness of the service would command the most hearty sympathy and support of the Boston merchants."

Full reports, or selections from them, are printed regularly in the daily newspapers, and a strong desire has been expressed by the members of the meteorological committee to have a greater number of them furnished to the station, in order that maps might be issued daily.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Farmers' bulletins	349,682
Bulletins, manifold	16,020
Maps, manifold	7,636
Local reports	1,632
Form 22	158
Total	375,128

BRECKENRIDGE, MINNESOTA.

[*Official number*, 82.]

Latitude	46° 11′
Longitude	96° 17′
Mean barometer for the year ending June 30, 1875	30.003
Mean temperature for the year ending June 30, 1875	35°.3
Amount of rain-fall for the year ending June 30, 1875	23.38 inches

Sergeant Hermann Frey has been in charge throughout the year, and has had no assistance. No change has been made in the location of the office, but one will be made as soon as a new building, now under contract, can be completed.

Telegraphic communication has been somewhat irregular during the year, but is, perhaps, as good as can be expected in a new country, where the amount of business done is small. Improvement in this respect is promised by the officers of the telegraph company, and will undoubtedly be made, as they appear to appreciate the importance of this work and the value of the reports from the outlying stations, of which this is one.

The station was inspected in May, 1875, and the instruments were found in good condition generally. The office-room and the station-records were found in very bad condition, showing gross carelessness on the part of the sergeant in charge. Proper steps have been taken to correct these reported errors. The inspector states that the reports from this station are almost daily called for by farmers living along the line of railroad to Saint Paul. There are no newspapers published at the station, nor are any reports received from other stations, and no publication, in any form, is made of the local reports.

BUFFALO, NEW YORK.

[*Official number*, 33.]

Latitude	42° 53′
Longitude	78° 55′

Mean barometer for the year ending June 30, 1875 ..... 30.020
Mean temperature for the year ending June 30, 1875 ..... 44°.20
Amount of rain-fall for the year ending June 30, 1875..... 26.71 inches

Sergeant James Mitchell remains in charge of this station, and has given full satisfaction by the promptness and regularity with which all reports have been forwarded. Four assistants are on duty, two of whom are printers. One man has been relieved for misconduct, two transferred to other stations, and one ordered to Fort Whipple, as a candidate for promotion. No change has been made in the location of office, nor is any considered necessary at this time. The farmers' bulletin is printed at this station, and furnished regularly to three hundred post-offices. The work of printing and mailing them has been well and promptly done. The city newspapers devote a liberal amount of space to the publication of the full reports, which are given in tabulated form. The monthly reports made by the sergeant, and printed in the principal papers, contain much interesting meteorological data in compact form.

Twenty-four cautionary signals have been displayed, of which number fourteen are reported as fully justified, and one partially so, at the station. In reference to these displays, the sergeant remarks as follows:

September 30, 1874.—Warning generally heeded by marine men. One schooner last sails opposite Dunkirk; obliged to put into port.

October 1-2, 1874.—Warning generally heeded. Many vessels on the lake were forced in with sails, spars, &c., carried away.

October 10-11, 1874.—Warnings very generally heeded by marine men.

October 28-30, 1874.—Very many vessels remained in harbor on account of signal.

November 1, 1874.—Warning generally heeded.

November 5, 1874.—The majority of vessels remained in port. The haze and smoke, and subsequently fog, rendered navigation unusually dangerous.

November 22-24, 1874.—One vessel left port during display, but soon put back damaged. Many disasters reported. Benefits of warning largely commented upon. The press make very favorable comments. Storm very severe.

May 9 and 10, 1875.—Although the signal was not justified at this station, newspaper reports show a tornado to have prevailed at Attica, N. Y., only thirty-five miles distant. No loss of life reported.

The sergeant reports that the office is visited almost daily by persons wishing information about the weather, and remarks as follows upon the interest taken in the service by them:

The display of the cautionary signal is looked upon with general interest, and but few captains are willing to leave port while the signal is hoisted.

The service is very popular among all classes, both in the city and in the vicinity, and increasing confidence in its benefits is manifested by the public in general.

By those interested in commercial and agricultural pursuits it is looked upon as a "necessity," to use their own words; and almost all classes of the community utilize, in their own special manner, its reports.

To shippers of produce by rail it has been of special service, especially during the past winter, when numerous parties engaged in that business, who were formerly skeptical as to its benefits, frequently visited the office and expressed their indebtedness.

Painters, contractors, builders, &c., frequently visit and send messengers to the office for information relative to rain and fair weather, while those interested in navigation make similar visits, with a view of obtaining information relative to the velocity and direction of the wind.

Threatening weather at any time is usually productive both of numerous visits and messages to the office.

The members of the meteorological committee and board of trade in general continue to take much interest in the service. The chairman of the meteorological committee, Alonzo Richmond, esq., gives the service his warm support, and is ready on all occasions to co-operate in the promotion of its interests.

The station has been twice inspected during the year, once in July, 1874, and again in March, 1875, and found in excellent condition on both occasions.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Farmers' bulletins	138,767
Manifold bulletins	11,105
Maps, manifold	5,632
Local reports	3,232
Form 22	66
Form 15, manifold	466
Total	159,268

BURLINGTON, IOWA.

[*Official number*, 122.]

This station was established for the distribution of the farmers' bulletin, the first copy of which was issued here on September 30, 1874. The station was opened by Private E. L. Thomson, who remained until May 12, 1875, when he was relieved on account of sickness, and succeeded by Corporal Henry Pennywitt, who is now in charge. Both men have been regular and prompt in the discharge of their duty. One hundred and eighty-five post-offices are supplied with the bulletins, and the total issue during the year has been 59,772 copies. The office-room selected at the date of opening the station was on the second floor of the building known as Union Block, at the corner of Main and Valley streets, but this not proving convenient, the office was removed, October 26, 1874, to No. 215 Elm street, and again, on February 1, 1875, to No. 117 Post-Office Block, where it still remains. The present location is central and convenient to the telegraph and post offices, and it is hoped that there will be no necessity for further removal.

No meteorological reports are made from this station, as the full time of the man on duty is required for the issue of the farmers' bulletin. The station has not been inspected since its establishment.

BURLINGTON, VERMONT.

[*Official number*, 45.]

Latitude	44° 29′
Longitude	73° 15′
Mean barometer for the year ending June 30, 1875	30.022
Mean temperature for the year ending June 30, 1875	43°.5
Amount of rain-fall for the year ending June 30, 1875	26.27 inches

Sergeant W. A. Chapman remains in charge, and has rendered all reports promptly and regularly and without assistance. Reports from other stations are not received here, and the publications have, therefore, been limited to the local observations, of which 622 copies have been bulletined and furnished for publication to the local newspapers. The office was removed August 1, 1874, to Fisher's Block, at the southeast corner of Bank and Church streets. The location is central and the exposure for instruments an excellent one. The office is on the upper floor of the building, which allows the rod of the wind-vane to be brought through the ceiling of the room. Since the removal the citizens have manifested greater interest in the service. Frequent calls are made for examination of the records, and, in one instance, the observer was required to produce them in court. The station was inspected in November, 1874, and found in fair condition. The irregu-

larities noted by the inspector were ordered to be corrected, and the records and instruments are believed to be in good condition at the present time. Most of the errors noted by the inspector were made by the predecessors of the sergeant then in charge, and for which he was not wholly responsible.

CAIRO, ILLINOIS.

[*Official number*, 53.]

Latitude	37° 00′
Longitude	89° 12′
Mean barometer for the year ending June 30, 1875	30.085
Mean temperature for the year ending June 30, 1875	56°.3
Amount of rain-fall for the year ending June 30, 1875	45.78 inches

Sergeant Edwin Booth was relieved from charge of this station July 27, 1874, and reduced to the rank of a private soldier, as a punishment for his neglect of duty. He was succeeded by Sergeant Thomas Jones, who still remains and has one assistant. One man was ordered in as a candidate for promotion, February 16, 1875, having served nearly two years on the station as an assistant.

Telegraphic reports from this station were suspended March 1, 1875, until the end of the fiscal year. No change has been made in the location of office. The station was inspected in September, 1874, and its condition reported upon unfavorably. The necessary orders for correcting the irregularities pointed out by the inspector were promptly given, and it is believed with good results.

Reports are received each afternoon from eighteen other river stations, and are bulletined in the regular manner, and also given to the local press for publication. The highest water in the Mississippi at this point during the year was reached on March 20, 1875, when the gauge reading was 43 feet and 8 inches.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	3,022
Local reports	261
Form 22	34
Form 26	4,919
Total	8,236

CAPE HATTERAS, NORTH CAROLINA.

[*Official number*, 123.]

Latitude	35° 14′
Longitude	75° 30′
Elevation of barometer above sea-level	7½ feet

The station was established August, 1874, and is in telegraphic communication with the central office, over the sea-coast line. The office is located on the first floor of the building occupied by the assistant light-keeper, and the exposure for the instruments is as good as can be obtained with the present facilities. The instrument-shelter in use is of the standard portable pattern, and works satisfactorily. It is fastened to the north window of the office-room, and the instruments are read through windows. The wind-vane and anemometer are on the

ridge of the building, and well exposed. Sergeant Onslow has been in charge since the station was opened, with one assistant. Both men have performed their duties satisfactorily. They are required to keep the line in repair from the south side of New Inlet to the station at Hatteras, a distance of thirty miles.

Reports are made daily to the central office of the number and kind of vessels passing the station in either direction.

Communication with the central office has been frequently interrupted during the year by breaks in the line. Poles are blown down or shattered by lightning at every storm, and the work of maintenance and repair has been a difficult one, owing to the want of proper transportation and other necessary facilities. It is creditable to the men on duty that all breaks have been repaired without serious delay, and at reasonable cost. Twenty-six cautionary signals have been displayed during the year, of which number twenty are reported as justified at the station.

The following marine disasters have been reported from this station over the coast-line, and the information given to the press in the usual manner:

November 25, 1874.—Schooner Helen Rommel, of Cape May, N. J., bound for Mosquito Inlet, Fla., ballast with hay, driven ashore on beach, two miles south of Hatteras light-house, at 3 p. m. No lives lost.

June 4, 1875.—Vessel went ashore six miles south of life-saving station No. 9. Cargo, lumber. Total loss.

June 25, 1875.—Schooner P. Westcott, from Bridgeton, N. J., Capt. Wm. H. Clarke; owners, N. F. Grandy and others, of Greenwich, N. J. Cargo, ice. Bound from Morris River, Me., to New Berne, N. C.; 138 tons; went ashore at Body Island, at 3 p. m. All necessary assistance rendered by life-saving crew of station No. 8.

Referring to the case of the Helen Rommel, the sergeant remarks as follows:

This office and telegraph-line proved of great value in obtaining speedy assistance from Norfolk for the schooner Helen Rommel, which was driven ashore one and a half miles south of here by the strong southeasterly and southerly gale of November 25. Had it not been for this line she would have been a total wreck, but, as assistance was procured with such little loss of time, she was saved.

This station is supplied with a full set of instruments, and all regular meteorological reports, both telegraphic and mail, have been made promptly and continuously.

It was inspected in October, 1874, and found in excellent condition.

CAPE HENRY, VIRGINIA.

[*Official number*, 118.]

Latitude	36° 56′
Longitude	76° 00′
Mean barometer for the year ending June 30, 1875	30.069
Mean temperature for the year ending June 30, 1875	57°.6
Amount of rain-fall for the year ending June 30, 1875	49.52 inches

Sergeant William Stein remains in charge, and has two assistants. During the year three men have been transferred to other stations, one on September 13, 1874, one October 7, 1874, and a third on May 28, 1875.

The station is on the coast-telegraph line, and is connected directly with the central office. In addition to the regular meteorological reports, daily reports are made of the number of vessels passing the station in either direction, and for the Baltimore press and shipping interests the names of all passing steamers are promptly telegraphed to that city.

The sergeant is required to keep the line in repair from the south side of Lynn Haven Bay to Knott's Island, a distance of fifty-two miles. Thirty-three cautionary signals have been displayed, of which number twenty-five are reported as fully justified at the station.

The following marine disasters have been reported from this station over the coast-line:

January 1, 1875.—English steamer San Marcos, of Liverpool and Texas line, from Galveston, 2,238 tons; number crew unknown; 24 passengers; wind north-northeast, with heavy sea; went ashore at False Cape, 2 a. m.; rudder and stern-post gone; blade of propeller partly gone; passengers forwarded through canal to Norfolk; no lives lost. Ship and cargo valued at $400,000.

Steamer afloat, and on way to Norfolk, at 7 p. m., January; 6,229 bales cotton and 400 boxes preserved meats left on shore in care of underwriters. Total cargo safe.

An enlisted operator was sent to the wreck from the Cape Henry station, January 3, and an office opened there, through which probabilities were furnished the wrecking party three times daily, and telegrams received and forwarded promptly for interested parties.

January 15, 1875.—English schooner Charles E. Scammel, consigned to Messrs. Alexander Brason & Co., Baltimore, Md., went ashore twenty miles south of Cape Henry. Cargo, sugar; northeast wind and heavy sea; crew, numbering 7, all saved by life-saving boat, and accommodated at False Cape life-saving station. Vessel and cargo valued at $80,000.

An operator was sent to wreck, from the Cape Henry station, and office opened January 16, through which telegrams were received and forwarded promptly for parties interested, and probabilities furnished daily.

Vessel got off at 7 p. m., January 29, 1875, and was towed to Norfolk. Cargo saved in damaged condition.

January 18, 1875.—British brig Sabra, in ballast, from Windsor, N. S., to Baltimore, went ashore at Currituck Inlet, January 18. Captain Hultman, master. Crew saved. Vessel total loss.

February 12, 1875.—British brig Kewadin, from Havana to Baltimore, went ashore at 9 p. m., on half-tide, with fresh northeast wind, quarter-mile south of Cape Henry station. Crew of 10 men; tonnage, 269; cargo, 220 hogsheads sugar and 768 boxes, consigned to Spence, Montague & Co., Baltimore. Owner, Robert Holman, Prince Edward's Island. Vessel floated and towed to Norfolk, February 24. Cargo badly damaged.

February 18, 1875.—Baker's steam-tug Aroma Mills, having a part of brig Kewadin cargo aboard, dragged her anchor and went ashore. Floated and towed to Norfolk, February 22. Cargo total loss.

June 29, 1875.—Bark Oreste, from Liverpool to Baltimore, Captain Martina, came ashore at this station. Crew, 10; cargo, 200 tons salt and chemicals; 365 tons vegetator. Floated at high tide, 1.15 p. m., and proceeded to Baltimore.

Information of these disasters was, in all cases, given promptly to the press and to interested parties.

Considerable difficulty is experienced in keeping the line south of this station in working order, as the poles are liable to be blown down at every high wind, on account of the shifting nature of the sand in which they are planted. It is creditable to the men on duty here that the interruptions, on that portion of the line under their care have been so promptly removed in every instance.

The station was inspected in October, 1874, and found in excellent condition. All reports have been promptly and regularly rendered and in proper form. No change has been made in location of office.

CAPE MAY, NEW JERSEY.

[*Official number*, 54.]

Latitude	38° 56
Longitude	74° 58
Mean barometer for the year ending June 30, 1875	30.086
Mean temperature for the year ending June 30, 1875	50°.6
Amount of rain-fall during the year ending June 30, 1875	45.71 inches

Sergeant Theodore F. Townsend has been in continuous charge of the station since its establishment, and has one assistant. One man was transferred to another station November 26, 1874, a second, February 16, 1875, and a third, May 25, 1875. The present assistant has been on duty since the date last named.

All reports, both mail and telegraphic, have been made regularly, promptly, and in excellent form. The station has not been inspected formally during the year, but is known to be in good condition. Since November 25, 1874, it has been connected with the central office by the coast-telegraph line, over which all reports are regularly sent.

The reports from other stations on the coast-circuit are received here, and published in the regular manner. A special report of the temperature and humidity is made daily for the Philadelphia press during the months of July, August, and September.

The sergeant in charge of this station is required to keep this line in repair from Cape May to Seaville, a distance of twenty miles. Both men on duty are necessarily telegraph-operators.

Forty cautionary signals have been displayed during the year, of which number twenty-five are reported as fully justified, and two partially so at the station.

The following marine disasters have been reported from this station over the coast-line:

1. *December* 11, 1874.—Schooner G. M. Partridge, of Rockland, Me., Eugene Mills, master, from Baltimore, loaded with corn, bound to Belfast, Me., went ashore on Cold Spring Bar at 9 p. m.; vessel bilged and full of water.
2. *December* 14, 1874.—Schooner Sarah J. Bright, in ballast, went ashore in the night on Townsend Inlet Bar, twenty miles north of Cape May.
3. *December* 25, 1874.—Orange-schooner Barrass went ashore at Hereford Inlet; was hauled off and taken inside to stop leaks before proceeding.
4. *March* 25, 1875.—Schooner Early Bird, of New York, with general cargo, bound to St. Augustine, vessel and cargo valued at $25,000, owned by Beatly, Gildersleeve, and others, tonnage 150, crew six men, went ashore at 9 p. m. on north bar of Townsend Inlet; boarded by life-saving crew, and crew saved.
5. *April* 25, 1875.—Sloop N. C. Price went ashore near mouth of Delaware Bay during gale; total loss. Same date schooner Warden Evans, of Salem, N. J., went ashore near mouth of Delaware Bay; but little damaged.
6. *May* 8, 1875.—Schooner L. and A. Babcock, of Absecom, in ballast, Captain Smith, bound to Philadelphia, went ashore at Townsend Inlet at 3 p. m.; boarded by crew-station 34, and taken off with but little damage.
7. *June* 7, 1875.—Schooner Lizzie Maul, Captain Schultz, cargo hay and railroad iron, bound for Richmond, went ashore near life-saving station No. 6; crew safely landed.

Information of these disasters has been in all cases promptly given to the press, and to the parties directly interested when they could be reached.

During the watering season full reports are published by the local newspapers, and at other times selections from them. No change has been made in the location of the office.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Local reports	274
Form 22	35
Total	309

CHARLESTON, SOUTH CAROLINA.

[*Official number*, 21.]

Latitude	32° 45′
Longitude	79° 55′
Mean barometer for the year ending June 30, 1875	30.112
Mean temperature for the year ending June 30, 1875	64°.7
Amount of rain-fall for the year ending June 30, 1875	68.99 inches.

Sergeant M. L. Hearne has been in charge throughout the year, and has given satisfaction by the prompt and regular manner in which his reports have been rendered. Two assistants were allowed the station until May 28, 1875, when the number was reduced to one. One man was relieved for misconduct, December 30, 1874, and another ordered in as a candidate for promotion, February 2, 1875. No change has been made in the location of office.

Eight cautionary signals have been displayed during the year, of which number four are reported as fully justified and one partially so at the station. All reports passing over the New York and Savannah circuit have been received here.

In reference to the interest taken in the service, the sergeant remarks as follows:

The class of people most benefited by the service are the ship-owners and the masters of the same; secondly, the cotton factors and brokers. The cotton-brokers buy and sell by the reports "on time," according as the reports show favorable or unfavorable weather for the planting, growth, and development of the crop; the reports from the cotton-belts, as they are termed, are particularly useful and are eagerly looked for. The farmers who carry on business for the northern markets, such as planting and raising vegetables for the early markets, watch the reports for the appearance of cool weather in the north, and govern themselves accordingly, particularly in gathering fruit and shipping the same.

The city newspapers publish selections from all the reports, but do not have space for them in detailed form. The station was inspected in November, 1874, and found in excellent condition.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Manifold bulletins	8,231
Maps, manifold	5,298
Local reports	1,460
Form 22	67
Form 15, manifold	2,675
Total	17,731

CHEYENNE, W. T.

[*Official number*, 63.]

Latitude	41° 12′
Longitude	104° 42′
Mean barometer for the year ending June 30, 1875	29.953
Mean temperature for the year ending June 30, 1875	43°.6
Amount of rain-fall for the year ending June 30, 1875	8.00 inches

Sergeant A. C. Dobbins has been in charge of the station during the whole year, and has made all reports without assistance. No change has been made in the location of the office. The station was inspected in August, 1874, and a favorable report made upon its condition. All reports passing over the San Francisco and Chicago circuit are received here, and together with those from the Santa Fé and Cheyenne circuit, which are transferred at this station, are bulletined in the regular manner.

The sergeant reports but little local interest taken in his work.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins	1,615
Local reports	69
Form 22	14
Total	1,698

CHICAGO, ILLINOIS.

[*Official number*, 37.]

Latitude	41° 52′
Longitude	87° 38′
Mean barometer for the year ending June 30, 1875	30.010
Mean temperature for the year ending June 30, 1875	47°.2
Amount of rain-fall for the year ending June 30, 1875	28.9 inches.

Sergeant W. S. Kaufman remains in charge of station, and has six assistants, of whom one is a non-commissioned officer and three are printers. One man has been called in from this station, as a candidate for promotion, two transferred to other stations, and one relieved for misconduct. No change has been made in location of office. Farmers' bulletins are supplied regularly to eight hundred and fifty post-offices, being the largest number issued from any of the printing stations. Twenty-six cautionary signals have been displayed, of which number eleven are reported as fully justified and two partially so, at the station. All signals are duplicated from the roof of the Central Hotel, which commands a better view of the harbor than can be had from the office-roof. Seventy-four printed maps are issued daily, (except on Sundays,) and distributed to such business firms and places of public resort as will bring the reports within the reach of the classes most interested in them. The maps are made up from the midnight report and printed in time for distribution before the business hours of the day begin. Extra reports are sent from New York at midnight to fill up the map and show the prevailing weather in each section of the country. In addition to the usual symbol-reports upon the map, each issue gives in tabulated form the changes in height of water at the new stations, and the general instrumental changes at all stations from which reports have been received. The station has been twice inspected during the year, once in August, 1874, and again in April, 1875, and on both occasions was found in good condition. Some slight irregularities were noted at the last inspection, which were promptly corrected. The general management of the station has been satisfactory. The sergeant is reported to be attentive to his duties and intelligent in the discharge of them, while the assistants have been, as a whole, competent and faithful.

The following extracts are given from the sergeant's semi-annual report:

This office is greatly indebted to the various post-office officials of this city for their willing and hearty co-operation, and for information given, frequently unsought, whereby the transmission of reports has been expedited.

The distribution of the farmers' bulletins has been the cause of a marked increase of interest in the predictions of the service, as evinced by the testimony of many citizens living out of the city, and with whom I have had conversation in regard thereto.

On 'change the reports, all of which are exposed there, are closely examined and studied, and bear a very important part in the commercial transactions of the day, especially during the spring and this season, as the market is almost entirely governed by the weather. I have been informed by numerous parties dealing on 'change that they consider the reports indispensable, and place the utmost reliance in them.

In conversation with an extensive shipper of meats a few days since, he informed me that he governed all his shipments by the reports; also his buying and selling, and considered them of so much importance to him that he could not trust himself without consulting them.

The reports begin also to bear a very important part in the courts, and in one case a verdict of $5,000 was given to a woman whose husband was killed on the railroad, when the state of the weather bore an important part, the information in regard to which was obtained from the records of this office.

In several other cases the railroads were benefited by the service by the records

when parties claimed damages through exposure while the goods were in transit, and *vice versa*. The reports have also been largely utilized by the ice-packers, shippers of oysters and fruits, and, during the present season of the year, have an important bearing with parties who are desirous of taking pleasure-trips for a few days, and those generally desirous of traveling.

On several occasions I have known important contemplated sales of lands in this vicinity postponed on account of the weather predictions, and always with good results.

Tabulated reports are not printed in the newspapers at this station. A wide circulation is, however, given the reports by means of the several office publications.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Farmers' bulletins	419,200
Bulletins, manifold	8,282
Maps	28,890
Local reports	2,654
Form 22	153
Total	459,179

CINCINNATI, OHIO.

[*Official number*, 65.]

Latitude	39° 06′
Longitude	84° 26′
Mean barometer for the year ending June 30, 1875	30.072
Mean temperature for the year ending June 30, 1875	54°.8
Amount of rain-fall for the year ending June 30, 1875	34.00 inches

Sergeant J. O. Manson was in charge of station until August 25, 1874, when he was relieved by Sergeant S. S. Bassler, who still remains, and has given full satisfaction by the energetic, prompt, and intelligent manner in which all of his station-duties have been discharged. There are five assistants on duty, one of whom is a non-commissioned officer and three are printers. Two men have been transferred to other stations during the year, one ordered to Fort Whipple as a candidate for promotion, and one for misconduct. Farmer's bulletins and weather-maps are printed at this station. The former are furnished regularly to seven hundred and forty-five post-offices, and of the latter, one hundred and thirty-four copies are distributed and displayed daily. The map contains, in addition to the regular symbol-reports, a table showing the depth of water at the principal river-stations, and the instrumental changes and rain-fall at all stations from which reports have been received. The map is made up from the midnight report, and is printed and ready for distribution before the business hours of the day begin. A lively interest is taken in the service by the press at this station, and most of the daily newspapers print full tabulated reports, and all of them the regular monthly summary prepared by the sergeant. This summary is unusually full of local meteorological data, and its preparation reflects credit upon Sergeant Bassler. The meteorological committees of the chamber of commerce and board of trade have shown marked and substantial interest in the service and station, and their members are frequent visitors at the office. The station was inspected in September, 1874, and found in excellent condition. A display of instruments used in the service, and of the practical working of a station, were made at the annual exposition, and attracted much attention.

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

The Cincinnati Chamber of Commerce and the leading Cincinnati papers proudly point to the fact that they were among the first to aid in the project of establishing

some system in the interest of commerce and agriculture; and a thorough appreciation of the grand service, which resulted in so short a time from that small experimental beginning, is but natural.

Cincinnati is second to no city in the country in a hearty indorsement and thorough appreciation of the Signal-Service of the United States Army.

Mr. Sydney D. Maxwell, the very able and efficient superintendent of the Merchants' Exchange, says, in his last annual report, that "the reports of the Signal-Service Department of the United States Army have become a necessity now to commerce, and are regarded with much interest by a large body of merchants. These reports are regularly placed on the bulletins of the Merchants' Exchange, and enter into the daily calculations, particularly at certain seasons of the year, of a number of important departments of our commerce, as well as of our manufactures."

Merchants—notably pork-packers, coal-men and ice-men—derive special and valuable benefit from the reports issued, regularly examining the map published, and not unfrequently personally visiting the office for information.

The medical profession, represented by the board of health, continue to manifest their old-time interest in, and respect for, the service.

The highest water in the river at this station for the year was reached March 1, 1875, when the gauge-reading was 42 feet and 1 inch. Ice commenced to break up on the 28th of January.

The city post-office officials have been very obliging, and given valuable aid in the distribution of the farmers' bulletins.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Farmers' bulletins	375,680
Bulletins, manifold	16,120
Maps	50,380
Local reports	1,121
Form 22	117
Form 26	4,375
Form 15, manifold	3,928
Total	451,721

CLEVELAND, OHIO.

[*Official number*, 34.]

Latitude	41° 30
Longitude	81° 47
Mean barometer for the year ending June 30, 1875	30.019
Mean temperature for the year ending June 30, 1875	47°.1
Amount of rain-fall for the year ending June 30, 1875	31.93 inches

Sergeant Will Stromberger remains in charge, and has given satisfaction by the regularity and neatness of his reports. Two assistants were allowed at the station until February 20, 1875, when the number was reduced to one. During the year one assistant has been ordered to Fort Whipple, as a candidate for promotion, one for misconduct, and one transferred to other duty. Twenty-two cautionary signals have been displayed, of which number sixteen are reported as justified at the station. In reference to these displays the sergeant makes the following remarks:

September 29–30, 1874.—Out of a large number of vessels in the harbor only two ventured out.

October 2, 1874.—One schooner left port while signal was flying and went ashore near Fairport; two others started, but signal detained them.

October 17–18, 1874.—Schooner C. Jeffrey left harbor while signal was flying, and, attempting to return, went ashore east of Pier Light-House.

October 28–30, 1874.—Two vessels went out regardless of the warning, and were both injured.

November ——, 1874.—No vessels left port during display of signal.

November 5, 1874.—No vessels left port during display; one started, but seeing signal returned.

November 22–24, 1874.—Many persons, anxious about property, traveling relations, &c., kept themselves posted in regard to the storm through this office. All vessels remained in port except one scow, which returned when signal was seen. Many persons, before not giving the service a thought, were impressed by the forecast of this storm and of its great benefit to the community.

April 29–30, 1875.—Only one vessel was prepared to leave port and remained in harbor until signal was lowered.

May 12, 1875.—Considerable damage done to shipping, &c., by the storm.

The cautionary signal indicator at this station has been placed in the tug office, corner of Main and River streets, which is more frequented by interested parties than the board of trade rooms.

Two inspections have been made during the year—one in July, 1874, and the other in March, 1875. At the first inspection a favorable report was made upon the condition of office and instruments, and the conduct of the sergeant commended; but at the second the report was unfavorable, and numerous irregularities were noted. Orders were at once given to have them corrected, and at present the station is believed to be in fair condition. The sergeant was not removed or punished for the irregularities referred to, because the inspector attributed them to the fact that both the men on station were ill and really unable to attend properly to their duties. He was severely reprimanded for his neglect, and made ample promise of amendment. Manifold maps are issued daily, from the morning reports, and displayed in the most conspicuous public places. The tabulated reports are printed in the local newspapers, which also print such other reports as are furnished them.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Manifold bulletins	6,987
Maps, manifold	8,225
Local reports	2,809
Form 22	42
Form 15, manifold	4,884
Total	22,947

COLORADO SPRINGS, COLORADO TERRITORY.

[*Official number*, 109.]

Latitude	38° 55′
Longitude	104° 58′
Mean barometer for the year ending June 30, 1875	29.943
Mean temperature for the year ending June 30, 1875	46°.8
Amount of rain-fall for the year ending June 30, 1875	10.85 inches

Sergeant Henry Fenton was transferred December 23, 1874, to the Denver station, and succeeded by Sergeant P. J. Huneke, who still remains. One assistant is allowed at this station, to aid in repairing the telegraph-line by which it is connected with the summit of Pike's Peak, and in such other extra duties as are required. One man was transferred to another station March 23, 1875, since which date the present assistant has been on duty. No change has been made in the location of office, but a new instrument-shelter was constructed in May, and placed upon the roof of the office-building, to obtain a better exposure for the instruments than had previously been given them. All messages to and from the summit-station are here transferred, and all supplies and mails for that station collected and forwarded. The men on duty at the summit are dependent upon the men at this station for many comforts and con-

veniences not strictly within the line of official duty, and it is creditable to the latter that they have uniformly responded promptly to all demands upon them of this nature. This station does not send telegraphic reports, but all mail reports have been forwarded regularly and promptly.

It was inspected in December, 1874, and found in excellent condition, and the inspector refers as follows to the men on duty:

In making contracts for the peak, in supervising the receipt and forwarding of supplies, and in making timely repairs of the line for the coming winter, Sergeant Fenton has displayed marked zeal and commendable energy and foresight. * * *

Private Browder has been particularly zealous and attentive to his duty of line-repairer.

Sergeant Fenton rendered special service in connection with the exposure of attempted frauds upon the office at this point, and it was on account of the personal feeling thus created against him that he was permitted to exchange stations with the observer at Denver.

CORSICANA, TEXAS.

[*Official number*, 107.]

Latitude	32° 05′
Longitude	96° 30′
Elevation of barometer above sea-level	445 feet

This station was established September 1, 1874, and the first telegraphic report was made on the morning of September 15. The office was at first located in Molloy's Hotel, on the corner of Harden and Beaton streets, but was removed November 24, 1874, to the Commercial Building, on the corner of Beaton and Collins streets, directly opposite the post-office, and within two squares of the telegraph-office.

The office is on the second floor; is plastered; with four windows, two facing northward, two westward; one door opening into hall, and one connecting the adjoining room. The building is of brick; office-rooms up-stairs, and stores on the ground-floor. The instrument-shelter is placed in one of the north windows, and the exposure for the instruments is good. The rain-gauge, wind-vane, and anemometer are on the roof of the building, and the wind-vane-rod connects with the office through the ceiling.

The station is supplied with a full set of standard instruments, all of which were found in good order when the station was inspected in October, 1874.

Sergeant W. D. McChesney has been in charge of the station, and made all reports without assistance since its establishment. The mail reports have been made with regularity and neatness, and the telegraphic ones with commendable promptness. No reports are received here from other stations, nor are any publications made of the local ones.

DAVENPORT, IOWA.

[*Official number*, 51.]

Latitude	41° 32′
Longitude	90° 38′
Mean barometer for the year ending June 30, 1875	30.050.
Mean temperature for the year ending June 30, 1875	46°.8
Amount of rain-fall for the year ending June 30, 1875	30.48 inches

Sergeant S. P. Ruthven continues in charge of this station, with one assistant, who has been continuously on duty since June 3, 1873.

No change has been made in the location of the office, nor has the station been inspected during the year. Telegraphic reports to and from the station were suspended March 1, until the end of the fiscal year.

The highest water reported in the river at this station during the year was on April 29, 1875, when the gauge-reading was 12 feet and 11 inches.

The following extracts from the reports of the sergeant shows the interest taken in the service at this point:

The classes of citizens chiefly benefited are shippers of produce and the farming community. The dealers referred to have, during the past year, applied in numerous instances at this office to learn what prospect there might be for warmer or colder weather within a day or two following, as the shipments they had in view might demand.

In every case the published probabilities are consulted regularly and carefully by them; and, very frequently, further information is sought at this office. The benefits derived have been frequently acknowledged by them. During the past half year frequent visits by farmers have been made to this office, for the purpose of ascertaining the probable state of the weather during an ensuing twenty-four or thirty-six hours, to enable them to judge of the advisability of proceeding with contemplated operations on their farms.

The local medical society, of which there is a large and influential membership, makes use of the meteorological data in connection with its statistics of sickness and disease. The local agricultural society is also indebted in like manner. In all of these cases special application has been made to the sergeant-observer for the data referred to.

PUBLICATIONS.

(*Year ending June 30, 1875.*)

Bulletins, manifold	12,901
Form 22	51
Total	12,952

DENVER, COLORADO TERRITORY.

[*Official number, 76.*]

Latitude	39° 44′
Longitude	105° 04′
Mean barometer for the year ending June 30, 1875	30.001
Mean temperature for the year ending June 30, 1875	49°.2
Amount of rain-fall for the year ending June 30, 1875	15.24 inches

Sergeant P. J. Huneke remained in charge of station until December 23, 1874, when he was tranferred to Colorado Springs, and succeeded by Sergeant Henry Fenton, who is still on duty. There was one assistant on duty until October 22, 1874, when he was transferred to another station, and the work done since that date by the sergeant alone.

The station was inspected in December, 1874, and found in good condition.

No change has been made in the location of office since last report. Telegraphic reports were suspended March 1, 1875, until the end of the fiscal year, but all observations have been made regularly, and forwarded weekly by mail.

Referring to the interest manifested in the service at this point, the sergeant remarks as follows:

The usual amount of interest in the reports has been exhibited by health-seekers and medical men in and out of the Territory. The sudden changes of temperature at this station on January 14 and 15 seem to have been some of the most remarkable ever known. The newspapers' reports of them were scarcely believed, and numerous inquiries by scientific men and others were made for the readings of the signal-service thermometer during these changes.

The local reports have been given to the press and printed regularly throughout the year.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	1,206
Local reports	480
Form 22	75
Total	1,761

DETROIT, MICHIGAN.

[*Official number*, 36.]

Latitude	42° 21′
Longitude	83° 07′
Mean barometer for the year ending June 30, 1875	30.017
Mean temperature for the year ending June 30, 1875	45°.6
Amount of rain-fall for the year ending June 30, 1875	25.64 inches

Sergeant William Finn remains in charge, and has four assistants, of whom two are printers. Six changes in assistants have been made during the year. Three men have been ordered to Fort Whipple as candidates for promotion, two ordered in to be discharged from the service, and one transferred to duty at another station. The farmers' bulletin is printed at this station, and issued regularly to three hundred and sixty post-offices. The work has been well and promptly done throughout the year, only two failures to get the early mail having occurred, and these through delay in getting copy from telegraph-office. The afternoon telegraphic reports from the station were suspended on March 1, and on the 16th of the same month the morning and midnight reports were also discontinued until the end of the fiscal year. Reports from other stations continued to be received and published here in the usual manner.

The station was inspected twice during the year, once in August, 1874, and again in April, 1875, and found in good condition on both occasions. Seventeen cautionary signals have been displayed, of which seven are reported as justified at the station, while others have beeen justified by severe winds upon Lakes Erie and St. Clair.

In reference to these displays, the sergeant remarks as follows:

September 19, 20, 1874.—Reports from vessels show a gale to have prevailed outside, and many took shelter in the first place offered.

October 28–30, 1874.—A few vessels left port, and latest accounts state all ashore. The display of signal excited very favorable comments, as it gave ample warning of the approaching storm.

November 22–24, 1874.—No disasters reported; no vessels left port during display; movements of vessels at other points, but owned here, were directed by the display of signal; the Cleveland steamers, even, remained in port until signal was lowered.

April 15–17, 1875.—Navigation hardly open; the steamer Essex rolled off the upper section of her smoke-stack on being struck by a sudden squall.

May 1, 2, 1875.—A tow of five barges was grounded in the river; the strong east wind caused a rise of two feet; most tempestuous weather known for years; steamer Benton driven off Saginaw Bay twice.

The city press has taken a lively interest in the service, and reports are published by three morning and one afternoon paper. In marine circles the display of signals is reported by the sergeant to have given satisfaction, with one exception—the Cleveland Steamboat Company, which says its business is impaired, because people will not travel by water while the signal is hoisted.

Signals continue to be duplicated, under the direction of the sergeant, on the warehouse of the Messrs. Dunlap, Donaldson & Co., with good results.

Manifold maps are issued regularly, and distributed and displayed in the usual manner.

A severe tornado passed over this station in 1875, a full report of which was made by Sergeant Finn, and is given elsewhere.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Farmers' bulletins	195,263
Bulletins, manifold	9,529
Maps, manifold	3,585
Form 22	63
Total	208,440

DODGE CITY, KANSAS.

[*Official number*, 106.]

Latitude	37° 39′
Longitude	100° 08′
Height of barometer above sea-level	2,479 feet. (?)

This station was established September 1, 1874, and the first telegraphic reports made on the 15th of the same month. Telegraphic communication to this point is under the control of a railroad company, and the offices along the line of road are closed at the proper hour of sending the morning and midnight reports. The three daily reports are consolidated, and sent as one message at the time of sending the afternoon report. In addition to this delay of two out of the three daily reports, the telegraph-line is frequently out of order, and the transmission of any report rendered impossible.

Sergeant M. L. Landers has been in charge since the station was established, and has no assistant.

The office is located in the Dodge House, where the exposure for instruments, both in shelter and on the roof, is excellent. The station was inspected in December, 1874, and found in fair condition. Some irregularities were found and ordered to be corrected. The sergeant has been sick a great portion of the time, and his mail-reports delayed in consequence. No publications are made at this station.

DUBUQUE, IOWA.

[*Official number*, 98.]

Latitude	42° 30′
Longitude	90° 45′
Mean barometer for the year ending June 30, 1875	30.039
Mean temperature for the year ending June 30, 1875	45°.7
Amount of rain-fall for the year ending June 30, 1875	35.76 inches

Sergeant R. J. Bell has been in charge of this station since its establishment, and has made all reports with promptness and regularity without an assistant. The afternoon reports were sent by telegraph until February 5, 1875, when they were ordered to be discontinued until the end of the fiscal year. The station was inspected in June, 1875, and found in good working-order, the office being neat in appearance, well-furnished, and well located. No change has been made in the location of the office. The highest water in the river at this point during the year occurred on April 26, 1875, when the gauge-reading was sixteen feet and six inches.

The following extract from a petition forwarded by the citizens of Dubuque to the central office, asking for additional reports, illustrates the interest taken in the service at this station:

The river reports of the rise and fall of water, both north and south of us, are of especial interest to the river traffic, which is very large between the extreme points, as well as to and from the intermediate points.

The starting, forwarding, landing, and successful management of the lumber-rafts depend largely on the stage of water and the favorable weather necessary to their safe transit along the "Father of Waters" and through the many bridges, which are increasing in number yearly.

The display of cautionary signals we also desire, as they are needed by the river, railroad, and other interests. The reports of storms, which they would foretell, would enable the river men to avoid the destruction of floating values; the railroad manager to foresee and avert disaster and loss, and the farmer to secure his crops with safety and dispatch.

The local press publish all reports furnished by the observer.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Local reports	957
Form 22	61
Total	1,018

DULUTH, MINNESOTA.

[*Official number*, 40.]

Latitude	45° 48′
Longitude	92° 08′
Mean barometer for the year ending June 30, 1875	29.999
Mean temperature for the year ending June 30, 1875	38°.1
Amount of rain-fall during the year ending June 30 1875	31.36 inches

Sergent R. R. Martin has been in charge since October 4, 1872, and the assistant since May 21, 1873. Both men have given full satisfaction by their attention to duty and the promptness and regularity with which they have forwarded all reports. Nineteen cautionary signals have been displayed, of which number, twelve are reported as fully justified, and two partially so, at the station. No change has been made in the location of the office.

The station was inspected in May, 1875, and found in excellent condition. The inspecting officer remarks as follows upon the condition of the records, and the interest shown in his work by Sergeant Martin:

The station records were found in excellent condition; the business of the office well managed, and the data kept by Sergeant Martin, bearing upon the storms, auroras, rainfall, and barometric changes, taken in connection with changes of temperature, are now complete, and of greater value than any heretofore inspected by me.

Sergeant Martin has continued to make and forward to the central office throughout the year special reports upon every storm of importance that has occurred at his station. The sergeant reports as follows upon the interest taken in the service by the citizens:

The same gratifying interest is manifested by the people in regard to the Signal-Service, and the working of this office, as at the date of my last report; indeed, it seems to have increased rather than diminished. The numerous fishing-parties, excursions, &c., that set out from here, send one or more delegates to this office for what information may be obtained, and usually govern their movements accordingly. Tourists and others visit the office to obtain reliable information in regard to the climatology of the place. Frequent calls have been made by citizens and others to make comparisons of temperature, moisture, precipitation, and winds for different periods. In a word, all classes of people seem to be interested. In one instance, April 12, the records of this office were produced as evidence in a court of arbitration, in an action brought to recover the loss of property lost in a storm of a year ago.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Local reports	790
Form 22	57
Total	847

EASTPORT, MAINE.

[*Official number* 94.]

Latitude	44° 55′
Longitude	66° 54′
Mean barometer for the year ending June 30, 1875	29.980
Mean temperature for the year ending June 30, 1875	39°.9
Amount of rain-fall for the year ending June 30, 1875	36.63 inches

Sergeant Theodore C. Taylor was in charge until his disappearance in May, 1875. He was reported as a deserter, but later information indicates that he commited suicide while laboring under an attack of insanity. He was succeeded, May 27, 1875, by Sergeant Thomas A. Taylor, who still remains. The assistant at this station has been on duty continuously since July 14, 1873. Both men have given satisfaction by their uniform good conduct and the regularity with which reports have been forwarded.

Thirty-four cautionary signals have been displayed, of which number twenty-two are reported as justified at the station. In reference to these displays, the sergeant reports as follows:

September 17–19, 1874. Rough weather experienced.

September 28–29, 1874.—Gale of short duration; heavy rain, &c.; all vessels remained in harbor during display.

January 25, 1875.—No shipping in port; very severe weather reported along the coast.

February 8–9, 1875.—Storm preceded by an auroral display; no knowledge of any injury; vessels remained in port.

March 3–4, 1875.—Some shipping in port; a Cuban schooner remained in port on account of signal; no knowledge of any injury.

March 7–8, 1875.—No shipping in port; large fields of ice were brought into the harbor by the gale; no knowledge of any injury.

March 24–25, 1875.—No shipping in port; most severe storm of the season.

April 13–14, 1875.—Storm severe; a number of steamers bound for the banks of Newfoundland remained in port during display of signal.

April 15–17, 1875.—A few schooners remained in port during the display; no knowledge of any injury.

The station was inspected in November, 1874, and found in excellent condition. All telegraphic reports to and from this station were suspended from March 16 to the close of the fiscal year. The local observations are printed weekly in the only paper published at the station.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	4,774
Form 22	35
Total	4,807

ERIE, PENNSYLVANIA.

[*Official number*, 97.]

Latitude	42° 07′
Longitude	80° 10′
Mean barometer for the year ending June 30, 1875	30.015
Mean temperature for the year ending June 30, 1875	47°.8
Amount of rain-fall for the year ending June 30, 1875	37.28 inches

Sergeant E. F. McComas has been in charge since the establishment of the station, in 1873, and has given full satisfaction by the prompt and regular manner in which all reports have been forwarded. One assistant is allowed at the station. One man, Private H. L'Esterre, deserted, August 27, 1874, and his successor was ordered in for discharge, January 4, 1875, since which date the present assistant has been on duty.

Twenty-three cautionary signals have been displayed, of which number seventeen are reported as justified at the station. The sergeant reports as follows upon their display:

September 30–*October* 1, 1874.—Vessels remained in port on account of signal. Buckley's hippodrome closed at 8 p. m. on account of storm.

October 10–11, 1874.—No vessels left port during display.

October 28–30, 1874.—Strong winds outside of harbor. The Cumberland, near Silver Inlet, threw one hundred and fifty head of cattle overboard, also a quantity of merchandise; was subsequently sunk near Prince Arthur's Island; no lives lost; many other vessels injured.

November 22–24, 1874.—All vessels remained in harbor after signal was hoisted. The signal attracted many persons to the office; many vessels injured, as well as fences, &c.

April 29–30, 1875.—Buildings unroofed, chimneys blown down, lumber pillar on dock blown over, and lumber scattered, &c. No other damage known; no vessels prepared to leave harbor on account of ice-blockade.

May 9–10, 1875.—Storm of rain, thunder, and lightning; no injury.

May 13, 1875.—Several vessels ran into port, and remained until the signal was lowered.

May 15, 1875.—Several vessels remained in port on account of signal; one schooner went ashore.

The cautionary signals are duplicated from the roof of the Reed House, which commands a fine view of the harbor. Since November 20, 1874, the anemometer has been placed on the building also, and connected by wire with the register in the sergeant's office. The exposure here is much better than that had at the office, which is protected by surrounding buildings from the full force of the wind.

The station has been twice inspected during the year, once in July, 1874, and again in March, 1875. On both occasions a lack of neatness was reported, but no serious irregularities in the records. The sergeant was severely reprimanded for neglect of duty in failing to keep his office clean; and it is hoped that another inspection will show different and more satisfactory results.

The office proper has been moved into a room adjoining the one previously used, and the latter retained as a store-room for the various articles of public property at the station.

Manifold maps are issued and distributed in the usual manner. Reports are regularly furnished to the press and selections from them published. Telegraphic reports from this station were suspended from February 5, 1875, until the end of the fiscal year; but all reports passing over the lake circuit continued to be received and bulletined here as usual.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	8,693
Maps, manifold	4,814
Local reports	890
Form 22	66
Form 15, manifold	4,925
Total	19,388

ESCANABA, MICHIGAN.

[*Official number*, 49.]

Latitude	45° 46′
Longitude	87° 14′
Mean barometer for the year ending June 30, 1875	29.993
Mean temperature for the year ending June 30, 1875	37°.7
Amount of rain-fall for the year ending June 30, 1875	27.35 inches

Sergeant Edward Lloyd was in charge until August 27, 1875, when he was transferred to Cincinnati as assistant, and succeeded by Sergeant J. M. Watson, who remained until March 21, 1874, when he was ordered in for discharge, and relieved by Sergeant W. E. Smith, who, proving incompetent, was replaced by Sergeant S. W. Naylor, June 1, 1875. One assistant was ordered to Fort Whipple as a candidate for promotion February 12, 1875, since which date the present assistant has been on duty, and given satisfaction.

Twenty-one cautionary signals have been displayed, of which number twelve are reported as justified at the station. In reference to these displays, the sergeant reports as follows:

September 19–20, 1874.—The Alpena left at 1.30 p. m., but returned at 4 p. m., on account of rough weather; four steamers and one schooner were ready to sail, but remained in harbor until next day; four lumber-vessels going past came into port, and were influenced by the warning.

September 26–27, 1874.—One steamer and three schooners were ready to leave port, but remained on account of signal; also many persons delayed, who were ready to sail in the Alpena.

November 22–24, 1874.—No disasters reported; all vessels remained in harbor during display.

The cautionary-signal indicator is placed in the post-office for the purpose of giving it the necessary publicity.

A removal of the office to another room in same building has been authorized, but had not been made at the close of the fiscal year.

The station has been twice inspected during the year—once in August, 1874, and again in May, 1875. The reports of the inspecting officer were were unfavorable on both occasions. Sergeant Lloyd, in charge at the first inspection, was transferred to subordinate duty elsewhere, and Sergeant Smith, in charge at the second one, was ordered to Fort Whipple and discharged from the service. So far as is known, the station is now in good condition.

Notwithstanding the inefficiency of the observers, the local interest in the service continues gratifying. The following extract from the station records is given in illustration of this subject:

A great deal of interest is manifested by the masters of vessels and those directly interested in shipping in the display of warning-signals. Some of these masters never leave port without calling at the office to ascertain the changes in the barometer, and if there are any indications of rough weather. These indications influence them to a great extent in the loading of their vessels, as they will load heavy or light according to whether they are favorable or not. About five hundred cargoes of ore—in the neighborhood of three hundred thousand tons—were shipped from this port during the past season of navigation, only one of which was lost, and that was on Lake Erie. There are also two lines of steamers here, one having vessels leaving every day, the other semi-weekly, besides quite a number engaged in the lumber and fishing trade. Among these I can hear of no disaster having occurred during the past season of navigation.

Telegraphic communication with this station is, as in previous years, frequently interrupted, but, as before, improvement is promised by the officers of the company, and earnestly hoped for by all interested in the service at the station.

The Tribune, a weekly paper, publishes the local reports, and also the monthly means, with extracts from such other reports as are furnished

FORT GIBSON, INDIAN TERRITORY.

[*Official number*, 93.]

Latitude	35° 43′
Longitude	95° 16′
Mean barometer for the year ending June 30, 1875	30.003
Mean temperature for the year ending June 30, 1875	59°.3
Amount of rain-fall for the year ending June 30, 1875	37.79 inches

Sergeant B. C. Anderson was in charge until June 7, 1875, when he was ordered in for discharge, (at his own request,) and succeeded by Sergeant T. S. Collins, who still remains. An assistant was allowed the station until March 30, 1875, when the one on duty was relieved for misconduct and not replaced.

In addition to his official duty the sergeant at the station was for a time permitted to act as operator for the telegraph company, but as this dual service threatened to lead to unpleasant complications, the permission was revoked. Mail reports have been made with regularity, and telegraphic ones with as much regularity as the condition of the line would permit. The telegraphic service at this station has been fairly performed.

The station has not been inspected during the year, nor has any change in location of office been made. No reports are received from other stations, and no publication made of the local observations.

FORT SULLY, DAKOTA TERRITORY.

[*Official number*, 83.]

Latitude	44° 39′
Longitude	100° 40′
Mean barometer for the year ending June 30, 1875	29.975
Mean temperature for the year ending June 30, 1875	43°.0
Amount of rain-fall for the year ending June 30, 1875	12.16 inches

Sergeant C. E. Brinsmade remains in charge of station, with Private H. M. Wells as assistant, and both men have given full satisfaction during the year. On September 1, 1874, Private Wells was moved to Fort Thompson, about midway between Forts Sully and Randall, in order that he might attend more readily and promptly to the repair of the telegraph-line between those posts. Owing to the length of the line, considerable delay is often experienced in reaching a break, and communication is thereby rendered irregular and uncertain. The station was inspected in June, 1875, and found in excellent condition. Both men are good telegraph-operators, and attend to all the telegraph business at their respective locations.

The office was removed from post headquarters to the band building at the post, on the 18th of July, 1874. The locations of the anemometer and wind-vane were not changed. Station barometer No. 1873 was accidentally broken in screwing up the mercury prior to removal, and permission was given the observer to take readings from the barometer at the post hospital until another could be got to the station.

GRAND HAVEN, MICHIGAN.

[*Official number*, 48.]

Latitude	43° 05′
Longitude	86° 18′
Mean barometer for the year ending June 30, 1875	30.024
Mean temperature for the year ending June 30, 1875	44°.9
Amount of rain-fall for the year ending June 30, 1875	inches

Sergeant A. J. Berry was in charge until ordered in for misconduct, December 28, 1874, when he was succeeded by Sergeant J. M. Frantz, who still remains. One assistant is allowed the station, and the one now on duty has been there since October 27, 1873.

Twenty-eight cautionary signals have been displayed, of which number twenty are reported as justified at the station. In reference to some of the displays the sergeant reports as follows:

October 1-2, 1874.—No vessel left harbor during display. Incoming vessels report a heavy gale on the lake; no known damage.

October 28-30 to *November* 1, 1874.—Signal generally observed. A vessel left Muskegon during display of signal, and was blown ashore near here; loss, $30,000.

November 22-24, 1874.—No vessel left port during display; no disasters reported; incoming vessels report the gale very severe on the lake.

May 1-2, 1875.—No vessels left port during display; no damage.

A desire has been expressed to have the cautionary signals duplicated from the summit of a hill near the town, from which they would be visible for miles out on the lake, whereas at present they can only be seen by vessels in the harbor. The expense attending this duplication has prevented favorable action up to this date.

The station has been twice inspected during the year, once in August, 1874, and again in April, 1875. The first report was unfavorable, but the second was satisfactory.

The sergeant reports a gratifying interest in the service at the station, and states that there have been numerous instances of vessels delaying in port because signals were flying. He says "that during the past winter, which was one of unprecedented severity, the office has been frequently visited by fruit-growers and others interested, desiring information regarding the weather, examining the records, and comparing the temperature of previous years with this and other sections of the country."

Reports from other stations are not received here, but the local reports are published regularly in the Herald and News. These papers also print a synopsis of the monthly reports. No change has been made in the location of the office during the year. The total amount of rain-fall for the year cannot be given for this station, as local causes prevented the collection and measurement of that which fell in the form of snow during the past winter. Steps have been taken to prevent such a loss in future.

GALVESTON, TEXAS.

[*Official number*, 55.]

Latitude	29° 18′
Longitude	94° 50′
Mean barometer for the year ending June 30, 1875	30.063
Mean temperature for the year ending June 30, 1875	69°.6
Amount of rain-fall for the year ending June 30, 1875	46.66 inches

Sergeant E. O. C. McInerney was on duty until March 26, 1875, when he was ordered to Washington for discharge, his term of service having expired. He was succeeded by Sergeant Robert Reeder, who still remains, and has given satisfaction. One assistant is allowed this station, and the present one has been constantly on duty here since October 11, 1873. The station was inspected in October, 1873, and found in good condition. The conduct of the sergeant in charge was highly commended by the inspecting officer, and much of the interest taken in the service at this point is due to his intelligent efforts to make its objects clearly understood. The office was removed on September 1, 1874, to the northwest corner of Strand and Tremont streets, in the same build-

ing that is occupied by the telegraph-office, and within four squares of the post-office, in the business center of the town. The office is a large room, well lighted, and affording an excellent exposure for all instruments and a fine view of the harbor.

Referring to the interest taken in the service, the sergeant remarks as follows:

There is a very generally expressed desire on the part of the shipping agents and merchants of the city to obtain the "tri-daily" weather reports from such points as affect the shipping or cotton interests of the city. It is very important to know how the wind is at such points in the interior as are visited or affected by "northers" *before* their arrival at Galveston. The reports from Fort Gibson, Shreveport, Denver, and other places will show this.

The chief cause of the desire to be forewarned of the arrival of "northers" arises from the fact that *after* a "norther" of any force strikes here ships cannot leave the wharves while it lasts. If its approach was made known twelve or twenty-four hours, the freight could be hurried on board and the vessel leave in good time.

The office is almost daily visited by seamen in search of information of the weather at other points, directions of winds, the probabilities of a change, or a continuance, &c., &c. They are furnished with such replies as I am enabled to make from the few reports I receive from other points, and the result of nearly four years' observation of the climate.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Local reports	995
Form 22	42
Total	1,037

INDIANAPOLIS, INDIANA.

[*Official number*, 43.]

Latitude	39° 47′
Longitude	86° 06′
Mean barometer for the year ending June 30, 1875	30.041
Mean temperature for the year ending June 30, 1875	51°.7
Amount of rain-fall during the year ending June 30, 1875	43.23 inches

Sergeant C. F. R. Wappenhans has been in charge of this station since its establishment, in January, 1871, and has been prompt, intelligent, and energetic in the discharge of his duty at all times. One assistant is allowed this station, and during the year two men have been ordered to Fort Whipple as candidates for promotion. The present assistant has been on duty since March 25, 1875. No change has been made in the location of office during the year. The station was inspected in September, 1874, and found in excellent condition. The expenses of this station have been uniformly below the average cost of stations, while its equipment is equal to the best. The station-property is cared for in a manner that is worthy of imitation at other stations.

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

The records of the meteorological observations have been of great importance, and used as evidence in courts. Many times the observer has been subpœnaed to testify in regard to temperature or rain-fall, &c., of past years, and only recently Judge Elliot, the attorney for the city, informed me that these have saved the city of Indianapolis from $10,000 to $15,000.

During the slaughtering-season, extending from October to the middle of December, information given to the pork-packing firms here, as well as at Franklin and Marion, Indiana, in regard to the approach of temperatures either favorable or unfavorable to the slaughtering of hogs, has been acknowledged as very important and useful to the pork-packers. In corroboration thereof, I have the honor to refer to the abstracts of the journal at this station for the months of November and December.

Since the middle of December, firms engaged in the cutting of ice have shown a great

interest in the weather-reports, and the office has been frequently visited by them. In fact, I am convinced that the interest taken in the Signal-Service and its publications in the papers by the public at large has certainly not diminished.

The city press has shown a lively interest in the service, and reports have been fully published in various forms.

This station receives all reports passing over the Chicago and Cincinnati circuit.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	10,425
Local reports	1,490
Form 22	139
Form 26	332
Form 15, manifold	8,535
Total	20,921

INDIANOLA, TEXAS.

[*Official number*, 84.]

Latitude	28° 32′
Longitude	96° 38′
Mean barometer for the year ending June 30, 1875	30.076
Mean temperature for the year ending June 30, 1875	69°.5
Amount of rain-fall for the year ending June 30, 1875	36.67 inches

Sergeant Frank Mansfield was in charge until November 2, 1874, when he was relieved, for gross misconduct, upon the telegraphic report of the inspecting-officer, and succeeded by Sergeant C. A. Smith, who still remains, and has given satisfaction. One assistant is allowed the station, and the present one has been on duty since February 17, 1874. The station was inspected in November, 1874, and found in bad condition. The prompt removal of the sergeant then in charge, and his reduction to the rank of private soldier for neglect of duty, have had good results, and the station is now, so far as can be judged from its reports, in good working order, and the men on duty in good repute. No reports are received at this station, and all telegraphic reports from it were suspended from March 16, 1875, to the end of the fiscal year. The local reports are published in the Bulletin, a weekly newspaper. No change has been made in the location of office during the year.

JACKSONVILLE, FLORIDA.

[*Official number*, 73.]

Latitude	32° 24′
Longitude	80° 40′
Mean barometer for the year ending June 30, 1875	30.022
Mean temperature for the year ending June 30, 1875	69°.01
Amount of rain-fall for the year ending June 30, 1875	57.81 inches

Sergeant R. McLaughlin has been continuously in charge of this station since January, 2, 1873, and his assistant has been on the station since August 9, 1872. Both men have given full satisfaction by the prompt and regular manner in which they have performed their duties.

Three cautionary signals have been displayed during the year, of which two are reported as justified at the station.

The signal-indicator is placed in the office of T. S. Ellis, underwriters' agent, as the board of trade has no public room. The underwriters'

office is visited by all sea-faring men. A notice, required by Mr. Ellis, is also posted in the office, directing vessels not to leave port while the cautionary signal is flying. A private arrangement has been made by the agents of steamers leaving this port to have all cautionary signal orders telegraphed to Fernandina.

This station was inspected in November, 1874, and found in excellent condition. All records, property, and instruments were in good order and well cared for. No change has been made in the location of the office during the year. Telegraphic reports from the station were suspended by order on February 5, 1875, until the close of the fiscal year. The local observations have been published regularly in the several newspapers printed at the station.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	3,317
Local reports	295
Form 22	81
Total	3,693

KEOKUK, IOWA.

[*Official number*, 47.]

Latitude	40° 23′
Longitude	91° 25′
Mean barometer for the year ending June 30, 1875	30.004
Mean temperature for the year ending June 30, 1875	50°.4
Amount of rain-fall for the year ending June 30, 1875	41.74 inches

Sergeant T. S. Collins was transferred to another station July 15, 1874, and succeeded by Sergeant William Black, who remains in charge, and has given satisfaction. One assistant is allowed the station, and the present one has been on duty since May 22, 1874.

The station has not been inspected during the year, but an inspecting-officer was expected daily at the date of this report. All reports, mail and telegraphic, have been made with regularity. Afternoon reports from seventeen other river-stations are received daily from Saint Louis, and bulletined in the usual manner.

The sergeant refers to some of the uses made of these reports, as follows:

Of the amount of public interest taken in the service, there is one important instance to be mentioned; on the extensive canal improvements around the Des Moines Rapids here, a large amount of channel excavation-work was done during the summer and fall, below the surface of the water and within two coffer-dams, the latter being only temporary, and insufficient to withhold a considerable rise of water. In view of this constant liability of inundation, the supervising engineers and contractors paid especial attention to the reports, examining them daily to ascertain the stage of water at northern stations. Captain Anderson, of the engineers in charge of steam-pumps, states that the daily information had from the reports was of great value in his department of the works.

Concerning the usefulness of the river reports to steamboatmen, the local actuary of the Northern Line Packet Company, Col. S. M. Archer, who has had an excellent opportunity for observation, states that during the running season the pilots and captains would examine daily the stage of water as reported from different stations, and from this data make deductions as to the probable current and sand-bars to be encountered.

The customary publication has been made of the local reports in the daily newspapers.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins	1,999
Local reports	281
Form 22	26
Form 26	2,275
Total	5,081

KEY WEST, FLORIDA.

[*Official number*, 25.]

Latitude	24° 32′
Longitude	81° 48′
Mean barometer for the year ending June 30, 1875	30.074
Mean temperature for the year ending June 30, 1875	77°.3
Amount of rain-fall for the year ending June 30, 1875	28.64 inches

Sergeant J. D. Sumet remained in charge until January 13, 1875, when he was authorized to exchange stations with Sergeant M. J. Shanefelter, at Punta Rassa, who has been in charge since that date. One assistant is allowed the station, and the present one has been on duty since March 2, 1874. No cautionary signals have been displayed during the year.

The station was inspected in December, 1874, and found in very poor condition. Records were improperly kept, instruments were dirty, and station property badly cared for. As soon as the inspector's report was received the sergeant was reprimanded severely and transferred to another station, where he would have an opportunity of correcting his errors. No change has been made in the location of the office. Telegraphic reports from this station were suspended March, 1875, until the close of the fiscal year.

The telegraphic service with this station has been very irregular, owing to frequent interruptions in the cable by which it is connected with the mainland.

Sergeant Shanefelter's management of the station has been satisfactory, and his mailed reports forwarded with regularity and promptness.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	2,236
Local reports	62
Form 22	17
Total	2,315

KITTY-HAWK, NORTH CAROLINA.

[*Official number*, 129.]

Latitude	36° 00′
Longitude	75° 23′
Height of barometer above sea-level	22 feet

This station is midway between Capes Henry and Hatteras, and was established for the purpose of facilitating the repair of the telegraph-line connecting those points. It was opened January 2, 1875, by Sergeant D. D. Stansell and Private J. M. Kistler, and the former still re-

mains. The latter was transferred to duty elsewhere May 28, 1875, and succeeded by Private Brown, the present assistant. The office is in Life-saving Station No. 6, in the north room of the second story. The anemometer and wind-vane are on the roof of the station. The rain-gauge is fifty yards north of it, and the other instruments are well exposed. The shelter is of the standard portable model, and is fastened to the north end of the building, one foot above the ground.

The station is connected by telegraph with the central office, and the men on duty are operators. The sergeant in charge is required to keep the line in repair from Knott's Island to the north side of New Inlet, a distance of forty miles. This work has been well done, and all breaks repaired with as much promptness as could be expected in a locality offering so few facilities for transportation of men and material. Twenty-two cautionary signals have been displayed, of which number twenty are reported as justified at the station. Daily reports of all vessels passing the station in either direction are made daily to the central office. Meteorological observations are made and reported regularly by telegraph and mail. The position of the station is an isolated one, but the men assigned to it have performed all their duties cheerfully, properly, and promptly.

On June 16, Sergeant Stansell was granted a furlough for thirty days, and Sergeant E. E. Clements sent to take charge of station during his absence.

KNOXVILLE, TENNESSEE.

[*Official number*, 42.]

Latitude	35° 56′
Longitude	83° 58′
Mean barometer for the year ending June 30, 1875	30.077
Mean temperature for the year ending June 30, 1875	56°.1
Amount of rain-fall for the year ending June 30, 1875	63.99 inches

Sergeant John K. Payne has been in charge since the establishment of the station, December 31, 1870. One assistant is allowed the station, and during the year one man has been ordered to Fort Whipple as a candidate for promotion, and one ordered to the same place for misconduct. The present assistant has been on duty since January 5, 1875, and given satisfaction. The only reports received here are those of Lynchburg, and these are published regularly with the local observations in the city newspapers. All reports, mail and telegraphic, have been rendered promptly, regularly, and in proper form. The station has not been inspected during the year. Referring to the flood of February, 1875, in the river at this point, the sergeant makes the following comparison between it and the flood of 1867:

From marks made in brick buildings by living and present witnesses, I determined the height of the flood of 1867 to be 45.75 feet above low water by the gauge recently put up by the officer in charge of the Tennessee River improvement. This gauge is forty-five feet long, and placed on lower face of first pier of Charleston bridge, to "reach to ordinary low-water mark." This on authority of Engineer F. T. Hampton, in charge of the river improvement.

The "Charleston bridge" and the "county bridge" both having been completed since 1867, acted as dams in the river, and gave the flood of 1875 an additional height of five to seven inches, when measured above said bridge piers.

The flood of 1875 was within thirty inches of 1867, but within twenty-three inches when measured above bridge.

The flood of 1867 was caused by rain longer continued and, I think, more extended than the recent one in 1875. This storm (1875) was very severe during only the night of the 24th instant. The damage on creeks was far greater than in 1867. Short streams were invariably higher in 1875 than in 1867. I am confident from my own observation that the rain-fall of 1867 was 9 inches, whereas the fall of 1875 was less than 8.

Highest water of 1867 at Knoxville, was on March 8, and at Chattanooga the highest was on the 13th.(†) My authority is S. C. Ramage, then an editor in Chattanooga, now in Knoxville.

Highest water of 1875 at Knoxville was on February 26, and at Chattanooga, the highest was probably Sunday, March 1. One was five days, the other three, in reaching Chattanooga. The river is larger below, and a continuous flood from a continuous moderate rain will be longer in reaching the lower country than a flood from an impetuous rain, mostly falling in one night. The former largely runs by in the wide stream before the tributaries have come down.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Local reports	1,234
Form 22	59
Total	1,293

LA CROSSE, WISCONSIN.

[*Official number*, 87.]

Latitude	43° 48′
Longitude	91° 23′
Mean barometer for the year ending June 30, 1875	30.029
Mean temperature for the year ending June 30, 1875	44°.7
Amount of rain-fall for the year ending June 30, 1875	35.22 inches

Sergeant Wm. E. Smith was in charge until November 28, 1874, when he was succeeded by Sergeant J. G. Lynch, who still remains. One assistant was allowed at this station until September 14, 1874, when he was transferred to other duty, and not replaced. Mr. D. M. Vanbergh has been selected by the sergeant to make reports in the event of his sickness or other disability. Reports from other stations are not received here, but the local observations are published regularly in the local press.

The sergeant reports that the records of the station are frequently referred to, and that six legal cases have been settled by such reference within the half-year ending June 30, 1875.

The station was inspected in May, 1875, and found in good condition. The river-gauge was out of order, but authority has been given for its proper repair. The highest water in the river at this station occurred April 27, 1875, when the gauge-reading was 9 feet and 10 inches.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Local reports	1,336
Form 22	24
Total	1,360

LEAVENWORTH, KANSAS.

[*Official number*, 52.]

Latitude	39° 19′
Longitude	94° 58′
Mean barometer for the year ending June 30, 1875	30.001
Mean temperature for the year ending June 30, 1875	52°.4
Amount of rain-fall for the year ending June 30, 1875	29.78 inches

Sergeant E. McGovern has been in charge during the entire year, and has given satisfaction by the manner in which he has rendered all reports.

Two assistants are allowed on this station, one of whom is a printer. The meteorological assistant has been on duty since October 24, 1873, and is highly commended by the sergeant for his uniform good conduct. Several printers have been on duty at different times during the year. One was transferred to the central office September 14, 1874; one was ordered in for misconduct October 30, 1874, and another for the same cause January 27, 1875, since which date no difficulty has been reported. The farmers' bulletin is printed at this station, and supplied regularly to two hundred and thirty post-offices. As at other printing stations, efficient aid has been given in this work by the local post-office officials in extending the service to new points and in improving the facilities for reaching the old ones whenever practicable. The only failures to issue during the year have been caused by drunkenness on the part of the printer, who has in each instance been relieved and punished. No change has been made in the location of the office, nor is any necessary at present.

The station was inspected in December, 1874, and found in good condition. The inspector reports considerable interest taken in the service, and a general desire expressed for reports from more stations to the westward, in place of the river-reports now sent from twenty other stations each afternoon. The zero of the Signal-Service river-gauge at this station was fixed at low-water mark of November 27, 1871, on March 13, 1875, and since that date its readings have corresponded with those made on the gauge at the fort. Reports from Dodge City station are transferred here to the Saint Louis circuit.

The reports, in various forms, are regularly published in the daily newspapers at the station. The morning papers are furnished with and print the midnight probabilities.

The highest water in the river at this station during the year occurred on April 30, 1875, when the gauge-reading was 17 feet and 3 inches.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Farmers' bulletins	100,076
Bulletins, manifold	2,300
Local reports	1,612
Form 22	93
Form 26	1,227
Total	105,308

LEXINGTON, KENTUCKY.

[*Official number*, 90.]

Latitude	38° 08′
Longitude	84° 33′
Mean barometer for the year ending June 30, 1875	30.079
Mean temperature for the year ending June 30, 1875	54°.3
Amount of rain-fall for the year ending June 30, 1875	39.57 inches

Sergeant W. S. Jewell has been in charge of this station since its establishment, in October, 1872. The office is still located in the university building, and has not been inspected during the year. Telegraphic reports are not sent from this station, but until March 29, 1875, reports for twenty-one other stations were received here once a day, and bulletined in the regular manner.

The station has not been managed satisfactorily, and Sergeant Jewell will be removed as soon as a suitable man can be found to replace him.

The regents of the university continue to afford every facility for the proper performance of the station-duties.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	2,998
Form 32	10
Total	3,008

LAKE CITY, FLORIDA.

[*Official number*, 24.]

Latitude	30° 13′
Longitude	82° 40′

This station was discontinued October 31, 1874, and the records and instruments transferred to Saint Mark's. Observations were made and reports forwarded regularly by Sergeant Wolcott until the date of removal.

LOGANSPORT, INDIANA.

[*Official number*, 124.]

This station was established for the distribution of the farmers' bulletins, and the first issue was made on July 15, 1874. Corporal Lloyd Prather has been in charge during the whole year, and the work has been well and regularly done with the aid of one assistant. Two hundred post-offices are supplied, and the total number of copies issued to June 30, 1875, was 97,896.

The station was inspected in August, 1874, and found in excellent condition. The office is well located, in a second story front room, at No. 48 Front street, in the same building with the Western Union Telegraph office, and within easy reach of the post-office.

LONG BRANCH, NEW JERSEY.

[*Official number*, 113.]

Latitude	40° 18′
Longitude	79° 59′
Mean barometer for the year ending June 30, 1875	30.052
Mean temperature for the year ending June 30, 1875	49°.7
Amount of rain-fall for the year ending June 30, 1875	47.42 inches

Sergeant George W. McKee was in charge of station until his death, from typhoid fever, September 14, 1874. He was succeeded by Corporal I. T. Shadle, who remained until February 25, 1875, when he was transferred to duty elsewhere, and Sergeant W. E. Smith assigned to duty in his place. Sergeant Smith was found guilty of neglect of duty, and removed March 12, 1875. His successor was Sergeant William H. Ray, who remained until May 13, 1875, when he was ordered to exchange stations with Sergeant E. D. Holbrook, then at Barnegat. Sergeant Holbrook remains in charge. Several changes have been made in the assistant during the year, three men having been transferred successively to other stations. The present one has been on duty since Jan-

uary 2, 1875. Both men on duty are telegraph-operators. The station is on the coast telegraph-line, and in direct communication with the central office. It is a repeating station, and, therefore, one of the most important in the coast system. The sergeant is required to keep the line in repair half-way to Squan Beach, a distance of eleven miles.

Special reports of the temperature and humidity are made daily during the months of July, August, and September, for the Philadelphia press. Forty cautionary signals have been displayed, of which number thirty-one are reported as justified at this station. Daily reports are made to the central office of all vessels passing the station in either direction.

The only marine disasters reported during the year, at this station, were the following:

November 22, 1874.—Bark H. C. Gray, of New York, went ashore on the rocks below the station.

February 25, 1875.—Steamship France, from Havre to New York, went ashore about half a mile from the beach. Got off safely at high water same night.

No change has been made in the location of office, which is in an observatory erected on the top of the life-saving building.

The station was inspected in February, 1875, and found in good condition, so far as its management was concerned, but in want of many conveniences, which were furnished upon the inspector's recommendation. The tri-daily probabilities are sent to this station, as to all others on the coast-line, but there is no other publication made of them, other than to post a copy at the office, which is done regularly.

LOUISVILLE, KENTUCKY.

[*Official number*, 64.]

Latitude	38° 18′
Longitude	85° 52′
Mean barometer for the year ending June 30, 1875	30.055
Mean temperature for the year ending June 30, 1875	55°.6
Amount of rain-fall for the year ending June 30, 1875	39.05 inches

Sergeant J. W. Craig was relieved from charge of this station July 27, 1874, and succeeded by Sergeant J. H. Marsh, who was then serving as assistant on the station, and who still remains. He served without an assistant until August 21, 1874, since which date the present assistant has been on duty, and given satisfaction.

The station was inspected in September, 1874, and the office, records, and instruments found in good condition, and the men well informed as to their duties. No change has been made in the location of the office.

The daily newspapers print the reports regularly and in excellent form, and citizens engaged in the shipping business take great interest in those from the river stations. The highest water in the Ohio at this point during the year occurred March 20, 1875, when the gauge-reading was seventeen feet and eleven inches.

Twenty-three maps are received daily from Cincinnati station, and are distributed and displayed in the usual manner.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	13,754
Local reports	1,840
Form 22	82
Form 26	8,794
Total	24,470

LYNCHBURG, VIRGINIA.

[*Official number*, 44.]

Latitude	37° 30′
Longitude	79° 02′
Mean barometer for the year ending June 30, 1875	30.094
Mean temperature for the year ending June 30, 1875	55°.5
Amount of rain-fall for the year ending June 30, 1875	40.72 inches

Sergeant H. U. Jones has been in charge of this station during the year, with the exception of the month of February, 1875, when he was absent on furlough, and his place supplied by Sergeant Charles Dill, assigned temporarily. The station is not allowed an assistant, as the duty is light and the location healthful. All reports, both mail and telegraphic, have been rendered promptly, regularly, and in excellent form.

The station has not been inspected during the year. The only reports received are those of Knoxville, which, together with the local observations, are regularly printed in the local newspapers.

Referring to the interest taken in the service by the citizens, the sergeant remarks as follows:

> The public interest seems to be equal if not greater than what it has been. Pork-packers have reaped a good deal of advantage from the service, but the tobacco-dealers derive the most benefit. One case in particular is as follows: A warehouse burned down, and while in process of rebuilding, before the roof was put on, the proprietors would consult the weather reports before putting tobacco in it, and although tobacco is easily injured by moisture, and appearances were often against them, in no case was there any damage done from the non-verification of the probabilities. Their confidence is rendered greater by the practical and immediate benefit thus derived.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Local reports	877
Form 22	32
Total	909

MARQUETTE, MICHIGAN.

[*Official number*, 50.]

Latitude	46° 36′
Longitude	87° 36′
Mean barometer for the year ending June 30, 1875	29.987
Mean temperature for the year ending June 30, 1875	39°.1
Amount of rain-fall for the year ending June 30, 1875	26.36 inches

Sergeant W. H. Clendenon has been in charge of this station since October 4, 1871, and his assistant since April 9, 1874. Both men have given satisfaction by the regularity with which the mail reports have been forwarded, and their general accuracy. Nineteen cautionary signals have been displayed, of which number twelve are reported as justified at the station. The general result of these displays is reported to have been beneficial. The station was twice inspected during the year, once in August, 1874, and again in May, 1875, and the instruments, records, and office found in good condition on both occasions. Telegraphic communication with the station is frequently interrupted, and important reports and orders are often delayed until they have

become valueless and inoperative. Reports from other stations are not received here, and the only publications made are of the local observations in "The Mining Journal." No change has been made in the location of the office. Telegraphic reports from the station were suspended from March 1, 1875, to the close of the fiscal year.

MEMPHIS, TENNESSEE.

[*Official number*, 61.]

Latitude	35° 07′
Longitude	93° 07
Mean barometer for the year ending June 30, 1875	30. 086
Mean temperature for the year ending June 30, 1875	60°. 1
Amount of rain-fall for the year ending June 30, 1875	47. 28 inches

Sergeant S. W. Rhode was in charge until his transfer on September 14, 1874, to Milwaukee. He was succeeded by Sergeant H. M. Ludwig, who still remains, and has given satisfaction. There are two assistants on duty, one of whom is a printer. One assistant was ordered to Fort Whipple as a candidate for promotion October 22, 1874, and another to the same post on account of sickness October 24, 1874. The farmers' bulletin is issued regularly from this station to sixty-five post-offices, that being the greatest number it has been found possible to reach on the day of issue in time to make the reports of any practical value. An intelligent interest is taken in the service at this station by the members of the Cotton Exchange and Chamber of Commerce, both of which bodies are largely interested in the condition of the growing crops, and, therefore, in the meteorological changes by which they are affected. The city press use the local reports and those from the other river stations received here daily.

The station was inspected in October, 1874. The instruments and records were found in good condition, and the men well informed as to their duties, but the general appearance of the office was bad, and the furniture out of repair. These faults were remedied promptly upon the recommendation of the inspector.

Complaint is made by the men on duty at this station that their pay is insufficient, owing to the prevalent high prices charged for the necessaries of life. As their statements are supported by the testimony of leading citizens, they are entitled to such consideration as can properly be given them.

The river-gauge at this station was swept away by high water, and since May 5, 1875, the observations have been made from a temporary gauge at the Anchor Line's wharf. The highest water in the Mississippi River at this point occurred April 1, 1875, when the gauge-reading was 33 feet and 10 inches. No change has been made in the location of the office.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Farmers' bulletins	33,453
Bulletins, manifold	5,235
Local reports	474
Form 22	100
Form 26	3,707
Total	42,969

MILWAUKEE, WISCONSIN.

[*Official number*, 38.]

Latitude	43° 03′
Longitude	87° 54′
Mean barometer for the year ending June 30, 1875	30.049
Mean temperature for the year ending June 30, 1875	42°.4
Amount of rain-fall for the year ending June 30, 1875	34.28 inches

Sergeant H. M. Ludwig was in charge until September 14, 1874, when he was transferred to Memphis, and succeeded by Sergeant S. W. Rhode, who still remains, and has two assistants. During the year two men have been ordered to Fort Whipple as candidates for promotion, and two for misconduct. All the men now on duty give satisfaction. Twenty-seven cautionary signals have been displayed, of which number sixteen are reported as justified at the station. In reference to these displays, the sergeant reports as follows:

November 22–24, 1874.—Signal hoisted nine hours before storm began. It was preceded by rain and snow; the wind was dangerous and destructive, prostrating trees and telegraph-poles and delaying railroad-trains; not a single vessel left port during the display.

Many owners of vessels called for information regarding the storm, and several of them stated that they were satisfied the value of their vessels and cargoes were saved by obedience to the signal.

A schooner wanted to leave during the night of the 22d while signal was up, but the insurance companies refused to take the risks.

Comparatively few disasters are reported on lake Michigan, the cause of which the insurance men claim is due to the timely warning of the signal. The local press very favorably mention the signal and its beneficial results. On the 25th instant the Daily News remarks, concerning the few disasters reported: "This is undoubtedly due, in a great measure, to the cautionary signal of Old Prob., which kept vessels in port."

April 29 *to May* 2, 1875.—The signal was hoisted at 12.25 a. m. of the 1st instant. At 8.15 a. m. a heavy northeast gale began, accompanied by heavy snow, which continued until after midnight. No vessels left port while the signal was up. Several schooners which left on the evening of the 30th ultimo, but could not get an offing before daylight of the 1st, saw the signal up at that time and came back. Several disasters reported.

The cautionary-signal indicator is placed in the exchange.

The press continues to manifest a lively interest in the service, and since the 1st of June, 1875, the morning newspapers have been receiving and publishing the midnight probabilities. The sergeant states that Colonel Hathaway, the chairman of the meteorological committee of the chamber of commerce, has displayed marked interest in the condition of the office, and extended many courtesies to the men on duty.

The station was inspected twice during the year—once in August, 1874, and again in May, 1875. The instruments, records, and qualifications of the men on duty were favorably reported upon on both occasions; but at the first inspection the office was out of order from want of necessary repairs and articles of furniture, which were promptly supplied upon the inspector's recommendation. The second report was a favorable one, as the office was found neat in appearance and well furnished.

Manifold maps, to the number of twenty-two, are issued daily, and judiciously distributed and displayed. No change has been made in the location of the office.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	9,550
Maps, manifold	4,570
Form 22	74
Form 15, manifold	5,468
Total	19,662

MOBILE, ALABAMA.

[*Official number*, 27.]

Latitude	30° 42′
Longitude	88° 59′
Mean barometer for the year ending June 30, 1875	30.100
Mean temperature for the year ending June 30, 1875	67°.0
Amount of rain-fall for the year ending June 30, 1875	55.50 inches

Sergeant D. O'Donoghue has been in charge of this station since November 4, 1871, and during the past year has rendered all reports promptly, regularly, and satisfactorily. The station is allowed one assistant, and the present one has been on duty since August 11, 1874, on which date his predecessor was ordered to Fort Whipple as a candidate for promotion. Four cautionary signals have been displayed, of which number three are reported as justified at the station.

The members of the board of trade and cotton exchange take a lively interest in the reports received here from other stations in the cotton-growing States, and the sergeant reports that members of the medical profession are making special studies of such reports as they have access to.

The station was inspected in November, 1874, and the instruments, records, and office found in good condition, and the men on duty well informed in their duties.

The morning newspapers go to press before the midnight reports are received, and, therefore, print those of the previous afternoon. No change has been made in the location of the office, but the present one has been improved and made more comfortable.

PUBLICATIONS.

[*Year ending June* 30, 1875.]

Bulletins, manifold	5,708
Form 22	88
Form 15, manifold	2,053
Total	7,843

MONTGOMERY, ALABAMA.

[*Official number*, 26.]

Latitude	32° 22′
Longitude	86° 23′
Mean barometer for the year ending June 30, 1875	30.110
Mean temperature for the year ending June 30, 1875	65°.5
Amount of rain-fall during the year ending June 30, 1875	48.50 inches

Sergeant E. T. Carvalho was in charge until September 17, 1874, when he left his station without authority, while laboring under an attack of temporary insanity. He reported at Fort Whipple on the 19th of the same month, and was shortly afterward transferred to the Government Asylum for the Insane. Private Mayhew took charge of the station until the arrival of Corporal W. J. Evans, on the 21st of September; since which date the latter has been in charge, and given satisfaction. There are two assistants on duty, one of whom is a printer. During the year two men have been ordered to Fort Whipple for misconduct, and one for discharge. The farmers' bulletin is printed at this station, and supplied regularly to fifty-three post-offices; that being the greatest num-

ber it is found possible to reach in time to make the reports of practical value.

The station was inspected in November, 1874, when the instruments and records were found in good condition and the men on duty well informed. The office was in need of repairs, and these were made under the supervision of the inspecting-officer. No change has been made in the location of the office.

No reports are received here from other stations, and the publications are limited to those of the local observations in the daily press.

Corporal Evans has discharged his various duties intelligently and well, and his promotion to the grade of sergeant is recommended as a reward for faithful service.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Farmers bulletins	24,771
Bulletins, manifold	6,170
Local reports	460
Form 22	32
Total	31,433

MORGANTOWN, WEST VIRGINIA.

[*Official number*, 92.]

Latitude	39° 36′
Longitude	79° 52′
Mean barometer for the year ending June 30, 1875	30.049
Mean temperature for the year ending June 30, 1875	51°.7
Amount of rain-fall for the year ending June 30, 1875	43.17 inches.

Sergeant Lawrence Dunne has been in charge throughout the year, and all his reports have been made promptly and with unusual neatness and care. The office still remains in the university building, and its maintenance involves no cost to the United States except for instruments, telegraphing, and pay of observer. The sergeant acts as instructor in meteorology to the students at the university, and in this capacity has done good service. On special occasions river reports are telegraphed from this station, but the regular reports are forwarded by mail only. A weekly digest of the local observations is regularly published in the Post, and is the only publication made at the station.

This station has not been inspected during the year.

MOUNT WASHINGTON, NEW HAMPSHIRE.

[*Official number*, 46.]

Latitude	40° 16′ 25″
Longitude	71° 16′ 26″
Mean barometer for the year ending June 30, 1875	29.976
Mean temperature for the year ending June 30, 1875	24°.0
Amount of rain-fall for the year ending June 30, 1875	47.65 inches

Sergeant A. R. Thornett was transferred August 29, 1874, and his senior assistant, Sergeant William Line, placed in charge, remaining in that position during the year, with the exception of a few days in May, when he was called in to Washington for discharge and re-enlistment, returning, immediately afterward, to the station. One assistant, Private De Rosher, has been on duty since August 4, 1873, and the other

one, Private King, since September 4, 1874. All the men have performed their duties faithfully and well, and worked harmoniously together.

The office building has been covered with another thickness of board, which renders it more comfortable during the storms of winter. The telegraph-line has been kept in fair working order, the principal interruptions occurring in winter, when the labor of repairing is most difficult.

The health of the men has been excellent, and no complaint is made of want of society or amusement. The station was inspected in October, 1874, and found in good condition.

Telegraphic reports from the station were ordered to be discontinued February 5, 1875, until the close of the fiscal year.

No items of special interest have been reported by the observer as occurring during the year.

NASHVILLE, TENNESSEE.

[*Official number*, 63.]

Latitude	36° 11′
Longitude	86° 53′
Mean barometer for the year ending June 30, 1875	30.080
Mean temperature for the year ending June 30, 1875	59°.5
Amount of rain-fall for the year ending June 30, 1875	51.19 inches

Sergeant A. C. Ford remains in charge of this station, with two assistants, one of whom is a printer. One man was ordered to Fort Whipple July 20, 1874, as a candidate for promotion, and his place filled by another instructed man, being the only change made during the year. The farmers' bulletin is printed at this station, and supplied to one hundred and sixteen post-offices. No change has been made in the location of office. The station was inspected in September, 1874, and the instruments, records, and office found in good condition, and the men well informed as to their duties.

The telegraphic transmission of the afternoon reports from this station was suspended during the month of March, 1875, and from May 1, to the close of the fiscal year.

Much interest is taken in the service by the local press, and the regular reports published in tabulated form, together with the latest received probabilities. The highest water in the Cumberland River at this station occurred March 2, 1875, when the gauge-reading was forty-one feet and four inches.

Referring to the public interest in the office, the sergeant remarks as follows:

> The sergeant has been twice summoned as a witness in important railroad and insurance law-suits, and on several other occasions he has been called upon to give information, which has proved of direct pecuniary value to the parties receiving it.
>
> On one occasion the agent of the Nashville and Chattanooga Railroad wished to know the direction and force of the wind, on a certain day at a given hour. With this knowledge, which was favorable to the railroad company, he was enabled to prevent the institution of a suit for damages caused by fire near the track of the railroad, and alleged to have originated from the sparks or cinders of a passing engine.
>
> A gentleman engaged in building windmills through this section, requested to have a table of the wind's velocity, at every observation during two years, prepared, and he since stated that its value to him has been great.
>
> The farmers of the vicinity have this season manifested a greatly increased interest in the service. Many now call regularly at the office for the official report of rain-fall and temperature, with such other information as the sergeant is able to furnish them.
>
> Rain-gauges, thermometers, and sometimes barometers are applied for by persons anxious to obtain and use for themselves reliable instruments. All these applicants are referred to Mr. James Green, New York.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Farmers' bulletins	53,570
Manifold bulletins	8,021
Local reports	696
Form 22	171
Form 26	3,740
Form 15, manifold	4,992
Total	71,190

NEW HAVEN, CONNECTICUT.

[*Official number*, 47.]

Latitude	41° 17′
Longitude	72° 57′
Mean barometer for year ending June 30, 1875	30.076
Mean temperature for the year ending June 30, 1875	48°.6
Amount of rain-fall for the year ending June 30, 1875	49.54 inches

Sergeant William Black was in charge until transferred to another station July 15, 1874. He was succeeded by Sergeant F. P. Bayes, who remained until June 15, 1875, when he was transferred to New York, and succeeded by Sergeant M. F. Tighe, the present observer. An assistant was allowed the station from March 5 to April 9, 1875, but the demands of the service elsewhere would not justify his permanent retention.

Thirty-five cautionary signals have been displayed, of which number twenty-seven are reported as justified at the station. The following remarks upon some of the results of these displays are made by the sergeant in his special reports:

September 17–18, 1874.—During the display the harbor was filled with coasting-vessels, which remained until the signal was lowered. The steamer Continental, for New York left, but meeting high winds had to put back. The storm did much damage in the country, blowing fruit off trees; more severe on the Sound than here.

November 23–24, 1874.—No vessels left the harbor during the display except the daily steamers; high winds and heavy sea on the Sound; tide ran higher during the storm than for sixteen years, and did much damage to property.

January 9–10, 1875.—Squally and gusty, and reported dangerous from the immediate coast; the steamer City of New York became disabled, and put into this harbor; several sailing-vessels remained at anchor during the display.

January 24–25, 1875.—Storm of rain, snow, and sleet, with but little wind at this station, but dangerous winds reported off the coast. The brig Morning Light, bound to this port, driven out to sea. Harbor full of ice.

February 25–28, 1875.—The tug-boats Narragansett, Terror, and Thunder started with tow of barges, but were compelled to return to port.

March 1–4, 1875.—The steamers Continental and Traveler, of the New York lines, delayed leaving port until signal was lowered. The steamer Elm City, New York line, obliged to lay over; sound full of ice; few craft moving.

The station was inspected in November, 1874, and records, instruments, and office found in good condition. No change has been made in the location of the office, nor is any desirable at present. Telegraphic reports are not received at or sent from this station. The local observations are published regularly in the local press.

Thirteen maps are received daily from New York, and promptly distributed.

The sergeant reports as follows upon some of the uses made of the office-records:

During the session of the last court, these records have been called in four times as evidence. The board of health use the records in their deliberations, and publish them in connection with their monthly statement of mortality. Chief engineers consult the records to ascertain the force and pressure of the wind on various occasions, and other instances of benefit might be cited.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Local reports	716
Form 22	47
Total	763

NEW LONDON, CONNECTICUT.

(*Official number*, 14.)

Latitude	41° 22′
Longitude	72° 09′
Mean barometer for the year ending June 30, 1875	30.070
Mean temperature for the year ending June 30, 1875	48°.5
Amount of rain-fall for the year ending June 30, 1875	50.26 inches

Sergeant George H. Crane has been in charge of this station since June 29, 1874. One assistant was called in for misconduct March 5, 1875, and replaced by another man, who deserted April 7, 1875; since which date the sergeant has done all the station-work without assistance. Sergeant John McCann is at present in charge, during the temporary absence of Sergeant Crane.

Thirty-seven cautionary signals have been displayed, of which number twenty-one are reported as fully verified, and four partially so, at the station. Referring to some of these displays, the sergeant reports as follows:

December 20-21, 1874.—Several vessels left port, but had to put back on account of storm; heavy snow prevailed.

February 3-4, 1875.—Warning given two hours in advance. Vessels put in for shelter after signal was hoisted. No knowledge of any injury.

March 3-4, 1875.—Warning given three hours in advance, enabling vessels which had just left the harbor to put back. An unknown schooner reported off Gull Island with foremast gone.

May 8, 1875.—Two vessels which were under way returned to anchor as soon as the signal was hoisted.

May 12, 1875.—A number of vessels ran in for shelter, and remained until after signal was lowered. Storm very severe outside the harbor.

The station was inspected in November, 1874, and the instruments, records, and office found in good condition, and the men well-informed in their duties.

Telegraphic reports from this station were suspended from March 1, 1875, to the close of the fiscal year, and as no reports from other stations were received during the same period, the office-work was light, and the local interest in the service limited.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	4,901
Form 22	34
Form 22, manifold	2,368
Total	7,303

NEW ORLEANS, LOUISIANA.

[*Official number*, 47.]

Latitude	29° 58′
Longitude	90° 07′
Mean barometer for the year ending June 30, 1875	30.083
Mean temperature for the year ending June 30, 1875	69°.3
Amount of rain-fall for the year ending June, 30, 1875	74.98 inches

Sergeant N. Gorom remains in charge. His original term of service expired December 16, 1874, but he was re-enlisted at the station, and his service made continuous. Three assistants have been allowed this

station, one of whom is a printer. One man was ordered to Fort Whipple as a candidate for promotion, February 9, 1875, and his place filled by another instructed man, being the only change made during the year. The force will be reduced at an early date, as it is too large for the amount of work done at the station.

The farmers' bulletin is printed regularly, and supplied to fifty-five post-offices; that being the greatest number it is found possible to reach before 6 o'clock in the afternoon of the day of issue. Five cautionary signals have been displayed, of which three are reported as justified at the station. The signal-indicator is placed in the Cotton Exchange. The station was inspected in November, 1874, and the records, instruments, and other property found in good condition, but the location of the office-room was unfavorably reported upon, and a change to another part of the building strongly recommended.

Reports from seven stations in addition to those originally furnished this station have been sent once a day since November 25, at the request of the officers of the Merchants' Exchange, to the members of which body these reports are of special value in regulating the movement of produce. The following extract is made from the last semi-annual report of the sergeant in charge:

> At the Cotton Exchange the members are most interested in the reports from the cotton-region, and, from the time of planting to the picking, these reports are watched very closely by all. All are anxious to know in regard to the rain-fall each day, and for their information I post in the Exchange the rain-fall for the twenty-four hours from the reports received here from that section. If, when the cotton-crops have grown to such extent as to promise an abundant yield, a heavy rain should occur, or a long spell of rainy weather should set in, it has a damaging effect upon the crops, by retarding their growth and causing them to go to seed, while a light rain at intervals facilitates their growth. In such an event as heavy rain-fall the cotton market is seriously affected. The value of cotton on hand is considerably enhanced and that of the future is depreciated, while favorable weather has a contrary effect. As the fluctuations of the cotton-market are controlled more directly by the state of the weather than by anything else, it is very desirable that we should receive more reports from the cotton-growing regions.

Reports in tabulated form are regularly printed in the daily newspapers of the city. The latest probabilities received before the papers go to press are also printed, but, as the usual hour of going to press is before the receipt of the midnight reports, the farmers' bulletin, which is printed after their receipt, gives later information than is contained in the morning papers.

The highest water in the Mississippi at this point during the year occurred on April 22, 1875, when the gauge-reading was four feet below bench-mark.

PUBLICATIONS.

(Year ending June 30, 1875.)

Bulletins, manifold	11,664
Form 22	62
Form 26	6,916
Form 15	18,480
Total	37,122

NEW YORK, NEW YORK.

[Official Number, 61.]

Latitude	40° 42′ 43″
Longitude	74° 00′ 03″
Mean barometer for the year ending June 30, 1875	30.080
Mean temperature for the year ending June 30, 1875	49°.8
Amount of rain-fall for the year ending June 30, 1875	36.24 inches

Sergeant H. E. Cole was in charge until November 23, 1874, when he was discharged from the service at his own request, and succeeded by Sergeant M. F. Tighe, his senior assistant. On December 31, 1874, Sergeant F. M. M. Beall was ordered to assume charge of the station, and still remains. There are six assistants on duty, three of whom are printers and one a non-commissioned officer, who is in charge of the night relief. It is proposed to reduce the force at an early date. Four assistants have been transferred to other stations during the year, and one discharged from the service. The farmers' bulletin is printed at this station, and also the daily weather map. The former is sent regularly to six hundred and ninety-eight post-offices, and of the latter, two hundred and seventy-nine copies are issued daily, except on Sundays, and distributed in the usual manner to interested parties, and to such prominent business places as can be reached in time to make their display of value. Forty-five cautionary signals have been displayed, of which number twenty-five are reported as justified at the station. The cautionary-signal indicator is placed in the room of the Maritime Exchange. Referring to some of the signal displays, the sergeant remarks as follows:

January 24–25, 1875.—Storm accompanied by heavy snow; harbor full of dangerous masses of ice; no vessel left port.

February 7–8, 1875.—An unknown vessel seen off the coast dismasted; ship Ambassador ashore near Bedloe's Island.

February 10–12, 1875.—United States revenue-steamer Grant disabled; few vessels sailed during display of warning, and very many clearances delayed on its account.

February 25–26, 1875.—The wall of Shaw's building thrown against and on the roof of St. Andrew's church, crushing in the roof, and killing five persons and wounding thirty; no knowledge of any injury to shipping.

March 20–21, 1875.—Generally observed by sailing vessels. I learn upon inquiry that only one left port.

April 1–2, 1875.—The Maritime Exchange reports a number sailing-vessels delayed by signal.

The following extracts from the reports of the sergeant show some of the uses made of the office-records:

From careful personal observation, with the assistance of the secretary of the Maritime Exchange, a favorite resort for masters and shippers and other shipping officials, it is found that the influence of the display of cautionary signals with shippers and sailors, more especially coasters, is gratifying; especially when the general appearance of the weather is dubious.

Three citations have been received and complied with, to appear in court with the weather-records, and also have been consulted a large number of times by members of the bar in cases where the weather played an important part. Our records are usually accepted as authority.

The American Rifle Association made some important experiments, during February and March, as to the influence atmospheric pressure has in causing a shot to preserve or deviate from a straight line. After making a series of careful comparisons of their instruments with those of this station, they reported their experiments tended to show that during a high barometer and low temperature the shot maintained its direction of movement nearer to a straight line than during a low pressure and high temperature; but these conditions appeared not to work satisfactorily at all times. Supposing the humidity to influence, to some extent, the combustion, it was suggested to them to make readings of the hygrometer during the experiments.

The station was inspected in February, 1875, and the instruments and records found in good order, but the office in bad condition.

The location of the instrument-shelter was reported by the inspector as unsuitable for the proper exposure of instruments, and it is intended to remove it to another part of the roof as soon as some changes now making in the Equitable building are completed.

The signal-lantern will also be removed. This lantern continues to give satisfaction, as its light is visible from all parts of the harbor.

Mr. Theodore Weston, of the Equitable Company, has rendered efficient assistance to the service, in connection with the office at this station, on frequent occasions during the year. The post-office officials have also been courteous, attentive, and obliging in expediting the distribution of the farmers' bulletins.

The sergeants who have managed this station during the year have been uniformly faithful and intelligent in the discharge of their duties.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Farmers' bulletins	349,537
Bulletins, manifold	8,773
Maps	94,918
Form 22	230
Form 26	893
Total	454,051

NORFOLK, VIRGINIA.

[*Official number*, 92.]

Latitude	35° 51′
Longitude	76° 19′
Mean barometer for the year ending June 30, 1875	30.109
Mean temperature for the year ending June 30, 1875	57°.3
Amount of rain-fall for the year ending June 30, 1875	49.48 inches

Sergeant E. W. McGann has been in charge since February 18, 1873, and has two assistants. Two men have been transferred to duty elsewhere during the year, and one ordered to Fort Whipple for misconduct.

The station is on the Coast Telegraph Line, and is in direct communication with the central office. The men on duty are necessarily telegraph-operators, and the station affords a good school for teaching this branch of duty. The sergeant is required to keep the line in repair from his station to the north side of Lynn Haven Bay, a distance of twelve and a half miles.

Thirty cautionary signals have been displayed, of which number fifteen are reported as fully justified, and two partially so, at the station. In many of the other instances high winds have prevailed outside, although not felt at the station. The following are some of the reported results of these displays:

February 14, 1875.—The brig Kerwadin, loaded with sugar, from Havana to Baltimore, driven ashore near Cape Henry during the storm; otherwise no knowledge of any injury.

February 24–25, 1875.—Several stables, and one church in course of erection, blown down; telegraph communication with the Office of the Chief Signal-Officer interrupted.

March 1–4, 1875.—Very high sea and dangerous winds prevailed outside; no casualties; all vessels remained in port.

April 24, 1875.—The signal gave two and a half hours' warning. Two oyster-sloops were capsized in the roads; all hands reported lost. Ferry-boats were compelled to stop running; trees were blown down; and in two instances the tin roofs were started on lofty buildings.

April 29–*May* 2, 1875.—The yacht Tidal Wave remained in port until signal was lowered, when she immediately put to sea. The signal was most favorably commented on by all classes of citizens. Very fine weather prevailed for several hours after signal was hoisted.

The telegraphic communication with Cape Hatteras and intermediate points along the coast, by the signal-line, is considered of great im-

portance at this station, on account of the facilities it affords the wrecking companies for the transaction of their business.

Since the 12th of February, the tri-daily probabilities have been received at this station over the signal-line, and are furnished the daily press for publication.

January 1, the English steamship San Marcus ran ashore at False Cape; and a man from this station was ordered to proceed without delay and open communication between the stranded steamer and Norfolk, which was accomplished the following day. It is believed that the ship and cargo would have proved almost a total loss but for the timely assistance rendered by the signal-line. She was floated off on 7th of January.

The station was inspected in October, 1874, and instruments, records, and office found in good condition. No change has been made in location of office during the year.

The local observations are published in the daily newspapers.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	6,062
Maps, manifold	3,404
Local reports	826
Form 22	44
Form 15, manifold	3,871
Total	14,207

NORTH PLATTE, NEBRASKA.

[*Official number*, 105.]

Latitude	41° 8′
Longitude	100° 53′
Height of barometer above sea-level	2,846 feet.

Sergeant John R. Williams has been in charge of this station since its establishment, (September 16, 1874,) and has made all reports regularly, promptly, and with commendable neatness. An order was issued relieving him on account of ill-health June 6, 1875, to take effect on the arrival of his successor, but the latter has not yet reported, having been detained by sickness.

The office is located in the school-building through the courtesy of the board of school directors, who tendered its use free of charge. The room occupied is one of the finest in the town, and the exposure for all the station instruments excellent. The instrument-shelter is of the standard model, and projects from a window facing the north.

The station has not been inspected. All reports passing over the Chicago and San Francisco circuit are received and published here in the regular manner.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	
Local reports	
Form 22	20
Form 15, manifold	210
Total	4,630

OMAHA, NEBRASKA.

[*Official number*, 67.]

Latitude	41° 16
Longitude	96° 00
Mean barometer for the year ending June 30, 1875	29.995
Mean temperature for the year ending June 30, 1875	47°.8
Amount of rain-fall for the year ending June 30, 1875	33.11 inches

Sergeant Thomas Cleary has been in charge of this station since August 13, 1873, and given satisfaction by the promptness and regularity with which all reports have been forwarded. One assistant was ordered to Fort Whipple, January 8, 1875, as a candidate for promotion, and his successor to the same post for misconduct, March 18, 1875, since which date the present one has been on duty. The station was inspected in June, 1875, and found in good condition. The highest water in the Missouri River at this point occurred April 27, 1875, when the gauge-reading was 17 feet and 10 inches. The local observations are printed in the daily newspapers of the station, together with occasional selections from other reports.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	7,779
Form 22	41
Total	7,820

OSWEGO, NEW YORK.

[*Official number*, 31.]

Latitude	42° 28′
Longitude	75° 35′
Mean barometer for the year ending June 30, 1875	30.037
Mean temperature for the year ending June 30, 1875	45°.3
Amount of rain-fall for the year ending June 30, 1875	30.65 inches

Sergeant B. F. Hough has been continuously in charge of this station since its establishment in October, 1870, and the assistant has been on duty since March 3, 1874. Sergeant Hough has made all reports promptly, regularly, and intelligently, and has attended to his station-duties with marked faithfulness and ability. Seventeen cautionary signals have been displayed, of which number ten are reported as justified at the station.

Referring to some of these displays, the sergeant remarks as follows :

September 30—*October* 1, 1874.—Schooner McDonald lost two anchors; schooner May Williams lost jib-fly in storm of the 30th.

October 29–30, 1874.—All vessels remained in port, except one which put out, but was obliged to return.

November 23–24, 1874.—A large fleet of vessels detained by the signal. The wind coming from the west caused a very heavy sea, rolling entirely over the old and new piers.

The station has been twice inspected during the year; once in July, 1874, and again in February, 1875. Instruments, records, and office were found in excellent condition on both occasions. Arrangements have been made by which, after July 1, 1875, the midnight probabilities will be received at this station, and forwarded along the line of the Lake Ontario Shore Railroad, free of expense to the Government. This will

distribute the reports in a section of country not previously reached by them.

The sergeant reports as follows upon the local uses made of the records :

The public generally are much interested in the weather-reports. It is seldom that a vessel leaves port without the captain first coming to the office to learn if he is likely to have fair wind for his passage. The weather-reports are made use of by all classes.

There have been some important lawsuits settled that were depending by my evidence on the records of this office. I am frequently called upon from a distance to give the records from my daily journal for dates back sometimes two and three years.

Sailors, shippers, vessel-owners, and mechanics of every class, derive the greatest benefit. Colonel Wilson, United States Engineers, who is now building the new pier at this port, expresses himself as having been materially aided in his work by the information obtained from this office, as sinking of cribs depends upon the direction and force of the wind.

No change has been made in the location of office. The inspector makes the following remarks upon the condition of the station :

The office is in excellent condition ; clean and neat in appearance ; the walls in good order ; the room presenting an attractive appearance ; the work correctly performed ; the service exceedingly popular ; the office consulted by all classes of citizens, and Sergeant Hough enjoying an excellent reputation. * * * The inspector has seen no office of the Signal-Service that is better kept.

The local newspapers print tabulated reports regularly. Manifold maps are issued here, and distributed in the usual manner.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	5,996
Maps, manifold	4,169
Local reports	1,238
Form 22	48
Total	11,451

PECK'S BEACH, NEW JERSEY.

[*Official number*, 117.]

Latitude	39° 11′
Longitude	79° 41′
Mean barometer for the year ending June 30, 1875	30.098
Mean temperature for the year ending June 30, 1875	49°.4
Amount of rain-fall for the year ending June 30, 1875	48.26 inches

Sergeant J. O. Barnes has been in charge of this station since its establishment, (December 1, 1873,) and his assistant has been on duty since April 6, 1874. Both men have given satisfaction.

The station is on the coast-telegraph line, and in direct communication with the central office, and the men are of necessity fair telegraph operators. Thirty-four cautionary signals have been displayed, of which number twenty-four are reported as justified at the station. During the months of July, August, and September, reports of the mean temperature and humidity are telegraphed daily to Philadelphia, at the request of the press of that city. The sergeant in charge is required to keep the line in repair from Seaville to the south side of Great Egg Harbor, a distance of fourteen miles.

The station has not been inspected during the year, nor have any marine disasters occurred within its range. Daily reports are made

to the central office of the number of vessels passing in either direction. Full meteorological observations are made and forwarded regularly by mail and telegraph.

PEMBINA, DAKOTA TERRITORY.

[*Official number*, 86.]

Latitude	49° 00′
Longitude	97° 05′
Mean barometer for the year ending June 30, 1875	
Mean temperature for the year ending June 30, 1875	
Amount of rain-fall for the year ending June 30, 1875	inches

Sergeant Sidney Powell was in charge until March 12, 1875, when he was relieved and transferred to the Government Insane Asylum. He was succeeded by Sergeant Charles Dill, who still remains, and has made his reports with regularity. Owing to Sergeant Powell's inability to perform his duties, the records for the months of January, February, and March, 1875, are worthless, and for this reason the annual means have not been given.

During this period the telegraphic observations were made and forwarded, as regularly as the uncertain telegraphic communication would permit, but as it was afterward learned, no record was kept of them at the station. His removal would have been ordered earlier, had not the receipt of these occasional telegraphic reports led to the belief that the mail reports would come forward in due season. The station was inspected in May, 1875, and the records found complete from the date of the arrival of Sergeant Dill, and the instruments and office in an improving condition. The office was removed June 15, 1875, from the log building situated near Fort Pembina, to a more suitable building in the town of Pembina, where the accommodations are better for observers and instruments. The large standard wind-vane is erected on a substantial platform, and is higher than any other object in the vicinity. The instrument-shelter is of the standard pattern, and has a northern exposure.

Since June 5, 1875, Sergeant Dill has telegraphed his own reports by permission of the superintendent of the Northwestern Telegraph Company. No publications are made at this station.

PHILADELPHIA, PENNSYLVANIA.

[*Official number*, 17.]

Latitude	39° 57
Longitude	75° 10
Mean barometer for the year ending June 30, 1875	30.094
Mean temperature for the year ending June 30, 1875	51°.0
Amount of rain-fall during the year ending June 30, 1875	39.03 inches

Sergeant W. T. Boyd was in charge of this station until September 12 1874, when he was transferred to Baltimore, and succeeded by Sergeant Robert Seyboth, who, on December 23, 1874, was transferred to Wilmington. His successor was Sergeant C. M. Hobbs, who still remains, and whose telegraphic and mail reports have been forwarded regularly and promptly. There are six assistants on duty, two of whom are printers. This force will be reduced at an early date. Six assistants have been transferred to duty elsewhere during the year and nine removed for misconduct, the cause being drunkenness in most of the cases.

The station has acquired an unenviable notoriety by the bad behavior of these men, but it is hoped that those now on duty will conduct themselves in a manner to redeem the character of the station, and place it on an equal footing with the best.

Farmers' bulletins are issued regularly to seven hundred and twenty post-offices, and one hundred and ninety maps are printed daily for distribution in the regular manner. These maps are made up from the midnight report and printed in time for issue before the business hours of the day begin. In addition to the symbol-reports the map contains a table of instrumental changes at all stations from which reports have been received, and also a table of the seven daily local observations immediately preceding the time of issue. The station is on the coast line, and in direct telegraphic communication with the central office. This causes much additional work, as it compels an operator to be constantly on duty, and, as all the men are not operators, an extra force is required.

The station was inspected in October, 1874, and the instruments and records found in good condition. Referring to the numerous changes that had been made in the working force, the inspector remarks:

> No man has been recommended for relief save on good grounds, and through his own fault.

He also comments on the evident want of management on the part of the sergeant then in charge, who had neglected his business duties to attend wholly to his clerical office-work. The office-room proper at this station is well and conveniently located, but the printing-room and instrument-shelter are difficult of access and unpleasant to work in when reached. The position of the anemometer is such that the dial-readings required at all other stations were discontinued here on account of the danger incurred in taking them. A gratifying interest is taken in the service by the city press, and by the business men generally. A suggested reduction in the daily issue of maps was earnestly protested against by the members of the marine board of underwriters, and not carried into effect on that account. Here, as at other printing-stations, the post-office officials have offered every facility to expedite the distribution of the farmers' bulletin.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Farmers' bulletins	256,231
Bulletins, manifold	9,050
Maps	61,890
Local reports	1,060
Form 22	91
Form 15, manifold	4,982
Total	333,304

PIKE'S PEAK, COLORADO TERRITORY.

[*Official number*, 99.]

Latitude	38° 48′
Longitude	104° 59′
Mean barometer for the year ending June 30, 1875	29.944
Mean temperature for the year ending June 30, 1875	18°.4
Amount of rain-fall for the year ending June 30, 1875	21.40 inches

Sergeant Robert Seyboth was in charge of this station until relieved, September 12, 1875, on account of ill-health. His principal assistant,

Sergeant William Phœdovious, was placed in charge, and remained until February 9, 1875, when, having proved himself unfitted for this duty, he was relieved by Sergeant John V. Brown, who still remains and has given satisfaction. Two assistants are allowed the station, one of whom, Private J. T. O'Keefe, has been on duty since January 5, 1875, and the other, Private Thomas B. Bowlus, since March 25, 1875. Both men are favorably mentioned for attention to duty by the sergeant. Three assistants have been relieved during the year for misconduct, and one ordered to Fort Whipple as a candidate for promotion.

The station was inspected in December, 1874, and the instruments, records, and office found in good condition. The building was in good repair and as comfortable as could be desired, except in the matter of ventilation during the winter season. No provision had been made by the builder for any other ventilation than that afforded by shrinkage in lumber and crevices about the doors and windows. The inspector remedied this fault as far as practicable while at the station. Provisions are purchased for one year at a time, and the supply during the past year was found sufficient, having been used carefully and systematically to prevent waste or extravagance. Wood is burned for fuel, and twenty-five cords is the amount estimated for annual consumption. Most of the transient supplies have been freighted up by the men on duty at the lower station, and the fuel and regular supplies by contract.

The telegraph-line has been kept in fair condition, but at great outlay of labor. During the winter the snow broke down the poles so frequently that at last orders were issued to take the wire from them altogether, above timber-line, and place it on the snow. After this was done there were but few interruptions.

The inspector reports that, previous to his visit, most of the work of repairing was done from Colorado Springs station, under the direction of Sergeant Fenton. The number of visitors to the station has largely increased during the year, and for their accommodation a hotel has been erected by private enterprise at the lake, four and three-quarters of a mile from the summit. Visitors coming up remain at the hotel over night and reach the summit by sunrise the next morning. This arrangement has relieved the station from the previous heavy draft upon its resources in taking care of visitors. The general health of the men has been excellent, but it is found that on account of the isolated position of the station, a year's tour of duty is sufficient for even the most enthusiastic student of meteorology. Arrangements are now making to supply the men with reading-matter for the ensuing winter, and to make them in other respects as comfortable as possible.

On February 5, 1875, the telegraphic reports from this peak were ordered to be discontinued until the close of the fiscal year. All observations have been made regularly and forwarded by mail. The anemometer record for this station is nearly complete, and the instrument itself is kept in running order with much less difficulty than is experienced on Mount Washington.

PITTSBURGH, PENNSYLVANIA.

[*Official number*, 41.]

Latitude	40° 32′
Longitude	80° 02′
Mean barometer for the year ending June 30, 1875	30.042
Mean temperature for the year ending June 30, 1875	50°.0
Amount of rain-fall for the year ending June 30, 1875	33.86 inches

Sergeant George H. Rohe has been in charge since February 28, 1874, and given full satisfaction. There are three assistants on the station, two of whom are printers. Two assistants have been transferred to other duty during the year, and two relieved for misconduct. The Farmers' Bulletin is printed at this station, and mailed regularly to three hundred and fifty post-offices. The station was inspected in January, 1875, and instruments, records, and office found in good condition. The daily papers, both morning and evening, print the full reports or selections from them in tabulated form.

The post-office officials have aided in the prompt distribution of the Farmers' Bulletin, and a general interest is taken in the service by the citizens.

The highest water in the river at this point, during the year, was on December 30, 1874, when the gauge reading was twenty-one feet. No change has been made in the location of the office.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Farmers' bulletins	177,391
Bulletins, manifold	11,728
Form 22	148
Form 26	4,087
Total	193,354

PORT HURON, MICHIGAN.

[*Official number*, 103.]

Latitude	42° 58′
Longitude	82° 29′

This station was established July 14, 1874, and the first report made by telegraph on the 25th of that month. Sergeant N. D. Lane has been in continuous charge, and since September 16, 1874, has had one assistant. Both men have given satisfaction, and all reports have been made promptly and regularly. The office is on the second floor of the city hall, two rooms being furnished free of cost by the city authorities. The location is an excellent one, and the exposure for instruments good.

The instrument-shelter is in the tower of the building, but exposed to a free circulation of air.

Twenty-one cautionary signals have been displayed, of which number eleven are reported as justified at the station. In reference to some of these displays the sergeant remarks as follows:

November 22–24, 1874.—All vessels remained in port, with the exception of one propeller and one barge with two vessels in tow, but they were obliged to return on account of the gale. Rumor of a grain-vessel ashore between here and Alpena. Three vessels aground in river between here and Detroit, owing to low water caused by southwest wind.

May 1–2, 1875.—Several vessels which left port while signal was flying were obliged to return. No damage.

May 14–15.—During storm several vessels remained in port; others put out, but were forced to return.

June 11–12.—All vessels either remained in port or returned after having attempted to put out.

The sergeant reports as follows upon the local interest taken in the service:

The establishment of a cautionary-signal station at this point has supplied a want long felt by mariners passing this port northward. That the action is fully appreciated

by all parties interested has, in many ways, been evidenced, and especially by the close attention given the signal by mariners and vessel-owners, who express much satisfaction in the fact, that during the past season of navigation, since the station has been opened, there has not been a single instance in which dangerous winds were raging that the cautionary signals were not up, and always in advance of the storms, giving timely warning.

The station was inspected in April, 1875, and found in excellent condition.

The tabulated reports are printed in the local press, as well as such other reports as are furnished from time to time.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins	3,255
Local reports	331
Form 22	35
Total	3,621

PORTLAND, MAINE.

[*Official number*, 12.]

Latitude	43° 40′
Longitude	70° 16′
Mean barometer for the year ending June 30, 1875	29.995
Mean temperature for the year ending June 30, 1875	44°.2
Amount of rain-fall during the year ending June 30, 1875	38.96 inches

Sergeant A. B. Williams was in charge of this station until August 29, 1874, when he was relieved for discharge from the service, and succeeded by Sergeant A. R. Thornett, who remained until ordered to Fort Whipple for misconduct, May 20, 1875. His successor, Sergeant W. T. Boyd, still remains, and has forwarded all reports promptly and satisfactorily. One assistant was ordered to Fort Whipple as a candidate for promotion, September 3, 1874, since which date the present assistant has been on duty.

Thirty-six cautionary signals have been displayed, of which number twenty-three are reported as justified at the station. The sergeant remarks as follows upon some of these displays:

September 29–30, 1874.—All shipping remained in port; steamers from St. Johns, N. B., on the 30th, were compelled to put into the nearest harbor for safety; several vessels came in here for shelter on the 30th.

November 23–24.—The United States shipping-commissioners state that the warning was of the greatest service to shipping along the coast; a large number of vessels remained in harbor, and several came in for shelter; heavy and dangerous weather is reported by incoming vessels from the Atlantic.

March 2–4, 1875.—Shipping remained in port; wind, gusty; considerable damage reported at sea; warning given in good season, and was favorably commented upon by shippers, &c.; the schooner Little Fanny was wrecked; one man frozen to death, and the whole crew badly frost-bitten.

March 7–8.—No damage reported about the city or harbor; many shipping-masters called to obtain information, and many satisfactory remarks were made concerning the cautionary signal displayed for their benefit.

March 17–19.—Very gusty gale; shipping remained in port; the office was inundated with inquiring seamen and shipping-masters; the agents of the various shipping companies are unanimous in testifying to the value of the signal; no disasters reported.

March 24–25.—No knowledge of any injury at the station, but a number of disasters are reported at sea; shipping remained in port.

April 14–15.—The first mate of the steamer Franconia, Maine Steamship Company, states that the amount of good derived from the display of signals is beyond calculation. Snow reported all along the coast.

The office was removed December 1, 1874, to the United States custom-house, where an excellent exposure for the instruments and for the display of cautionary signals is secured. Two rooms are used for office purposes, both of which are well and comfortably furnished. The instrument-shelter is placed in one of the windows of the front room, and faces 65° west of north, and is finished to match the stone work of the building.

The anemometer, rain-gauge, and staff for display of signals, are on a platform 8 feet square upon the dome, and the wind-vane on a rod at the side of the dome.

The station was inspected in November, 1874, and found in bad condition, and the removal of the office to its present location strongly recommended. Since the removal there has been every facility given to bring the office and station into first-class condition.

The sergeant remarks as follows upon the interest taken in the service:

The Maine Steamship Company, as an instance, whose vessels run between this point and New York City, rely almost entirely upon the service reports and signals. The slightest delay to one of their steamers causes considerable anxiety, in which case our telegrams are consulted, and frequently suffice to allay uneasiness regarding their safety. This company is furnished with a copy of the midnight and morning bulletins, which they highly prize.

PUBLICATIONS.

(*Year ending June 30, 1875.*)

Bulletins, manifold	5,973
Form 22	73
Form 15, manifold	2,386
Total	8,432

PORTLAND, OREGON.

[*Official number*, 74.]

Latitude	46° 30
Longitude	122° 27′ 30″
Mean barometer for the year ending June 30, 1875	30.131
Mean temperature for the year ending June 30, 1875	52°.3
Amount of rain-fall for the year ending June 30, 1875	41.45 inches

Sergeant J. E. Evans has been continuously on duty at this station since October 18, 1872. His assistant was discharged from the service May 19, 1875, and since that date Sergeant Evans has attended to the station duties alone. His reports by mail have not been forwarded with sufficient promptness, and he will be relieved as soon as can be done without prejudice to the service elsewhere. Telegraphic communication with this station has been irregular, and reports delayed in consequence.

The station was inspected in August, 1874, and the records, instruments, and office found in excellent condition, and the men well informed as to their duties. The daily newspapers publish all local reports and the monthly means. These reports are also sent weekly on postal-cards (furnished by the publishers) to the Granger at Albany, and the Astorian at Astoria, for publication.

PUNTA RASA, FLORIDA.

[*Official number*, 59.]

Latitude	26° 36′
Longitude	82° 10′
Mean barometer for the year ending June 30, 1875	30.103
Mean temperature for the year ending June 30, 1875	73°.7
Amount of rain-fall for the year ending June 30, 1875	31.47 inches

Sergeant M. J. Shanefelter was in charge until January 13, 1875, when he was authorized to exchange stations with Sergeant J. D. Sumet, then at Key West, and since that date the latter has been in charge. One assistant was ordered to Fort Whipple as a candidate for promotion, January 13, 1875, and succeeded by the present assistant.

The sergeant at this station is authorized to go twice a year to Key West to purchase supplies, but not to be absent from station more than ten days at any one time.

The station was inspected in December, 1874, and the records, instruments, and office found in excellent condition. The inspector remarks as follows upon the condition of the station:

Sergeant Shanefelter's knowledge of his instruments, and of all his duties, even to the most minute matters, and the attention which he gives to his duties, entitle him to special commendation. No office heretofore inspected by me has been found in better condition than the one at Punta Rasa.

The principal difficulty experienced at this station is in getting fresh water, which has to be brought usually a distance of thirty miles, and sometimes even from Key West. No matters of special note have occurred at the station during the year.

Telegraphic reports from this station were suspended from March 1, 1875, until the close of the fiscal year.

ROCHESTER, NEW YORK.

[*Official Number*, 32.]

Latitude	43° 08′
Longitude	77° 51′
Mean barometer for the year ending June 30, 1875	30.017
Mean temperature for the year ending June 30, 1875	45°.2
Amount of rain-fall for the year ending June 30, 1875	25.48 inches

Sergeant F. M. M. Beall was in charge until his transfer to the central office, August 17, 1874. He was succeeded by Sergeant L. E. Sebree, who still remains, and who has given full satisfaction by the prompt, regular, and unusually neat manner in which he has rendered all reports. There are two assistants on duty, and during the year one assistant was transferred to duty elsewhere and one ordered to Fort Whipple for misconduct.

Sixteen cautionary signals have been displayed, of which number twelve are reported as fully justified, and one partially so, at the station. The cautionary-signal indicator is placed in the Arcade, at the suggestion of the meteorological committee. Several requests have been made by prominent citizens of the station to have signals officially duplicated at Charlotte, which is the port of Rochester, but the expenses of keeping up this second station has so far prevented favorable action in the matter.

The station was inspected twice during the year—once in July, 1874, and again in March, 1875—and on both occasions the records, instruments, and office were found in good condition, and the men well informed and attentive to their duties. In both reports the sergeants in charge are spoken of in terms of special commendation.

Manifold maps are issued and distributed in the usual manner.

No change has been made in the location of the office, and it would be difficult to find a more desirable one than that now occupied.

Telegraphic reports from the station were ordered on February 5, 1875, to be discontinued until the close of the fiscal year, but all reports passing over the New York and Milwaukee circuit continued to be

received here, and were published by the daily newspapers in tabulated form. The city press has taken a lively interest in the service, and publishes full tabulated reports.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	4,351
Maps, manifold	2,570
Local reports	976
Form 22	116
Form 15, manifold	3,439
Total	11,452

SALT LAKE CITY, UTAH.

[*Official Number*, 70.]

Latitude	41° 10′
Longitude	112° 00′
Mean barometer for the year ending June 30, 1875	29.982
Mean temperature for the year ending June 30, 1875	52°.1
Amount of rain-fall for the year ending June 30, 1875	20.24 inches

Sergeant W. B. Webster was in charge until January 12, 1875, when he was discharged at his own request, and succeeded by Sergeant J. F. Tenney, who still remains. An assistant is allowed this station, but will be removed at an early date, as it is found that the work can be done by one man. One assistant was ordered to Fort Whipple as a candidate for promotion, August 26, 1874, since which date the present one has been on duty.

The station was inspected in August, 1874. The instruments and records were found in good condition, but the office-room was unfavorably reported upon. The necessary instructions were given to have the office cleaned properly and to keep it in that condition hereafter.

Reports passing over the Chicago and San Francisco circuit were dropped here, and published with the local observations by the daily papers, until all telegraphic reports to and from the station were ordered, on February 5, 1875, to be discontinued until the close of the fiscal year.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	862
Local reports	333
Form 22	52
Total	1,247

SAN DIEGO, CALIFORNIA.

[*Official number*, 75.]

Latitude	32° 44′ 41″
Longitude	117° 08′ 00″
Mean barometer for the year ending June 30, 1875	30.030
Mean temperature for the year ending June 30, 1875	60°.1
Amount of rain-fall for the year ending June 30, 1875	5.66 inches

Sergeant J. B. Wells has been continuously on duty since the establishment of the station, October 7, 1871, and has given satisfaction. An

assistant was allowed the station until October 16, 1874, when he was removed, and Sergeant Wells attended to the work alone, until his failing health rendered the presence of an assistant again necessary, and one was, therefore, sent him on June 7, 1875. The station was inspected in September, 1874, and the records, instruments, and office found in excellent condition, and the sergeant well informed and attentive to duty. No change has been made in the location of the office since the last report. The sergeant remarks as follows upon the interest taken in the service:

> The public interest in the observations of this station is highly complimentary to the service. The widest publicity is given to reports showing the climatology of this locality, and the public confidence in their correctness and reliability is unbounded.
>
> At my suggestion, measures are being inaugurated by a committee of citizens through which extensive observations of the wet and dry bulb thermometers will be made at different localities in the county.

The daily newspapers of the station publish all the reports furnished them in daily, weekly, monthly, or annual form.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Local reports	1,986
Form 22	24
Total	2,010

SAN FRANCISCO, CALIFORNIA.

[*Official number*, 29.]

Latitude	39° 47′ 35″
Longitude	122° 26′ 15″
Mean barometer for the year ending June 30, 1875	30.036
Mean temperature for the year ending June 30, 1875	55°.6
Amount of rain-fall for the year ending June 30, 1875	21.54 inches

Sergeant S. W. Beall has been in charge since June 30, 1874, and had one assistant until February 9, 1875, since which date he has attended to the station work alone. His reports have been forwarded promptly and regularly by mail, and by telegraph as regularly as the facilities at his command would permit. Telegraphic reports from this station were ordered on February 5, 1875, to be discontinued until the close of the fiscal year, but reports continued to be received from the other Pacific-coast stations.

The station was inspected in August, 1874, and the records, instruments, and office found in good condition.

The city papers publish the monthly summary only, except during the rainy season, when the daily amount of rain-fall is also published.

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

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	2,222
Form 22	73
Total	2,295

SANDY HOOK, NEW JERSEY.

[*Official number*, 112.]

Latitude	40° 28′
Longitude	74° 01′
Mean barometer for the year ending June 30, 1875	30.065
Mean temperature for the year ending June 30, 1875	50°.0
Amount of rain-fall for the year ending June 30, 1875	43.01 inches

Sergeant John R. Williams was in charge of this station until July 20, 1874, when he was ordered to Fort Whipple, and succeeded by Sergeant J. J. Naury, who still remains, and has performed his duties satisfactorily. One assistant was transferred to duty elsewhere September 2, 1874, and another on April 16, 1875. The present assistant has been on duty since the latter date. Forty-one cautionary signals have been displayed during the year, of which number thirty-one are reported as justified at the station. The signals displayed here are visible to all vessels passing in and out of the harbor. Vessels bound out, when the signal is flying, frequently take refuge in the bay, and wait until the threatened danger is over. The station is on the signal-telegraph line, and in direct communication with the central office, to which all regular reports are telegraphed. A special report of temperature and humidity is sent daily to Philadelphia during the months of July, August, and September for the use of the press of that city. The sergeant is required to keep the line in repair from this station to Long Branch, a distance of thirteen miles. Daily reports of passing vessels are not sent from this station.

This station was inspected in February, 1875, and records, instruments, and office found in good condition, and the men well informed and attentive to duty. Both men are good telegraph-operators. No change has been made in location of office, nor have any publications been issued during the year.

SANTA FÉ, NEW MEXICO.

[*Official number*, 69.]

Latitude	35° 41′
Longitude	106° 10′
Mean barometer for the year ending June 30, 1875	29.671
Mean temperature for the year ending June 30, 1875	49°.2
Amount of rain-fall for the year ending June 30, 1875	16.68 inches

Sergeant William McElroy has been on duty since December 15, 1873, and given full satisfaction, having attended to all his duties during that period without an assistant. Telegraphic communication with this station is unreliable, and the reports have been frequently interrupted in consequence.

Telegraphic reports from the station were discontinued by order on February 5, 1875, until the close of the fiscal year. The station has not been inspected during the year, nor has any change in location of office been made.

The local observations are published weekly in the local paper.

SAVANNAH, GEORGIA.

[*Official number*, 22.]

Latitude	32° 05′
Longitude	81° 08′
Mean barometer for the year ending June 30, 1875	30.115
Mean temperature for the year ending June 30, 1875	65°.7
Amount of rain-fall for the year ending June 30, 1875	62.12 inches

Sergeant W. S. Popple has been in charge of this station since February 25, 1874, and has performed his duties in an energetic and satisfactory manner. Two assistants were allowed the station until May 18, 1875, when the number was reduced to one. During the year three assistants have been ordered to Fort Whipple from this station for misconduct, and another one deserted.

Six cautionary signals have been displayed, of which number four are reported as justified at the station. All signal orders sent this station are forwarded promptly to the Tybee Island station for duplication at that point.

The station was inspected in November, 1874, and the records, instruments, and office found in good condition. The location of the office was reported as unfavorable, and a change recommended as soon as a better one could be found. No change has been made up to the date of this report, but arrangements are in progress for one.

The city press and the citizens generally take a gratifying interest in the service. Reports are published in tabulated form daily, and frequent requests are received for reports from additional stations. Manifold maps are issued daily, and distributed in the usual manner.

The afternoon reports from this station were discontinued from March 1, 1875, until the close of the fiscal year.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	10,339
Maps, manifold	7,172
Local reports	678
Form 22	69
Total	18,258

SHREVEPORT, LOUISIANA.

[*Official number*, 72.]

Latitude	32° 30′
Longitude	93° 45′
Mean barometer for the year ending June 30, 1875	30.045
Mean temperature for the year ending June 30, 1875	65°9
Amount of rain-fall for the year ending June 30, 1875	38.96 inches

Sergeant James O'Dowd was in charge of station until November 2, 1874, when he was relieved on account of inefficiency, and succeeded by Sergeant J. J. Weinberg, who still remains. One assistant has been ordered to Fort Whipple during the year as a candidate for promotion, and two to the same post for misconduct. The station was worked without an assistant from February 12 to June 12, 1875, when it was found necessary to send one on account of the sergeant's ill-health, which unfitted him for constant duty.

The station was inspected in October, 1874, and the records, instruments, and office found in a discreditable condition. Sergeant O'Dowd, then in charge, was immediately relieved upon the report of the inspecting officer, and reduced to the rank of a private soldier for his gross neglect of duty.

Telegraphic reports from the station were discontinued from March 16, 1875, to the close of the fiscal year. A constant error in the reported depth of water in the river at this station was discovered and corrected May 16, 1875. A new gauge is in process of construction, and will be completed during the season of low water.

No change has been made in the location of office, but one is proposed

at an early date, as the proprietor of the building in which it is now located has given notice that he intends to make certain alterations that will render a removal necessary.

The highest water reported in the Red River at this station during the year occurred April 22, 1875, when the gauge-reading was 28 feet and 1 inch. The local newspapers publish regularly all reports furnished them, and the citizens manifest a lively interest in the service, especially in that part of it which affects the cotton business.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Local reports	450
Form 22	20
Form 26	2,284
Total	2,754

SPRINGFIELD, MASSACHUSETTS.

[*Official number*, 110.]

Latitude	42° 6′
Longitude	72° 36′
Height of barometer above sea-level	119.98 feet

Corporal J. G. Murray was in charge until January 11, 1875, when he was transferred to the central office, and his assistant, N. Dumont, promoted to the grade of corporal, and placed in charge, with a printer to assist him in issuing the farmers' bulletin. A full set of standard instruments was sent to the station, and regular meteorological observations commenced on the morning of November 1, 1874, since which date they have been continued regularly. The telegraphic transmission of reports to and from the station was suspended by order of February 5, 1875, until the close of the fiscal year.

The farmers' bulletin has been issued regularly, and sent to one hundred and forty-eight post-offices.

The room occupied in the Republican building not being suited for the proper exposure of instruments, the office was moved October 30, 1874, to the fifth story of Hayne's Opera House, at the southeast cornea of Main and Pynchon streets. The exposure of instruments in this new location is good, and the office-rooms are well located for the station work, and are furnished with steam-heat, gas-fixtures, water, and use of roof, with the privilege of running the vane-rod through into the office below. The instrument-shelter is of the standard model, and is placed in the northward window of the front room.

The station was inspected in November, 1874, and found in excellent condition. Both men on duty were reported to be industrious, faithful, and competent, and the local interest in the service gratifying; and the same may be said of those now at the station. Corporal Dumont has shown marked attention to duty.

The local observations are published regularly in the daily newspapers, with occasional extracts from other reports furnished.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Farmers' bulletins	53,653
Bulletins, manifold	6,442
Form 22	23
Total	60,118

SAINT LOUIS, MISSOURI.

[*Official number*, 66.]

Latitude	38° 37′ 28″
Longitude	90° 15′ 16″
Mean barometer for the year ending June 30, 1875	30.071
Mean temperature for the year ending June 30, 1875	54°2
Amount of rain-fall for the year ending June 30, 1875	43.66 inches

Sergeant Geo. Prender has been in charge since May 27, 1874, and has discharged his duties with promptness, regularity, and intelligence. There are six assistants at present on duty at this station, but the number will be reduced at an early date. Two of the men are printers, as the Farmers' bulletin and the printed weather-map are both issued. Eight hundred and four post-offices are regularly supplied with the bulletin, and one hundred and seventy-one copies of the map are issued and distributed daily.

The amount of work done at this station is unusually large, but seems to be required by the public demand for the reports in various forms. Three assistants have been transferred to duty elsewhere during the year, and three relieved for misconduct. No change has been made in the location of the office. The station was inspected, formally, in September, 1874, and informally on several occasions since that date. Records, instruments, and office were found in good condition, and the men attentive to their duties, and well informed as to their nature. The leading daily newspapers print the tabulated reports in excellent form, and also a very complete monthly summary of meteorological data prepared by the sergeant. The post-office officials have aided the observer in extending the issue of the Farmers' bulletin in a very efficient and courteous manner. Reports are transferred at this station to and from the Keoknk, Cairo, Leavenworth, Cincinnati, and the Texan circuits.

The weather-map is made up from the midnight reports, and, in addition to the symbol-reports, contains two tables, one showing the stage of water at all river-stations from which reports have been received, and the other the local observations in full.

This map is printed and ready for distribution by daylight.

The highest water in the Mississippi at this point occurred on May 3, 1875, when the gauge-reading was 24 feet and 7 inches.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Farmers' bulletins	361,126
Bulletins, manifold	12,803
Maps	51,737
Local reports	2,427
Form 22	435
Form 26	2,915
Total	431,413

SAINT MARK'S, FLORIDA.

[*Official number*, 24.]

Latiitude	30° 10′
Longitude	84° 12′
Height of barometer above sea-level	15 feet

The station at Lake City, Fla., was discontinued October 31, 1874, and the instruments, records, and furniture moved to Saint Mark's, where a station was established, and observations commenced with the morning report of November 10, 1874. The office is located in what is known as the "Telegraph building," from the roof of which the wind-vane, anemometer, and rain-gauge are exposed. The shelter is of the standard model, and projects from a window having a northern exposure. At the time of opening the station no mechanic could be found in the place to put up the instruments, and the work was done by the observer and his assistant. The necessary blacksmithing was done at Tallahassee, at the shops of the J. P. & M. R. R. Co., free of cost to the Government, the officers of this road taking great interest in the service. Sergeant A. D. Wolcott and Private J. A. Cody established the station, and the latter still remains. Sergeant Wolcott was relieved January 2, 1875, and was succeeded by Sergeant J. T. Minchin, who is still on duty.

The station was inspected in November, 1874, and found in fair condition only. Necessary orders were given to have all irregularities corrected, so far as it was possible to correct them with the facilities afforded in the place. The building occupied as an office is in a dilapidated condition, and the owner declines to put it in repair. No other suitable house can be obtained in the place, which is a small one, and inhabited principally by fishermen. The telegraph-service to this station has been unsatisfactory, as the line used belongs to a railroad company, and is often required for its use when needed for the reports. No publications are made at this station, nor have any cautionary signals been displayed up to the time of this report.

SAINT PAUL, MINNESOTA.

[*Official number*, 39.]

Latitude	44° 53′
Longitude	93° 05′
Mean barometer for the year ending June 30, 1875	29.957
Mean temperature for the year ending June 30, 1875	40°.2
Amount of rain-fall for the year ending June 30, 1875	32.42 inches

No change has been made in the working force of this station during the year. Sergeant W. O. Bailey has been continuously in charge since January 29, 1874, and the assistant on duty since July 17, 1873. Both men have given satisfaction, and all reports by mail and telegraph have been rendered promptly, regularly, and with accuracy.

The station was inspected in May, 1875, and instruments, records, and office found in good condition, and the men well informed and attentive to their duties. The local press print all reports in tabulated form, and they are also printed daily in the Minneapolis Tribune, being sent to that town by messenger. Referring to some of the uses made of the reports, the sergeant remarks as follows:

The *modus operandi* by which the service-reports are rendered serviceable to the shipping interests at Stillwater is explained by Mr. W. G. Clark as follows:

"By comparing the reported stage of water at Keokuk and Davenport with a written memorandum, which determines the amount on the board, I can base my calculations with every assurance of correctness. 'On the board' is a technical term employed by raftsmen to express the stage of water in the low raft-channel; and, through the combined agency of our reports and this 'memorandum,' Mr. Clark has always been guided in starting his rafts, and estimating their progress from one point to another."

During the season of river-navigation reports from the other Mississippi stations are sent here regularly. No change has been made in the location of the office. The highest water in the river at this station occurred April 16, 1875, when the gauge-reading was 18 feet.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	5,673
Local reports	752
Form 22	92
Form 26	1,161
Total	7,678

SAINT PAUL'S ISLAND, ALASKA.

[*Official number*, 120.]

Latitude	57° 38′
Longitude	169° 50′
Mean barometer for the year ending June 30, 1875	29.715
Mean temperature for the year ending June 30, 1875	38°.64
Amount of rain-fall for the year ending June 30, 1875	55.65 inches

Private C. P. Fish remains on duty, and has forwarded full reports for the year in complete and accurate form. In addition to the regular forms, this observer has prepared and forwarded several interesting papers on special subjects connected with meteorology, that indicate close observation and zealous attention to duty. The following table gives in condensed form the summary of the year's record at the station:

Meteorological record for the fiscal year ending June 30, 1875.—Island of Saint Paul, Behring Sea.

Month of record.	July.	August.	Sept.	October.	Nov.	Dec.	January.	February	March.	April.	May.	June.
Mean of barometer corrected	29.880	29.917	29.704	29.638	29.548	29.374	29.681	29.411	29.934	30.035	29.749	29.711
Maximum of barometer corrected	30.31	30.25	30.17	30.44	30.60	30.35	30.79	29.91	30.97	30.59	30.27	30.35
Minimum of barometer corrected	29.40	29.37	29.15	29.01	28.73	28.41	28.15	28.76	28.68	28.90	29.05	28.91
Monthly range of barometer corrected	.91	.88	1.02	1.43	1.87	1.94	2.64	1.15	2.29	1.69	1.22	1.44
Greatest daily range of barometer corrected	.59	.34	.52	.74	.95	.90	1.20	.50	.67	.77	.70	.52
Least daily range of barometer corrected	.04	.00	.08	.04	.01	.03	.07	.04	.06	.03	.04	.04
Mean daily range of barometer corrected	.154	.130	.227	.260	.327	.334	.414	.270	.320	.210	.222	.198
Mean of exposed thermometer	49°.09	50°.82	47°.29	40°.22	37°.81	33°.31	34°.95	35°.26	29°.03	28°.93	34°.20	41°.96
Maximum of exposed thermometer	58°	62°	56°	48°	45°	40°	42°	44°	40°	41°	47°	51°
Minimum of exposed thermometer	42°	44°	39°	32°	26°	22°	19°	21°	12°	17°	25°	34°
Monthly range of exposed thermometer	16°	18°	17°	16°	19°	18°	24°	23°	28°	24°	22°	17°
Greatest daily range of exposed thermometer	12°	14°	10°	10°	10°	10°	13°	14°	20°	14°	15°	12°
Least daily range of exposed thermometer	3°	2°	2°	1°	2°	2°	1°	2°	3°	2°	3°	3°
Mean on warmest day of exposed thermometer	53°	55°.5	52°	46°.5	44°	39°	40°.5	40°.5	37°.5	38°	41°	46°
Mean on coldest day of exposed thermometer	46°	47°	43°	35°.5	31°	24°.5	24°	26°	15°	19°	28°.5	37°.5
Mean of maximum of exposed thermometer	52°.32	54°.32	50°.33	43°.10	40°.11	35°.42	37°.35	38°.50	33°.16	33°.03	38°.06	46°.10
Mean of minimum of exposed thermometer	46°.23	47°.61	44°.40	37°.58	35°.23	31°.23	32°.90	33°.11	24°.97	26°.27	31°.13	39°.33
Mean daily range of exposed thermometer	6°.09	6°.71	5°.93	5°.52	4°.88	4°.19	4°.45	5°.39	8°.19	6°.76	6°.93	6°.77
Mean relative humidity	87.44	83.85	79.19	76.2	80.84	81.4	84.1	87.52	77.72	73.0	74.4	82.4
Maximum relative humidity	93	93	93	92	91	100	100	100	100	100	90	100
Minimum relative humidity	72	51	58	56	61	58	68	68	50	54	47	58
Prevailing wind	W.	S.	N.	N. W.	E.	N.	S. E.	E.	N. W.	N.	N.	S. E.
Number of miles traveled by wind	10,420	11,016	11,070	12,580	15,287	13,293	15,953	10,446	14,774	12,283	13,080	7,827
Mean daily velocity of wind	336.1	355.4	369.0	405.8	509.6	428.8	514.6	373.1	476.6	409.4	421.9	264.2
Mean hourly velocity of wind	14	14.8	15.4	16.9	21.2	17.9	21.4	15.5	19.9	17.1	17.6	11.0
Maximum hourly velocity of wind	36	36	48	56	68	92	84	46	67	47	74	31
Proportion of cloudiness	97.3	82.2	75.0	78.0	73.2	71.8	73.8	77.5	82.9	71.0	76.6	95.1
Proportion of fog	61.7	22.2	2.6	1.01	1.3	0.07	2.6	12.5	2.6	1.4	0.27	7.2
Amount of rain-fall, in inches	3.81	2.62	3.01	4.82	9.28	6.59	7.75	4.27	3.38	2.79	2.15	5.38
Amount of rain-fall, greatest daily	.72	.70	.85	1.10	1.15	1.08	1.46	.49	.92	1.13	1.23	1.55
Amount of melted hail and snow included in rain-fall	.00	.00	.00	.20	.15	.72	2.16	.48	2.78	1.07	2.15	.44
Number of days on which precipitation occurred	27	29	25	31	28	29	26	26	29	25	26	26
Number of days on which hail or snow fell	0	1	2	15	19	21	18	13	28	25	26	4
Number of days on which rain fell	27	29	25	29	26	20	22	24	14	7	11	26

SQUAN BEACH, NEW JERSEY.

[*Official number*, 114.]

Latitude	40° 08′
Longitude	74° 01′
Mean barometer for the year ending June 30, 1875	30.071
Mean temperature for the year ending June 30, 1875	47°.8
Amount of rain-fall for the year ending June 30, 1875	57.11 inches.

Sergeant D. M. Kennedy has been continuously in charge since the establishment of the station, December 1, 1873, and has attended faithfully to his duties. One assistant is allowed the station, and two changes have been made during the year, one man being ordered to Fort Whipple for misconduct, July 16, 1874, and another for discharge, April 7, 1875, since which date the present assistant has been on duty. Thirty-nine cautionary signals have been displayed, of which number twenty-seven are reported as fully justified at this station. This station is on the coast telegraph-line, and in direct communication with the central office, to which regular meteorological reports are made, and also daily reports of the number of vessels passing the station in either direction. During the months of July, August, and September special reports of temperature and humidity are sent to Philadelphia for the press of that city. Both men on duty are fair telegraph-operators, and are required to keep the line in repair from the north side of Barnegat Inlet to a point half-way between the station and Long Branch, making a total distance of thirty-two miles. The following marine disasters were reported from this station over the coast-line:

February 4, 1875.—American bark Thomas Fletcher, from Hamburg to New York, 645 tons; crew, 13, all told; cargo, general; wind, southwest, variable; rain and fog; sea, heavy; struck, 6 p. m.; high tide. No lives lost; crew saved by crew of station No. 8.

February 25, 1875.—Steamer Queen, National line, from Liverpool for New York; tonnage, 4,441; crew, 100; cargo, general; twenty-one cabin and twenty steerage passengers; got off without assistance, at 10 p. m., during strong gale from west. No lives lost.

The station was inspected in January, 1875, and the instruments, records, and office found in fair condition. The irregularities noted were corrected under the supervision of the inspector, or by orders from the central office in such cases as were beyond his authority.

THATCHER'S ISLAND, MASSACHUSETTS.

[*Official number*, 125.]

Latitude	42° 36′
Longitude	70° 34′

This station was established, September 3, 1874, for the display of cautionary signals only, and has not been supplied with meteorological instruments, although it is intended to equip it with a full set at an early date. A frame building was put up on the island for the observer's use, and a flag-staff erected for the display of signals, both at the cost of the Government. The office is connected with the main-land and the telegraph-office in Rockport by a cable and short land-line, laid and built by enlisted men of the Signal Service. Twenty-four signals have been ordered since the station was opened, of which number sixteen are reported as justified at the station.

No formal inspection has been made of the station, but it has been visited by parties connected with the service on two occasions and found in good condition. Private Edmund Davis is in charge, and is a fair operator and a reliable man in his performance of duty.

TOLEDO, OHIO.

[*Official number*, 35.]

Latitude	41° 40′
Longitude	83° 32′
Mean barometer for the year ending June 30, 1875	30.027
Mean temperature for the year ending June 30, 1875	48°.3
Amount of rain-fall for the year ending June 30, 1875	20.72 inches.

Sergeant J. E. Cook has been continuously in charge of this station since January 2, 1873, and given satisfaction. All reports have been made promptly and accurately. One assistant, relieved for misconduct, April 21, 1875, deserted before reaching Fort Whipple; another was ordered in as a candidate for promotion, February 2, 1875. There are two assistants now on duty, both of whom are commended by the sergeant.

Twenty cautionary signals have been displayed, of which number fifteen are reported as fully justified, and two partially so, at the station. The sergeant reports that the cautionary warnings are generally heeded by sailors and owners of shipping.

The station was twice inspected during the year, once in July, 1874, and again in April, 1875, and records, instruments, and office found in excellent condition on both occasions.

Manifold maps are issued and regularly distributed in the usual manner. No change has been made in the location of the office, nor is one considered desirable.

The local observations are printed in the daily papers, and also the monthly reports, as furnished by the observer.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins manifold	4,225
Maps, manifold	2,991
Local reports	468
Form 22	66
Form 15, manifold	590
Total	8,340

TYBEE ISLAND, GEORGIA.

[*Official number*, 121.]

Latitude	32° 00′
Longitude	80° 52′
Mean temperature for the year ending June 30, 1875	65°.2
Amount of rain-fall for the year ending June 30, 1875	41.95 inches

Sergeant Hugh R. Stockman remains in charge of this station, and has had no assistant during the year. Five cautionary signals have been displayed, of which number three are reported as justified at the station. Communication is maintained by telegraph with the signal office in Savannah, and all signal orders received at the latter station are immediately transmitted to Tybee for display there also. The local observations are also telegraphed to Savannah at the request and expense of the merchants of that city. Mail communication with the station is very irregular, and the receipt of mail reports has been in consequence frequently delayed.

The station was inspected in November, 1874, and found in as good

condition as the facilities of the place would admit. The inspector recommended that the old Martello Tower, on the island, be fitted up for an office, but the estimated cost was found to be too great to justify this being done. The present office has been furnished, free of charge, by Messrs. Richardson & Barnard, the owners of the telegraph line.

VICKSBURG, MISSISSIPPI.

[*Official number*, 61.]

Latitude	32° 23′
Longitude	90° 54′
Mean barometer for the year ending June 30, 1875	30.141
Mean temperature for the year ending June 30, 1875	65°.6
Amount of rain-fall for the year ending June 30, 1875	59.42 inches

Sergeant John Dascomb has been in continuous charge of the station since October 4, 1872, with the exception of 10 days in June, 1875, occupied in traveling to and from Washington for re-enlistment on the expiration of his original term of service. One assistant was ordered to Fort Whipple, July 20, 1874, for misconduct, since which date the present one has been on duty, and given satisfaction. The station was inspected in October, 1874, and records, instruments, and office found in good condition. No change has been made in the location of office during the year. Full tabulated reports from the river stations are regularly published by the daily newspapers. Referring to the local interest taken in the service, the sergeant remarks as follows:

River reports are highly commended by river men, merchants, planters, and others living along the river, as they are enabled, by close attention to them, to prepare for an overflow several days in advance.

Vicksburg merchants desiring goods shipped by water from points high up the Ohio and other tributary streams of the Mississippi, call at this office for information if there is any doubt as to whether boats will be detained or not by low water, ice, or other causes.

Have frequent calls, mostly from carriers, for facts in regard to weather on certain dates—information used to determine whether or not goods were damaged by weather.

The highest water in the Mississippi at this station occurred on April 21, 1875, when the gauge-reading was 43 feet.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	2,041
Form 22	57
Form 26	1,891
Total	3,989

VIRGINIA CITY, MONTANA TERRITORY.

[*Official number*, 77.]

Latitude	45° 20′
Longitude	112° 03′
Mean barometer for the year ending June 30, 1875	29.704
Mean temperature for the year ending June 30, 1875	38°.6
Amount of rain-fall for the year ending June 30, 1875	18.76 inches

Sergeant J. B. Campbell remained in charge of the station until relieved by order dated June 4, 1875, and transferred to duty elsewhere. He was succeeded by Sergeant R. B. Watkins, from whom no reports have been received at the date of this report.

Telegraphic reports from this station were suspended by order of February 5, 1875, until the close of the fiscal year. Frequent interruptions in telegraphic communication with the station have occurred during the year. Mail reports were seriously delayed by sickness of observer, but none were wholly lost, as all observations were made at regular hours and properly recorded.

No change has been made in the location of the office, nor has the station been inspected during the year. The local reports are published weekly in the Montanian.

WASHINGTON, D. C.

[*Official number*, 19.]

Latitude	38° 53′
Longitude	77° 01′
Mean barometer for the year ending June 30, 1875	30.096
Mean temperature for the year ending June 30, 1875	53°.8
Amount of rain-fall for the year ending June 30, 1875	30.68 inches

Sergeant Theodore Mosher has continued in immediate charge of this station throughout the year, and has performed his various duties in a manner that entitles him to special commendation.

Sergeants T. B. Jennings and E. B. Robbins remain in charge of the office night-reliefs; Sergeant J. B. Newlin, of the correspondence, in the station division; Sergeant H. C. Hirst, of the printing-room; and Sergeant P. F. Nagle, of the lithograph-room. Their retention in these positions for so long a period of time is evidence of the faithful manner in which their duties have been discharged.

While the men named are deserving of special mention, most of those on duty in the several divisions under their charge have done well. The amount of clerical work thrown upon this station, in the examination, comparison, and filing of the records of all the stations, together with those received from a large number of volunteer and foreign observers, is necessarily large, and requires a correspondingly large force of men to attend to it properly. In the telegraph-division, Mr. James A. Swift has been in immediate charge, and has been zealous, faithful, and regular in his attention to duty.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Farmers' bulletins	235,023
Bulletins, manifold	18,134
Maps	141,223
Form 15, manifold	11,704
Form 22	136
Weekly chronicle	28,621
Monthly weather review	17,408
International bulletins	110,662
Board of health report	290
Total	563,201

WILMINGTON, NORTH CAROLINA.

[*Official number*, 20.]

Latitude	34° 11′
Longitude	78° 10′
Mean barometer for the year ending June 30, 1875	30.110
Mean temperature for the year ending June 30, 1875	62°.0
Amount of rain-fall for the year ending June 30, 1875	56.63 inches

Sergeant S. B. Lum was in charge of this station until December 23, 1874, when he was relieved and succeeded by Sergeant Robert Seyboth, who still remains and has had two assistants during the year. One man has been transferred to duty elsewhere, and three relieved for misconduct during the year. Twelve cautionary signals have been displayed, of which number five are reported as fully justified, and two partially so at the station. The distance of the station from the ocean renders the display of signals here of less value than at stations directly on the coast. The completion of the telegraph-line to Smithville will afford better facilities for displaying signals than in the past. The office was removed on the 27th of November, 1874, to the fourth floor of the new Hanover Bank building, on the northwest corner of Front and Princess streets. The roof of the building affords an excellent exposure for instruments and for the display of signals, being much higher than any of the surrounding buildings. The instrument-shelter is built on the roof, and well located.

The station was inspected in November, 1874, and found in such a bad condition that the sergeant in charge was relieved and reduced to the rank of private soldier for his gross neglect of duty. The present sergeant has acquired a fine reputation while in the service for attention to duty, and under his management it is believed that the station has been restored to good working order. Referring to the proposed telegraph-line to Smithville, the sergeant remarks as follows:

> The most universally popular feature of the service is the proposed telegraph-line to Smithville, and, it is hoped, eventually to Cape Hatteras, as this line will supply a long-felt want, and is really the only means for rendering our cautionary signals of practical value.
>
> Telegraphic communication with the seaboard will make this office one of the most important and useful institutions in town. Smithville is the proper place to display cautionary signals, as most vessels receive their final cargo at that point before proceeding to sea. All outward-bound vessels from this port have to pass it.

The local observations only are printed in the daily newspapers at this station. Manifold maps are issued and distributed in the regular manner. Afternoon telegraphic reports from this station were discontinued from March 1, 1875, until the close of the fiscal year, but reports were received from other stations in the usual manner.

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Bulletins, manifold	5,440
Maps, manifold	3,195
Local reports	33
Form 22	34
Total	8,702

WOOD'S HOLE, MASSACHUSETTS.

[*Official number*, 60.]

Latitude	41° 33′
Longitude	70° 40′
Mean barometer for the year ending June 30, 1875	30. 063
Mean temperature for the year ending June 30, 1875	47°.0
Amount of rain-fall for the year ending June 30, 1875	39. 36 inches

Sergeant J. K. P. Purdum has been in continuous charge of this station since its establishment, (December 4, 1872,) and has performed his duties without an assistant and in a satisfactory manner.

Telegraphic reports are not made from this station, but full observations are made and forwarded by mail promptly and regularly.

Thirty-four cautionary signals have been displayed during the year, of which number twenty-four are reported as fully justified at the station. In reference to some of these displays the sergeant remarks as follows:

September 29-30, 1874.—The signal caused twelve vessels to anchor off Nobsque lighthouse, which escaped the gale.

October 29-30, 1874.—Six vessels anchored off the point and escaped the storm; all incoming vessels were close-reefed, showing they had experienced rough weather.

November 23-24, 1874.—Most severe storm of the season; no damage; steamer Monohansett omitted regular trip.

February 3-4, 1875.—No knowledge of any injury other than the wrecking of a vessel off Gay Head; name, unknown.

February 8-9-10-12, 1875.—One vessel wrecked at Cape Cod on the night of the 11th; name, unknown.

February 17-18, 1875.—One barge started out, but as soon as signal was hoisted put back; otherwise no knowledge of any benefit or injury.

March 3-4, 1875.—No damage reported; two large steamers anchored off Nobsque, besides a large number of sailing-vessels.

The sergeant reports that the signals are universally heeded by seagoing men at the station, and that passing vessels run into harbor for shelter when their captains see a signal displayed.

The station was inspected in October, 1874, and the records, instruments, and office found in good condition. As the telegraph-office at the station is not open on Sundays nor during the evening on week days, signal-orders are frequently delayed and their value as warnings consequently reduced. On several occasions during the year, warnings have from this cause failed to reach the station until the storm for which they were ordered had passed over it.

WYTHEVILLE, VIRGINIA.

[*Official number*, 91.]

Latitude	36° 56′
Longitude	81° 00′
Mean barometer for the year ending June 30, 1875	29 .887
Mean temperature for the year ending June 30, 1875	50°.8
Amount of rain-fall for the year ending June 30, 1875	44.15 inches

Sergeant F. Z. Gosewisch has been in charge of this station since its establishment, with the exception of the month of August, 1874, when he was granted a furlough, and his duties performed by Sergeant John Laurens, who was temporarily assigned for that purpose. Telegraphic reports are not sent from this station, but all mailed ones have been forwarded promptly, neatly, and regularly. The expenses of this station are conspicuously low. Mr. Henry Leach has been selected by the observer to take observations during his illness or disability from any cause. No change has been made in the location of the office, nor has it been inspected during the year. A weekly summary of the local observations is given in the local newspaper. No other publication made.

YANKTON, DAKOTA TERRITORY.

[*Official number*, 95.]

Latitude	42° 45′
Longitude	97° 30′
Mean barometer for the year ending June 30, 1875	30 .044
Mean temperature for the year ending June 30, 1875	42°.6
Amount of rain-fall for the year ending June 30, 1875	33.22 inches

Sergeant C. A. Shaw has been in charge of this station, and attended to all its duties without assistance since October 2, 1873. The office

was moved July 25, 1874, to a detached building at the northwest corner of Capitol and Fifth streets, in consequence of the objections made by the proprietor of the old office to having the roof of the building used for display of instruments. The present office is conveniently located in an open space near the post-office, and within four squares of the main telegraph-office. Sergeant Shaw, being an operator, has an instrument in his office, and sends and receives all signal-reports. The instrument-shelter has a northern exposure, and is of the standard window model. The anemometer, wind-vane, and rain-gauge are well exposed on the roof of the building. The station was inspected in June, 1875, and the records, instruments, and office found in good condition. The inspector refers to the sergeant in terms of special commendation. The newspapers of the town publish weekly summaries of the local observations.

The highest water in the Missouri River at this station during the year occurred April 24, 1875, when the gauge-reading was fifteen feet and ten inches.

SAINT MICHAELS, ALASKA.

[*Official number*, 119.]

Latitude	63° 48′
Longitude	162° 10′

No communication has been received from Private L. M. Turner, who is in charge of this station, since the date of the last annual report. A supply of stationery and an additional barometer were sent to him by the vessel which left San Francisco in April of this year.

RECAPITULATION.

Number of sergeants on station June 30, 1875	108
Number of corporals on station June 30, 1875	7
Number of privates on station June 30, 1875	130
Total	245

Of this number, six sergeants and four privates are on duty in the Central Office.

Number of deaths on station during the year ending June 30, 1875	1
Number of desertions from stations during year ending June 30, 1875	6

PUBLICATIONS.

(*Year ending June* 30, 1875.)

Maps, printed	429,038
Maps, (manifold)	65,599
Farmers' bulletins	3,489,398
Bulletins, (manifold)	314,954
River bulletins, (Form 26)	49,516
Form 15, (manifold)	103,433
Form 22	4,379
Form 22, (manifold)	7,370
Local reports	42,644
Miscellaneous	1,359
Weekly weather chronicles	28,621
Monthly weather reviews	17,408
International bulletins	110,662
Board of health reports	290
Total	4,664,671

The annual meteorological statistics of the several stations are given in papers 15 to 19.

SPECIAL RIVER STATIONS.

The following table shows the names and locations of all Special River Stations under the direction of the Signal-Office, with the date at which each began reporting originally:

	Stations.	Rivers.	Names.	Began reporting.
1	Freeport, Pa	Allegheny	M. H. Alter	Apr. 17, 1873
2	Hermann, Mo	Missouri	Edward Kehr	Apr. 24, 1873
3	Jefferson City, Mo	do	Louis C. Lohman	May 12, 1873
4	Oil City, Pa	Allegheny	W. R. Stevenson, C. E	Apr. 20, 1873
5	Brownsville, Pa	Monongahela	J. Allen Hubbs	June 6, 1873
6	Evansville, Ind	Ohio	A. C. Pushee	Apr. 21, 1873
7	Confluence, Pa	Youghiogheny	M. Tannehill	Apr. 23, 1873
8	New Geneva, Pa	Monongahela	H. T. Davenport	Apr. 24, 1873
9	Lexington, Mo	Missouri	Z. S. Mitchell	Apr. 27, 1873
10	Kansas City, Mo	do	W. A. M. Vaughan	Apr. 21, 1873
11	Brunswick, Mo	do	G. D. Kennedy	May 1, 1873
12	Little Rock, Ark	Arkansas	C. H. Conradt	Apr. 21, 1873
13	Plattsmouth, Nebr	Missouri	A. L. Child, M. D	Apr. 20, 1873
14	Marietta, Ohio	Ohio	J. H. Best	Apr. 19, 1873
15	Saint Joseph, Mo	Missouri	Robert Gunn	May 8, 1873
16	Warsaw, Ill	Mississippi	D. H. Cox	May 7, 1873
17	Paducah, Ky	Ohio	Capt. C. Bachmann	May 1, 1873
18	Boonville, Mo	Missouri	Charles W. Hazell	Apr. 28, 1873
19	Le Claire, Iowa	Mississippi	C. P. Disney	June 2, 1873
20	Helena, Ark	do	J. B. Miles	Feb. 25, 1874

No new stations have been added during the year, and only two changes made in the observing force. Mr. David Alter, at Freeport, Pa., discontinued taking observations November 28, 1874, and was succeeded by his son, Mr. M. H. Alter, who has continued to make reports with regularity. The meteorological reports forwarded by Mr. Alter were discontinued in May, 1874.

Mr. C. P. Forman, at Boonville, Mo., resigned his position as observer May 29, 1875, and was succeeded by Mr. Chas. W. Hazell, who makes all necessary reports with regularity.

Mr. J. B. Miles, at Helena, Ark., and Dr. A. L. Child, at Plattsmouth, Nebr., continue to furnish valuable data, in addition to their regular observations.

The reports from Little Rock, Ark., have not been received with the regularity that is necessary to make them valuable, but it is hoped that improvement will be made during the ensuing year. Reports from these stations are telegraphed daily from April 1 to July 31, and from October 1 to November of each year, and on Saturday of each week during the intervals. Observations are made daily throughout the year, and a weekly record of them forwarded to the central office by mail.

WEST INDIAN STATIONS.

No new stations have been established in the West Indies during the year, but reports, synchronous with the 7.35 a. m. and 4.35 p. m. observations taken at this Office, have been received regularly by mail, from the Rev. Charles Partridge, of Clifton, (Port Royal Mountains,) Jamaica, since October 1, 1874. These reports are made on the regular forms in use at our own stations, and without cost to the Government. The elevation of the barometer above sea-level is 2,895 feet, and of the wind-vane above ground 40 feet.

HAVANA, CUBA.

[*Official number*, 100.]

Latitude	23° 09′ 24″
Longitude	82° 22′
Elevation of barometer above sea-level	21.65 feet

Mail-reports have been made with regularity during the year by Mr. Chas. Hasselbrink, the observer. Three observations, synchronous with those of the telegraphic series of the Signal-Service, are made daily, and reported on the regular forms.

The office is located in a two-story house at No. 63 Neptuno street, with a terrace 36.25 feet above ground. The barometer is in the lower story, near a large window without glass, always open to the north, and is 21.65 feet above sea-level. On the terrace are located the thermometer, rain-gauge, anemometer, and wind-vane. Height of thermometer above ground of terrace, 4.25 feet; above ground, 40.50 feet; rain-gauge above ground of terrace, 5.25 feet; above ground, 41.50 feet; anemometer above ground of terrace, 5.25 feet; above ground, 41.50 feet; wind-vane above ground of terrace, 6 feet; above ground, 42.25 feet.

SANTIAGO DE CUBA.

[*Official number*, 3.]

Latitude	19° 55′
Longitude	75° 50′
Elevation of barometer above sea-level	23.16 feet

Mr. Robert Mason still continues to take observations as at last report, and these are synchronous with the telegraphic series of this Office. Mail-reports have been forwarded regularly. The elevation of the barometer is 23.16 feet above sea-level. The thermometer is 20.17 feet, the anemometer 41.01 feet, and the wind-vane 39.86 feet above ground. The telegraphic service from this station has been irregular and unsatisfactory.

KINGSTON, JAMAICA.

[*Official number*, 4.]

Latitude	17° 58′
Longitude	76° 47′ 30″
Elevation of barometer above sea-level	9.16 feet

Mr. James Gall continues to take tri-daily observations, which are synchronous with the telegraphic series of the Signal-Service, and forwarded his mail-reports with regularity until May 29, 1875, since which date no reports have been received. The office is located at Myrtle Bank, on the sea-beach of the harbor. The barometer is 9 feet 2 inches above sea-level. The thermometer is 4 feet 11 inches, the rain-gauge 4 feet 3 inches, the anemometer 27 feet 2 inches, and the wind-vane 60 feet above ground. The telegraphic service from this station has been irregular and unsatisfactory.

Mr. Gall has continued to act as general agent for the Signal-Service in the West Indies, and in that capacity has frequently put himself to personal inconvenience in his efforts to further the interests of the service.

ST. THOMAS, WEST INDIES.

[*Official number*, 102.]

Latitude	18° 20′ 24″
Longitude	64° 55′ 45′

Mr. W. S. Cameron is still the observer at this station, and has forwarded his mail reports with regularity. He takes two synchronous observations only, omitting the one at night, on account of the danger attendant upon exposure to the night-air during the summer-months.

The telegraphic service from this station has been irregular and unreliable.

POINTE-À-PITRE, GUADELOUPE.

[*Official number*, 9.]

Latitude	16° 03′
Longitude	61° 30′
Elevation of barometer above sea-level	20 feet

Since the last annual report, Mr. L. V. Bigard has continued in charge, and takes three synchronous observations daily, which are reported to this office on the regular forms. The barometer is 20 feet above the sea-level; the thermometer 14 feet; the rain-gauge 12 feet; the wind-vane 25 feet, and the anemometer 6 feet above ground.

The telegraphic service from this station has been irregular and unreliable.

BARBADOES, WEST INDIES.

BRIDGETOWN.

Latitude	13° 4′ 12″
Longitude	59° 37′
Elevation of barometer	22.03 feet

The office is situated on Constitution Road, and Mr. E. Racker continues to take the three daily synchronous observations. The mail reports have been forwarded with regularity. The elevation of the thermometer is 12.4 feet; rain-gauge, 18.6 feet; anemometer, 23.7 feet, and wind-vane, 23.6 feet above ground. The telegraph service from this station has been irregular and unreliable.

Telegraphic reports from these stations are desired twice daily from July 1 to October 31 of each year, and it is not through any fault of the observers that they failed to reach this Office during that time.

BERMUDA ISLANDS.

ST. GEORGE.

Latitude	32° 20′
Longitude	64° 50′

Observations were commenced at this place by Mr. C. F. Allen, on the 1st of January, 1875. Tri-daily observations, synchronous with the telegraphic observations of the signal service, are made and recorded on the regular forms and forwarded by mail to this Office since that date. The station is provided with a full set of signal-service standard instruments.

BRITISH AMERICAN STATIONS.

YORK FACTORY.

Latitude	92° 26′
Longitude	57° 02′
Elevation of barometer	45 feet

This station is situated five miles from the junction of Nelson and Hayes Rivers, in an estuary of which Port Nelson Shoals form one side and Cape Tatnam the other. All the instruments are well exposed, but the mercurial thermometers sent with the original outfit for the station do not read low enough, as the temperature in winter falls below —50°. Fortunately the observer has in his possession a spirit-thermometer, that had been used in Dr. Raes's arctic expedition, by the use of which he

has been able to keep a complete record. Mr. J. Fortescue, the observer, has shown a gratifying spirit of interest in the work, and complete records from him have been received from October 1, 1874, to June 19, 1875, the date of his last communication. In addition to one synchronous observation in the morning of each day, he makes three additional observations, at the hours of 7, 2, and 9 o'clock, local time, all of which are recorded on the regular forms.

CUMBERLAND HOUSE.

A letter from Mr. Horace Bélanger, the Hudson Bay Company's factor at this point, written March 1, 1875, states that "no competent person can be found to take observations for the amount of compensation offered by the signal service." He also reports that the mercurial thermometers are unsuited for the low temperature of that locality. Correspondence has been opened with Mr. Kittson, the general agent of the company in Saint Paul, Minn., for the purpose of having some competent person designated by the company for this work, either at Cumberland House or at the nearest adjoining post. No communication has been received from Forts Chippeyan and McPherson, and only a statement from Fort Simpson, that the instruments arrived there in good condition.

DOMINION OF CANADA.

Three observations, synchronous with those of the telegraphic series of the United States signal service, are made daily from the stations in the Dominion of Canada and exchanged with this Office. Most of these are forwarded by telegraph, but from a few they are transmitted by mail on weekly forms by Professor Kingston, the director of the Canadian meteorological office, with whom the exchange of reports is effected.

BROCKVILLE, ONTARIO.

Mailed reports have been received from this station with regularity throughout the year.

CAPE ROZIERE, QUEBEC.

[*Official number*, 1.]

Latitude	48° 56′
Longitude	64° 21′

Telegraphic reports are made from this station, and, in addition, the observations are entered on weekly forms and mailed weekly. The receipt of the telegraphic reports at this Office were discontinued, by request, on February 5, until the end of the fiscal year.

CHARLOTTETOWN, PRINCE EDWARD'S ISLAND.

Reports are not received by telegraph from this station, but the observations are transmitted weekly by mail, and have been received regularly during the year.

CHATHAM, NEW BRUNSWICK.

[*Official number*, 2.]

Latitude	47° 01′
Longitude	65° 30′

The reports from this station have been regularly received by telegraph, and also weekly by mail during the year.

FATHER POINT, QUEBEC.

Telegraphic reports of the observations taken at this station continue to be received with regularity, but the weekly mail reports of them have not been received since October 3, 1874. Prof. G. T. Kingston has informed the Office that efforts would be made to have their transmission resumed at as early a date as practicable.

HALIFAX, NOVA SCOTIA.

[*Official number*, 89.]

Latitude	44° 39′ 42″
Longitude	63° 35′ 30″

Observations are forwarded by telegraph from this station, and at the end of each week by mail, on the regular form used by all the Canadian stations. They have been received regularly.

KINGSTON, ONTARIO.

[*Official number*, 80.]

Latitude	44° 12′
Longitude	75° 41′

At Kingston the observations have been taken throughout the year as previously, and have been transmitted by telegraph and also by mail on the regular forms. Telegraphic reports from this station were not received at this office from February 5, 1875, until the close of the fiscal year, their transmission from Toronto having been discontinued by request.

MONTREAL, QUEBEC.

[*Official number*, 56.]

Latitude	55° 30′
Longitude	73° 25′

The tri-daily observations are taken at this station and forwarded by telegraph daily, and by mail at the end of each week.

OTTAWA, ONTARIO.

Reports from this station have been regularly forwarded by telegraph, as well as weekly by mail, and have been regularly received.

PARRY'S SOUND.

[*Official number*, 108.]

Latitude	45° 25′
Longitude	80° 08′

Reports from this station commenced on the 27th of September, 1874, and have been continued with regularity since that date. The observations are transmitted tri-daily by telegraph, and also on the usual form, at the end of each week, by mail.

PORT DOVER, ONTARIO.

[*Official number*, 79.]

Latitude	32° 47′
Longitude	80° 12′
Elevation of barometer above sea-level	619 feet

Telegraphic reports are made daily from this station, and also weekly ones by mail. The telegraphic reports were not received at this office from February 5, 1875, until the close of the fiscal year, their transmission from Toronto having been discontinued by request.

PORT STANLEY, ONTARIO.

[*Official number*, 78.]

Latitude	42° 40′
Longitude	81° 1′
Elevation of barometer above sea-level	584 feet

Reports from this station are made by telegraph and mail. The telegraphic reports were not received at this office from February 5, 1875, until the close of the fiscal year, their transmission from Toronto having been discontinued by request.

QUEBEC, QUEBEC.

[*Official number*, 57.]

Latitude	46° 29′ 12″
Longitude	71° 13′ 45″
Elevation of barometer above sea-level	336 feet

Regular telegraphic reports are made tri-daily from this station, and also forwarded weekly by mail.

SAUGEEN, ONTARIO.

[*Official number*, 81.]

Latitude	40° 40′
Longitude	81° 16′
Elevation of barometer above sea-level	619 feet

Reports from this station are made by telegraph and mail, the former tri-daily and the latter on the weekly form. The telegraphic transmission of the reports from Toronto was suspended at the request of this office, from February 5, 1875, until the close of the fiscal year.

STAYNER, ONTARIO.

The observations from this station are not forwarded by telegraph, but are entered on the usual form, and transmitted weekly by mail. They have been received with regularity.

Two observations, synchronous with those at 7.35 a. m. and 4.35 p. m., are taken each day, except Sunday.

SYDNEY, CAPE BRETON.

The observations made at this station are transmitted by telegraph tri-daily, and weekly by mail. The telegraphic transmission of the reports from Toronto was suspended at the request of this office from February 5, 1875, until the close of the fiscal year.

TORONTO, ONTARIO.

[*Official number*, 48.]

Latitude	43° 39′ 24″
Longitude	79° 21′
Elevation of the barometer above sea-level	342 feet.

The reports from this station are sent under the direct supervision of Prof. G. T. Kingston, and are forwarded by telegraph tri-daily, and by mail on weekly forms.

WINNIPEG, MANITOBA.

Latitude	49° 52′ 32″
Longitude	97° 08′ 39″
Elevation above sea-level	754 feet.

Six observations are taken each day, and were commenced on the 21st day of June, 1874, and received regularly from that date until June 5, 1875. Three of the observations are made at hours synchronous with those made at the signal-service stations for transmission by telegraph, and the remaining three at 7 a. m., 2 p. m., and 9 p. m., local time. The observations are entered on Forms 4, and forwarded weekly, by mail, to this office. The observer is Mr. James Stewart, who works under the direction of Professor Kingston, but forwards copies of his reports, both telegraphic and mail, direct to this office.

GENERAL SUMMARY.

UNITED STATES STATIONS.

Number of stations making full telegraphic reports	88
Number of stations making full observations and reporting by mail	11
Number of printing stations, at which meteorological observations are not made	3
Number of special river stations	20
Total	122

WEST INDIAN STATIONS.

Number of stations making full telegraphic reports	6
Number of stations making full mail-reports	1
Total	7

BRITISH AMERICAN STATIONS.

Number of stations from which telegraphic reports are received	15
Number of stations from which mail-reports are received	4
Total	19

From April 18 to June 30, 1875, First Lieut. Robert Craig, acting signal-officer and assistant, had general charge of instruction, and was in general charge of the stations above reported and the duties connected therewith, in relation to the receipt, record, and publication of weather reports.

The annual reports of the Chief Signal-Officer relating to the details of the different duties at the different stations, and the mode in which the services rendered at all are combined to obtain general results, become, to a greater extent, each year, as the service is established, repetitions of the antecedent reports. The labor of maintaining so large a number of stations, charged with so many and different duties, which must be rendered daily and at night at fixed instants of time, and without cessation throughout the year, is great. The superior character of the men employed upon the duty has gone far to make it successful.

The total number of stations of observation now maintained upon the territories of the United States, as necessary for the purposes of the service, is one hundred and two. Reports are, by comity of exchange, received from nineteen additional stations, established by the authorities of the Dominion of Canada and within the Dominion; and observations are had from seven stations located at suitable points upon the islands of the West Indies.

The total number of stations from which telegraphic reports of meteoric changes are received tri-daily, in regular series, is one hundred and nine.

The forms herewith exhibit the reports received from the stations tri-daily, in cipher, over a system of telegraphic circuits connecting with this office, which have been heretofore sufficiently explained. (Paper 24.)

The bulletin forms contain the same reports, after translation from the cipher, and exhibit the information received from each station. (Paper 25.)

In pursuance of the plan some years ago entered upon at the request of the chief of the meteorological office of the Dominion of Canada, warnings of approaching dangerous storms are, by arrangement, telegraphed from this office to Toronto. The display of signals by the authorities of the Dominion of Canada is based upon these telegrams. The relations thus maintained between the two services continue to be of benefit to both.

The plan of the location of the different stations of observation has been referred to in preceding reports of the Chief Signal-Officer. It has been to so arrange that each station might, from its point of observation, give notice of meteoric changes, and warn against unusual disturbances, for its particular section, while all should be so placed, as in a series of lines and in such relations, each to the other, that the reports of any one and the contiguous stations received at the other stations as they pass by telegraph toward the office of the Chief Signal-Officer at Washington, may of themselves give notice of marked approaching meteoric changes. The reports of all, concentrated, charted, and studied at this office, are intended to enable the extent, movement, and course of the disturbance to be observed and defined from report to report, and to permit warnings to be issued by publications or by signals at any time, for the benefit of all.

The eastern line of observation, attempted to be maintained, reaches from the stations far southward and eastward, at Barbadoes and the Windward Islands, through the West India Islands, and along the Atlantic coasts to the northeast, at Father Point and Halifax.

The southern line, joining that of the east at Key West, extends along the southern coasts of the United States bordering the Gulf of Mexico to the mouth of the Rio Grande and the Mexican frontier. Between this point and the southern port of San Diego upon the Pacific Ocean, the intervals not covered by telegraph-lines each year diminish. The time is not far distant when the line can be extended across the continent.

The western line reaches, on the Pacific, with far too few stations, from San Diego to Portland, Oreg. The northern line connects this station, passing over the plains by the Great Upper Lakes, through the Dominion of Canada and the Saint Lawrence Valley, with the eastern line at Halifax.

Within these bounding lines the territory is covered by the establishment of such stations of observation as the skill and the facilities of the office have permitted. There have been but few changes in the locations of these stations east of the Mississippi River. West of the Mississippi the lines of stations are carried steadily westward, wherever improving facilities of communication and the means at the control of the service have made the measure possible.

The chart herewith exhibits the names and locations of the different stations. (Paper 47.)

In the whole list of stations there is not one but the failure of reports from which is unpleasantly felt; nor is there any limiting station but from which the student looks longingly into the unknown region beyond, with the wish that from that unknown might come the information to give his studies accuracy. Near the southern extremity of the eastern line, the experience of meteorists has located the origin of cyclones, which sometimes sweep in a single course over the whole eastern portion of the United States in the vicinity of the sea. Beyond the western extremity of the southern line, and upon the coast of the Gulf of Mexico, there lies a region from which the sad experience of the last summer shows reports are needed to warn our ports against such storms as that which recently devastated the southwestern coasts. But little progress can be made in the study of the practical meteorology of the Pacific coast while the scant stations which now dot the Pacific line are all from which information can be had. North and west of the great lakes some of the richest territories of the United States cannot be properly forewarned of coming changes until the lines of stations can be carried farther westward. Over the whole interior west of and in the Mississippi Valley the populations are impatient for premonitions, which must be delayed until the advancing telegraph-lines have pioneered the way for stations, reports from which must first be had. For the interior east of the Mississippi, and for the districts near the great lakes, reports for study cannot be too full or too numerous for the proper protection of the great agricultural and commercial interests. Experience has shown that a storm once fairly within the scope of the stations of this office, the study-charts can hardly fail to indicate in their ceaseless sequence the place of its existence, its extent, and something of its probable march. It is a duty to give that scope such field as will make it most effective.

The service of the West India stations has had something of the imperfection due to their recent establishment. The telegraphic communication between them has been but for a short time accomplished, and it has been frequently interrupted. The observers cannot be held to that rigid rule which makes the regular reports of the service throughout the United States at once prompt and reliable. As time goes on, however, and the work takes permanent shape, when the reports shall be received at the hours due, and their indications understood by tried experience, it seems almost impossible that the great hurricanes which pass the stations should precipitate themselves unheralded on our coast. An instance of the absolute necessity of reports from these stations has been given by the memorable cyclone of September 16, 1875, which, but for a single brief report from a single station in Cuba—no other West Indian reports being on that day received—would have passed through the Gulf and fallen on our southern coast unannounced, as similar storms have done in preceding years. A solitary warning of the existence of the hurricane at Santiago de Cuba, studied in connection with subsequent reports from Havana and Key West, enabled warnings to be given many hours in advance at the ports of Mobile and New Orleans of the probable presence of the cyclone in the Gulf of Mexico and of the danger of its approach.

The utility for meteorological purposes of the sea-coast service stations of the signal service in connection with the life-saving service, and located in the life-saving service stations, has been tested in the year elapsing since the date of the last annual report. These stations have the important advantage of being directly connected with this office by the telegraphic wires of the signal service, an arrangement

which renders it possible to receive from any one or all of them reports of any character, at any moment of time. The reports from these stations are often of the first importance. They are frequently found to differ markedly from those had from stations only a few miles distant in the interior. Giving the character and direction of the sea-swell on the coast itself, they have enabled opinions to be formed as to the approach and distance of coming or passing storms. A better knowledge of the force and real direction of the winds at sea can be here had than can be gathered from inland reports. The cases are not infrequent in which, by such and the other data reported, the march of a storm can be traced along our coast from station to station, connected as all of them are by telegraphic wires under the control of the service, with exactness. It can so be judged some hours in advance what ports will be next threatened, or between what ports the coast navigation will become dangerous.

The systematic study of the data thus regularly collected at numerous points upon our coast will aid in establishing generalizations of value. An incidental use of the reports there had has developed itself by the fact that, published in the daily journals, they have been found to enable shippers interested in the coasting trade to judge for themselves on any day the character of the weather along the coast, and thus to know approximately the location of their vessels and the conditions under which their voyages are making. It begins to be possible to judge sometimes the character of voyages making farther out at sea.

A further reference to other uses of these stations is made in this report. The sea-coast service is considered as having so fully established its utility, and is capable of being made so useful, that its gradual extension is recommended. The great coasting interests moving along the northern and New England coasts ought to have the benefits of its aid.

As the lines of telegraph constructed in pursuance of the acts of Congress have extended along the southwestern and Indian frontier and over the deserts of the interior, the plan has been to make the stations upon them stations for meteorological observation and report. The field of study has been thus enlarged to cover regions where it was before impossible, and of the meteorology of which very little was known. While but scanty reports have as yet been had from the stations up to the time of reporting, the utility of those received is manifest. Each aids in the study of the whole system of reports, and adds to the accuracy of the generalizations sought to be established by it. The reports from the stations established on the Indian frontier of Texas have already indicated a relation between the direction of the winds in the interior and those which sometimes prevail with violence upon the coasts, which, while it might have been before surmised to exist, had not been shown to do so.

It is greatly to be desired, for the protection of our Gulf commerce, that arrangements should be made with the government of Mexico by which daily reports of meteoric changes should be had from the Mexican Gulf coast. An increase of stations upon the Pacific coast between the ports of San Diego and Portland—an increase which the scant appropriation at the control of the Office has hitherto not permitted—could hardly fail to permit such announcement of meteoric changes as would be of practical importance to the great commercial interests upon the Pacific.

The northern lines of stations, extending from Pembina and Fort Garry, by the Upper Lakes and Canada, to the extreme northeast at

Halifax, have been useful, the reports had from them giving often the first premonition of changes of temperature, accompanying areas of high barometer extending southward, and enabling storms, which would otherwise too soon be lost to view upon the study-charts of the Office, to be traced in their course over the eastern part of the continent.

The reports of barometric readings, taken at stations in the interior west of the Mississippi and upon the great interior plateau, have been lessened in their value, by the fact that the correct reduction of the readings to the hypothetical readings at the sea-level has not been satisfactorily determined. The effort to remove this difficulty has been continued.

The uses of the stations in the States east of the Mississippi have been sufficiently referred to in preceding reports.

Further action has been had during the year to secure the practical results of 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.

Special correspondence had by this Office and by authority of the Department with scientists and chiefs of meteorological services representing the different countries, had at the date of the last annual report, resulted in arrangements by which a record of observations to be 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, Belgium, Great Britain, Denmark, Dutch Guiana, France, Germany, Italy, Japan, The Netherlands, Sweden, Norway, Portugal, Russia, Spain, Switzerland, Turkey, and British North America. On July 1, 1875, the daily issue of the printed bulletin of international simultaneous reports was commenced at this Office, and has been since maintained. A copy of this bulletin is furnished to each of the co-operating observers. (Paper 40.)

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, to extend the plan of report upon the seas, to bring within the scope of study observations practically extending around the northern hemisphere. This assistance will be sought.

The Office has to acknowledge in this connection the cordial and valued co-operation of the meteorological services of the different nations, represented as follows: Russia, by Prof. H. Wild, director of the Imperial Central Physical Observatory at St. Petersburg; Turkey, by A. Coumbary, effendi, director of the Central Observatory at Constantinople; England, by Robert H. Scott, esq., director of the Meteorological Office, London; Austria, by Prof. Carl Jelinek, director of the Imperial and Royal Central Meteorological Institute at Vienna; Belgium, by Prof. E. Quetelet, director of the Royal Observatory at Brussels; Denmark, by Capt. N. Hoffmeyer, director of the Royal Danish Meteorological Institute at Copenhagen; France, by M. U. J. LeVerrier, director of the observatory at Paris; Algiers, by M. le général Farre, commandant supérieur du génie; Italy, by his excellency the minister of agriculture, industry, and commerce; The Netherlands, by Prof. Buys Bal-

lot, 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; Spain, by A. Aguilar, director of the Royal Observatory at Madrid, and Don Cecilio Pujazon, director of the Naval Observatory at San Fernando; Portugal, by J. H. F. de Silveira, director of the observatory of the Royal Polytechnic School at Lisbon, and J. C. de Brito Capello, his successor; Switzerland, by Prof. R. Wolf, director of the observatory at Zurich, and Prof. E. Plantamour, director of the observatory at Geneva; Dominion of Canada, by Prof. G. T. Kingston, director of the Magnetic Observatory at Toronto; Germany, by Prof. C. Bruhns, director of the Royal Observatory at Leipsic, and Prof. G. Neumayer, hydrographer to the government; Sweden, by Prof. R. Rubenson, director of the Royal Swedish Meteorological Institute at Stockholm, and Dr. H. H. Hildebrandsson, of the Upsula Observatory; Greece, by Prof. J. F. J. Schmidt, director of the Royal Observatory at Athens, and numerous observers in their individual capacity.

The concurrence of so many nations seems to put beyond question the practicability of securing a daily and simultaneous report of the meteoric changes over the greater portion of the earth's surface.

The opinion has become so general among scientific men that it is necessary to study the atmosphere of the earth as a unit, that skilled and energetic colaborers are everywhere found. Co-operation is sought from other nations as rapidly as the facilities of the Office permit. It is not necessary, nor is it possible, to dwell here at length upon the results to be hoped from this undertaking. It will be one of the chief among them if it secures the friendly co-operation of the world in a labor for the world's benefit. The accompanying charts indicate what it has already made practicable, and foreshadow the progress possible in the future. (Paper 41.) There is little danger that the work, once undertaken and sucessfully prosecuted for the period of a year, will be thereafter willingly abandoned by those who have stood side by side in its execution.

The average number of daily simultaneous observations now made abroad is two hundred and sixty-eight. The charts herewith exhibit the locations of the stations from which the series are received. The co-operation of the different nations given, as above described, renders the additional cost to the United States of the grand system of reports it opens only that of the cost of the preparation, paper, and printing of the International Bulletin, a cost which would have to be met in great part for the proper preservation of the records themselves, even if the bulletin was not distributed. It is doubtful whether so extensive a record was ever before had at so trivial an expense

On January 1, 1874, the distinguished secretary of the Smithsonian Institution, Prof. Joseph Henry, proposed, in pursuance of a plan agreed upon, to place in the charge of this Office, from that date, the very extensive system of meteorological reports made by voluntary observers in all parts of the United States, which, organized by the Smithsonian Institution in 1848, had been successfully conducted under its management for twenty-six years. With the approval of the Secretary of War, the charge, thus courteously tendered, was accepted. The numerous voluntary observers, who, prior to the date above-mentioned, reported to the Smithsonian Institution, have since that date reported regularly to this Office, and their reports are entered on its files.

The system of voluntary meteorological reports for the United States,

becoming by this action the voluntary system of this Office, has been since increased by the tender and acceptance of reports made by additional observers. These reports are of observations made at 7 a. m., 2 p. m., and 9 p. m., local time, at the different stations named in Paper 12 herewith. Papers 50 and 51 are the forms adopted by this Office upon which observations of this character are now entered. On June 19, 1874, the very courteous proposal was made by the Surgeon-General of the Army, Brig. Gen. Joseph K. Barnes, brevet major-general, U. S. A., to place at the disposal of this Office, after having extracts made from them at the Office of the Surgeon-General, the extensive series of observations made by the medical officers of the Army at the different military posts and stations.

These reports, the continuation of the series commenced by the Medical Department in 1819, are, like those of the Smithsonian series, from observations made at 7 a. m., 2 p. m., and 9 p. m. The proposal of the Surgeon-General was accepted, in a communication of date June 26, 1874. (Papers 27*a* and 27*b*.) The series of the Medical Department is now regularly received and entered on the record-files of the Office. The series at present numbers one hundred and two. The record of observations is as the form herewith, (Paper 52.)

The total of daily reports filed at the Office of the Chief Signal-Officer now numbers as follows: Total number of daily-service simultaneous telegraphic reports, one hundred and nine; total number of international daily simultaneous reports, two hundred and sixty-eight; total number of reports of voluntary observers, three hundred and ninety-three; total number of reports of Medical Corps of the Army, one hundred and two; total number of reports of Medical Corps of the Navy, five; making a grand total of eight hundred and seventy-seven daily reports received regularly for discussion.

The subject of the construction of a building, to be fire-proof, and properly arranged for the duties of the Signal-Service, and for the preservation of the records, now become very valuable, and which, if destroyed, cannot be reproduced, is respectfully commended to the consideration of the Secretary of War.

The data thus accumulating on the files of this Office, and to the extent of which reference has been previously made, have afforded scope for generalization, differing from and, perhaps, more extensive 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, to the dates at which they 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 monthly review, combining the results had from these data and those received from other sources for each month during the year. It has thus been 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 period 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 those 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 these, which have in view the prennouncement of storms or other meteoric changes, furnish results valuable for practical uses.

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 knowledge 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. They will follow the practical use by the people themselves of the information gained through it, 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. The farmer will not cultivate his fields less wisely if he may be able to judge, by the use of simple instruments, better than now of the coming changes that will forward or retard his work. The seaman will not feel less safe if conscious that his own observations will assure him something as to coming favorable or dangerous winds. 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 it in the able suggestions, based upon deductions had from the charts and data, by distinguished scholars, who thus become its associates in its own especial labors, aid in forming the rules on which its duties rest.

As rehearsed in the last annual report of the Chief Signal-Officer, the daily official deductions constituting the tri-daily synopses and probabilities, 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 meteorological reports of the service stations of observation, transmitted tri-daily, by telegraph, after passing over a system of telegraphic circuits, so arranged as to at once concentrate the reports at this Office, and to distribute, in doing so, certain numbers of them at designated cities and posts. Special 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 probabilities are announcements of the changes considered from the study of the charts, in connection with such rules and generalizations as the experience of the Office and the study of meteorologists seem to have determined as probable to happen within the twenty-four hours then next ensuing. The study for each issue requires the draughting and study of four charts; these charts to exhibit chartographically the data furnished by the simultaneous reports of the one hundred and nine stations, heretofore referred to, located in the United States on the Atlantic and Pacific coasts, the coasts of the Gulf and of the Lakes, in the western interior, and in the Dominion of Canada, Nova Scotia, Newfoundland, New Brunswick, and the West India Islands. The charts are as follows: (*a.*) A chart of barometric pressures, the temperatures, and the winds, together with the wind directions and velocities at the different stations. The character of the precipita-

tion, if any, occurring at the time of the report, and the amount since the time of the last preceding report. This chart exhibits barometric pressures and the temperatures in their relation to districts and territory and to each other, by a system of isobaric and isothermal lines inscribed. The wind-directions are shown by arrows at the different stations. (*b.*) A chart of the cloud-conditions prevailing over the United States, in which the different varieties of cloud reported at the stations appear by symbols. On this chart are also indicated the weather, as reported at each station at the time of each report, the direction of movement of lower and upper clouds, and each morning the minimum temperature of the preceding night in relation to districts of territory. The cloud-areas appearing upon this chart are surrounded by an outline to enable their extent and probable movement to be considered. (*c.*) A chart of the relative humidities over territorial districts, with the temperatures at the several stations. This chart of humidities enables studies to be made for territorial sections, the difficulties attending the study of observations of this character being obviated to a very considerable extent by the intercorrection of the 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 little the general result. (*d.*) A chart of barometric pressures exhibits, for purposes of reference, by lines of no variation, the districts of territory over which the barometric pressure has increased, and those over which it has diminished, in each averaged period of eight hours in the twenty-four hours terminating at the hour of the report. (Papers 43 to 46.) The study of these charts requires that they should be compared with each other, and with the antecedent charts of a similar character prepared at the times of the preceding reports. The total of the readings of the different instruments inscribed on each series of charts, as exhibiting the elements of the general meteoric condition, reaches the number of two thousand one hundred and eighty. The duties of the preparation of these charts, and of the reports based upon them, have been under the immediate charge of Assistant Cleveland Abbe, A. M.; First Lieut. Robert Craig, acting signal-officer and assistant; First Lieut. H. H. C. Dunwoody, acting signal-officer and assistant; and Assistant T. B. Maury, A. M., who have been relieved and alternated in the discharge of these and other special duties at such times as directed under the instructions of the Chief Signal-Officer. The daily series of study-charts are twelve in number; the yearly series, four thousand three hundred and eighty. The field which a series continuing for years opens for investigation is almost without a limit. Additions to the charting are made as it is found it can be improved.

The statements of synopses and probabilities have been furnished for the press at 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. The great diffusion thus given this intelligence has, of course, its advantages. The Office has found itself, however, exposed to unexpected difficulties.

It has been the plan of the Chief Signal-Officer that these published statements should never appear without the publication of a portion of the data on which they are founded, and that they should be published with, at the least, the full rehearsal of the synopsis of the conditions preced-

ing the forecast, and the full publication of the forecast in the words in which it is issued. Every press association receiving the statement from the Office receives it on the condition that, if used at all, it shall be printed in full as furnished for the journals, and each has formally accepted the condition. Thus given to the public, the meteoric conditions, on which the announcements are based, can be seen—the statements are better understood—and can be correctly judged by local indications on points often so doubtful that they are stated with hesitation. The haste with which the great journals are issued does not always permit this, and the Office sometimes finds itself held responsible for what purports to be its utterances, so garbled in the publication as not to be recognizable. It is but just to American journalists to say that the instances are rare, however, in which, when attention has been directed to these errors, they have failed to be corrected.

A careful analysis of these statements of the Office, made for the year terminating June 30, 1875, and a comparison of the meteoric conditions occurring within the twenty-four hours and within the district to which each statement has had reference, has given an average of 87.4 per cent. as verified. The mode of comparison is set forth in Papers 22 and 23 herewith. A comparison of this percentage with the averaged percentage of preceding years exhibits a continuing improvement in accuracy with each succeeding year. The popular faith in the announcements of the Office, now in the fifth year of their issue, has remained unchanged. It has not at any time been sensibly lessened by the errors which now and then direct attention to the fact that in the present condition of science premonitions having in their scope a territory so great as that of the United States cannot always be correct for every part of a district.

The close watch kept upon this Office, the popular knowledge of its duties, and its reasonable success in the discharge of them, cannot, perhaps, be better evidenced than by the criticisms to which it is subjected if an error now and then occurs in a work in which a few years ago any success was by many deemed impossible.

The systematic instruction of officers of the Signal Service to fit them for duties of this description has been continued, though greatly interfered with, by the small force charged with the now very extensive duties of the service in its different branches. The duties in which the officers are engaged, each in his sphere, and each of which contributes its share to the success of the whole, are such as necessarily lay well the foundation for the courses of especial study and practice. The courses once commenced, the skill increases with acquired experience. The studies to which reference has been hitherto made, and the data condensed for generalization, improve each year the material before the student for consideration. The improving accuracy of the reports seems to evidence the correctness of the plan of study adopted.

The display of cautionary signals has been had, when necessary, by day and night, during the year ending June 30, 1875, at the following principal ports and harbors of the United States, located upon the lakes, the Atlantic, and the Gulf coasts: New Orleans, Mobile, Jacksonville, Savannah, Charleston, Wilmington, Cape Hatteras, Norfolk, Cape Henry, Baltimore, Cape May, Peck's Beach, Atlantic City, Barnegat, Squan Beach, Long Branch, Sandy Hook, New York, New Haven, New London, Wood's Hole, Boston, Portland, Eastport, Oswego, Rochester, Buffalo, Erie, Cleveland, Toledo, Detroit, Port Huron, Alpena, Grand Haven, Chicago, Milwaukee, Escanaba, Marquette, Duluth, Key West, Thatcher's Island, Kittyhawk, and Tybee Island.

During this period one thousand and twenty-three signals have been

ordered, counting each separate display at each port a separate signal, in anticipation of sixty-seven dangerous storms. Of this number 76 per cent. have been afterward reported as verified, by the occurrence of dangerous winds at the points where the signals were displayed, or within the radius of one hundred miles from these points, as set forth in the rules of the Office. The signal ordered by this Office is always cautionary in its character, not announcing positively 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 falls to the Office to determine in advance over what ports to be named, to the exclusion of others, an observed storm-area will pass, and in such manner as to be accompanied at those ports with a given wind-velocity. Within the same area the winds differ in force at different points. 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 permit greater accuracy. There will be higher success as the data of the Office become full enough to enable it to be judged what local wind-velocities are to be expected to follow the different meteorological indications in the different districts at the different seasons. The experience of the few years past which has shown with what precision storms may be charted as they pass over the continent, or sweep its coasts, and that something may be known of their location, even when far at sea, gives assurance of progress.

The effort has been continued during the year to exhibit as widely as possible in the agricultural districts the results of the daily office studies, in the form of printed forecasts, for the benefit of the agricultural populations throughout the United States. The continuance of this work has seemed to be warranted by the favor with which it has been received. The effort to cover so wide an extent of territory has made the labor great. By an arrangement with the Post-Office Department, six thousand three hundred and sixty-four printed farmers' bulletins, on which have appeared the daily reports of this Office, have been distributed and displayed in frames daily, at as many different post-offices in different cities, villages, and hamlets in different States. At midnight of each day the midnight report of the Office for the ensuing day is telegraphed to twenty centers of distribution located respectively as follows: At Albany, N. Y.; Augusta, Ga.; Bangor, Me.; Boston, Mass.; Buffalo, N. Y.; Burlington, Iowa; Chicago, Ill.; Cincinnati, Ohio, Detroit, Mich.; Leavenworth, Kans.; Logansport, Ind.; Memphis, Tenn.; Montgomery, Ala.; Nashville, Tenn.; New Orleans, La.; New York City, N. Y.; Pittsburgh, Pa.; Philadelphia, Pa.; Springfield, Mass.; and Saint Louis, Mo.; they are also issued at Washington, D. C. The relative location of the centers of distribution is exhibited on the chart herewith. (Paper 42.) They have been carefully selected as located in the midst of the denser agricultural populations of the United States, and at points where facilities of communication enabled the surrounding districts to be most rapidly supplied. The telegraphic report received at a center of distribution is at once printed by enlisted men of the Signal Service, on bulletin forms provided for that purpose, 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 arrange-

ment by which each postmaster receiving the bulletin has the order of the Postmaster-General to display it instantly, in a frame provided by this Office for the purpose, and to report the fact of its receipt and of its display in writing to the Chief Signal-Officer.

The average hour at which the bulletins have reached each of the different offices, and have been displayed in the frames, has been 11 a. m., a period of ten hours thus elapsing from the time at which the information had at the central office has left that office to the time at which it has been displayed in the midst of the farming populations, and at country villages in most of the States throughout the United States. It is difficult, without some consideration, to estimate the numbers of people and the varied interests it has been attempted in this way to benefit. It is found in the experience of the Office that the effort is appreciated by the fact that the failure of the bulletin to appear at any village where it has been customarily received rarely fails to be notified to this Office, with the request that it may be supplied. It seems not impossible that at some time in the future, as telegraphs ramify, economical arrangements may be made by the people of the different States by which information of this character may be distributed by telegraph to the places at which there are offices. The Office is in correspondence with one hundred and twenty-three agricultural societies, in reference to its duties, and seeks information from them as to the manner in which those duties can best benefit the farming populations in the regions they represent.

The 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 by brief rules for the guidance of agriculturists and others, as to the weather conditions probably to follow certain meteoric changes in the different territorial districts of the United States. It is not impossible that suggestions can be given as to the practical operations of farming it is wise to undertake with the differing atmospheric conditions; as to gather the crops for harvest with the certain winds found to be accompanied in any particular district with the least humidity; to plant with other winds, and the conditions which indicate the probable approach of rain. With each year the popular knowledge of the uses of the bulletin and some increased interest in, and study of, meteorology renders 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 and generalizations can be given, to add to the bulletin such brief rules as may be developed in regard to its uses in connection with such instruments as may be had for local use; together with such suggestions as may relate to the crops had in hand at the different seasons of the year, with reference to the atmospheric conditions then habitually occurring.

The description of this work will not be complete without reference made to its economy. At a recent session of Congress an estimate was submitted to one of the committees, the plan of which shows that if the total cost of each bulletin-station at which the bulletin is displayed at each different post-office, hamlet, village, or city, were computed to be thirty-one cents per day only, the sum so resulting would meet every expense caused by the Signal Service. A very little saving of any one crop or to any interest made on any one day in the vicinity of the station, supposing nothing to be saved on any other day in the year, would more than compensate for the expenditure.

The river reports of the Office have been continued during the year. As in preceding years, the changing depth of water in the river-channels of the principal rivers has been recorded and published daily at

certain points for the benefit of the commercial populations along the river banks and to enable river-shipping to be moved with intelligent foreknowledge of the probable depths to be found at the different points to be passed in the voyages. The simple and inexpensive river-gauges established by the service have been found to answer well their purpose. The reports are useful to the river interests as having an official character.

The data had at this Office, though meagre, suffice to permit a foreknowledge of changes likely to happen, and enable useful warnings to be given of coming floods, ice-floods, and sudden and great rises or falls of the river levels. As instances occurring during the year, it is mentioned that, at the time of the floods in the Mississippi, in consequence of the unusual rains of last summer, warnings could be given daily from the Office, with fair accuracy, as to the rises to occur at the principal cities, in the vicinity of which they were likely to cause damage.

While it cannot be determined what has been the value in individual cases resulting from the information given by these reports, or what has been the aggregate value, it is sufficient to state, for the purposes of this paper, that without them no systematized information upon the subject to which they relate would have reached the populations interested. The manner in which these reports have been 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 them, have given evidence of their usefulness.

In order to render them as useful as possible a careful reconnaissance of the principal western rivers was directed to be made, to determine a certain level or depth of water at different points, a rise above which is held to be dangerous to river interests along the courses of the river, and which has, for this reason, been designated as a "danger level."

The report of First Lieut. A. W. Greely, acting signal-officer, who, under instructions from the Chief Signal-Officer, made a careful examination of the Mississippi, Missouri, Ohio, and Cumberland Rivers, accompanied the last annual report. Since the date of that report this work has been supplemented by additional information required to be reported by the sergeants in charge at stations on the rivers, and by data furnished from the special river stations.

The results are summarized in the paper herewith, (Paper 26,) the danger-line circular, which was issued from the Office, in the form herewith, on March 15, 1875, and was given, under the order of the Secretary of War, a wide diffusion throughout the great river valleys of the interior. Copies of this paper were forwarded to the mayors or other proper authorities at two hundred and seven villages located upon the different rivers. It was proposed, in each case, that a simple river-gauge, upon the plan of the Signal-Service gauge, be established at each village, and the proposal was made to collate upon the circular in such form as to be of most utility, the data thereafter to be regularly had from it, and reported to this Office. Paper 29 exhibits the correspondence.

The Chief Signal-Officer is confirmed in his opinion, that, with a 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 of the daily probable rises at the localities threatened, and notice given of its coming in advance.

A brief examination of the charts of changes of the river-levels herewith (Paper 49) will exhibit the fact 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 condition existing at points sometimes far distant, above the point at which the rises are anticipated as to happen; certain river-depths at particular points being followed as consequences, and after certain lengths of time, by proportionate rises at points lower upon the river's course.

The data accumulating in a series of years would permit studies of this kind to be valuable. They can be much more carefully analyzed. In connection with studies of this character, the charts of river-basins, which enable it to be determined during the existence of any flood what rivers will probably be affected by precipitation then occurring, are found to be of value in establishing correct prognostications. The plan for the study of the progress of the flood from day to day was referred to in the last annual report.

The daily reports of the surface and bottom water temperatures at points upon rivers, lakes, and on the sea-coast, have been continued during the year. These reports are furnished at the request of Professor Spencer F. Baird, United States Commissioner of Fish and Fisheries, the object had in view being to determine the proper rivers and lakes in which to place different varieties of food-fishes. It is necessary for this purpose to ascertain the extremes and means of the water temperatures in the different localities. This series of reports has now been continued for three years.

The display of bulletins of river reports during the year has been at the following stations: Cairo, Cincinnati, Davenport, Dubuque, Keokuk, La Crosse, Leavenworth, Louisville, Memphis, Nashville, New Orleans, Omaha, Pittsburgh, Shreveport, Saint Louis, Saint Paul, Vicksburg, Yankton, Dak., and Helena, Ark.

The series of reports being the announcement from day to day of such probable approaching changes of temperatures as would be likely to cause the closing of the canals by freezing, or, in other cases, as would open them, were continued during the days of closing canal navigation in the past year. The commerce moving upon the canals, as their closing draws near, is sometimes of greater value than at any other season of the year. The canals are then thronged with hundreds of laden canal-barges, and the market values at the great cities, influenced by the prospect that the merchandise or grain with which they may be laden will reach or fail to reach the points for which it is intended, are received with satisfaction by the commercial associations of the cities, and constitute for the months of November, December, and January, one of the regular issues of the Office. Papers 37 to 39 exhibit specimens of river, special river, water temperature, and canal reports.

The forms of the bulletins published for the use of the farmers and 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, and cannot be changed until long experience has shown it safe to make the changes. The regular printed publications of the Office have been issued during the year as in the year preceding. Copies of these papers, the Office Weekly Weather Chronicle and the Office Monthly Weather Review, sufficiently illustrate their character. (Paper 20 & 21.) The scope of the Review has become extensive, with the increase of the number of reports received, all of which are valuable for reference, and a general study of which enters necessarily into the study for the preparation of each Review.

The three charts which accompany each issue of the Review exhibit

the uses of these data. Each of these charts is to some extent the reduction of data first chronicled on ninety separate study-charts for the month. It will be readily understood how much this constant monthly reduction simplifies the work of generalization for the year. The wide circulation given this Review meets in part the wish for generalizations prepared by this Office, while the receipt of a copy by the hundreds of voluntary observers, now its correspondents, is considered by them at once a sufficient acknowledgment of, and compensation for, their labors. Assistants Abbe, Craig, Dunwoody, and Maury have alternated in the charge of the preparation of these papers and of the charts which accompany them.

The preparation of the matter for the reports, the "synopses, probabilities, and facts," commenced in 1872, has been continued. These volumes 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 based upon the study of each report; the synopses and probabilities on that date issued, with a statement of the facts or meteoric conditions which subsequent reports have shown as actually existing during the time for which each forecast was made. They are useful for purposes of exchange, and constitute a meteoric record, more full, perhaps, than any other now issued. A number of charts have been prepared in the map-room of the Office under charge of Lieutenant Henry Jackson, acting signal-officer and assistant. A series of twelve charts exhibiting, for each month and for each station, the general wind-directions of the winds found in each month and at that station to be most frequently followed by rain, are herewith, (paper 48.) These charts have been prepared by comparing the wind-directions noticed at each station at the hours for the taking of each of the observations made for the daily local and daily simultaneous reports with the weather recorded at that station at the next report. From the detailed information thus obtained the accompanying general charts of winds preceding rain have been constructed. The number of years during which reports have been received from each station are shown by figures. These charts are believed to exhibit approximately those wind-directions which, in each month, are most likely to be followed by rain. Thus, other things being equal, if in any month the wind-direction at any place is found to be within the quadrant inscribed in blue, for that place and for that month, upon the chart, this fact may be considered an indication that rain is more likely to follow at that place within the twelve hours next ensuing than if the wind-direction is found to be from some point not within the quadrant. If, on the other hand, in this month the wind-direction is found at any station to be within the quadrant inscribed in red upon the chart, this fact may be considered an indication that rain is less likely to follow than if the wind is found to be from any point not within this quadrant.

The uses of charts of this character in connection with the tri-daily study-charts of the Office, for the purposes of forecasts, will suggest themselves. It is hoped a wider usefulness may be found for them as aiding in the local studies, such information supplementing that furnished by the reports and in the other daily issues of the Office, will make possible among the farming and other populations.

Thus the regular daily reports of the Office having announced rain as probable for any territorial district, the probability of precipitation to occur at any point within the district will be better judged by the information to be had from the local instrumental indications there,

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when supplemented by a knowledge of the winds more frequently preceding rain at that place and at that season.

Another series of charts exhibits the averaged barometric pressures, as reduced to sea-level and telegraphed to this Office, found to be at each station of report for each month, at each of the hours of tri-daily report, 7.35 a. m., 4.35 p. m., and 11 p. m., Washington mean time.

A certain barometric pressure being found or reported to exist at any place, in any month, at the hours given, it can be known, by reference to the charts of average pressures, whether the pressure noted is above or below the average pressure as reported during the years to which these charts relate, at the place, at the time, and at the season. Papers 47[a] and 47[b] are specimens of these charts for the month of January.

Reference was made in the last annual report of this Office to the wide diffusion given its reports. It was then estimated that by the publications of this Office, which have been heretofore referred to, and specimen copies of which accompany this report; by the signals displayed by day or at night at times of probable danger; by the announcement of probable changes of weather in the synopsis and probabilities 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 this Office was received in some form daily at not less than one-third of all the households of the United States.

There is no reason to imagine that this diffusion has been lessened within the year just past. The effort has been and continues to be to make this information as valuable as possible. The first uses of the studies of the Office and of the data on its files accomplished, the records condensed in the processes of that study furnish, for the more careful study of scientists everywhere, papers equal perhaps in their form and in the regularity of their publication to those issuing from any similar institution in any country.

The work in the instrument and model room, referred to in preceding reports, has been steadily continued. Five hundred and twenty-one meteorological instruments have been carefully compared during the year with the standard instruments in the instrument-room of the Office, and four hundred and fifty have been issued thence after comparison. A model rain-gauge, a model anemoscope, and a model mechanical barometer, all self-registering and arranged upon plans not known to have been before used, have been constructed at the Office, and are now undergoing the usual tests. Several additions have been made to the collection of self-registering instruments of foreign manufacture.

The very valuable collection of instruments now had by the Office has been useful, both by enabling it to be judged what progress has been made in other countries in works of this description, and by suggesting improvements in the construction of the standard self-registering instruments it has been attempted to provide for the United States. The use of the self-registering instruments already distributed to stations has been found to supply many important facts, of which cognizance could not otherwise have been taken.

An essential use of self-registering instruments to a service organized as is that of this Office, is that they will render it possible for the different instruments to be exposed with such similar conditions of level and shelter as will render the readings comparable and correct for any practicable purpose. The purpose of arranging an instrument to be at once simple, strong, and inexpensive, for the use farmers may wish to make of it, and for a general use, in connection with the daily bulletins, has been kept in view. A simple form of hygrodeik, upon the frame of which an aneroid barometer can be mounted, will probably be found best suited for this purpose. The readings of such an instrument, supplemented by some knowledge of local signs and by the information furnished in the bulletin reports of this Office, can hardly fail to enable those who will take the trouble to make them, to profit by a knowledge of coming changes better than they can now have.

The constant and exact work required at the numerous stations now connected with this Office renders it necessary that each station should be frequently and minutely inspected, the books and papers examined and the instruments compared with the standard instruments. Each station ought to be inspected at least once in each period of six months.

Eighty-one stations have been inspected during the fiscal year; ten of these upon the lakes were inspected twice. Lieutenants F. C. Grugan, A. W. Greely, and D. J. Gibbon have been employed upon this duty; the former throughout the entire year; Lieutenant Greely until transferred to other duty, and Lieutenant Gibbon until his relief from signal-duty. Paper S shows the date of each inspection and the names of stations inspected.

The sea-coast service of the signal-service has been before referred to in this report. At the date of the last annual report telegraphic lines on the sea-coast itself, and reaching from Sandy Hook to Cape May, and from Norfolk to Cape Hatteras, had been completed. They have been since in operation.

The extension of the line from Cape Hatteras by Cape Fear to Smithville, at the mouth of the Cape Fear River, is in process of completion.

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 the central office. The lines are manned, maintained, and operated by enlisted men of the signal-service. These 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 the vessels of any nationality. Aside from its uses for meteorological purposes, the service has proven its usefulness during the past year in the cases of a number of disasters to shipping. In several of these it has been considered that very valuable vessels or cargoes were saved to those interested in them by the prompt information given at and by the aid called for from the proper ports or by the rapid communication kept up from the vicinity of the wrecks with those engaged in the saving.

The attention of the honorable Secretary of War was invited to these instances at the time. It has been believed that the values thus saved have been many times greater than the whole cost of the lines.

The sea-coast-service stations in operation have been at Sandy Hook, Long Branch, Squan Beach, Barnegat, Atlantic City, Peck's Beach, and Cape May, N. J., Cape Henry, Va., and Kittyhawk and Cape Hatteras, N. C. The economy of the service can be judged of from the fact that, aside from the pay and allowances of the enlisted men employed upon them, the total cost of the maintenance and repair of the coast-lines for the fiscal year ending June 30, 1875, was at an average cost per mile of $5.50. The intended use of these lines for purposes of instruction and practice has been before referred to. Bvt. Capt. H.W. Howgate, acting signal-officer and assistant, has been in charge of these lines during the greater portion of the period embraced in this report. During the remainder of the period First Lieut. H. H. C. Dunwoody, acting signal-officer and assistant, has been in charge.

By an act of Congress approved March 3, 1873, the duty was imposed upon the Secretary of War of causing to be constructed a military telegraph from San Diego, Cal., via Fort Yuma and Maricopa Wells, to Prescott and Tucson, Ariz. The work of this construction was done under the direction of the Quartermaster's Department. Subsequently an act approved June, 23, 1874, directed the extension of this line from Prescott to Camps Verde and Apache, Arizona, and required certain reports and duties to be under the direction of the Chief Signal-Officer. An act approved June 3, 1874, authorized the Secretary of War to construct a telegraph-line in Texas and the Indian Territory, for the protection of the frontier against Indian and other depredations. On July 30, 1874, orders were issued from the War Department instructing the Chief Signal-Officer to assume charge, subject to the direction of the Secretary of War, of the construction, maintenance, and operation of the different lines provided by these acts. The act approved March 3, 1875, had further reference to these lines. (Paper 30.)

On August 19, 1874, First Lieut. Allyn Capron, acting signal-officer, was assigned to immediate charge of the construction of the lines in Texas and the Indian Territory, assisted by Mr. J. C. Van Duzer, as superintendent of construction. The time until the end of September was occupied by Lieutenant Capron in making the necessary preliminary arrangements for procuring details of men for working parties, transportation for men and material, and for prosecuting the work in his section. The detail of enlisted men and the transportation were to be sought from the department commander. An office was established at Denison, Tex., and that place became the principal depot of supplies for the line. In October a reconnaissance of the route to be followed by the line to Fort Sill, via Fort Richardson, was made by Lieutenant Capron. A detail of one company of troops for construction work, with a limited amount of transportation, was ordered to report to him by the department commander. Contracts were made for poles to be delivered along a part of the route selected.

A detachment of enlisted men of the signal-service practiced in line-building, was ordered from Fort Whipple to report to Lieutenant Capron, and arrived at Denison early in November. The work of construction was actually commenced on the 20th of that month. During the months of December, January, and February, the work was much retarded by the unfavorable state of the weather and the small amount of transportation, together with other embarrassments. Forty miles of line were completed in these months. On April 5, 1875, First Lieut. A. W. Greely, acting signal-officer, who had been detailed for the purpose, assumed charge of the work. During the month of April additional details of enlisted men were furnished by the department

commander, and at the end of that month several parties had been organized and were at work in the field, a few experts of the signal-service serving with each party. During the month of May, parties were employed upon the routes from Fort Richardson to Fort Sill, and from Denison to Fort Richardson. A total length of seventy-five and one-half miles of linewereconstructed in this month. During the month of June parties were employed on the routes from Fort Richardson to Fort Sill, from Denison to Fort Richardson, from Fort Richardson to Fort Griffin, and from San Antonio to Fort Clark. A total length of one hundred and twenty-six and one-eighth miles was constructed in this month. During the month of July parties were employed upon the routes from Fort Richardson to Fort Griffin, from Fort Griffin to Fort Concho, from Brownsville to Ringgold Barracks, and from Ringgold Barracks to Fort McIntosh. A total length of one hundred and eighteen miles of line was constructed in this month. During the month of August parties were employed upon the routes from Brownsville to Ringgold Barracks, from Fort Griffin to Fort Concho, and from San Antonio to Fort Clark. A total length of one hundred and thirty-eight miles of line was constructed in this month. During the month of September parties were employed upon the routes from San Antonio to Fort Clark, from Fort Griffin to Fort Concho, from Fort Concho to Fort McKavett, and from Fort Duncan to Fort Clark. A total length of one hundred miles of line was constructed in this month. The lengths of line completed during the four months named aggregate six hundred miles. Operating stations are located at Denison, Pilot Point, Jacksboro', Cambridge, Fort Sill, Fort Griffin, San Antonio, Fort Clark, Brownsville, Rio Grande City, Uvalde, Castroville, Fort Concho, and Fort McKavett. It is anticipated that by the close of the present year all of the points named in the act of Congress requiring the construction of the line, will be in telegraphic communication by the lines constructed and their connections with the civil lines, with the military headquarters at San Antonio. The officer in charge of these lines has made a general statement of the cost of construction and equipment, as to average one hundred dollars per mile, exclusive of the pay and allowances of the troops employed. They are upon routes considered to be among the most difficult for such constructions in the United States. Lieutenant Greely deserves commendation for the energy with which he has conducted the work.

On August 22, 1874, Second Lieut. Theodore Smith, acting signal-officer, was assigned to the immediate charge of the construction, maintenance, and operation of the lines in Southern California and Arizona. Upon the arrival of this officer at San Diego, Cal., the lines completed in that Territory were transferred to his charge by the Quartermaster's Department. The lines then in operation extended from San Diego to Prescott and Tucson, a distance of five hundred and forty miles, connecting the following-named operating stations: San Diego, Stanwix, Maricopa Wells, Prescott, Tucson, Yuma, Phœnix, and Indian Wells. These stations were in charge of citizen operators. Extensive repairs of the lines were found immediately necessary, as the poles used in the construction were rapidly decaying. During the months of September and October a careful examination of the line was had by Lieutenant Smith, and arrangements were made for the construction of the extension required by law on the route from Prescott to Camp Verde, a distance of forty-five miles. Work was commenced on this section on October 24. On November 9, the line was completed to Camp Verde, and communication was opened to that point. On November 1, the

services of citizen operators were dispensed with at all the stations except San Diego, Prescott, and Tucson. Their places were supplied by enlisted men of the signal-service, who had been sent for this purpose from the school of instruction at Fort Whipple, Va.

On January 15, 1875, the charges on commercial messages passing over these lines were, by authority of the Secretary of War, reduced, and made to conform to the rates fixed by the Postmaster-General, under the act of Congress, approved July 24, 1866. The reduction was large, and the monthly receipts from the line were necessarily affected. The amount of business has, however, been steadily on the increase, and the receipts of the lines are at this date nearly as great as before the reduction. The collection of material for the extension of the lines required by law was commenced in the month of November, 1874. Little progress was made, however, owing to the great distance from which it was necessary to draw supplies. In December, 1874, a reconnaissance of this route was made, and the line was located. The small appropriation made for this work was found wholly insufficient. Work was practically suspended until July, 1875.

In July and August, 1875, two parties were employed on the route from Camp Lowell to Camp Apache. By the act of Congress approved March 3, 1875, the construction of a line from Fort Marcy, (Santa Fé,) New Mexico, to Camp Grant, in Arizona, was authorized. On March 30, 1875, Lieutenant Smith was ordered to assume immediate charge of the construction, maintenance, and operation of this line in addition to his previous duties. On June 2, 1875, Second Lieut. Philip Reade, acting signal-officer, was ordered, by Special Orders No. 108, from the Adjutant-General's Office, to relieve Lieutenant Smith of his duties in connection with the United States telegraph-lines. Lieutenant Reade took formal charge of the same on July 18, 1875. A reconnaissance of the line from Camp Grant to Santa Fé, ordered in April, was delayed by the change of officers. It has, at this date, November 1, 1875, been just completed.

The stations upon the different lines thus above referred to are manned with operators enlisted for the signal-service. No difficulty has been found in enlisting for the work men sufficiently competent, who receive by their different allowances a pay about equal to that formerly had in the signal corps of the Army during the war of the rebellion. The fact that the lines of telegraph can be constructed by the labor of troops through regions of territory in the interior considered as among the most difficult for such constructions, together with the further fact that they can be maintained and operated by similar labor, has been established. In considering the construction and maintenance of these lines by the United States in the interior and through regions where commercial lines cannot be profitably maintained, the measure may be looked upon as one of economy. The cost of sending mounted couriers with necessary messages between military posts or between the posts and the scant settlements along the routes in case of need, will probably more than equal the cost of the work. The lines are everywhere welcomed by the frontier populations through which they pass, and to whom they afford a facility for communication with the more thickly-settled States they had hardly hoped to possess. The connecting civil lines find an increase of their business from their connection with the military lines pushing far into the interior, which they do not fail to appreciate. The receipts for commercial messages transmitted over the lines of the United States make an item of importance in defraying the expense of maintaining them. The benefits to accrue to the regions

through which they pass, to the military service of the United States, and to the country at large are many. Reference to these benefits was made in the last annual report of this Office. The hamlet, settlement, or post upon an established line is no longer isolated. Enterprise is encouraged and safety is assured by the power of summoning aid from near or far, if there should be danger, and by the quick communication with the rest of the world. If, for any reason, it is found not practicable or economical for the interests of the United States to permanently operate these lines, the good ends will not be the less attained. Civil associations will always be ready to operate them if assured of remuneration for the communications the United States is likely to transmit over the wires, together with that to be had from the business of the local populations.

For the meteorological duties of the Signal-Service the lines entering regions never before opened to the proper study disclose a field for research, the value of which, as giving increasing accuracy to the prevision of meteoric changes elsewhere, cannot be too highly estimated. The existence of the lines in the interior of Texas already permit warnings to be exhibited on the coast of that State, where they were before impracticable. The lines penetrating the interior, through New Mexico and Arizona, have added to the record a series of observations which could not be before obtained. The scanty numbers of the Signal-Service will not permit it to occupy lines greater in extent than those already contemplated by existing legislation, without additional details. Its little force, already spread over the great territorial extent of the United States, is everywhere worked to its full capacity.

The circuit telegraphic service of this Office has been during the past year essentially the same in style as for the preceding year. The system of working forms of circuits adopted by the Office has been sufficiently described in preceding reports. The regular reports have been received during the year over the lines of the Western Union, Northwestern, and International Ocean Telegraph Companies, in accordance with the usual plans adopted by the Office for the collection and distribution of reports. A considerable number of messages and reports from centers of distribution, &c., have passed over the lines of the Atlantic and Pacific and Franklin Telegraph Companies. Seven hundred and ninety-one thousand two hundred and twenty-seven cipher-words of weather reports have been received at, and seventy thousand nine hundred and eighty-four words sent from, this Office during the year. Four thousand four hundred and seven telegraphic messages, other than weather reports, but connected with that work, were received, and seven thousand and eighty-five sent, during the same period. There have also been received at this Office eight thousand six hundred and ten cipher-words of special river reports.

The telegraphic business of the Office has been conducted with little difficulty during the year. In December, 1873, the Hon. Reverdy Johnson was commissioned by the Attorney-General as special assistant to the Attorney-General in matters in controversy between the United States and various telegraph companies. The grave questions which had arisen as to the rights of the United States and the duties of the companies in reference to the telegraph service of the United States, submitted for his consideration, have elicited opinions heretofore published, and have led to action, the benefits of which have been felt by the Office. The service has been further and specially benefited by the act of Congress approved June 23, 1874, entitled "An act to protect lines of telegraph constructed or used by the United States, from malici-

ous injury or obstruction." The uses of this act have been prominently exhibited by the protection it has given to the works of telegraphic construction on the Texan frontier and in the interior.

The Chief Signal-Officer has referred in preceding reports to the rapidity of the telegraphic work of this Office, and which the organization of the Office makes possible. This rapidity has been maintained during the year past. In the average time of one hour and sixteen minutes, from the moment at which its observers at stations throughout the great territory the service covers, are required to read simultaneously the different instruments at the different stations, the whole of these readings, covering thus an area almost continental, have been recorded, written, and telegraphed in cipher, and received and registered in this Office. The average time elapsing from the time at which the readings at the stations have been taken at the stations, to that at which the summary reports based upon these data have been issued from the Office, has been one hour and fifty minutes.

Assistant Cleveland Abbe furnishes a continuation of a paper on the auroral display of April 7, 1874—the subject of a preliminary report by this officer which accompanied the last annual report—and also a paper upon seismic observations. (Papers 32 and 33.)

Prof. I. A. Lapham contributes as in previous years a list of disasters upon the lakes. This paper was completed but a few days before his death, and was probably his last official labor. (Paper 34.)

The death of Professor Lapham calls for more than a passing mention. As one of the early practical meteorologists of the United States, his services in connection with this Office in the first days of its present work of storm-warning contributed to its first successes. In later years, and up to the time of his death, they did not cease to be of value.

The tornadoes which, on March 20, 1875, passed over Georgia and the adjoining States were of unusual violence, had courses unusually long, and presented other features of peculiar interest. Sergeant Henry Calver, Signal-Service, U. S. A., was ordered, on March 30, 1875, to the section of country over which they had passed, with instructions to collect such data as would serve for the preparation of a history of their origin, progress, and effects. His report is herewith. (Paper 35.)

A list of such boards of trade, chambers of commerce, and other organizations, apart from those directly connected with agriculture, as have appointed permanent committees to confer with this Office, is given in Paper 11. Paper 9 contain the names of places from which requests have been received for the establishment at them of signal-service stations, but at which stations had not been established on the date of June 30, 1875. Paper 10 exhibits the names of such agricultural societies which, on June 30, 1875, had appointed permanent committees to confer with the Chief Signal-Officer of the Army. Paper 13 exhibits the names of the military posts from which meterological registers are received at this Office.

The Chief Signal-Officer has earnestly represented in preceding reports the need of some permanent organization for the Signal-Service. The acts of Congress, approved June 16, 1874, and March 3, 1875, fixing the permanency of the service, and providing for the non-commissioned officers and the other enlisted men, have been productive of the best results. Provision was not, however, made by these acts for that proper pay the enlisted men of the service ought to receive. It would be difficult to find a body of men finer as a class or more faithful to their duty than those carried on the rolls of the corps. Admitted to the service after passing a thorough examination, and well instructed

before they are permitted to assume the charge of stations, it is right such men should have every encouragement. On any non-commissioned officer of the service rests the immediate care of the station at which he may be, separated sometimes many hundred miles from this Office. Present there, he represents the United States in his duties, with boards of trade, commercial associations, the press, and the large populations the station duties reach. Upon his faithfulness, honesty, sobriety, and good conduct depend the success and reputation of the service. They could not be retained in the service if their scanty remuneration were not eked out by a system of allowances. It was recommended last year, as necessary to retain men of this class, and the recommendation is renewed, that the pay of these men be made equal to that of the most favored enlisted men of the Army.

It seems simple justice that their pay should be at the rates corresponding to those formerly had in the signal corps of the Army. The pay proper of sergeants computed in this manner would be thirty-four dollars per month; that of corporals would be twenty-one dollars; that of first and second-class privates, eighteen dollars and thirteen dollars, respectively.

In the last annual report of the Chief Signal-Officer, a form of organization was recommended for the officers of the service, which was considered in the Military Committee, and was, by their authorization, brought to the notice of the House of Representatives of the United States. The experience of the past year has strengthened the Chief Signal-Officer in the view that the plan of organization then recommended is, with perhaps some slight modification, best suited to provide for the service in its present condition. Without some organization it is exposed to constant embarrassment. It is sometimes impossible to secure either the detail of officers especially desired or to retain those who have proven themselves valuable and suited for its duties.

Often in the case of officers to whom have fallen years of study and practice, in each of which they have improved by experience, and each of which has rendered their skill not only more valuable to this service, but to the great interests which now, throughout the United States, in some degree, depend upon it, a notice of relief comes at the moment the action of Congress or the orders of the Department have burdened the corps with additional duties. Often after months of labor in the cases of newly detailed officers, and after the time of others has been taken to fit them well for the special duty, their interests or the duties of their companies call them away at the moment they have become fitted to take their share in the real labor. The work of the Office is embarrassed as details change. It might be wholly broken up without intention even by a single misconceived order or one drawn in ignorance of the facts. The industries now benefited by this service, the sums which have been expended to secure its success, and the standing it has attained, are such that it ought not to be longer left without the protection of legislative enactment. To fulfill its demands reliably the employment of a selected officer once placed upon this duty and fitted for it ought to be permanent. Provision should be made for such permanent employment of its officers and for their reasonable promotion, for the same reason that it is made in the cases of the officers in every other special service.

The different acts of Congress, which have become statutes with the succeeding years, have seemed to indicate an approval of the work of the Office, and satisfaction with the results of its labors. They have provided all necessary powers to aid it in the prompt discharge of its

duties. To an office charged with such service that its best success depends upon a rapidity of action which may save minutes of time, protection from unnecessary delays cannot be too carefully assured. Lightning and the telegraph give little time for prolonged formalities. If a line is down, there must be the power to repair it immediately. Warnings to keep in advance of a storm must not be cumbered with slow processes. The prevision of the Secretary of War has hitherto guarded the service from many dangers. It is hoped that the plans under which it has been so long conducted, and with good results, will not change.

The Chief Signal-Officer finds, as he reviews the results of the year, causes for encouragement. The question of the useful pre-announcement of approaching meteoric changes may be considered as determined by now five years of successful service. With each year of labor the paths for improvement open more plainly. What was conjecture becomes certainty. The co-operation of scientists is assured, both at home and abroad. The uses of the work accomplished, the results to be hoped from in the future, have been well appreciated. The popular support and the support of the press have not failed. Legislation has been favorable. The opportunities for rendering a public good have opened wide to the service. The effort must be to use them wisely.

ALBERT J. MYER,
Brig. Gen., (Bvt. Assgd.,) Chief Signal-Officer, U. S. A.

Hon. WILLIAM W. BELKNAP,
Secretary of War.

PAPER 1.

RECORD OF SIGNAL-CAMP OF INSTRUCTION, FORT WHIPPLE, VA.

Officers instructed during the year ending June 30, 1875.

Name.	Rank and corps.	Reported for instruction.	Relieved from instruction.	Remarks.
Philip Reade	Second lieutenant Third Infantry.	Jan. 12, 1875	May 29, 1875	Completed full course of signaling, telegraphy, and meteorology.
S. C. Vedder	Second lieutenant Nineteenth Infantry.	Mar. 3, 1875	.....	Still under instruction.
C. S. Heintzelman	First lieutenant Third Artillery.	May 5, 1875	.....	Still under instruction.
H. A. Reed	Second lieutenant Second Artillery.	May 21, 1875	.....	Still under instruction; promoted to first lieutenant.
J. A. Buchanan	First lieutenant Fourteenth Infantry.	June 1, 1875	.....	Still under instruction.
James Allen	Second lieutenant Third Cavalry.	June 8, 1875	.....	Still under instruction.
Allan H. Jackson	First lieutenant Seventh Infantry.	June 17, 1875	.....	Still under instruction.

PAPER 2.

Amount of field-practice had by each officer.

Name.	Rank and corps.	Number of days flag-practice was had.	Number of nights torch-practice was had.	Remarks.
Philip Reade	Second lieutenant Third Infantry.	10	5	Field-practice in general-service code was omitted, as Lieutenant Reade was competent in that portion of the course.
S. C. Vedder	Second lieutenant Nineteenth Infantry.	21	8	Still under instruction.
C. S. Heintzelman	First lieutenant Third Artillery.	11	3	Still under instruction.
H. A. Reed	Second lieutenant Second Artillery.	11	3	Still under instruction.

PAPER 3.

Table showing the instruction of candidates for the grade of sergeant from July 1, 1874, to June 30, 1875.

Name.	Instruction commenced.	Date of promotion.	Remarks.
Edward D. Holbrook	Feb. 24, 1874	Aug. 8, 1874	In charge of station at Long Branch, N. J.
James H. Smith, (2d)	Apr. 25, 1874	Aug. 22, 1874	In charge of station at Bismarck, Dak.
Edward W. Boutelle	May 7, 1874	July 27, 1874	On telegraph-construction duty at Show Low station, Ariz.
Milton M. Lewis	Apr. 26, 1874	.....	Discharged July 13, 1874.
William J. Evans	May 19, 1874	.....	Promoted corporal September 21, 1874; in charge of station at Montgomery, Ala.
William D. McChesney	May 21, 1874	Aug. 22, 1874	In charge of station at Corsicana, Tex.
Edward Moran	May 27, 1874	.....	Discharged July 3, 1874.
Michael L. Landers	June 1, 1874	Aug. 22, 1874	In charge of station at Dodge City, Kans.
John G. Lynch	July 29, 1874	Oct. 29, 1874	In charge of station at La Crosse, Wis.
Jacob M. Frantz	Aug. 1, 1874	Dec. 1, 1874	In charge of station at Grand Haven, Mich.
Jerome J. Weinberg	Aug. 17, 1874	Oct. 29, 1874	In charge of station at Shreveport, La.
John C. Senger	Aug. 17, 1874	.....	Discharged October 16, 1874.
Robert B. Watkins	Aug. 19, 1874	Oct. 30, 1874	In charge of station at Virginia City, Mont.
Charles A. Smith	Aug. 19, 1874	Oct. 29, 1874	In charge of station at Indianola, Tex.
Dwight D. Stansell	Aug. 28, 1874	Dec. 1, 1874	In charge of station at Kittyhawk, N. C.
James T. Minchin	Sept. 3, 1874	Dec. 1, 1874	In charge of station at Saint Mark's, Fla.

Table showing the instruction of candidates for the grade of sergeant, &c.—Continued.

Name.	Instruction commenced.	Date of promotion.	Remarks.
Charles M. Hobbs	Sept. 14, 1874	Dec. 1, 1874	In charge of station at Philadelphia, Pa.
John V. Brown	Sept. 16, 1874	Dec. 1, 1874	In charge of station at Pike's Peak, Colo.
Cyrus Cramer	Sept. 17, 1874	Dec. 1, 1874	In charge of station at Atlantic City, N. J.
Charles Dill	Sept. 18, 1874	Dec. 1, 1874	In charge of station at Pembina, Dak.
William H. Ray	Oct. 2, 1874	Feb. 11, 1875	In charge of station at Barnegat, N. J.
Joseph E. Mayhew	Oct. 30, 1874	.....	Dropped from instruction; now on duty as assistant at Punta Rasa, Fla.
John Kabernagle	Nov. 3, 1874	Feb. 11, 1875	In charge of station at Baltimore, Md.
Ira W. Birt	Nov. 5, 1874	.....	Failed to pass examination: now on duty as assistant at New Orleans, La.
Robert Reeder	Nov. 6, 1874	Feb. 11, 1875	In charge of station at Galveston, Tex.
John C. Hanscom	Dec. 29, 1874	.....	Dropped from instruction; now on duty as assistant at New York City, N. Y.
John McCann	Feb. 1, 1875	May 6, 1875	Temporarily in charge of station at New London, Conn.
Hermann Voss	Feb. 13, 1875	May 7, 1875	On telegraph-construction duty at Camp Lowell, Ariz.
Samuel W. Naylor	Feb. 15, 1875	May 7, 1875	In charge of station at Escanaba, Mich.
Eugene E. Clements	Feb. 16, 1875	June 11, 1875	Temporarily in charge of station at Kittyhawk, N. C.
William Baber	Feb. 15, 1875	May 7, 1875	In charge of station at Alpena, Mich.
Isaac R. Birt	Feb. 20, 1875	May 7, 1875	On duty as telegraph-operator at Brackettville, Tex.
Pierson R. Murphey	Feb. 23, 1875	.....	Still under instruction.
Theodore V. Van Heusen	Feb. 26, 1875	June 11, 1875	Temporarily in charge of station at Vicksburg, Miss.
Isaac A. Reed	Feb. 26, 1875	June 11, 1875	On duty as assistant at Chicago, Ill.
Edward F. Brady	Feb. 28, 1875	June 11, 1875	Awaiting orders at Fort Whipple, Va.
George Feller	Mar. 11, 1875	June 16, 1875	Awaiting orders at Fort Whipple, Va.
Christopher J. Costello	Mar. 13, 1875	.....	Still under instruction.
Lucius A. Welsh	Mar. 16, 1875	June 16, 1875	Awaiting orders at Fort Whipple, Va.
Lemuel H. Foster	Mar. 24, 1875	June 16, 1875	
Penton Belville	Apr. 17, 1875	.....	Still under instruction.
Richard O. Trent	Apr. 22, 1875	.....	Still under instruction.

PAPER 4.

Enlisted men instructed for the position of assistant to non-commissioned officers in charge of stations from July 1, 1874, to June 30, 1875.

Names.	Placed under instruction for assistant.	Reported qualified as assistant.	Ordered on station.	Remarks.
John J. Buckley	June 6, 1874	.....	July 14, 1874	On duty with telegraph detachment in Texas.
Isaac Menah	June 6, 1874	July 25, 1874	.....	Discharged the service of the United States December 1, 1874.
Edward H. Woods	June 9, 1874	Aug. 1, 1874	Aug. 8, 1874	On duty as assistant at Vicksburg, Miss.
Richard J. Lewis	June 18, 1874	July 25, 1874	July 27, 1874	On duty as assistant at Saint Louis, Mo.
Llewellyn C. Stanford	June 26, 1874	July 25, 1874	.....	Discharged the service of the United States April 1, 1875.
Charles W. Roby	July 1, 1874	July 25, 1874	July 27, 1874	On duty as assistant at Albany, N. Y.
John T. O'Keefe	July 1, 1874	Aug. 1, 1874	Aug. 1, 1874	On duty as assistant at Pike's Peak, Colo.
Charles J. King	July 16, 1874	.....	Sept. 3, 1874	On duty as assistant at Mount Washington, N. H.
Robert T. Porter	July 16, 1874	Aug. 15, 1874	Aug. 19, 1874	On duty as assistant at Savannah, Ga.
Harry Hall	July 16, 1874	Aug. 8, 1874	Aug. 11, 1874	On duty as assistant at Mobile, Ala.
John C. Rogers	July 16, 1874	Aug. 15, 1874	Aug. 21, 1874	On duty as assistant at Louisville, Ky.
Thomas Gibson	July 16, 1874	Aug. 8, 1874	Aug. 11, 1874	On duty as assistant at Wilmington, N. C.
Herbert S. Foster	July 16, 1874	Sept. 5, 1874	Sept. 12, 1874	On duty as assistant at Albany, N. Y.
Ignatius V. Wallace	July 16, 1874	Aug. 8, 1874	Aug. 11, 1874	On duty as assistant at Cincinnati, Ohio.
Clinton C. Norris	July 16, 1874	Aug. 22, 1874	Aug. 26, 1874	Discharged the service of the United States February 1, 1875.

Enlisted men instructed for the position of assistant, &c.—Continued.

Names.	Placed under instruction for assistant.	Reported qualified as assistant.	Ordered on station.	Remarks.
Theodore V. Van Heusen	July 16, 1874	Aug. 8, 1874	Aug. 11, 1874	Ordered to Fort Whipple, Va., for promotion.
John W. Wildman	July 18, 1874	Aug. 22, 1874	Aug. 26, 1874	Deserted while on duty as assistant at New London, Conn.
Edward T. Upperman	July 16, 1874	Aug. 8, 1874	Aug. 13, 1874	Ordered to Fort Whipple, Va., for misconduct.
Richard N. Eastlack	July 16, 1874	.....	.....	Discharged the service of the United States June 6. 1875.
William Sholl	July 22, 1874	Sept. 19, 1874	Sept. 21, 1874	Ordered to Fort Whipple, Va., for misconduct.
Richard O. Trent	July 22, 1874	Aug. 22, 1874	Aug. 25, 1874	Ordered to Fort Whipple, Va., for promotion.
Joseph W. Buck	July 23, 1874	Sept. 26, 1874	Oct. 9, 1874	On duty as assistant at Bangor, Me.
John Hart	July 24, 1874	Sept. 5, 1874	.....	On duty at Office of the Chief Signal-Officer.
John T. Cochran	July 24, 1874	Aug. 22, 1874	Aug. 26, 1874	On duty as assistant at Salt Lake City, Utah.
John M. Clifford	July 24, 1874	Sept. 26, 1874	Oct. 7, 1874	On duty as assistant at Chicago, Ill.
Edward B. Garriott	July 24, 1874	Aug. 29, 1874	Sept. 3, 1874	On duty as assistant at Portland, Me.
William H. Knight	July 24, 1874	Aug. 22, 1874	Aug. 26, 1874	On duty as assistant at Detroit, Mich.
Martin Hoover	July 29, 1874	Sept. 26, 1874	Oct. 8, 1874	On duty as assistant at Norfolk, Va.
John J. Tuttle	Aug. 1, 1874	Sept. 12, 1874	Sept. 12, 1874	Ordered to Fort Whipple, Va., for misconduct.
Henry L. Boyce	Aug. 1, 1874	Sept. 12, 1874	Sept. 16, 1874	On duty as assistant at Port Huron, Mich.
William H. Agey	Aug. 1, 1874	Sept. 19, 1874	Sept. 21, 1874	On duty as assistant at Philadelphia, Pa.
Frank B. Woodbury	Aug. 1, 1874	Sept. 12, 1874	Sept. 12, 1874	Ordered to Fort Whipple, Va., for misconduct.
Harry F. McFarland	Aug. 4, 1874	Oct. 10, 1874	Oct. 20, 1874	Do.
Oliver H. Lowrey	Aug. 5, 1874	.....	Oct. 30, 1874	On duty as assistant at Baltimore, Md.
Henry H. Hull	Aug. 8, 1874	.....	Oct. 16, 1874	On duty as telegraph operator at Phœnix, Ariz.
George W. Kelsey	Aug. 12, 1874	.....	Oct. 22, 1874	On duty as assistant at Chicago, Ill.
Michael McGauran	Aug. 12, 1874	Oct. 10, 1874	Oct. 22, 1874	On duty as assistant at Boston, Mass.
John W. Smith	Aug. 17, 1874	.....	Oct. 22, 1874	On duty as assistant at Memphis, Tenn.
Edmund Davis	Aug. 21, 1874	.....	Sept. 3, 1874	In charge of station at Thatcher's Island, Mass.
John McGlone	Aug. 17, 1874	Oct. 10, 1874	Oct. 16, 1874	On duty as assistant at Baltimore, Md.
Orin Parker	Aug. 21, 1874	.....	Oct. 22, 1874	On duty as assistant at Montgomery, Ala.
John W. Case	Aug. 22, 1874	Nov. 11, 1874	Dec. 30, 1874	On duty as assistant at Cape Henry, Va.
John C. Rickli	Aug. 22, 1874	.....	Oct. 31, 1874	On duty with detachment in Texas.
Henry Blair	Aug. 29, 1874	Nov. 28, 1874	Jan. 18, 1875	Discharged the service of the United States April 17, 1875.
James J. Fitzgerald	Sept. 5, 1874	Dec. 8, 1874	Jan. 4, 1875	On duty as assistant at Erie, Pa.
Frederick J. Papst	Sept. 5, 1874	.....	Jan. 5, 1875	On duty as assistant at Knoxville, Tenn.
James F. Burke	Sept. 7, 1874	Nov. 6, 1874	Dec. 28, 1874	On duty as assistant at Augusta, Ga.
William H. Sayers	Sept. 15, 1874	Dec. 13, 1874	Dec. 30, 1874	On duty as assistant at Colorado Springs, Colo.
Thomas B. Bowlus	Sept. 15, 1874	Dec. 26, 1874	Jan. 4, 1875	On duty as assistant at Pike's Peak, Col.
James H. Crowley	Sept. 15, 1874	.....	.....	Dropped from instruction.
Edward F. Kubol	Sept. 15, 1874	Dec. 13, 1874	Dec. 28, 1874	On duty as assistant at Milwaukee, Wis.
Joseph B. Chapman	Oct. 10, 1874	Nov. 14, 1874	Dec. 29, 1874	Ordered to Fort Whipple, Va., for misconduct.
George D. Boutcher	Oct. 5, 1874	.....	Dec. 31, 1874	On duty as assistant at Buffalo, N. Y.
Martin Ryan	Oct. 15, 1874	.....	.....	On duty at Fort Whipple, Va.
Felix Myers	Nov. 6, 1874	.....	Jan. 12, 1875	On duty as assistant at Sandy Hook, N. J.
Pembroke M. Wilson	Nov. 29, 1874	.....	Jan. 5, 1875	On duty as assistant at Barnegat, N. J.
Reinhold F. de Grain	Dec. 28, 1874	.....	.....	On duty at Office of the Chief Signal-Officer.

Enlisted men instructed for the position of assistant, &c.—Continued.

Names.	Placed under instruction for assistant.	Reported qualified as assistant.	Ordered on station.	Remarks.
Dudley Brooks	Jan. 2, 1875	Jan. 30, 1875	Feb. 2, 1875	On duty as assistant at Charleston, S. C.
John B. Merrill	Jan. 2, 1875	.....	Jan. 21, 1875	On duty as assistant at Wilmington, N. C.
Luther M. Dey	Jan. 23, 1875	.....	Feb. 2, 1875	On duty as assistant at Buffalo, N. Y.
George V. Phillips	Feb. 2, 1875	.....	Feb. 15, 1875	On duty as assistant at Pittsburgh, Pa.
James C. Franklin	Feb. 4, 1875	.....	Feb. 16, 1875	On duty as assistant at Philadelphia, Pa.
George W. Hay	Feb. 4, 1875	Mar. 6, 1875	Mar. 12, 1875	On duty as assistant at Augusta, Ga.
William A. Massey	Feb. 4, 1875	Mar. 6, 1875	Mar. 16, 1875	On duty as assistant at Saint Louis, Mo.
Edmond Quann	Feb. 5, 1875	Mar. 6, 1875	Mar. 18, 1875	On duty as assistant at Omaha, Neb.
Nicholas G. Brewer	Feb. 25, 1875	Mar. 27, 1875	Apr. 6, 1875	On duty as assistant at Norfolk, Va.
William Dowes	Feb. 27, 1875	.....	Mar. 25, 1875	On duty as assistant at Indianapolis, Ind.
Frank Foster	Mar. 10, 1875	.....	Apr. 21, 1875	On duty as assistant at Toledo, Ohio.
George E. King	Mar. 10, 1875	.....	Apr. 7, 1875	On duty as assistant at Squan Beach, N. J.
Daniel F. Dulany	Mar. 31, 1875	May 22, 1875	.....	Awaiting orders at Fort Whipple, Va.
William E. Schneider	Apr. 3, 1875	.....	May 19, 1875	On duty as assistant at Shreveport, La.
Frank R. Clark	Apr. 17, 1875	June 12, 1875	June 29, 1875	On duty as assistant at Philadelphia, Pa.
Herman J. Schultheis, jr.	Apr. 17, 1875	June 12, 1875	.....	Awaiting orders at Fort Whipple, Va.
James Cassidy	Apr. 28, 1875	June 12, 1875	June 21, 1875	On duty as assistant at Milwaukee, Wis.
Francis Pierce	May 20, 1875	.....	.....	Still under instruction.
Thomas H. Breen	May 20, 1875	.....	.....	On duty at Office of the Chief Signal-Officer.
Edward Mayne	June 18, 1875	.....	.....	Still under instruction.
Denis Moore	June 21, 1875	.....	.....	Do.
Thomas Burke	June 21, 1875	.....	.....	Do.
Edwin L. Robison	June 21, 1875	.....	.....	Do.

PAPER 5.

Exhibiting the communications sent from and received at the Office of the Chief Signal-Officer, (exclusive of telegrams,) from July 1, 1874, to June 30, 1875.

SENT.

Division of telegrams and reports for the benefit of commerce and agriculture.

To heads of Departments and Bureaus	129
To non-commissioned officers in charge of stations, in reference to their duties	15,505
In reply to applications for stations, and others similar	48
To telegraph companies, in reference to transmission of weather reports and the erection of telegraph-lines, &c	193
To boards of trade, chambers of commerce, agricultural societies, &c.	398
To postmasters, in reference to weather bulletins	2,467
To foreign correspondents, relating to this division in general	110
To foreign correspondents, relating to synchronous reports	87
To volunteer observers throughout the United States	495
General and special orders, and circulars with reference to this division	11,562
Miscellaneous	799
Total	31,793

Signal division.

To heads of Departments and Bureaus	201	
Relating to duties and discipline at signal-service school of instruction and post of Fort Whipple, Virginia	945	
Relating to recruiting and enlistment	208	
Answers to applications for enlistment in the signal-service United States Army	786	
General and special orders, and circulars with reference to this division	933	
Miscellaneous	673	
Total		3,746

Property division.

To heads of Departments and Bureaus	434	
To manufacturers and others, in reference to instruments, equipments, &c	1,040	
To non-commissioned officers in charge of stations, and other enlisted men, in reference to property and money accounts	12,295	
In reference to quarterly returns of officers	3,673	
Miscellaneous	5,212	
Total		22,654
Aggregate		58,193

RECEIVED.

Division of telegrams and reports for the benefit of commerce and agriculture.

From heads of Departments and Bureaus	153	
Applications for establishment of new stations	41	
From telegraph companies, in reference to transmission of weather reports and the construction of telegraph-lines, &c	367	
From non-commissioned officers in charge of stations, in reference to their duties	12,322	
From boards of trade, chambers of commerce, and agricultural societies	137	
From foreign correspondents, relating to this division in general	281	
From foreign correspondents, relating to synchronous weather reports	3,130	
From volunteer observers throughout the United States, relating to observations and reports	7,479	
Reports relative to instruction of non-commissioned officers and assistants	3,816	
Mailed reports from non-commissioned officers in charge of stations	308,109	
Meteorological charts, abstracts of journals, forms, &c., received from non-commissioned officers in charge of stations	35,308	
Reports from postmasters throughout the United States, in reference to weather bulletins received and posted by them	381,348	
Miscellaneous	3,630	
Total		756,121

Signal division.

From heads of Departments and Bureaus	225	
Relating to duties and discipline at signal-service school of instruction and post of Fort Whipple, Virginia	916	
Relating to instruction in signaling at Fort Whipple, Virginia, and in different military departments	419	
Relating to recruiting and enlistment	580	
Applications for enlistment in the signal-service, United States Army	683	
Miscellaneous	975	
Total		3,798

Property division.

From heads of Departments and Bureaus	785	
From manufacturers and others, relating to instruments, equipments, &c	510	
From officers, concerning property, quarterly returns, &c	1,983	
From non-commissioned officers in charge of stations, and other enlisted men, relating to property and money accounts	36,137	
Regarding property transferred to stations	2,406	
Miscellaneous	7,125	
Total		48,946
Aggregate		808,865
Aggregate sent		58,193
Aggregate received		808,865
Aggregate sent and received		867,058

Table showing the number of cipher-words and messages sent and received by telegraph at the central office, Washington, D. C., from July 1, 1874, to June 30, 1875, inclusive.

Cipher-words of weather reports sent	70,984
Telegraphic messages, other than weather reports, sent	7,085
Cipher-words of weather reports received	791,227
Cipher-words of special river reports received	8,610
Telegraphic messages, other than weather reports, received	4 407

PAPER 6.

AN ACT making appropriations for the support of the Army for the fiscal year ending June thirtieth, eighteen hundred and seventy-six, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and the same are hereby, appropriated, out of any money in the Treasury not otherwise appropriated, for the support of the Army for the year ending June thirtieth, eighteen hundred and seventy-six, as follows:

* * * * * * *

For expenses of recruiting and transportation of recruits, one hundred and five thousand dollars. And no money appropriated by this act shall be paid for recruiting the Army beyond the number of twenty-five thousand enlisted men, including Indian scouts and hospital-stewards. Nothing, however, in this act shall be construed to prevent enlistments for the Signal-Service, which shall hereafter be maintained as now organized, and with the force of enlisted men now provided by law.

* * * * * * *

For expenses of the Signal-Service of the Army, purchase, equipment, and repair of electric field-telegraphs and signal-equipments, twelve thousand five hundred dollars.

* * * * * * *

Approved March 3, 1875. [Statutes, vol. 18, p. 452.]

[Executive Document No. 5, Forty-third Congress, second session.]

Estimates of appropriations required for the service of the fiscal year ending June 30, 1876, (p. 57–58,) under the War Department.

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PAY DEPARTMENT.

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General object (title of appropriation) and details and explanations.	Date of acts or treaties providing for the expenditure.	References to the Statutes at Large.			Estimated am't required for each detailed object of expenditure.
		Vol.	Page.	Sec.	
SIGNAL CORPS.					
1 colonel	July 28, 1866	14	335	22	$3,500 00
150 sergeants	Feb. 9, 1870	16	369	1	30,600 00
30 corporals	June 10, 1872	17	366	1	5,400 00
270 privates	June 16, 1874	18	72	1	42,120 00

PAPER 7.

List of foreign publications received during the fiscal year ended June 30, 1875.

Nederlandsch meteorologisch jaarboek voor 1872–1873. Uitgegeven door het Koninklijk nederlandsch meteorologisch institut. Vier en twintigste Jaargang. Erste deel. Waarnemingen in Nederland. Utrecht, 1872–73.

Repertorium für Meteorologie. Herausgegeben von der kaiserlichen Akademie der Wissenschaften. Redigirt von Dr. Heinrich Wild. Band 3. St. Petersburg, 1874.

Annalen des physikalischen Centralobservatoriums. Herausgegeben von H. Wild. Jahrgang, 1872. St. Petersburg, 1873.

Jahresbericht des physikalischen Centralobservatoriums für 1871 und 1872, der Akademie abgestattet von H. Wild. St. Petersburg, 1873.

Studien über meteorologische Instrumente und Beobachtungs-Methoden. Ueber die Bestimmung des Luftdrucks. Von H. Wild. St. Petersburg, 1874.

Mittheilungen aus dem Gebiete des Seewesens. Herausgegeben vom k. k. hydrographischen Amte, Marine-Bibliothek. Vol. I. Pola, 1873.

4. Jahresbericht der meteorologischen Centralstation Carlsruhe über die Ergebnisse der an den meteorologischen Stationen des Grossherzogthums Baden im Jahre 1872 angestellten Beobachtungen. Bearbeitet von Dr. Lübek. Karlsruhe, 1873.

1. und 2. Jahresbericht für das meteorologische Jahr 1869 und 1870, enthaltend die Ergebnisse der meteorologischen Beobachtungen der badischen Stationen. Bearbeitet von Dr. F. Weber.

Ueber einen einfachen Verdunstungsmesser für Sommer und Winter. Von H. Wild. ½. Feb. 1874.

Luftens Temperatur i og uden for Christiania samt dens Forandring med Hojden Sammesteds. Af H. Mohn. Christiania, 1874.

Ponts et chaussées. Service hydrométrique du bassin de la Seine. Résumé des observations centralisées pendant les années 1871 et 1872, par M. G. Lemoine, sous la direction de M. E. Belgrand, et observations sur les cours de l'eau et la pluie centralisées pendant l'année 1872, par M. Belgrand et M. G. Lemoine. Versailles, 1873.

Quarterly weather reports of the Meteorological Office, London. July to September, 1871; July to September, 1872; October to December, 1872; January to March, 1873. Daily weather bulletins, July, 1872, to June, 1873. 2 vols.

Third report of the Meteorological Office of the Dominion of Canada, for the fiscal year ended 30th June, 1873. By G. T. Kingston, M. A., superintendent.

Geological survey of Newfoundland. By A. Murray. Report of progress for the year 1873.

Magnetische und meteorologische Beobachtungen an der k. k. Sternwarte zu Prag im Jahre 1872. Auf öffentliche Kosten herausgegeben von Carl Hornstein. Prag, 1873.

Notice sur le service météorologique aux États-Unis. Par M. Malezieux. Paris, 1873.

Bericht über Wetter-Telegraphie und Sturmwarnungen. Abgestattet an den meteorologischen Congress in Wien von dem dafür auf der Leipziger Conferenz ernannten Comité. Redigirt von Dr. G. v. Boguslawski.

An attempt to establish relation between the velocity of wind and its force. By Robt. H. Scott.

Report on weather telegraphy and storm warnings. Presented to the Meteorological Congress at Vienna by a committee appointed at the Leipzig conference. Published by the authority of the Meteorological Committee. London, 1874.

Charter and bye-laws of the Meteorological Society, London. Established 1850; incorporated 1866.

Studii intorno ai diametri solari del P. Paolo Rosa, della Compagnia di Gesù, assistente all' Osservatorio pontificio del Collegio Romano. Roma, 1874.

Report of the Meteorological Reporter to the Government of Bengal. Meteorological abstract for the year 1873. By H. F. Blanford.

Observaciones magneticas y meteorologicas del Colegio de Belen de la Compañia de Jesus en la Habana. Año meteorologico de 1872. Habana, 1874.

Studien über meteorologische Instrumente und Beobachtungsmethoden. 3. Bestimmung der Anemometer-Constanten. Von F. Dohrandt, der Akademie vorgelegt am 23. April 1874.

Il periodo undecennale delle variazioni diurne del magnetismo terrestre, considerato in relazione colla frequenza delle macchie solari, resultati di 38 anni di osservazioni fatte a Milano (1836-1873) per G. V. Schiaparelli.

Jahrbücher der kön.-ung. Central-Anstalt für Meteorologie und Erdmagnetismus. Von Dr. Guido Schenzl. 11. Band. Jahrgang 1872. Budapest, 1874.

Separat-Abdruck aus der Zeitschrift für Mathematik und Physik, herausgegeben von O. Schlömilch, E. Kahl und M. Cantor. Leipzig.

Die historische Abtheilung der deutschen Telegraphen-Anstellung zu Wien, 1873. Von Prof. Dr. Eduard Zetzsche in Chemnitz.

Proceedings of the Belfast Natural History and Philosophical Society for the sessions 1872-73 and 1873-74.

Stonyhurst College Observatory. Results of meteorological and magnetical observations for 1873 and 1874.

Bulletin météorologique du département des Pyrénées-orientales. Publié sous les auspices du département et de la ville de Perpignan. Année 1873.

Cartes synoptiques journalières. Construites par N. Hoffmeyer, directeur de l'Institut météorologique danois. December, 1873, to July, 1874.

Norsk meteorologisk Aarbog for 1872-1873. Udgivet af det meteorologiske Institut. Christiania, 1873-74.

Jaettegryder og gamle Strandlinier i fast Klippe af S. A. Sexe, med traesnit (Universitetsprogram for förste Semester 1874). Christiania, 1874.

Comptes-rendus des séances de la Société entomologique de Belgique. Année 1873.

I. Witterungsbericht für 1872. II. Zusammenstellung der Beobachtungsresultate der württemb. meteorologischen Stationen für das Jahr 1872. III. Die Bewegung des Bodensees im Jahre 1872. Von Prof. Dr. Schoder.

Zur Meteorologie. Mittlere Bewölkung zu Stuttgart, berechnet aus den 45-jährigen Beobachtungen von 1826 bis 1870. Von Prof. Dr. Schoder.

Die Aufgaben des königlichen statistisch-topographischen Bureau. Ein Vortrag in der Sitzung vom 21. März 1874, erstattet durch Oberfinanzrath von Riecke. Stuttgart, 1874.

Schweizerische meteorologische Beobachtungen. Herausgegeben von der meteorologischen Centralanstaltder schweizerischen naturforschenden Gesellschaft unter Direktion von Prof. Dr. Rudolf Wolf. Vom ersten Jahrgang 1864 to neunter Jahrgang 1872 und Dec. 1872 to Sep. 1873.

Results of observations in meteorology, terrestrial magnetism, etc., etc., taken at the Melbourne observatory during the year 1872, under the superintendence of Robert L. J. Ellery, government astronomer. (Vol. 1.)

Service météorologique de l'Algerie. Bulletin mensuel, publié sous les auspices de M. le général Chauzy, gouverneur général. Première année. December, 1873, to December, 1874.

Amphiorama, ou la vue du monde des montagnes de la Spezia. Phénomène inconnu pour la première fois observé et décrit par F. W. C. Trafford. Zurich, 1874.

Theorie der Planetenvorübergänge vor der Sonnenscheibe. Von Dr. Karl Friesach. Leipzig, 1874.

Résumé météorologique de l'année 1873 pour Genève et le grand Saint-Bernard. Par E. Plantamour. Genève, 1874.

Atlas météorologique de l'observatoire de Paris, années 1869, 1870 et 1871. Paris, 1874.

Monatliche Berichte über die Resultate aus den meteorologischen Beobachtungen angestellt an den königlich-sächsischen Stationen im Jahre 1873-1874. Von Dr. C. Bruhns, Dresden, 1874-75.

Quarterly weather reports of the Meteorological Office, London. Part 4, October to December, 1871; parts 2 and 3, April to September, 1873; and part 4, October to December, 1873. Daily weather reports, July, 1873, to December, 1874.

Charts of meteorological data for square 3, lat. 0° to 10° N., long. 20° to 30° W. With remarks by Hydrographic Office, London.

Report of the Kew Committee, for the year ending October 31, 1874.

Öfversigt af Finska Vetenskaps-Societetens Förhandlinger. Vols. 14, 15, 16. 1871-74

Observations faites à l'Observatoire magnétique et météorologique de Helsingfors Vol. 5.

Jahresbericht der meteorologischen Centralstation Carlsruhe über die Ergebnisse der an den meteorologischen Stationen des Grossherzogthums Baden im Jahre 1873, angestellten Beobachtungen. Bearbeitet von Dr. Lübeck.

Magnetische und meteorologische Beobachtungen an der k. k. Sternwarte zu Prag im Jahre 1873. Von Carl Hornstein.

Meteorologia Italiana. Riassunto delle osservazioni fatte nel settennio 1866-72 e relative deduzioni.

Instructions for meteorological telegraphy, issued under the authority of the Meteorological Committee, drawn up in accordance with the international code adopted at Utrecht September, 1874. (Official, No. 2.)

Hourly readings from the self-recording instruments at the seven observatories, in connection with the Meteorological Office, London. Issued by authority of the Meteorological Committee, June, 1874, to March, 1875, inclusive.

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Transactions of the Imperial Botanical Society of St. Petersburg. Tome 3, part 1. St. Petersburg, 1874.

Siebenter Jahres-Bericht der deutschen Seewarte für das Jahr 1874, erstattet von, W. von Freeden. Hamburg.

Essai sur les courants supérieurs de l'atmosphère dans leur relation aux lignes isobarométriques. Par H. Hildebrand Hildebrandsson.

Astronomical, magnetical, and meteorological observations, made at the Royal Observatory, Greenwich, in the year 1872, under the direction of Geo. Biddell Airy. London, 1874.

Results of the astronomical observations made at the Royal Observatory, Greenwich 1872. (Extracted from the Greenwich Observations, 1872.)

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Protokolle der Verhandlungen des permanenten Comité's eingesetzt von dem ersten Meteorologen-Congress in Wien, 1873. Sitzungen in Wien und Utrecht, 1873 und 1874. Leipzig.

Note sur la température de l'hiver de 1874-75. Par M. E. Quetelet.

Ueber die Wasserabnahme in den Quellen, Flüssen und Strömen bei gleichzeitiger Steigerung der Hochwasser in den Culturländern. Von Gustav Wex. Wien, 1873.

Bericht der zur Begutachtung der Abhandlung des Herrn Hofrathes G. Wex, über die Wasserabnahme in den Quellen und Strömen eingesetzten Commission. (Vorgelegt in der Sitzung am 23. April 1874.)

Witterungsbericht für 1873, nach den Beobachtungen der württemb.-meteorologischen Stationen zusammengestellt. Von Dr. Schoder.

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Osservatorio di Moncalieri. Il congresso internazionale dei meteorologisti riunito a Vienna dal 2 al 16 Settembre 1873. Relazione del P. Francesco Denza. Torino, 1874.

Osservazioni delle meteore luminose nel 1874–1875. Anno v. Del G. V. Schiaparelli et P. F. Denza.

Riassunto delle osservazioni meteoriche eseguite nelle stazioni presso alle Alpi Italiane nell'anno 1872-73. Raccolte sotto la direzione del P. F. Denza.

Sulla distribuzione della pioggia in Italia nell'anno meteorico 1871–72. Memoria del P. F. Denza.

Osservazioni della declinazione magnetica fatte ad Aosta, Moncalieri e Firenze in occasione dell'eclise di sole del 26 Maggio 1873 nota del P. F. Denza.

Geologiske Undersogelser in den Tromso Amt og tilgraendsende Dele af Nordlands Amt IV af Karl Pettersen.

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On the rise of land in Scandinavia. By S. A. Sexe. (To accompany the "Index Scholarum" of the university for the year 1872, first season.) Christiania, 1872.

Zeitschrift der österreichischen Gesellschaft für Meteorologie. Redigirt von C. Jelinek und J. Hann. ix. Band. Wien, 1874.

Ueber den täglichen und jährlichen Gang der Feuchtigket in Russland. Von H. Wild. St. Petersburg, 1875.

Quelques nombres caractéristiques relatifs à la température de Bruxelles. Note de M. E. Quetelet.

Repertorium für Meteorologie. Herausgegeben von der kaiserlichen Akademie der Wissenschaften. Redigirt von Dr. Heinrich Wild. Band iv, Heft 1. St. Petersburg, 1874.

Annales de l'Observatoire physique central de Russie. Publiées par H. Wild. Année 1869. St. Pétersbourg, 1874.

Meteorologische Beobachtungen angestellt in Dorpat im Jahre 1872 und 1873. Redigirt und bearbeitet von Dr. Arthur von Oettingen und Dr. Karl Weihrauch. 2. Band, Heft 2 und 3.

Annales météorologiques de l'Observatoire royal de Bruxelles. Publiées aux frais de l'état, par le directeur A. Quetelet. Année 1872–73. Bruxelles, 1874.

Notices extraites de l'annuaire de l'Observatoire royal de Bruxelles pour 1874. Par A. Quetelet.

Aréographie, ou étude comparative des observations faites sur l'aspect physique de la planète Mars; par M. F. Terby, docteur en scientes. Rapport de M. E. Quetelet. Bruxelles, 1874.

La comète de Coggia, observée à Bruxelles. Note par M. E. Quetelet. Bruxelles, 1874.

Mittheilungen aus dem Gebiete des Seewessen. Herausgegeben vom k. k. hydrographischen Amte, Marine-Bibliothek. Vol. 2, 2. Jahrgang. Pola, 1874.

Verhandlungen der kaiserlich- königlichen zoologisch- botanischen Gesellschaft in Wien. Jahrgang 1874.

Ponts et chaussées. Service hydrométrique du bassin de la Seine. Résumé des observations centralisées pendant l'année 1873. Par M. G. Lemoine, sous la direction de M. E. Belgrand. Avec planches. Versailles, 1874.

PAPER 8.

Showing stations inspected, by whom, and when inspected.

Stations.	Name of inspector.	Date.
Albany, N. Y	First Lieut. F. C. Grugan, acting signal-officer	July 1–4, 1874.
Alpena, Mich	do	Aug. 11, 1874.
Atlantic City, N. J	do	Jan. 23, 1875.
Augusta, Ga	do	Nov. 10, 12, 1874.
Baltimore, Md	do	Jan. 9, 1875.
Bangor, Me	First Lieut. A. W. Greely, acting signal-officer	Nov. 15, 1874.
Barnegat, N. J	First Lieut. F. C. Grugan, acting signal-officer	Feb. 1, 2, 1875.
Boston, Mass	First Lieut. A. W. Greely, acting signal-officer	Oct. 19–27, 1874.
Breckenridge, Minn	First Lieut. F. C. Grugan, acting signal-officer	May 22, 1875.
Buffalo, N. Y	do	July 18, 1874.
	do	Mar. 12–16, 1875.
Burlington, Vt	First Lieut. A. W. Greely, acting signal-officer	Nov. 20, 21, 1874.
Bismarck, Dak	First Lieut. F. C. Grugan, acting signal officer	June 6, 1875.
Cairo, Ill	do	Sept. 23, 1874.

Showing stations inspected, by whom, and when inspected—Continued.

Stations.	Name of inspector.	Date.
Cape Hatteras, N.C	Second Lieut. D. J. Gibbon, acting signal-officer	Oct. 29-31, 1874.
Cape Henry, Va	do	Oct. 22, 23, 1874
Charleston, S. C	do	Nov. 7-10, 1874.
Cheyenne, Wyo	do	Aug. 2-5, 1874.
Chicago, Ill	First Lieut. F. C. Grugan, acting signal-officer	Aug. 29, 1874.
	do	April 22-27, 1875.
Cincinnati, Ohio	do	Sept. 6, 1874.
Cleveland, Ohio	do	July 25, 1874.
	do	Mar. 22-28, 1875.
Colorado Springs, Colo	First Lieut. A. W. Greely, acting signal-officer	Dec. 14, 15, 22, 23, 1874.
Corsicana, Tex	First Lieut. F. C. Grugan, acting signal-officer	Oct. 25, 1874.
Denver, Colo	First Lieut. A. W. Greely, acting signal-officer	Dec. 10, 11, 12, 1874.
Detroit, Mich	First Lieut. F. C. Grugan, acting signal-officer	Aug. 3, 1874.
	do	April 8-14, 1875.
Dodge City, Kans	First Lieut. A. W. Greely, acting signal-officer	Dec. 26-28, 1874.
Dubuque, Iowa	First Lieut. F. C. Grugan, acting signal-officer	June 28, 1875.
Duluth, Minn	do	May 18, 1875.
Eastport, Me	First Lieut. A. W. Greely, acting signal-officer	Nov. 17, 1874.
Erie, Pa	First Lieut. F. C. Grugan, acting signal officer	July 23, 1874.
	do	Mar 18, 1875.
Escanaba, Mich	do	Aug. 20, 21, 1874.
	do	May 2, 1875.
Fort Sully, Dak	do	June 10, 1875.
Galveston, Tex	do	Oct. 28, 1874.
Grand Haven, Mich	do	Aug. 14, 1874.
	do	April 17-21, 1875.
Indianapolis, Ind	do	Sept. 1, 5, 1874.
Indianola, Tex	do	Nov. 1, 1874.
Jacksonville, Fla	Second Lieut. D. J. Gibbon, acting signal-officer	Nov. 20-23, 1874.
Key West, Fla	First Lieut. F. C. Grugan, acting signal-officer	Dec. 9, 1874.
La Crosse, Wis	do	May 11-13, 1875.
Leavenworth, Kans	First Lieut. A. W. Greely, acting signal-officer	Dec. 28, 1874, Jan. 2, 1875
Logansport, Ind	First Lieut. F. C. Grugan, acting signal-officer	Aug. 30, 31, 1874.
Louisville, Ky	do	Sept. 24, 1874.
Long Branch, N. J	do	Feb. 5, 1875.
Marquette, Mich	do	Aug. 22, 1874.
	do	May 5, 1875.
Memphis, Tenn	do	Oct. 7, 1874.
Milwaukee, Wis	do	Aug. 19, 1874.
	do	April 28, May 1, 1875.
Mobile, Ala	do	Nov. 20, 1874.
Montgomery, Ala	do	Nov. 15, 1874.
Mount Washington, N. H	First Lieut. A. W. Greely, acting signal-officer	Oct. 15-17, 1874.
Nashville, Tenn	First Lieut. F. C. Grugan, acting signal-officer	Sept. 30 to Oct. 4, 1874.
New Haven, Conn	First Lieut. A. W. Greely, acting signal-officer	Nov. 27, 28, 1874.
New London, Conn	do	Nov. 24-26, 1874.
New Orleans, La	First Lieut. F. C. Grugan, acting signal-officer	Nov. 8, 1874.
New York City	do	Feb. 18, 1875.
Norfolk, Va	Second Lieut. D. J. Gibbon, acting signal-officer	Oct. 20, 21, 24-26, 1874.
Oswego, N. Y	First Lieut. F. C. Grugan, acting signal-officer	July 6-11, 1874.
	do	Feb. 26, 1875.
Pembina, Dak	do	May 26, 1875.
Philadelphia, Pa	First Lieut. A. W. Greely, acting signal-officer	Sept. 28 to Oct. 5, 1874.
Pike's Peak, Colo	do	Dec. 20, 1874.
Pittsburgh, Pa	First Lieut. F. C. Grugan, acting signal-officer	Jan. 15, 1875.
Port Huron, Mich	do	Apr. 5-8, 1875.
Portland, Me	First Lieut. A. W. Greely, acting signal-officer	Nov. 3-6, 1874.
Portland, Oreg	Second Lieut. D. J. Gibbon, acting signal-officer	Aug. 19-22, 1874.
Punta Rassa, Fla	First Lieut. F. C. Grugan, acting signal-officer	Dec. 20, 1874.
Rochester, N. Y	do	July 13-17, 1874.
	do	Mar. 6, 1875.
Saint Louis, Mo	do	Sept. 17, 1874.
Saint Mark's, Fla	Second Lieut. D. J. Gibbon, acting signal-officer	Nov. 18, 19, 1874.
Saint Paul, Minn	First Lieut. F. C. Grugan, acting signal-officer	May 14, 1875.
Salt Lake City, Utah	Second Lieut. D. J. Gibbon, acting signal-officer	Aug. 6-9, 1874.
San Diego, Cal	do	Sept. 5-7, 1874.
Sandy Hook, N. J	First Lieut. F. C. Grugan, acting signal-officer	Feb. 8, 1875.
San Francisco, Cal	Second Lieut. D. J. Gibbon, acting signal-officer	Aug. 12-15, 1874.
Savannah, Ga	do	Nov. 13, 17, 1874.
Shreveport, La	First Lieut. F. C. Grugan, acting signal-officer	Oct. 19, 1874.
Springfield, Mass	First Lieut. A. W. Greely, acting signal-officer	Nov. 22, 23, 1874.
Squan Beach, N. J	First Lieut. F. C. Grugan, acting signal-officer	Jan. 30, 1875.
Toledo, Ohio	do	July 29, 1874.
	do	Mar. 30 to Apr. 4, 1875.
Tybee Island, Ga	Second Lieut. D. J. Gibbon, acting signal-officer	Nov. 16, 1874.
Vicksburg, Miss	First Lieut. F. C. Grugan, acting signal-officer	Oct. 12-16, 1874.
Wilmington, N. C	Second Lieut. D. J. Gibbon, acting signal-officer	Nov. 3-6, 1874.
Wood's Hole, Mass	First Lieut. A. W. Greely, acting signal-officer	Oct. 29-31, 1874.
Yankton, Dak	First Lieut. F. C. Grugan, acting signal-officer	June 14-16, 1875.

PAPER 9.

List of places for which stations have been requested but not established on June 30, 1875.

Place.	Applicant.	Date.
Muskegon, Mich	Hon. H. H. Holt, Michigan legislature, inclosing petition of 99 citizens.	Jan. 21, 1871
	Board of Trade of Toledo	Jan. 27, 1871
	Board of Trade of Chicago	Feb. 10, 1871
	Hon. T. W. Ferry, United States Senate	Mar. 3, 1871
	T. W. Ferry, M. C., S. H. Warner, mayor, and 43 others	Mar. 15, 1875
Manitowoc, Wis	H. P. Sawyer, member of Congress	Jan. 25, 1871
Huron City, Mich	Board of Trade of Toledo	Jan. 27, 1871
	Board of Trade of Cleveland	Jan. 19, 1871
	Board of Trade of Detroit	Feb. 19, 1871
Mackinac, Mich	Board of Trade of Chicago	Feb. 10, 1871
Richmond, Va	W. G. Turpin	Apr. 3, 1871
Body Island, N. C	Board of Trade of Norfolk, Va., and resolution of the general assembly of Virginia.	Apr. 17, 1871
Lewes, Del	Board of Trade of Philadelphia	May 25, 1871
Parks, Colo	E. J. Mallett, late consul-general	May 24, 1871
Staten Island	C. Keutzen, jr	June 9, 1871
Chambersburgh, Pa	Hon. John 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
Xenia, Ohio	C. E. Case	June 30, 1871
Port Hope	Board of Trade of Detroit, Mich	July 22, 1871
Illinois Industrial University, Champaign, Ill.	Hon. W. C. Flagg, secretary	July 21, 1871
	Hon. J. M. Gregory, president	Feb. 21, 1872
	E. A. Gastman, chairman meteorological committee Macon County Fruit-Growers' Association.	Aug. 30, 1874
Little Rock, Ark	Hon. J. M. Hawks, member of Congress	July 26, 1871
	Albert Cohen	July 1, 1872
	A. Van Cleff	May 31, 1873
	Hon. Powell Clayton, United States Senate	Mar. 11, 1874
Sacramento, Cal	J. N. Hoag, secretary California State Board of Agriculture.	July 26, 1871
	Concurrent resolution of the legislature of California, presented by Dr. T. M. Logan, secretary State Board of Health.	May 15, 1872
		Jan. 10, 1872
Niles, Mich	J. B. Fitzgerald, secretary Berrien County Agricultural Society.	July 27, 1871
Louisiana, Mo	William Stark and R. E. Pleasants	Aug. 3, 1871
Hot Springs, Ark	J. H. Morton, M. D	Aug. 2, 1871
Janesville, Wis	J. B. Whiting, M. D., and Rock County Agricultural Society.	Aug. 7, 1871
Hillsdale, Mich	Prof. George M. Miller, secretary Hillsdale College	Aug. 6, 1871
	Hillsdale County Agricultural Society	Aug. 6, 1871
Metamora, Ill	Edward Kipp, secretary Woodford County Agricultural Society.	Aug. 8, 1871
Marietta, Ohio	J. W. Andrews, president Marietta College	Aug. 10, 1871
	Washington County Agricultural Society	Aug. 10, 1871
Mount Pleasant Academy, Pa	W. H. McCrey, Mount Pleasant Academy and Normal School.	Aug. 11, 1871
Nebraska City, Nebr	H. K. Raymond, secretary Otoe County Farmers' Club	Aug. 14, 1871
Mount Moosilaukee, 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	Dr. Wilmot Scott, editor Galena Commercial Advertiser	Sept. 14, 1871
Columbus, Nebr	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. Worth, for Greene County Agricultural and Mechanical Society.	Sept. 18, 1871
Mason City, Iowa	T. G. Ensley, secretary Cerro Gordo County Agricultural Society.	Oct. 6, 1871
Orono, Me	M. C. Fernald, Maine State College of Agriculture	Oct. 19, 1871
Balize, La., Fort Morgan, Ala., Waco, Tex.	Agent and captains of Morgan Steamship Company	Oct. 31, 1871
Fort Randall, Dak	R. J. Percy, for Missouri Valley Telegraph Company	Nov. 9, 1871
University of Michigan, Ann Arbor.	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, member of Congress	Dec. 19, 1871
Iowa City, Iowa	John P. Irish	Dec. 14, 1871
Manassas, Va	George G. 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	Jan. 24, 1872
Additional stations on eastern shore of Lake Michigan.	Hon. H. H. Holt, Michigan legislature	Feb. 11, 1871

List of places for which stations have been requested, &c.—Continued.

Place.	Applicant.	Date.
Additional stations on mountains of Virginia.	G. C. Wedderburn, secretary Virginia Telegraph Co	May 7, 1871
	L. A. Gobright, Associated Press	May 7, 1871
Additional stations on western slope of Mississippi Valley.	George P. Plant, W. H. Scudder, R. P. Handy, committee of Merchants' Exchange, Saint Louis, Mo.	July 16, 1871
Southwest Pass, (Pass à l'Outre.)	Thornton A. Jenkins, Rear-Admiral United States Navy.	Mar. 20, 1871
Stanton, Va., Christianburgh, Va., Bristol, Tenn., Easton, Pa., Harrisburgh, Pa., Winchester, Va.	Jed Hotchkiss	Aug. 15, 1871
Towanda, Kans	M. D. Ellis	Feb. 12, 1872
Black Dome, Black Mountain, N. C.	Willian Cain	Feb. 12, 1872
Charlotte, N. Y	J. Eaton and 35 others	Feb. 14, 1872
	George G. Clarkson, mayor, and 15 others	Oct. 27, 1872
	William H. Newcomb and 22 others	Oct. 27, 1872
Gallitzin, Altoona, on Pennsylvania Central Railroad.	David Peelor	Feb. 17, 1872
University of Minnesota, Minneapolis.	Willam Folwell, president	Feb. 21, 1872
Each of the State agricultural colleges.	J. B. Bowman, regent Kentucky University, and others	Feb. 29, 1872
Columbus, Ohio	J. H. Klippart, secretary Ohio State Board of Agriculture.	Mar. 5, 1872
Norwich University, Northfield, Vt.	Capt. C. A. Curtis	Mar. 15, 1872
Grand Tower, Ill	A. R Harris	Mar. 21, 1872
Iuka, Miss	Rev. J. T. Freeman, through Hon. George E. Harris, member of Congress.	Mar. 25, 1872
Great Natihalee, Bald Mountain, N. C.	Charles W. Jenks	Apr. 1, 1872
Deposit, N. Y	G. W. Hanford	Apr. 1, 1872
Hollman Dale	S. P. Hollman	Apr. 1, 1872
Boonville, Mo	J. L. Stephens	Apr. 11, 1872
Fort Wayne, Ind., New Albany, Ind.	F. C. Johnson, Indiana State Board of Agriculture	Apr. 22, 1872
Maryland Agricultural College.	A. R. Davis, president board of trustees	Apr. 19, 1872
San Antonio, Tex	Thomas G. Williams	May 10, 1872
	Fred. Petterson and 52 others	Mar. 16, 1874
	Hon. M. C. Hamilton, United States Senator	Mar. 17, 1874
	Hon. John Hancock, member of Congress	Apr. 1, 1874
Atlanta, Ga	Hon. John H. James, mayor	May 10, 1872
	R. W. Whiteley	Feb. 15, 1874
Auburn, Ala., Agricultural and Mechanical College of Alabama.	William C. Stubbs, John B. Reed, W. H. Jenison	May 14, 1874
Racine, Wis	Mayor and council	May 18, 1872
Ogdensburgh, N. Y	*Hon. W. A. Wheeler, member of Congress*	May 25, 1872
Plattsburgh, N. Y	Hon. John Rogers, member of Congress	May 28, 1872
Sewanee, Tenn	John L. Cooper, through Prof. Joseph Henry, Smithsonian Institution.	June 10, 1872
Newark College, Del	William D. Mackey, secretary	June 11, 1872
Green Bay, Wis	Hon. P. Sawyer, member of Congress	June 13, 1872
	Philetus Sawyer, member of Congress	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 Miller	July 10, 1872
Evansville, Ind	F. C. Johnson; P. Hornbrook, surveyor of customs; Thomas P. Britton, president Vanderburgh County Agricultural Society.	July 13, 1872
	John Ingle, secretary Vanderburgh County Agricultural Society.	July 13, 1872
	Charles Butterfield, mayor	July 13, 1872
	C. H. Butterfield, mayor	Nov. 26, 1873
	H. L. Merrill, citizens of Evansville	Jan. 16, 1874
Aiken, S. C	T. W. Veneman	May 31, 1875
	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, petition of 75 citizens	Aug. 8, 1872
Straits of Mackinac	E. A. Fuertes, department of engineering	Mar. 17, 1875
	Roys I. Cram	Aug. 7, 1872
	Board of Trade of Buffalo	May 26, 1873
	Board of Trade of Chicago	May 22, 1873
	J. L. Hathaway, J. B. Merrill, meteorological committee, Chamber of Commerce of Milwaukee.	Sept. 5, 1874

List of places for which stations have been requested, &c.—Continued.

Place.	Applicant.	Date.
Carthage, Ill	L. F. M. Easterday, petition of 105 citizens	Sept. 2, 1872
Kutztown, Pa	A. R. Hornell, principal of Keystone State Normal School	Sept. 13, 1872
Pensacola, Fla	Pensacola Ice Company, M. H. Sullivan and 29 others	Oct. 7, 1872
Gainesville, Ga	M. F. Stephenson	Nov. 5, 1872
	D. L. Yulee	Feb. 7, 1874
Chattanooga and some point between Leavenworth and Shreveport.	Steamboatmen's convention assembled at Cairo	Nov. 17, 1872
Dallas, Tex	W. A. Jones & Co., W. C. Connor, and 133 others	Dec. 26, 1872
On plains of Western Kansas and regions southward and southwestward.	Kansas State Horticultural Society	Dec. 21, 1872
Oil City and Parker's Landing on the Alleghany River.	Resolution of select council of Pittsburgh, transmitting and approving petition of 46 citizens of Pittsburgh.	Dec. 28, 1872 Jan. 10, 1873
Greensborough and Brownsville on the Monongahela.		
University of Kansas, Lawrence.	John Fraser, chancellor	Jan. 16, 1873
Manchester, N. H	Hon. S. N. Bell, member of Congress, inclosing resolution of New Hampshire State Agricultural Society.	Jan. 21, 1873
Sandwich, Ill	M. E. Ballou, through Commissioner of Agriculture	Jan. 22, 1873
Detroit, Minn	Daniel Coney	Feb. 2, 1873
Dayton, Ohio	Isaac Strohm	Feb. 11, 1873
Pilatka, Fla	J. F. Starr, through Secretary of the Navy	Feb. 17, 1873
Put-in-Bay, Ohio	H. B. West	Mar. 3, 1873
	H. D. Cooke, governor of the District of Columbia	July 17, 1873
Emporia, Kans	Robert Milliken	Mar. 6, 1873
North and west of Galveston, Tex.	Chamber of Commerce, through John Hancock	Mar. 6, 1873
Charlotteville, Va., University of Virginia.	R. T. W. Duke, member of Congress	Mar. 2, 1873
Raleigh, N. C	Cotton Exchange, New Orleans, La	Mar. 30, 1873
Columbia, S. C	Mayor of city and city council	June 11, 1873
Columbus, Miss	Cotton Exchange, New Orleans, La	Mar. 30, 1873
Pierce City, Mo	E. P. Lingee	Apr. 9, 1873
Nashanic, N. J	John V. D. Pumyea	Apr. 12, 1873
	N. B. Bradley, member of Congress	Apr. 27, 1873
Bay City, Mich	do	Feb. 19, 1874 June 17, 1874
	W. S. Crosthwaite	June 21, 1874
Vincennes, Ind	W. Hays	June 15, 1873
Springfield, Ill	S. M. Cullom, petition of governor, State officers, &c	July 5, 1873
	E. A. Gustman, chairman meteorological committee Macon County Fruit-Growers' Association.	Aug. 30, 1874
Cedar Keys	Abert E. Willard, mayor, and 16 others	July 7, 1873
	D. L. Yulee, Fernandina, Fla	Feb. 7, 1874
Salina, Kans	Freeman Kingman	July 17, 1873
Alleghanies	George W. Warren, jr	July 26, 1873
Carthage, Mo	E. P. Searle, Henry C. Henney, C. C. Allen, and others	Aug. 15, 1873
Newberne, N. C	George W. Nason, jr	Sept. 13, 1873
Port Townsend, Washington Ter.	Puget Sound Telegraph	Sept. 30, 1873
Mineral Point, Wis	Hon. T. O. Howe, U. S. Senator; Moses M. Strong	Dec. 16, 1873
Latitude 40° 30', longitude 74° 42', Somerset, N. J.	Hon. F. T. Frelinghuysen; citizens of Somerset, Hunterdon, and Middlesex Counties.	Dec. 22, 1873
Carlton, Kewaunee County, Wis.	Edward Bach; farmers and shipowners of the district.	Jan. 10, 1874 Jan. 15, 1874
Fernandina, Fla	Henry Hazen, collector; W. S. Simmons, first lieutenant United States Revenue Marine; S. B. Conover, United States Senator; G. Stark, mayor; Isaiah Wind, president of council; and 22 others.	Jan. 17, 1874 Jan. 19, 1874
	D. L. Yulee	Feb. 7, 1874
University of California	J. West Martin, secretary board of regents	Feb. 12, 1874
Helena, Ark	J. L. Alcorn, United States Senator	Feb. 12, 1874
Fayetteville, Ark	Hon. A. S. Prather, trustee Arkansas Industrial University, Huntsville, Ark.	Feb. 17, 1874
Manhattan State Agricultural College, Kansas.	John J. Ingalls, R. Crozier, W. A. Phillips, and D. P. Lowe.	Feb. 18, 1874
	J. M. Harvey, United States Senator; T. A. Osborn, governor; T. H. Cavenaugh, State secretary; and 18 others.	Jan. 23, 1875
Beatrice, Gage County, Nebr.	P. W. Hitchcock, United States Senator; 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.; G. T. Estis	Mar. 18, 1874
Fort Macon, N. C	J. M. Leach, member of Congress	Mar. 28, 1874
Gorham, N. C	Elias S. Mason	Mar. 30, 1874
Mason City, Mason County, Mo.	J. F. Benjamin, Brown & Shepard, E. B. Van Vent, and 33 others.	Mar. 30, 1874
Rockland, Me	Citizens of Rockland, Belfast, &c., Me., E. Waite, and 27 others.	Apr. 9, 1874

List of places for which stations have been requested, &c.—Continued.

Place.	Applicant.	Date.
Rome, Ga	Thomas J. Perry	Apr. 24, 1874
	T. J. Perry	Jan. 21, 1875
Kansas City, Mo	Theo. S. Case, postmaster	May 1, 1874
Muscatine, Iowa	J. P. Walton	May 7, 1874
Syracuse, N. Y	M. Graves, mayor, William Kirkpatrick, J. R. Whittock, and J. Hill.	May 9, 1874
Bakersfield, Kern County, Cal.	A. C. Bratton, M. D., P. D. McClanahon, M. D	May 14, 1874
Palmyra, Wis	J. C. Minton	May 19, 1874
Crawfordsville, Ind	H. B. Carrington, colonel United States Army, chair of 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 and Boardman Brothers	June 16, 1874
Fort Thompson	Col. D. S. Stanley	June 18, 1874
Chatawa, Pike County, Miss.	Alexander W. Gordon, College of the Redemptionist Fathers.	July 13, 1874
Ellsworth, Kans	W. A. Phillips, member of Congress	July 14, 1874
	M. W. Henry	July 21, 1874
Mount Lake, Giles County, or Bald Knob, W. Va.	Mrs. H. Haupt	July 21, 1874
Camden, N. J	Wood Dialogue & Co	July 29, 1874
Bloomington, Ill	E. A. Gastman, meteorological committee Macon County Fruit-Growers' Association.	Aug. 30, 1874
Decatur, Ill	....do	Aug. 30, 1874
Mount Kearsarge, Warner, N. H.	John Eaton, Commissioner, Hon. N. G. Ordway, Hon. W. E. Chandler.	Oct. 22, 1874
Ceredo, W. Va	S. A. Forbes	Nov. 21, 1874
Astoria, Oreg	Hon. J. H. Mitchell	Nov. 20, 1874
Fond du Lac, Wis	C. A. Eldredge, member of Congress, J. W. Carney	Dec. 15, 1874
Corpus Christi, Tex	H. Taylor, postmaster	Jan. 4, 1874
	}	Jan. 15, 1874
Michigan State Agricultural College, Lansing, Mich.	R. C. Kedzie	Jan. 12, 1875
Pana, Ill	E. C. Reese, postmaster	Jan. 17, 1875
Columbus, Ga	H. R. Harris, member of Congress	Jan. 19, 1875
Salisbury, N. C	W. M. Robbins, member of Congress	Jan. 20, 1875
Hartford, Conn	G. H. Kingsbury	Jan. 21, 1875
Oshkosh, Wis	T. Floyd Woodworth, M. D	Jan. 22, 1875
Iowa State Agricultural College, Ames, Iowa.	J. K. Macomber, professor of physics	Jan. 23, 1875
Mount Anthony, Bennington, Vt.	George W. Robinson	Jan. 27, 1875
National Soldiers' Home, Dayton, Ohio.	Thomas L. Neal, president Montgomery County Medical Society; Thomas D. Davis, secretary.	Feb. 1, 1875
Ithaca, N. Y	P. B. Crandell, corresponding secretary Farmers' Club	Feb. 3, 1875
Pentwater, Mich	Hon. J. A. Hubbell, Amos Dresser	Feb. 3, 1875
Fortress Monroe, Va	J. H. Platt, jr., member of Congress,; —— Phoebus, —— Watkins, —— Wright.	Feb. 8, 1875
Afton, Iowa	J. W. McDill, member of Congress,; N. W. Rowell, W. R. Roberts, and 12 others.	Feb. 17, 1875
Mount Pisgah, Bradford County, Pa.	R. Redington	Mar. 2, 1875
Maysville, Cal	Hon. J. K. Luttrell, E. H. Pratt	Mar. 8, 1875
Jacksonville, Ill	John A. Logan, United States Senator; G. V. Black, Samuel M. Martin, 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, J. Walker, and 7 others	Mar. 25, 1875
Saint Augustine, Fla	James Whitall	Mar. 31, 1875
Abingdon, Ill., Abingdon College.	D. S. Harris, professor 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
Hingham, Wis	Charles Rogers, F. A. Balch, meteorological committee Farmers' Club.	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 Senator; N. W. Napier, A. H. Potter, and 187 others.	May 26, 1875
Lake Charles, La	William Meyer, assistant postmaster	June 12, 1875
Tallahassee, Fla	Hon. S. B. Conover, United States Senator, and 44 others.	June 12, 1875

PAPER 10.

List of agricultural societies which, on June 30, 1875, had appointed permanent committees to confer with the Chief Signal-Officer of the Army.

Name of organization and State.	Committee.	Post-office address.
Muskingum County Agricultural Society, Ohio	R. S. Mershon	Zanesville, Ohio.
Louisville and Jefferson Counties Agricultural Society, Kentucky.	L. Young	Louisville, Ky.
Schuyler County Agricultural and Mechanical Society, Missouri.	John B. Glaze	Glenwood, Mo.
Highland County Agricultural Society, Ohio	J. S. Bell	Hillsborough, Ohio.
	J. W. Ellis	
Arkansas State Agricultural and Mechanical Society, Arkansas.	Albert Cohen	Little Rock, Ark.
Bertie County Agricultural Society, North Carolina.	S. J. Wheeler	Windsor, N. C.
	J. B. Cheney	Do.
	D. E. Taylor	Do.
Geauga County Agricultural Society, Ohio	Dexter Witter	Burton, Ohio.
	George H. Ford	Do.
	Luther Russell	Do.
Otsego County Agricultural Society, New York	G. Pomeroy Keese	Cooperstown, N. Y.
	H. M. Hooker	Do.
	Elisha Finney	Do.
Crawford County Agricultural Society, Pennsylvania.	A. P. Foster	Conneautville, Pa.
	Col. T. Manton	Do.
	Prof. W. H. Armstrong	Do.
Berrien County Agricultural Society, Michigan	J. B. Fitzgerald	Niles, Mich.
	D. O. Woodruff	Do.
	William Bort	Do.
Greene County Agricultural Society, Missouri	Dr. J. E. Tafft	Springfield, Mo.
	A. W. McPherson	Do.
	Rev. J. E. Worth	Do.
Tolland County Agricultural Society, Connecticut.	George H. Kingsbury	Rockville, Conn.
	J. C. Hammond, jr	Do.
Burlington County Agricultural Society, New Jersey.	G. C. Brown	Mount Holly, N. J.
	M. S. Pancoast	Do.
	James Lippincott	Do.
Agricultural and Mechanical Society of Western Alabama, Alabama.	W. S. Bird	Eutaw, Ala.
	H. G. Webb	Do.
	A. T. Lupton	Tuscaloosa, Ala.
Crawford County Agricultural Society, Ohio	G. Keller	Bucyrus, Ohio.
	E. R. Reamley	Do.
	H. M. Scroggs	Do.
	Josiah Koller	Do.
Saratoga County Agricultural Society, New York	R. S. Robinson	Greenville Centre, N. Y.
Martin County Agricultural Society, Minnesota	H. A. Munger	Fairmount, Minn.
California State Board of Agriculture, California.	J. N. Hoag	Sacramento, Cal.
	C. F. Reed	Do.
	F. M. Logan	Do.
Macon County Fruit-Growers' Association, Illinois	Prof. E. A. Gastman	Decatur, Ill.
	Theo. Hildebrandt	Do.
	J. B. R. Sherrick	Do.
Missouri State Board of Agriculture, Missouri	John H. Tice	Saint Louis, Mo.
	Rev. Charles Peabody	Do.
	Hon. G. W. Kinney	Snow Hill, Mo.
Jackson County Agricultural Society, Ohio	Davis Mackley	Jackson C. H., Ohio.
	J. E. Ferree	Do.
	Jacob Dungan	Do.
Pike County Agricultural Society, Georgia	J. S. Pope	Zebulon, Ga.
	J. H. Mitchell	Do.
	H. Green	Do.
Greene County Agricultural Society, New York	G. C. Mott	Catskill, N. Y.
York County Agricultural Society, Pennsylvania.	John Evans	York, Pa.
	G. A. Heckert	Do.
	W. S. Roland	Do.
Allamakee County Agricultural Society, Iowa	Hon. Charles Paulk	Waukon, Iowa.
	A. M. May	Do.
	W. M. Read	Do.
Bay State Horticultural Society of California, California.	F. A. Miller	San Francisco, Cal.
	Prof. H. N. Bolender	Do.
Maine Board of Agriculture, Maine	M. C. Fernald	Orono, Me.
	Prof. G. L. Goodale	Bowdoin College, Brunswick, Me.
	Prof. C. E. Hamlin	Colby University, Waterville, Me.
	C. T. Brackett	Bowdoin College, Brunswick, Me.
	Hon. S. F. Perley	Naples, Me.
Tuscola County Agricultural Society, Michigan	C. C. Stoddard	Caro, Mich.
	Townsend North	Do.
	Dr. William Johnson	Do.
Central Iowa District Agricultural Association, Iowa.	P. H. Bristow	Des Moines, Iowa.
	M. W. Robinson	Do.
	D. V. Cole	Do.

List of agricultural societies, &c.—Continued.

Name of organization and State.	Committee.	Post-office address.
South Carolina Agricultural and Mechanical Society, South Carolina.	Dr. F. P. Porcher	Charleston, S. C.
	D. T. T. Robertson	Winnsborough, S. C.
	Col. J. P. Thomas	Columbia, S. C.
Connecticut State Agricultural Society, Connecticut.	Hon. E. H. Hyde	Stafford, Conn.
	Hon. Thomas H. Butler	Norwalk, Conn.
	H. S. Collins	Collinsville, Conn.
Connecticut State Board of Agriculture, Connecticut.	Prof. W. H. Brewer	New Haven, Conn.
	W. H. Yeomans	Columbia, Conn.
	T. S Gold	West Cornwall, Conn.
Terre Haute Horticultural Society, Indiana	H. D. Scott	Terre Haute, Ind.
	J. F. Soulo	Do.
	John Weir	Do.
	Rev. —— Stimson	Do.
Middlesex County Farmers' Club, New Jersey	G. H. Lambert	New Brunswick, N. J.
	G. W. Thompson	Do.
Farmers' Club, Beaver City, Utah	D. Tyler	Beaver City, Utah.
	Wm. Fotheringham	Do.
	J. L. Smith	Do.
Indiana State Board of Agriculture, Indiana	T. C. Johnson	New Albany, Ind.
	Thomas Dowling	Terre Haute, Ind.
	J. D. G. Nelson	Fort Wayne, Ind.
Rhode Island Society for the Encouragement of Domestic Industry, Rhode Island.	Dr. J. W. Sawyer	Providence, R. I.
	J. T. Smith	Do.
	Dr. W. F. Channing	Do.
Washington County Agricultural Society, New York.	M. Ingalsbe	South Hartford, N. Y.
	R. W. Pratt	Do.
Farmers and Fruit-Growers' Association of Illinois, Illinois.	D. W. West	Belleville, Ill.
	F. H. Pieper	Do.
	E. W. West	Do.
Iowa State Horticultural Society, Iowa	J. K. Macomber	State Agricultural College, Ames, Iowa.
	Hon. John Scott	Nevada, Iowa.
	G. B. Brackett	Denmark, Iowa.
Addison County Agricultural Society, Vermont	Prof. E. Brainerd	Middlebury College, Middlebury, Vt.
	Prof. W. H. Parker	Do.
	Prof. H. M. Seely	Do.
Orleans County Agricultural and Mechanical Society, Vermont.	D. M. Camp	Newport, Vt.
	T. H. Haskins	Do.
	Z. E. Jameson	Irasburgh, Vt.
Bradley County Agricultural Society, Tennessee	T. L. Cate	Cleveland, Tenn.
	J. C. Morgan	Do.
	Dr. G. A. Long	Do.
Iowa State Agricultural Society, Iowa	Peter Melendy	Cedar Falls, Iowa.
	S. B. Hewitt, jr	Eagle Grove, Iowa.
	J. M. Shaffer	Fairfield, Iowa.
Carroll and Choctaw Counties Agricultural Societies, Mississippi.	A. M. Rafter	Winona, Miss.
	T. J. Blackmoore	Do.
	O. J. Moore	Do.
Belmont Farmers' Club, Mississippi	A. M. Rafter	Do.
	W. W. Dabney	Do.
	James Thompson	Do.
Broome County Agricultural Society, New York	E. G. Cratts	Binghamton, N. Y.
	T. F. Roberts	Do.
	Arch Stone	Do.
	P. Van Vredenberg	Do.
Bureau County Agricultural Society, Illinois	G. W. Stone	Princeton, Ill.
	A. Bryant, jr	Do.
	H. L. Baltwood	Do.
Essex County Agricultural Society, Massachusetts	Charles P. Preston	Danvers, Mass.
	William Sutton	Salem, Mass.
	A. N. Dodge	Do.
Kokomo Horticultural Society, Indiana	L. J. Templin	Kokomo, Ind.
	L. W. Leach	Do.
	C. S. Boggs	Do.
Jo Daviess, La Fayette, and Stephenson Union Agricultural Society, Illinois.	A. M. Jones	Warren, Ill.
Marshall County Agricultural Society, Iowa	Byron Webster	Marshalltown, Iowa.
	John Turner	Do.
	S. P. Kinsley	Do.
Coles County Agricultural Society, Illinois	Charles Periatel	Charleston, Ill.
Rock County Agricultural Society, Wisconsin	Dr. J. B. Whiting	Janesville, Wis.
Waupaca Agricultural Society, Wisconsin	H. C. Mead	Waupaca, Wis.
	W. Scott	Do.
	E. Coolidge	Do.
Ingham County Agricultural Society, Michigan	G. W. Bristol	Mason, Mich.
	A. M. Chapin	Eden, Mich.
	William Rayner	Mason, Mich.

List of agricultural societies, &c.—Continued.

Name of organization and State.	Committee.	Post-office address.
Fillmore and Mower Counties Agricultural Society, Minnesota.	Dr. A. T. Whitman	Spring Valley, Minn.
	H. S. Hart	Do.
	W. L. Kellogg	Do.
	B. F. Farmer	Do.
	William McNee	Do.
	E. S. Bumstead	Do.
	George W. Farmer	Do.
	W. Allen	Do.
	D. Rathbun	Do.
Marion County Agricultural Society, Ohio	H. M. Ault	Marion, Ohio.
	H. A. True	Do.
	J. K. Newcomer	Do.
Humphreys County Farmers' Club, Tennessee	Rev. A. A. Wilson	Waverly, Tenn.
	T. M. Harris	Do.
	W. A. Hollinger	Do.
	A. R. Lankford	Do.
Luzerne County Agricultural Society, Pennsylvania.	Steuben Jenkins	Wyoming, Pa.
	Rev. Abel Parker	Do.
	Dr. J. M. Lewis	Do.
	Dr. J. B. Crawford	Wilkesbarre, Pa.
	Dr. C. R. Gorman	Pittston, Pa.
	Dr. B. H. Throop	Scranton, Pa.
	Dr. R. H. Tubbs	Kingston, Pa.
Atlanta Union Central Agricultural Society, Illinois	C. L. Downey	Atlanta, Ill.
	William P. Hunt	Do.
	Daniel McFarland	McLean, Ill.
Howard County Agricultural Society, Iowa	H. D. Noble	Cresco, Iowa.
	Stephen Rockford	Chester, Iowa.
	C. S. Turber	Cresco, Iowa.
Outagamie County Agricultural Society, Wisconsin	W. H. P. Bogan	Appleton, Wis.
	Edwin Nye	Freedom, Wis.
	N. B. Clark	Ellington, Wis.
	Louis Perrott	Greenville, Wis.
Lawrence County Agricultural and Industrial Association, Ohio.	Dr. G. S. B. Hempstead	Hanging Rock, Ohio.
	Cyrus Ellison	Ironton, Ohio.
	Hiram Campbell	Do.
	H. W. Gillett	Quaker Bottom, Ohio.
	Samuel Burke	Arabia, Ohio.
Miami County Agricultural Society, Ohio	W. W. Crane	Tippecanoe City, Ohio.
Michigan State Pomological Society, Michigan	A. T. Linderman	Grand Rapids, Mich.
	C. L. Whitney	Muskegon, Mich.
	Edward Bradfield	Ada, Mich.
Lamoille County Agricultural Society, Vermont	George Wilkins	Stowe, Vt.
	H. H. Powers	Morrisville, Vt.
	G. L. Waterman	Hyde Park, Vt.
Sheboygan County German Agricultural and Trades Association, Wisconsin.	Ferdinand Stoesser	Sheboygan, Wis.
	Frederick Must	Do.
	Fred. Zimmerman	Do.
	Albert Mohlendorf	Do.
	Thomas Blackstock	Do.
Walworth County Agricultural Society, Wisconsin	Peter Golder	Elk Horn, Wis.
	David Williams	Darien, Wis.
	Charles E. Buhre	Geneva, Wis.
Floyd County Agricultural Society, Iowa	E. C. Chapin	Charles City, Iowa.
Edgar County Agricultural Society, Illinois	Walter Booth	Paris, Ill.
	B. Halcomb	Do.
	D. P. Elliott	Do.
Perry County Agricultural and Mechanical Association, Indiana.	I. F. Patterson	Rome, Ind.
	I. I. Wheeler	Do.
	Ad. Ackerman	Do.
Davis County Agricultural Society, Iowa	Howard Willey	Bloomfield, Iowa.
	William J. Hamilton	Do.
	T. A. Walker	Do.
	A. Rankin	Belknap, Iowa.
	William Hill	Bloomfield, Iowa.
Utah County Agricultural and Home Manufacturing Society, Utah.	Hon. George Bean	Provo, Utah.
	C. D. Evans	Springville, Utah.
	Daniel Graves	Provo, Utah.
Ontario County Agricultural Society, New York	Cooper Sayre	Oak's Corners, N. Y
	John S. Coe	Canandaigua, N. Y.
Washington County Agricultural and Mechanical Association, Virginia.	Rev. George R. Barr	Abingdon, Va.
	J. L. White	Do.
	Thomas Cosby	Do.
Otoe County Agricultural Society, Nebraska	J. W. Pearman	Nebraska City, Nebr
	W. W. Wardell	Do.
Lake County Agricultural Society, Ohio	D. W. Mead	Painesville, Ohio.
	C. C. Jennings	Do.
	George Blish	Do.
Page County Agricultural Society, Iowa	S. H. Kiddlebaugh	Clarinda, Iowa.
	S. W. Petterson	Do.
	J. L. Barrett	Do.

List of agricultural societies, &c.—Continued.

Name of organization and State.	Committee.	Post-office address.
King's Creek Valley Farmers' Club, Ohio	Thomas Cowgill	Kennard, Ohio.
Cerro Gordo County Agricultural Society, Iowa	George R. Miller	Mason City, Iowa.
	T. G. Emsley	Do.
	A. Wilson	Owen's Grove, Iowa.
	Henry Martin	Mason City, Iowa.
	C. W. Tenney	Plymouth, Iowa.
Northumberland County Agricultural Society, Pennsylvania.	Dr. E. H. Horner	Turbotville, Pa.
	William A. Dean	Do.
	Thomas Barr	Do.
Johnson County Agricultural and Mechanical Association, Kansas.	John M. Giffen	Olathe, Kans.
	Henry McBride	Do.
	J. M. Hadley	Do.
Albany County Agricultural and Industrial Society, New York.	Hon. Geo. A. Tweddle	Albany, N. Y.
	J. Winne	Bethlehem Centre, N. Y.
	J. H. Farrell	Albany, N. Y.
Pike County Agricultural Society, Mississippi	M. D. Pound	Magnolia, Miss.
Warren County Agricultural Society, New York	Charles W. Osborn	Warrensburgh, N. Y.
Shenandoah Valley Agricultural Society, Virginia.	Edmund Pendleton	Winchester, Va.
	Dr. W. J. Best	Bruceton, Va.
	J. C. Baker	Winchester, Va.
	Jarvis Jennings	Millwood, Va.
	Edwin S. Baker	Winchester, Va.
Wabaunsee County Central Agricultural Society, Kansas.	M. Thompson	Eskridge, Kans.
	J. Sedgwick	Do.
	A. Schwarting	Do.
Oswego County Agricultural Society, New York.	Henry L. Davis	Oswego, N. Y.
	P. M. Newton	Sandy Creek, N. Y.
	Hiram Walker	Union Square, N. Y.
	Thomas H. Austin	New Haven, N. Y.
	Henry Palmer	Paris, N. Y.
Tennessee Central Fair Association, Tennessee	W. P. Henderson	Murfreesborough, Tenn.
Jersey County Agricultural Society, Illinois	Dr. J. O. Hamilton	Jerseyville, Ill.
	George H. Jackson	Do.
	William Shepard	Do.
Steuben County Agricultural Society, New York.	R. E Robie	Bath, N. Y.
Watonwan County Agricultural Society, Minnesota.	W. W. Murphy	Madelia, Minn.
Moultrie County Agricultural and Horticultural Society, Illinois.	G. W. Vaughan	Sullivan, Ill.
	E. W. Mills	Do.
Rome Agricultural and Mechanical Fair Association, Georgia.	Thomas J. Perry	Rome, Ga.
	Thomas W. Alexander	Do.
West Virginia Central Agricultural and Mechanical Society, Virginia.	Lee Haymond	Clarksburgh, W. Va.
	R. T. Lowndes	Do.
	Thomas S Spates	Do.
	Dr. W. M. Late	Bridgeport, W. Va.
	Henry Bassell	Brown's Creek, W. Va.
Hall County Agricultural Society, Georgia	Dr. M. Stephenson	Gainesville, Ga.
	J. E Redwine	Do.
Portage County Agricultural Society, Ohio	H. U. Beebe	Ravenna, Ohio.
	E. R. Wart	Do.
	John Meharg	Do.
Chickasaw County Agricultural Society, Iowa	L. J. Young	Chickasaw, Iowa.
	H. M. Mixer	New Hampton, Iowa.
	Buel Sherman	Fredericksburgh, Iowa.
Virginia State Agricultural Society, Virginia	F. G. Ruffin	Richmond, Va.
	Col. Wm. C. Knight	Do.
	Dr. Wm. T. Walker	Dover Mines, Goochland, Va.
Agricultural and Mechanical Society of Alleghany County, of Maryland, West Virginia, and Pennsylvania.	Charles C. Shriver	Cumberland, Md.
	J. B. H. Campbell	Do.
	R. L. Gross	Do.
Central Farmers' Club, Delaware	M. Hayes	Dover, Del.
	J. H. Bateman	Do.
	C. H. B. Day	Do.
Madison County Agricultural Society, Indiana	I. R. Holston	Anderson, Ind.
	William Crun	Do.
	James Halzlett	Do.
	M. G. Walker	Pendleton, Ind.
	N. G. Tomlinson	Alexandria, Ind.
	Thomas Beckworth	Perkinsville, Ind.
Convention of Pomologists, Michigan	H. S. Clubb	Grand Haven, Mich.
	Samuel B. Peck	Muskegon, Mich.
	C. L. Whiting	Do.
State Pomological and Horticultural Society of Michigan, Michigan.	W. K. Kedzie	Lansing, Mich.
Champaign County Agricultural Society, Ohio	W. A. Humes	Urbana, Ohio.
Buchanan County Agricultural Society, Iowa	Lyman J. Curtis	Independence, Iowa.
	Dr. George Worne	Do.
	Jed. Lake	Do.
New Hampshire State Agricultural Society, New Hampshire.	Hon. Samuel N. Bell	Manchester, N. H.
	Hon. Frederick Smyth	Do.
	Gen. Nathaniel Head	Hooksett, N. H.

List of agricultural societies, &c.—Continued.

Name of organization and State.	Committee.	Post-office address.
Republic County Agricultural Society, Kansas	O. A. A. Gardner	Belleville, Kans.
Doylestown Farmers' Club, Pennsylvania	T. W. Trego	Doylestown, Pa.
	H. T. Darlington	Do.
	D. E. Brower	Do.
Franklin County Agricultural Society, Maine	D. H. Knowlton	Farmington, Me.
	L. T. Green	East Wilton, Me.
	P. P. Tufts	Farmington, Me.
Oxford County Agricultural Society, Maine	Howard D. Smith	Norway, Me.
	A. C. T. Smith	South Paris, Me.
Iowa County Agricultural Society, Iowa	J. Root, jr	Marengo, Iowa.
	J. C. Clark	Foote, Iowa.
	A. H. Simpson	Victor, Iowa.
Ephrata Agricultural and Scientific Society, Pennsylvania.	W. H. Spera	Ephrata, Pa.
Warsaw Horticultural Society, Illinois	B. Whitaker	Warsaw, Ill.
	J. W. Hollowbush	Do.
	Charles Hay	Do.
State Grange of Patrons of Husbandry, South Carolina.	John B. Moore	Edgefield, S. C.
	D. W. Aiken	Cokesbury, S. C.
	Benjamin Allston	Georgetown, S. C.
Illinois State Board of Agriculture, Springfield, Illinois.	Jonathan Periam	Jefferson, Ill.
	William H. Russell	Springfield, Ill.
	A. M. Garland	Do.
Fayette County Agricultural Society, West Union, Iowa.	Frank McClintock	West Union, Iowa.
Farmers' Club of Hingham, Wisconsin	C. Rogers	Hingham, Wis.
	J. de Lyser	Do.
	F. A. Balch	Do.
Winona County Agricultural Society, Minnesota	Edward Ely	Winona, Minn.
	Norman Buck	Do.
	H. C. Jones	Rollingstone, Minn.
San Diego Society of Natural History, California	G. W. Barnes	San Diego, Cal.
	C. J. Fox	Do.
	O. N. Sanford	Do.

PAPER 11.

List of boards of trade, chambers of commerce, and other organizations, apart from those directly connected with agriculture, which had, on June 30, 1875, 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	George W. Dow, M. Maury, J. D. Jones, Charles G. Curtis.
Board of Trade of Buffalo	do	Alonzo Richmond, George S. Hazard, John H. Vaught.
Board of Underwriters of New York	do	John D. Jones, Daniel Drake Smith, Elwood Walker, Alfred Ogden.
Board of Trade of Toledo	Ohio	W. T. Walker, M. D. Carrington, A. W. Colton, C. A. King.
Board of Trade of Washington	District of Columbia	J. W. Thompson, A. S. Solomons, R. M. Hall.
Board of Trade of Detroit	Michigan	J. Aspinwall, G. W. Bissell, E. W. Hudson.
Board of Trade of Chicago	Illinois	C. Randolph, D. H. Denton, E. T. Lawrence.
Board of Trade of Boston	Massachusetts	Nathaniel Spooner, J. Cummings, Thomas Gaffield, E. H. Sampson, Ebon Howes.
Chamber of Commerce of Milwaukee	Wisconsin	John L. Hathaway, J. B. Merrill, L. R. Durand.
Board of Trade of Nashville	Tennessee	James Whitworth, R. T. Kirkpatrick, Dr. W. W. Berry, E. D. Hicks, M. S. Cochrill.
Chamber of Commerce of Duluth	Minnesota	Charles M. Cushman.
Board of Trade of Baltimore	Maryland	H. L. Whitridge, Robert R. Kirkland, Benj. M. Hodges, jr., J. Hall Pleasants.
Board of Trade of New London	Connecticut	James T. Skinner, George P. Rogers.
Board of Trade of San Francisco	California	R. R. Swain, J. De Freney, R. G. Sneath, C. A. Low.
Board of Trade of Cleveland	Ohio	R. K. Winslow, R. F. Lyon, J. C. Sage.
Chamber of Commerce of Charleston	South Carolina	E. H. Frost, W. P. Hall, T. W. Dawson.
Board of Trade of Charleston	do	Hon. George A. Trenholm, Prof. F. S. Holme, E. Lafitte.
Chamber of Commerce of Memphis	Tennessee	B. J. Semmes, H. H. Higbee, Thomas H. Allen.
Board of Trade of Oswego	New York	A. H. Failing, W. J. Malcolm.
Board of Trade of Omaha	Nebraska	A. D. Jones, G. H. Collins, M. Stephens, Col. J. Patrick, C. C. Housel.

List of boards of trade, chambers of commerce, &c.—Continued.

Name of organization.	State.	Committee.
Committee appointed by mayor of Rochester.	New York	George Schofield, John Siddons, Henry S. Hebbard.
Board of Trade of Portland	Maine	C. H. Farley, J. S. Bodlow, M. N. Rich.
Board of Trade of Philadelphia	Pennsylvania	Henry Windsor, Thomas C. Hand, Thomas L. Gillespie, George N. Fotham, George N. Allen, James Hand.
Board of Trade of Mobile	Alabama	J. M. Thompson, J. Y. Thompson, Daniel Jones.
Chamber of Commerce of Savannah	Georgia	Gen. Joseph E. Johnston, J. F. Gilmer, H. C. Wayne.
Chamber of Commerce of Wilmington	North Carolina	A. H. Van Bokkelen, George Harriss, W. L. De Rossett.
Board of Trade of Norfolk	Virginia	Dr. S. K. Jackson, W. A. Graves, E. C. Lindsay.
Board of Trade of Indianapolis	Indiana	D. M. Berry, E. F. Cox, John E. Wright, W. R. Nofsinger, S. T. Bowen.
Chamber of Commerce of Saint Paul	Minnesota	R. Ormsby Sweeney, Rev. J. Mattocks, J. Fletcher Williams.
Board of Trade of Burlington	Vermont	G. G. Benedict, Prof. Peter Collier, Prof. McK. Petty.
Union Merchants' Exchange of Saint Louis.	Missouri	George P. Plant, R. P. Fancy, W. H. Scudder.
Chamber of Commerce of Galveston	Texas	J. S. Thrasher, W. Richardson, C. G. Forshey.
Board of Trade of Shreveport	Louisiana	George Williamson, R. D. Sale, George A. Pike.
Chamber of Commerce of San Diego	California	E. T. Spence, T. J. Higgins, Douglass Gunn.
Philadelphia County Medical Society	Pennsylvania	Benjamin Lee, M. O'Hara, J. R. Wells, R. Burns, L. Turnbull.
Board of Trade of Davenport	Iowa	James M. Dalzell, Edward Russell, F. A. Angel.
Board of Trade of Jacksonville	Florida	A. S. Baldwin.
Chamber of Commerce of Indianola	Texas	G. Seeligson, W. P. Milby, D. Sullivan.
Board of Trade of La Crosse	Wisconsin	William W. Jones, James J. Lyndes, S. L. Nevins.
Cotton Exchange of New Orleans	Louisiana	John J. Noble, Cyrus Bussey, Thomas Henderson.
Chamber of Commerce of New Haven	Connecticut	Johnson T. Platt, Mayor Lewis, E. S. Wheeler.
Chamber of Commerce of Cairo	Illinois	W. P. Holliday, Charles M. Howe, Peter Cubl.
Board of Trade of Cincinnati	Ohio	Daniel B. Pierson.
Board of Trade of Dubuque	Iowa	Dr. Asa Horr, Franklin Hinds, N. C. Ryder.
Board of Trade of Albany	New York	William H. Hale, E. C. Jackson, E. T. Durant.
Board of Trade of Louisville	Kentucky	J. L. Smith, Dr. B. M. Wible, R. A. Robinson, John A. Carter, J. Val Cowling.
At Springfield	Massachusetts	E. W. Bond, D. B. Wesson, J. G. Benton, W. G. Chamberlain, M. C. Stebbins.

PAPER 12.

List of volunteer observers reporting under the direction of the Chief Signal-Officer, United States Army, June 30, 1875.

Albree, George	Pittsburgh, Allegheny County, Pennsylvania.
Anderson, 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, John A	Statesville, Iredell County, North Carolina.
Abbott, E. K	Salinas City, Monterey County, California.
Alison, H. L	Carlowville, Dallas County, Alabama.
Armstrong, Rev. G. C	Fayette, Jefferson County, Mississippi.
Andrews, L	Southington, Hartford County, Connecticut.
Adams, E. W	Goldsboro', Wayne County, North Carolina.
Ashby, M. V	Afton, Union County, Iowa.
Alden, Thomas E	Rising Sun, Ohio County, Indiana.
Alden, George J	New Smyrna, Volusia County, Florida.
Ashhurst, Dr. Francis	Mount Holly, Burlington County, New Jersey

List of volunteer observers, &c.—Continued.

Arnold, C. P	Angelica, Alleghany County, New York.
Allin, Lucius C	Springfield, Hampden County, Massachusetts.
Adriance, Charles E	Hector, Schuyler County, New York.
Acuna, Leon M	St. John's, island of Porto Rico, W. I.
Amos, Franklin	Ringgold, Morgan County, Ohio.
Beans, Thomas J	Moorestown, Burlington County, New Jersey.
Breed, J. E	Embarrass, Waupaca County, Wisconsin.
Bentley, E. T	Tioga, Tioga County, Pennsylvania.
Barrows, Storrs	South Trenton, Oneida County, New York.
Beecher, Charles	Newport, Wakulla County, Florida.
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.
Brooks, Samuel	Chicago, Cook County, Illinois.
Bœrner, C. G	Vevay, Switzerland County, Indiana.
Beall, R. L	Lenoir, Caldwell County, North Carolina.
Brendell, Fred	Peoria, Peoria County, Illinois.
Barker, Ebenezer	St. Mary's, Camden County, Georgia.
Bryant, A. F	Clear Creek, Saunders County, Nebraska.
Benton, E. H	Le Roy, Dodge County, Wisconsin.
Blodget, J. H	Rockford, Winnebago County, Illinois.
Bartlett, E. B	Vermillion, Oswego County, New York.
Blaisdell, A. A	Beloit, Rock County, Wisconsin.
Ballou, N. E	Sandwich, De Kalb County, Illinois.
Babcock, E	Boonesborough, Boone County, Iowa.
Bluhm, P. C	Smithville, De Kalb County, Tennessee.
Bourke, J. G., 2d Lt., 3d U. S. Cav'y	Prescott, Yavapai County, Arizona.
Benner, D. J	South Bend, St. Joseph County, Indiana.
Byers, William N	Hot Sulphur Springs, Grande County, Colorado.
Beegle, H. B	Ocean Grove, Monmouth County, New Jersey.
Boies, A. H	Hudson, Lenawee County, Michigan.
Brown, Charles N	Utica, Dane County, Wisconsin.
Blodgett, Charles	Howard, Nemaha County, Nebraska.
Behrens, Charles M	North Shippen, Cameron County, Pennsylvania.
Bulloch, Thomas	Coalville, Summit County, Utah.
Bartlett, George S	Whitewater, Walworth County, Wisconsin.
Bayles, Mason	Glenwood, Mills County, Iowa.
Barton, Stephen	Visalia, Tulare County, California.
Buck, Frank	Orland, Hancock County, Maine.
Brown, H. W	Richmond, Furnas County, Nebraska.
Blood, Charles F	Waltham, Middlesex County, Massachusetts.
Barry, Dr. William H	Hot Springs, Garland County, Arkansas.
Child, A. L	Plattsmouth, Cass County, Nebraska.
Clark, Dr. James T	Mount Solon, Augusta County, Virginia.
Chandler, 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.
Connell, Mrs. Jane	Houston, Harris County, Texas.
Cheney, William	Minneapolis, Hennepin County, Minnesota.
Crosier, Adam	Laconia, Harrison County, Indiana.
Collin, John	Shelburne, Coos County, New Hampshire.
Crane, George W	Bethel, Clermont County, Ohio.
Carman, Fred. D	Jacksonville, Tompkins County, New York.
Cothane, T. W	Cave Spring, Greene County, Missouri.
Cutler, J. L	Quitman, Brooks County, Georgia.
Cochrane, Joseph	Havana, Mason County, Illinois.
Cooke, Dr. William H	Carlisle, Cumberland County, Pennsylvania.
Clifford, J. R	Montville, Waldo County, Maine.
Clarke, B. W	Lockport, Niagara County, New York.
Curtis, W. W	Rocky Run, Columbia County, Wisconsin.
Cook, E. R	Trenton, Mercer County, New Jersey.
Couch, E. D	Contoocookville, Merrimack County, N. H.
Collin, Alonzo	Mount Vernon, Linn County, Iowa.

List of volunteer observers, &c.—Continued.

Chase, Dr. D. H	Louisville, Clay County, Illinois.
Curtis, George G	Fallston, Harford County, Maryland.
Clark, T. A	Weldon, Halifax County, North Carolina.
Chappellsmith, John	New Harmony, Posey County, Indiana.
Colby, Alfred	Amoskeag, Merrimack County, New Hampshire.
Chamberlin, S. N	Daytona, Volusia County, Florida.
Cline, Fred. P	Mesquite, Dallas County, Texas.
Cutler, Rev. B. B	Wendell, Franklin County, Massachusetts.
Calhoun, P. B	Austin, Wilson County, Tennessee.
Cleland, Rev. T. H	Delhi, Richland Parish, Louisiana.
Caswell, Alexis	Providence, Providence County, Rhode Island.
Cornell University	Ithaca, Tompkins County, New York.
Clendenin, R. H	Carroll, Dawson County, Montana.
Cleft, Henry A	Harbor Grace, Newfoundland.
Cornell University Observatory	Ithaca, Tompkins County, New York.
Church, E. P	Honolulu, Sandwich Islands.
Clark, F. L	Makawao, Sandwich Islands.
Colt, H. H	Nora Springs, Floyd County, Iowa.
Dawson, William	Spiceland, Henry County, Indiana.
Doton, Hosea	Woodstock, Windsor County, Vermont.
Duerrstein, Jacob	Marathon City, Marathon County, Wisconsin.
Denny, E. D	Stoutland, Camden County, Missouri.
Day, Theodore	Dyberry, Wayne County, Pennsylvania.
Daniells, W. W	Madison, Dane County, Wisconsin.
Dunn, William	Emerson, Otoe County, Nebraska.
Dickinson, J. P	Guttenberg, Clayton County, Iowa.
Duncan, A	Mount Sterling, Brown County, Illinois.
Delany, John	Saint John's, Newfoundland.
Dewhurst, Rev. E	Hinsdale, Berkshire County, Massachusetts.
Davis, Jacob	Florida, Berkshire County, Massachusetts.
Dawson, Miss Sina	Tonganoxie, Leavenworth County, Kansas.
Daviss, Mrs. D. D	Webster, Jackson County, North Carolina.
Dennis, W. A	Somonauk, De Kalb County, Illinois.
Dunning, J. S	Vail, Crawford County, Iowa.
Edwards, Daniel	Ceres, Allegany County, New York.
Emery, Josiah	Williamsport, Lycoming County, Pennsylvania.
Ellicott, James F	Saint Inigoes, Saint Mary's County, Maryland.
Edwards, B. J	Wood's Hole, Barnstable County, Massachusetts.
Ellis, Edwin	Ashland, Ashland County, Wisconsin.
Edington, R. P	Pontiac, Butler County, Kansas.
Ellis, J. M	Philadelphia, Philadelphia County, Pa.
Ferriss, E. J	Painesville, Lake County, Ohio.
Fallon, J	Lawrence, Essex County, Massachusetts.
Foster, R. W	Carrollton, Jefferson Parish, Louisiana.
Foster, H	Spring Garden, Bradley County, Tennessee.
Fleming, John	Readington, Somerset County, New Jersey.
Fuller, A. N	Hermosa, La Plata County, Colorado.
Fernald, Prof. M. C	Orono, Penobscot County, Maine.
Fales, J. C	Danville, Boyle County, Kentucky.
Fortescue, J	Hudson Bay Company, Canada.
Franklin, Dr. W. E	La Grange, Fayette County, Tennessee.
Friend, Charles H	Carson City, Ormsby County, Nevada.
Gardiner, R. H	Gardiner, Kennebec County, Maine.
Gilman, Robert H	Milford, Kent County, Delaware.
Gillingham, C	Accotink, Fairfax County, Virginia.
Gibbon, Lardner	Haciendo Saluda, Greenville County, S. C.
Green, H. A	Atco, Camden County, New Jersey.
Gardner, O. A. A	Belleville, Republic County, Kansas.
Grathwohl, John	Blooming Grove, Pike County, Pennsylvania.
Godfrey, M. P	Carlton, Orleans County, New York.
Grant, John	Manchester, Scott County, Illinois.
Glasco, J. M	Gilmer, Upsher County, Texas.
Goodwin, Spencer L	Warrensburgh, Johnson County, Missouri.
Green, T. E	Lebanon, Saint Clair County, Illinois.
Goodlander, Harry	Leesburgh, Kosciusko County, Indiana.
Gundrum, Jacob	Hanover, York County, Pennsylvania.
Gleitsman, Dr. W	Asheville, Buncombe County, North Carolina.

List of volunteer observers, &c.—Continued.

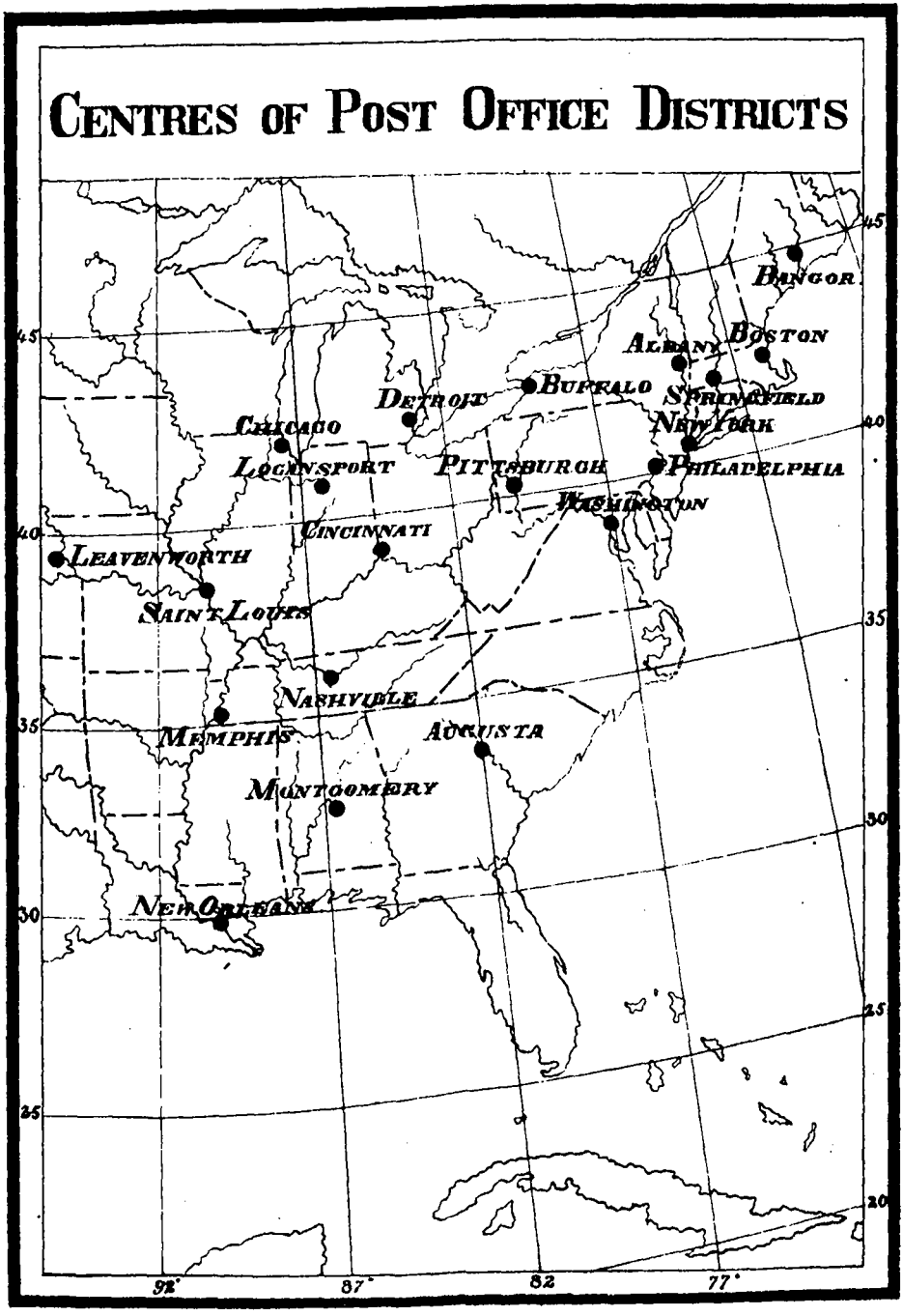
Harris, Wyatt	Mount Vernon, Lawrence County, Missouri.
Hyde, Gus. A	Cleveland, Cuyahoga County, Ohio.
Howard, jr., Thomas T	Jersey City, Hudson County, New Jersey.
Harkinson, R. M	Burlingame, Osage County, Kansas.
Harper, George W	Cincinnati, Hamilton County, Ohio.
Howard, S. A	Greensboro', Guilford County, North Carolina.
Hance, Ebenezer	Fallsington, Bucks County, Pennsylvania.
Hurlin, William	Plaistow, Rockingham County, New Hampshire.
Hosford, O	Olivet College, Eaton County, Michigan.
Heimstreet, J. W	Troy, Rensselaer County, New York.
Hammitt, J. W	College Hill, Hamilton County, Ohio.
Horn, David B	Kerwick Station, Albemarle County, Virginia.
Haworth, John	Hazelton, Luzerne County, Pennsylvania.
Higgins, F. W	Detroit, Wayne County, Michigan.
Hyland, William	Baxter Springs, Cherokee County, Kansas.
Howell, Robert	Nichols, Tioga County, New York.
Hunt, G. M	North Argyle, Washington County, New York.
Haas, Henry	Depauville, Jefferson County, New York.
Haywood, John	Westerville, Franklin County, Ohio.
Hoadley, James H	Santa Cruz, Santa Cruz County, California.
Hornung, B	Tiffin, Seneca County, Ohio.
Hardy, J. F. E	Asheville, Buncombe County, North Carolina.
Horn, H. B	Atchison, Atchison County, Kansas.
Hubbs, J. A	Brownsville, Fayette County, Pennsylvania.
Hurley, D. P	Troy, Pike County, Alabama.
Henry, Dr. W. E	Independence, Montgomery County, Kansas.
Hopkins, Dr. H. H	New Market, Frederick County, Maryland.
Hills, F. T	Manchester, Rockingham County, N. H.
Higgins, Prof	Wolfville, King's Province, Nova Scotia.
Hering, C. J	Paramaribo, South America.
Herran, Thos	Medellin, United States of Colombia, S. A.
Harcourt, J. D., & Sons	Wappinger's Falls, Dutchess County, New York.
Ingram, Dr. J	Vineland, Cumberland County, New Jersey.
Industrial University	Urbana, Champaign County, Illinois.
Ingalsbe, Grenvielle	South Hartford, Washington County, New York.
James, John W	Marengo, McHenry County, Illinois.
Johnson. Rev. Samuel	Rodman, Jefferson County, New York.
Jones, M. C	Newburyport, Essex County, Massachusetts.
Johnson, John	Middletown, Middlesex County, Connecticut.
Judson, J. A	Newport, Newport County, Rhode Island.
Jennison, H. L	Starkey, Yates County, New York.
Jennings, Dr. S. K	Purdy, McNairy County, Tennessee.
Kidder, L. D	Whitefield, Coös County, New Hampshire.
Kron, F. J	Albemarle, Stanley County, North Carolina.
Koch, Peter	Bozman, Meagher County, Montana Territory.
Kirkpatrick, J. G	Medicine Lodge, Barbour County, Kansas.
Keeler, W. F	Mayport, Duval County, Florida.
Kedzie, R. C	Lansing, Ingham County, Michigan.
Keese, G. P	Cooperstown, Otsego County, New York.
Kennedy, Thomas J	Castalian Springs, Sumner County, Tennessee.
Keenan, Mrs. W. E. A	Brook Haven, Lincoln County, Mississippi.
Kohler, Edward	Egypt, Lehigh County, Pennsylvania.
Kedzie, W. K	Manhattan, Riley County, Kansas.
Kemp, A. F., LL. D	Galesburgh, Knox County, Illinois.
Kentgen, Charles	Staten Island, New York.
King, Dr. J. S	Decatur, Macon County, Illinois.
Lüps, Jacob	Manitowoc, Manitowoc County, Wisconsin.
Love, Samuel G	Jamestown, Chautauqua County, New York.
Lewis, Miss Blanche L	McMinnville, Warren County, Tennessee.
Leoni, George N	New Iberia, Iberia Parish, Louisiana.
Ludwick, H. T. J	Mount Pleasant, Cabarrus County, N. Carolina.
Lilienhain, Capt. F	Str. "Baltimore," Baltimore and Bremen Line.
Laboratory, Iowa State University, care of Prof. G. Hinricks	Iowa City, Johnson County, Iowa.
Lewis, James	Kanab, Kane County, Utah.
Lee, Fred. S	Canton, Saint Lawrence County, New York.
Metcalf, John G	Mendon, Worcester County, Massachusetts.
Moore, C. R	Johnsontown, Northampton County, Virginia

List of volunteer observers, &c.—Continued.

Moulton, J. P.	Sebago Lake, Cumberland County, Maine.
Mead, S. B.	Augusta, Hancock County, Illinois.
McCormick, J. O.	Woodlawn, Cecil County, Maryland.
Martin, Horace.	Corning, Holt County, Missouri.
Morris, Prof. Oran W.	New York, New York County, New York.
Morelle, Rev. Daniel.	Wilmington, New Hanover County, N. C.
McConnell, E. M.	New Castle, Lawrence County, Pennsylvania.
Mueller, Dr. Rudolph.	Carthagena, Mercer County, Ohio.
Martin, Samuel D.	Pine Grove, Clarke County, Kentucky.
Marshall, G.	Cresco, Howard County, Iowa.
Marsden, J. H.	York Sulphur Springs, Adams County, Penn.
McCall, Charles	Cathlamet, Wankiakum County, Wash. Ter.
Martin, George	West Chester, Chester County, Pennsylvania.
McCready, Miss L. A.	Fort Madison, Lee County, Iowa.
Mathews, J. McD.	Hillsborough, Highland County, Ohio.
Moore, Nathan	Pennville, Clearfield County, Pennsylvania.
Minesinger, J. M.	Missoula, Missoula County, Montana Territory.
Merriweather, C. I.	Boonsborough, Bedford County, Virginia.
Munn, Archibald	Harbor Grace, Newfoundland.
Meade, H. C.	Waupaca, Waupaca County, Wisconsin.
McIlvaine, Charles J.	Kensico, Westchester County, New York.
Meeham, Thomas	Germantown, Philadelphia County, Penn.
Maxwell, Samuel A.	Lyndon, Whiteside County, Illinois.
McCutchan, W. T.	Goshen Bridge, Rockbridge County, Virginia.
Murdoch, W. H.	Kokomo, Howard County, Indiana.
Moss, G. B.	Belvidere, Boone County, Illinois.
Moore, Dr. J. L.	Shreveport, Louisiana.
McGill College	Montreal, Canada.
Merritt, Dr. J. C.	Farmingdale, Queens County, New York.
Mackall, jr., B. F.	Moorhead, Clay County, Minnesota.
Mays, Theo. J.	Upper Lehigh, Luzerne County, Pennsylvania.
Morris, John	Fristed, Davidson County, Montana Territory.
Muscott, J. N.	Atlanta, Rice County, Kansas.
Newcomb, G. S.	Westborough, Worcester County, Massachusetts
Noll, A. B.	New Germantown, Hunterdon County, N. J.
Nettleton, E. S.	South Pueblo, Pueblo County, Colorado.
Neill, Thomas	Sandusky, Erie County, Ohio.
Nason, Rev. Elias	North Billerica, Middlesex County, Mass.
Nicherson, Capt. A. H., 2d Infantry.	Prescott, Arizona.
Nixon, J. Sharp.	Chambersburgh, Pennsylvania.
Naval Hospital.	Mare Island, California.
Naval Hospital.	Annapolis, Maryland.
Naval Hospital.	Philadelphia, Pennsylvania.
Naval Hospital.	New York, New York.
Osborn, Ethan.	Hennepin, Putnam County, Illinois.
Owsley, J. B.	Jacksonburgh, Butler County, Ohio.
Ogden, James M.	Winchester, Clarke County, Kentucky.
Parker, F. M.	Bloomington, Monroe County, Indiana.
Patterson, J. S.	Berlin Heights, Erie County, Ohio.
Patrick, J. M.	North Volney, Oswego County, New York.
Phelps, E. S.	Wyanet, Bureau County, Illinois.
Phelps, Samuel B.	Norwich, Windsor County, Vermont.
Poe, J. H.	Chillicothe, Ross County, Ohio.
Puffer, A. W.	Mattoon, Coles County, Indiana.
Parker, J. D.	Mount Desert, Hancock County, Maine.
Peck, George H.	El Monte, Los Angeles County, California.
Pearce, T.	Eola, Polk County, Oregon.
Palmer, Mrs. J. R.	Rio Grande, Cape May, New Jersey.
Payne, J. S.	Grenada, Grenada County, Mississippi.
Patterson, H. N.	Oquawka, Henderson County, Illinois.
Page, W. F.	Blacksburgh, Montgomery County Virginia.
Phillips Academy.	Andover, Essex County, Massachusetts.
Quartermann, E. A.	Flushing, New York.
Richardson, C. F.	Freehold, Monmouth County, New Jersey.
Robertson, T. D.	Rockford, Winnebago County, Illinois.
Rodman, Samuel.	New Bedford, Bristol County, Massachusetts.
Russell, C. H.	Gouverneur, St. Lawrence County, New York.
Raser, John H.	Reading, Berks County, Pennsylvania.

List of volunteer observers, &c.—Continued.

Roos, Charles	New Ulm, Brown County, Minnesota.
Robertson, R. S.	Fort Wayne, Allen County, Indiana.
Runge, C	New Ulm, Austin County, Texas.
Ruggles, Homer	Rolla, Phelps County, Missouri.
Ralston, E	Weston, Lewis County, West Virginia.
Rockwell, Charlotte	Colebrook, Litchfield County, Connecticut.
Rollins, John F	Fort George Island, Duval County, Florida.
Remington, C. V. S	Fall River, Bristol County, Massachusetts.
Ring, John J	San Bernardino, San Bernardino County, Cal.
Rotch, William	Fall River, Bristol County, Massachusetts.
Sumner, D. H	Marion, Perry County, Alabama.
Seltz, Charles	De Soto, Washington County, Nebraska.
Stewart, W. M	Clarksville, Montgomery County, Tennessee.
Smith, E. A	Moriches, Suffolk County, New York.
Shriver, E. T	Cumberland, Alleghany County, Maryland.
Smith, William	Cannonsburgh, Washington Co., Pennsylvania.
Strong, L. H	Grand Rapids, Kent County, Michigan.
Stevens, Rev. D. W	Vineyard Haven, Dukes County, Massachusetts.
Smith, C. H	Kenton, Hardin County, Ohio.
Soule, Prof. William	Cazenovia, Madison County, New York
Shannon, J. M	Cabaniss, Monroe County, Georgia.
Slater, J. S	Marion, Smyth County, Virginia.
Stern, Jacob F	Logan, Harrison County, Iowa.
Scott, Thomas G	Forsyth, Monroe County, Georgia.
Scott, T. M	Melissa, Collin County, Texas.
Stratton, Thomas	Port Townsend, Saint Clair County, W. T.
Snell, E. S	Amherst, Hampshire County, Massachusetts.
Stillman, Spooner	Oneida, Madison County, New York.
Slenker, Elmina D	Snowville, Pulaski County, Virginia.
Smith, H. D	Norway, Oxford County, Maine.
Smith, George N	Northport, Lenawee County, Michigan.
Slade, Elisha	Somerset, Bristol County, Massachusetts.
Shoemaker, J. G	Le Roy, Coffee County, Kansas.
Smith, C. J	Hudson, Summit County, Ohio.
Shuman, J. M	Hampton, Elizabeth County, Virginia.
Sessions, Lewis	Norfolk, Madison County, Nebraska.
Salisbury, G. R	Kansas City, Jackson County, Missouri.
Stephenson, M. F	Dahlonega, Lumpkin County, Georgia.
Spaulding, J	Wautoma, Waushara County, Wisconsin.
Spencer, William C	Dubois, Washington County, Illinois.
Snow, Frank H	Lawrence, Douglas County, Kansas.
Sturtevant, E. T	Biscayne, Dade County, Florida.
Sommerville, W. B	Wilsonville, Shelby County, Alabama.
Smith, W	Spartanburgh, Spartanburgh County, S. C.
Scribner, H. F. J	Strafford, Orange County, Vermont.
Sanford, Shelton P	Macon, Bibb County, Georgia.
Smith, B. B	Ellinwood, Barton County, Kansas.
Stanton, J. C	Hutchinson, Jefferson County, Colorado.
Shriver, H. L	Wytheville, Wythe County, Virginia.
Southern Hospital for Insane	Anna, Union County, Illinois.
Shenandoah	United States Steamer.
Tayloe, Edward	Comorn, King George County, Virginia.
Truman, George S	Santee Agency, Knox County, Nebraska.
True, Dr. H. A	Marion, Marion County, Ohio.
Talbot, Benjamin	Council Bluffs, Pottawattamie County, Iowa.
Taylor, John	Dunbar, Fayette County, Pennsylvania.
Thompson, Rev. David	Arkansas City, Cowley County, Kansas.
Tutwiler, H	Green Spring, Hale County, Alabama.
Trip, O. H Trip, Rev. L. S	Surry, Hancock County, Maine.
Thralls, George R	Welborn, Suwanee County, Florida.
Townsend, Emma C	Capeville, Northampton County, Virginia.
Trowbridge, David	Waterburgh, Tompkins County, New York.
Thompson, F. E	Newport, Newport County, Rhode Island.
Teele, A. K	Blue Hill, Norfolk County, Massachusetts.
Turner, Ernest	Point Pleasant, Tensas Parish, Louisiana.
Trembley, J. B	San José, Santa Clara County, California.
Vanhekle, J. M	Delaware City, New Castle County, Delaware.


CENTRES OF POST OFFICE DISTRICTS
BANGOR
ALBANY
BOSTON
SPRINGFIELD
BUFFALO
DETROIT
CHICAGO
NEW YORK
LOGANSPORT
PITTSBURGH
PHILADELPHIA
WASHINGTON
CINCINNATI
LEAVENWORTH
SAINT LOUIS
NASHVILLE
MEMPHIS
AUGUSTA
MONTGOOMERY
NEW ORLEANS
45
40
35
30
25
20
92°
87°
82
77°

List of volunteer observers, &c.—Continued.

Valente, Prof. A. X	Woodstock, Howard County, Maryland.
Van Nostrand, J	Austin, Travis County, Texas.
Walters, Dr. James	Hatton, Jackson County, Kansas.
Waite, S. E.	Traverse City, Grand Traverse County, Mich.
Watkins, A. B	Adams, Jefferson County, New York.
West, Silas	Cornish, York County, Maine.
Warne, Dr. George	Independence, Buchanan County, Iowa.
Wild, Rev. E. P	Craftsbury, Orleans County, Vermont.
Winchell, Prof. N. H	Minneapolis, Hennepin County, Minnesota.
Walton, J. P	Muscatine, Muscatine County, Iowa.
Whitehead, W. A	Newark, Essex County, New Jersey.
Woodworth, A	Council Grove, Morris County, Kansas.
Wenger, Martin	Wooster, Wayne County, Ohio.
Wooster, C. A	North Hammond, St. Lawrence County, N. Y.
Wadey, H	Rockford, Floyd County, Iowa.
Wilson, Louis	Astoria, Clatsop County, Oregon.
White, I. H	Cincinnati, Hamilton County, Ohio.
Witter, D. R	Council Bluffs, Pottawattamie County, Iowa.
Wilber, Benjamin F	West Waterville, Kennebec County, Maine.
Williams, Milo G	Urbana, Champaign County, Ohio.
Whiting, William H	Geneva Lake, Walworth County, Wisconsin.
Wheaton, Mrs. D. B	Independence, Buchanan County, Iowa.
Warren, J. H	Alzona, Kossuth County, Iowa.
Woodbury, C. W	Sibley, Sibley County, Minnesota.
Wing, Minerva E	West Chester, Chittenden County, Vermont.
Willis, O. R	White Plains, Westchester County, New York.
Wylie, William	Mount Forest, Ontario County, Canada.
Walker, G. W	Atlanta, Fulton County, Georgia.
Wurts, T. F	Northampton, Hampshire County, Massachusetts.
Wyman, Charles A	Hutchinson, McLeod County, Minnesota.
Whittington, Granville	Mount Ida, Montgomery County, Arkansas.
Woodward, Dr. A. J	Ironton, Lawrence County, Ohio.
Walcott, A. D	Port Orford, Curry County, Oregon.
Williams College	Williamstown, Berkshire Co., Massachusetts.
Warner, Dr.	Durham, Washington County, Arkansas.
Yeamans, W. H	Columbia, Tolland County, Connecticut.
Young, George R	Pen Yan, Yates County, New York.
Yale, Walter D	Houseville, Lewis County, New York.
Young, E. J	Horn's Mills, Carroll County, New Hampshire.

PAPER 13.

List of United States military posts from which meteorological registers are received by arrangement with the Surgeon-General, U. S. A., at the office of the Chief Signal-Officer.

1. Augusta, Ga., (arsenal.)
2. Abercrombie, Dak., Fort.
3. Adams, R. I., Fort.
4. Angel Island, Cal.
5. Austin, Tex., Post of.
6. Alcatraz Island, Cal.
7. A. Lincoln, Dak., Fort.
8. Apache, Ariz., Camp.
9. Baton Rouge Barracks, La.
10. Baker, Mont., Camp.
11. Bayard, N. Mex., Fort.
12. Brady, Mich., Fort.
13. Buford, Dak., Fort.
14. Brown, Tex., Fort.
15. Bidwell, Cal., Camp.
16. Bridger, Wyo., Fort.
17. Boise, Idaho, Fort.
18. Benicia Barracks, Cal.
19. Brown, Wyo., Camp.
20. Bowie, Ariz., Camp.
21. Bliss, Tex., Fort.
22. Colville, Wash., Fort.
23. Cape Disappointment, Wash., Fort.
24. Concho, Tex., Fort.
25. Craig, N. Mex., Fort.
26. Columbus, New York Harbor, Fort.
27. Carlisle Barracks, Pa.
28. Clark, Tex., Fort.
29. Columbia, S. C.
30. Douglas, Utah, Camp.
31. Duncan, Tex., Fort.
32. Foote, Md., Fort.
33. Fetterman, Wyo., Fort.
34. Fred Steele, Wyo., Fort.
35. Gibson, Ind. T., Fort.
36. Gaston, Cal., Camp.
37. Garland, Colo., Fort.
38. Griffin, Tex., Fort.
39. Humboldt, Tenn.
40. Hays, Kans., Fort.

List of United States military posts, &c.—Continued.

41. Halleck, Nev., Camp.
42. Hall, Idaho, Fort,
43. Hamilton, New York Harbor, Fort.
44. Harney, Oreg., Camp.
45. Independence, Cal., Camp.
46. Independence, Mass., Fort.
47. Jackson, Miss.
48. Johnson, N. C., Fort.
49. Klamath, Oreg., Fort.
50. Larned, Kans., Fort.
51. Lowell, Ariz., Camp.
52. Lyon, Colo., Fort.
53. Mount Vernon Barracks, Ala.
54. McPherson, Nebr., Fort.
55. McPherson Barracks, Ga.
56. Macon, N. C., Fort.
57. McDowell, Ariz., Camp.
58. McIntosh, Texas, Fort.
59. McHenry, Md., Fort.
60. Monroe, Va., Fort.
61. Madison Barracks, N. Y.
62. Mojave, Ariz., Fort.
63. McDermitt, Nev., Camp.
64. Niagara, N. Y., Fort.
65. Newport Barracks, Ky.
66. Oglethorpe Barracks, Ga.
67. Porter, N. Y., Fort.
68. Pembina, Dak., Fort.
69. Point San José, Cal.
70. Plattsburgh Barracks, N. Y.
71. Rock Island Arsenal, Ill.
72. Randall, Dak., Fort.
73. Richardson, Texas, Fort.
74. Ripley, Minn., Fort.
75. Raleigh, N. C.
76. Ringgold Barracks, Texas.
77. Riley, Kans., Fort.
78. Sanders, Wyo., Fort.
79. Sidney Barracks, Neb.
80. Sill, Ind. Ter., Fort.
81. Stevens, Oreg., Fort.
82. Stockton, Texas, Fort.
83. Shaw, Mont., Fort.
84. Supply, Ind. Ter., Camp.
85. Stambaugh, Wyo., Camp.
86. Sitka, Alaska.
87. Seward, Dak., Fort.
88. Selden, N. Mex., Fort.
89. Thomas Barracks, Ala.
90. Totten, Dak., Fort.
91. Townsend, Wash., Fort.
92. Trumbull, Conn., Fort.
93. Union, N. Mex., Fort.
94. Verde, Ariz., Camp.
95. Wayne, Mich., Fort.
96. Wallace, Kans., Fort.
97. Wadsworth, New York Harbor, Fort.
98. Whipple, Ariz., Fort.
99. West Point, N. Y.
100. Wadsworth, Dak., Fort.
101. Willet's Point, New York Harbor.
102. Wrangle, Alaska, Fort.
103. Yuma, Cal., Fort.

PAPER 14.

Names, &c., of vessels from which logs have been received during the year ending June 30, 1875.

Names of vessels.	Kind.	Total No. logs received.	Names of vessels.	Kind.	Total No. logs received.
Ocean Rover	Bark	1	Good Templar	Schooner	1
Allahabad	Ship	1	Addie Fuller	do	1
Nereus	do	1	J. B. Ford	Brig	1
Nimbus	do	1	Baltimore	Steamship	2
Adriatic	do	1	Berlin	do	4
El Capitan	do	1	Java	do	1
Sparrowhawk	do	1	Wachusett	do	1
Coloma	do	1	Wasp	do	12
D. C. Murray	Bark	1	Lancaster	do	1
Hansa	do	1	Onward	do	12
Lord Macauley	do	1	Monocacy	do	12
Saco	Steamship	12	Hartford	do	12

PAPER 15.

STATION STATISTICS.

Monthly and annual mean pressures—July, 1874, to June, 1875, inclusive.

Stations.	1874.						1875.						Annual means.
	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Albany, N. Y	29.931	29.956	30.036	30.029	30.078	30.080	30.179	30.055	30.088	29.950	29.928	29.964	30.023
Alpena, Mich	29.934	30.022	29.988	30.038	30.015	30.030	30.123	30.018	30.009	29.954	29.895	29.916	29.995
Atlantic City, N. J	30.041	30.022	30.089	30.115	30.182	30.158	30.196	30.119	30.089	29.966	29.996	30.039	30.084
Augusta, Ga	30.073	30.029	30.067	30.143	30.199	30.237	30.201	30.177	30.098	30.011	29.978	30.048	30.105
Baltimore, Md	30.011	30.023	30.081	30.119	30.190	30.168	30.218	30.126	30.081	29.976	29.978	30.020	30.082
Barnegat, N. J	29.944	29.937	30.015	30.031	30.101	30.075	30.120	30.038	30.066	29.947	29.976	30.035	30.024
Benton, Mont	29.770	29.994	30.010	30.102	29.975	30.032	30.122	30.039	29.895	30.096	29.890	29.991	29.993
Biskmarck, Dak				29.943	29.945	29.980	30.211	30.155	29.931	29.912	29.630	29.739	
Boston, Mass	30.005	30.004	30.085	30.051	30.103	30.074	30.123	30.004	30.062	29.909	29.944	29.990	30.029
Breckinridge, Minn	29.839	29.886	29.897	30.040	30.019	30.103	30.288	30.247	30.032	30.000	29.824	29.863	30.003
Buffalo, N. Y	29.943	29.995	30.031	30.033	30.063	30.084	30.165	30.067	30.028	29.953	29.910	29.946	30.020
Burlington, Vt	29.953	29.924	30.066	30.042	30.093	30.091	30.162	30.031	30.075	29.946	29.909	29.943	30.022
Cairo, Ill	30.002	29.974	30.018	30.149	30.165	30.226	30.260	30.177	30.028	30.016	29.973	30.003	30.085
Cape Hatteras, N. C				30.107	30.171	30.197	30.169	30.149	30.082	29.982	30.019	30.083	
Cape Henry, Va	29.979	29.956	29.995	30.044	30.112	30.176	30.219	30.153	30.109	29.993	30.021	30.068	30.069
Cape May, N. J	30.043	30.019	30.083	30.086	30.190	30.170	30.210	30.129	30.089	29.972	30.001	30.044	30.086
Charleston, S. C	30.058	30.038	30.058	30.122	30.184	30.233	30.197	30.184	30.114	30.035	30.025	30.101	30.112
Cheyenne, Wyo	30.098	30.079	30.062	30.082	29.881	29.950	29.795	29.820	29.810	29.945	29.913	30.004	29.953
Chicago, Ill	29.939	29.953	29.991	30.055	30.023	30.097	30.214	30.098	29.959	29.959	29.905	29.934	30.010
Cincinnati, Ohio	30.007	30.007	30.059	30.130	30.169	30.189	30.237	30.158	30.016	29.987	29.953	29.955	30.072
Cleveland, Ohio	29.939	29.974	30.009	30.041	30.083	30.086	30.206	30.074	29.995	29.958	29.917	29.952	30.019
Colorado Springs, Colo	30.077	30.062	30.042	30.081	29.886	29.954	29.801	29.805	29.798	29.923	29.905	29.987	29.943
Corsicana, Tex				30.129	30.110	30.164	30.223	30.109	29.998	30.035	29.928	29.983	
Davenport, Iowa	29.947	29.949	30.013	30.116	30.111	30.171	30.305	30.170	30.010	29.977	29.907	29.927	30.050
Denver, Colo	30.111	30.091	30.076	30.112	29.942	30.023	29.899	29.962	29.883	30.006	29.947	30.020	30.001
Detroit, Mich	29.930	29.982	30.003	30.054	30.078	30.086	30.189	30.081	30.006	29.956	29.901	29.937	30.017
Dodge City, Kans				29.774	29.747	29.887	29.975	29.783	29.598	29.650	29.501	29.494	
Dubuque, Iowa	29.923	29.970	30.004	30.085	30.073	30.145	30.280	30.163	29.994	29.988	29.909	29.932	30.039
Duluth, Minn	29.881	29.963	29.920	30.029	29.996	30.051	30.201	30.128	30.019	30.001	29.890	29.911	29.999
Eastport, Me	29.997	29.980	30.066	29.986	30.037	29.998	30.022	29.896	30.040	29.868	29.918	29.952	29.980
Erie, Pa	29.931	29.980	30.016	30.048	30.071	30.084	30.174	30.073	30.008	29.951	29.903	29.940	30.015
Escanaba, Mich	29.898	29.996	29.952	30.029	29.988	30.020	30.156	30.065	30.006	29.975	29.911	29.927	29.993
Fort Gibson, Ind. T	29.925	29.867	29.959	30.087	30.051	30.142	30.219	30.089	29.953	29.955	29.877	29.914	30.003
Fort Sully, Dak	29.766	29.813	29.879	30.040	30.037	30.078	30.305	30.222	29.997	30.005	29.759	29.796	29.975
Galveston, Tex	30.022	29.993	29.973	30.119	30.120	30.152	30.168	30.116	30.029	30.041	29.971	30.050	30.063
Grand Haven, Mich	29.941	29.989	29.998	30.058	30.150	30.083	30.178	30.068	29.994	29.970	29.916	29.948	30.024
Indianapolis, Ind	29.954	29.952	30.020	30.093	30.116	30.165	30.232	30.129	29.999	29.964	29.922	29.948	30.041

Monthly and annual mean pressures—July, 1874, to June, 1875, inclusive—Continued.

Stations.	1874.						1875.						Annual means.
	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Indianola, Tex	30.051	30.018	29.994	30.146	30.128	30.166	30.191	30.120	30.028	30.053	29.971	30.052	30.076
Jacksonville, Fla	30.075	30.029	30.029	30.100	30.151	30.225	30.183	30.184	30.117	30.052	30.013	30.104	30.022
Keokuk, Iowa	29.909	29.903	29.976	30.068	30.067	30.139	30.243	30.118	29.966	29.940	29.835	29.881	30.004
Key West, Fla	30.072	30.010	29.980	30.004	30.065	30.172	30.142	30.143	30.111	30.083	30.007	30.099	30.074
Kitty Hawk, N. C							30.390	30.218	30.068	29.981	30.019	30.084	
Knoxville, Tenn	30.028	29.988	30.046	30.123	30.173	30.211	30.185	30.154	30.036	29.992	29.964	30.024	30.077
La Crosse, Wis	29.921	29.979	29.992	30.078	30.069	30.127	30.271	30.156	29.999	29.965	29.882	29.917	30.029
Leavenworth, Kans	29.886	29.854	29.958	30.063	30.071	30.162	30.268	30.120	29.967	29.961	29.850	29.851	30.001
Lexington, Ky	29.989	29.984	30.050	30.123	30.165	30.210	30.247	30.173	30.028	30.002	29.971	30.009	30.079
Long Branch, N. J	29.977	29.972	30.045	30.055	30.145	30.100	30.146	30.084	30.108	29.975	29.987	30.031	30.052
Louisville, Ky	29.965	29.947	30.026	30.110	30.144	30.184	30.230	30.152	30.013	30.003	29.920	29.972	30.055
Lynchburg, Va	30.021	30.028	30.080	30.137	30.213	30.204	30.221	30.155	30.071	29.974	29.994	30.024	30.094
Marquette, Mich	29.898	29.999	29.928	30.024	29.974	30.006	30.141	30.058	30.006	29.986	29.905	29.922	29.987
Memphis, Tenn	30.023	29.989	30.045	30.158	30.162	30.218	30.241	30.165	30.031	30.032	29.981	29.989	30.086
Milwaukee, Wis	29.967	30.010	30.002	30.103	30.075	30.142	30.254	30.132	30.023	29.994	29.931	29.961	30.049
Mobile, Ala	30.054	30.017	30.025	30.128	30.163	30.216	30.179	30.178	30.081	30.063	30.005	30.094	30.100
Montgomery, Ala	30.053	30.011	30.045	30.139	30.187	30.244	30.211	30.198	30.095	30.054	30.004	30.084	30.110
Morgantown, W. Va	29.965	29.989	30.041	30.098	30.150	30.154	30.199	30.113	30.016	29.958	29.930	29.982	30.049
Mount Washington, N. H	30.276	30.252	30.228	30.086	29.927	29.769	29.689	29.565	29.835	29.850	30.040	30.198	29.976
Nashville, Tenn	29.993	29.973	30.057	30.141	30.168	30.221	30.229	30.163	30.030	30.011	29.971	29.997	30.080
New Haven, Conn	30.023	30.026	30.108	30.101	30.168	30.139	30.191	30.078	30.103	29.957	29.979	30.034	30.076
New London, Conn	30.031	30.015	30.097	30.087	30.161	30.127	30.169	30.066	30.097	29.953	29.993	30.043	30.070
New Orleans, La	30.039	30.006	30.006	30.115	30.146	30.188	30.161	30.150	30.055	30.056	29.993	30.080	30.083
New York, N. Y	30.021	30.015	30.096	30.101	30.171	30.160	30.202	30.104	30.102	29.973	29.987	30.029	30.080
Norfolk, Va	30.071	30.038	30.094	30.145	30.211	30.206	30.214	30.154	30.098	29.991	30.023	30.069	30.109
North Platte, Nebr				29.728	29.669	29.822	29.936	29.772	29.611	29.648	29.439	29.441	
Omaha, Nebr	29.860	29.845	29.943	30.055	30.052	30.147	30.278	30.167	29.979	29.958	29.824	29.830	29.995
Oswego, N. Y	29.956	30.014	30.055	30.062	30.093	30.090	30.165	30.051	30.065	29.972	29.938	29.977	30.037
Pembina, Dak	29.809	29.883	29.849	30.018	29.998					30.003	29.826	29.853	
Philadelphia, Pa	30.030	30.032	30.100	30.115	30.200	30.175	30.231	30.131	30.103	29.978	29.993	30.034	30.094
Peck's Beach, N. J	30.055	30.031	30.096	30.139	30.206	30.182	30.229	30.131	30.079	29.978	30.006	30.051	30.098
Pike's Peak, Colo	30.316	30.279	30.137	30.086	29.831	29.817	29.597	29.648	29.606	29.838	29.991	30.184	29.944
Pittsburgh, Pa	29.955	29.987	30.003	30.092	30.144	30.144	30.206	30.119	30.022	29.958	29.927	29.943	30.042
Port Huron, Mich			30.017	30.059	30.077	30.095	30.194	30.077	30.016	29.965	29.911	29.952	
Portland, Me	29.937	29.941	30.032	29.976	30.006	30.045	30.119	29.974	30.076	29.917	29.946	29.985	29.995
Portland, Oreg	30.071	30.065	30.060	30.096	30.030	30.248	30.211	30.243	30.129	30.183	30.113	30.119	30.131
Punta Rassa, Fla	30.086	30.030	30.016	30.058	30.101	30.199	30.162	30.182	30.142	30.104	30.031	30.124	30.103
Rochester, N. Y	29.935	29.990	30.028	30.048	30.074	30.078	30.158	30.053	30.043	29.949	29.908	29.945	30.017
Salt Lake City, Utah	29.981	29.942	29.983	30.029	29.959	30.111	29.950	30.026	29.977	30.006	29.903	29.921	29.982
San Diego, Cal	29.963	29.943	29.905	30.024	30.060	30.125	30.099	30.097	30.107	30.054	29.973	30.000	30.030
Sandy Hook, N. J	30.020	30.010	30.073	30.097	30.164	30.137	30.185	30.084	30.087	29.952	29.964	30.011	30.065

San Francisco, Cal	29.959	29.966	29.912	29.998	30.054	30.177	30.065	30.112	30.176	30.062	29.978	29.971	30.036
Santa Fé, N. Mex	29.876	29.879	29.980	29.850	29.730	29.745	29.636	29.635	29.605	29.679	29.706	29.809	29.761
Savannah, Ga	30.080	30.036	30.058	30.136	30.195	30.246	30.194	30.186	30.112	30.034	30.013	30.095	30.115
Shreveport, La	30.013	29.964	29.912	30.048	30.043	30.135	30.218	30.137	30.026	30.039	29.968	30.031	30.045
Saint Louis, Mo	29.980	29.969	30.029	30.127	30.141	30.205	30.220	30.175	30.021	30.006	29.954	29.962	30.071
Saint Mark's, Fla	.....	.....	.....	.....	30.134	30.225	30.167	30.179	30.109	30.055	30.007	30.096	.....
Saint Paul, Minn	29.842	29.892	29.908	30.003	29.951	30.050	30.214	30.114	29.940	29.916	29.808	29.843	29.957
Saint Paul's Island, Behring Sea	29.880	29.917	29.704	29.638	29.548	29.374	29.681	29.411	29.934	30.035	29.749	29.711	29.715
Springfield, Mass	.....	.....	.....	.....	30.144	30.115	30.178	30.056	30.098	29.947	29.959	30.007	.....
Squan Beach, N. J	30.017	30.015	30.082	30.097	30.165	30.138	30.192	30.099	30.087	29.954	29.977	30.023	30.071
Toledo, Ohio	29.971	29.983	30.018	30.071	30.096	30.116	30.212	30.055	29.950	29.978	29.929	29.941	30.027
Tybee Island, Ga	.....	.....	.....	30.121	30.189	30.247	30.204	30.198	30.124	30.050	30.026	30.093	.....
Vicksburgh, Miss	30.078	30.054	30.080	30.191	30.216	30.265	30.261	30.209	30.089	30.096	30.036	30.118	30.141
Virginia City, Mont	29.784	29.763	29.783	29.796	29.612	29.769	29.590	29.644	29.568	29.758	29.649	29.736	29.704
Washington, D. C	30.021	30.027	30.086	30.133	30.207	30.189	30.234	30.143	30.094	29.990	29.996	30.036	30.096
Wilmington, N. C	30.089	30.005	30.066	30.130	30.197	30.231	30.195	30.172	30.103	30.010	30.029	30.093	30.110
Wood's Hole, Mass	30.043	30.022	30.110	30.085	30.148	30.111	30.152	30.043	30.080	29.933	29.987	30.040	30.063
Wytheville, Va	29.832	29.828	29.895	29.955	30.008	30.011	29.989	29.933	29.843	29.764	29.764	29.826	29.887
Yankton, Dak	29.880	29.886	29.979	30.091	30.088	30.179	30.356	30.278	30.053	30.030	29.842	29.870	30.044

PAPER 16.

STATION STATISTICS.

Monthly and annual mean temperatures—July, 1874, to June 30, 1875, inclusive.

Stations.	1874.						1875.						Annual means.
	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
	°	°	°	°	°	°	°	°	°	°	°	°	°
Albany, N. Y.	71.1	66.9	63.3	49.1	36.4	27.3	15.6	16.0	26.6	39.0	57.4	66.9	44.6
Alpena, Mich.	65.1	63.3	59.9	45.6	33.4	23.3	10.0	4.1	19.6	32.2	47.8	58.7	38.6
Atlantic City, N. J.	70.3	69.5	67.8	55.6	44.3	37.0	28.3	26.2	35.1	42.6	54.8	64.5	49.7
Augusta, Ga.	78.5	78.8	74.7	63.5	56.7	•49.1	44.9	46.9	55.4	60.9	73.0	78.4	63.4
Baltimore, Md.	77.3	72.8	69.9	56.6	45.3	39.0	30.1	29.3	39.5	49.4	64.1	73.7	53.9
Barnegat, N. J.	70.2	69.1	66.6	54.9	42.8	34.8	25.7	25.4	35.0	43.2	55.9	65.2	49.1
Benton, Mont.	75.1	69.1	58.0	49.8	19.4	29.6	−8.6	13.9	27.8	43.0	58.1	62.0	41.4
Bismarck, Dak.	.....	.....	.....	41.3	18.1	15.6	−8.9	−5.9	15.3	33.9	56.1	60.9	.....
Boston, Mass.	72.2	67.7	63.8	53.4	41.5	31.9	20.9	22.8	31.7	42.2	57.3	66.5	47.6
Breckinridge, Minn.	70.2	67.8	57.8	43.8	21.4	12.8	−9.5	−7.9	14.7	36.1	56.0	60.8	35.3
Buffalo, N. Y.	69.4	67.9	65.5	50.0	38.4	29.1	17.3	13.0	27.4	36.3	51.9	64.1	44.2
Burlington, Vt.	70.4	66.1	61.9	50.4	36.1	22.4	12.7	14.1	25.9	38.5	55.8	67.3	43.5
Cairo, Ill.	81.3	78.6	71.9	58.2	47.6	40.4	28.1	32.5	41.9	54.8	65.9	74.2	56.3
Cape Hatteras, N. C.	.....	.....	.....	63.7	56.9	49.3	44.9	43.7	52.6	53.7	64.7	72.9	.....
Cape Henry, Va.	76.5	73.8	72.0	62.4	53.0	45.1	36.6	36.2	45.9	51.0	63.8	73.4	57.6
Cape May, N. J.	69.2	68.8	68.6	57.3	46.1	38.2	28.8	28.8	36.9	44.4	55.8	64.8	50.6
Charleston, S. C.	79.3	79.1	75.8	66.7	58.8	53.1	47.3	49.2	57.1	60.8	71.7	78.2	64.7
Cheyenne, Wyo.	71.8	68.6	54.2	46.7	35.8	29.1	12.5	25.6	24.3	36.9	54.7	63.7	43.6
Chicago, Ill.	74.7	71.9	66.8	53.3	40.3	33.5	17.7	15.1	31.8	42.7	55.5	63.0	47.2
Cincinnati, Ohio.	79.3	77.4	71.9	59.8	45.6	40.9	26.7	27.4	41.1	49.8	65.1	72.9	54.8
Cleveland, Ohio.	72.4	70.2	66.9	52.5	39.6	31.9	18.1	16.6	31.5	40.7	57.6	66.7	47.1
Colorado Springs, Colo.	73.2	70.3	56.7	49.9	37.9	28.1	19.1	29.2	30.4	41.6	57.3	67.9	46.8
Corsicana, Tex.	.....	.....	.....	67.3	58.2	51.1	36.8	42.5	55.8	61.3	72.9	79.5	.....
Davenport, Iowa.	78.0	74.4	65.5	52.5	36.4	27.9	9.4	10.9	30.4	46.3	60.9	68.6	46.8
Denver, Colo.	76.1	73.0	59.0	52.9	42.2	29.7	16.8	32.3	33.4	44.5	60.2	70.4	49.2
Detroit, Mich.	71.4	67.9	66.7	51.3	38.4	29.7	15.3	12.3	28.3	40.9	57.5	67.2	45.6
Dodge City, Kans.	.....	.....	.....	60.7	48.4	34.2	13.2	29.8	38.1	47.9	65.4	75.4	.....
Dubuque, Iowa.	80.0	74.2	65.5	52.2	34.7	26.0	6.8	6.5	29.2	45.0	60.5	67.5	45.7
Duluth, Minn.	67.9	64.0	59.4	47.7	27.2	17.6	0.4	0.9	20.1	35.3	48.9	55.8	37.1
Eastport, Me.	59.6	59.2	56.3	49.0	36.3	23.9	13.9	17.5	25.6	36.4	47.0	53.6	39.8
Erie, Pa.	72.7	71.4	69.4	54.0	41.8	33.1	20.1	16.7	31.4	39.9	57.4	66.1	47.8
Escanaba, Mich.	66.9	64.4	60.1	45.5	31.3	21.2	4.6	−0.1	19.4	31.9	49.0	58.5	37.7
Fort Gibson, Ind. T.	83.1	86.1	71.5	60.9	50.7	43.4	27.7	38.7	47.7	56.7	67.6	77.9	59.3
Fort Sully, Dak.	79.2	76.1	65.2	50.9	26.2	26.9	0.1	4.2	22.3	39.2	60.1	66.0	43.0
Galveston, Tex.	82.5	84.4	79.5	71.8	65.1	59.5	48.3	55.3	62.1	65.9	77.0	83.5	69.6
Grand Haven, Mich.	70.4	68.4	63.9	51.6	39.3	30.7	18.6	12.9	28.5	39.8	53.6	61.7	44.9
Indianapolis, Ind.	78.5	75.9	69.6	55.5	42.4	35.6	20.5	21.6	37.3	49.7	62.6	70.8	51.7
Indianola, Tex.	82.3	84.3	79.2	73.2	66.4	59.1	46.0	56.4	63.4	66.4	76.3	82.2	69.5
Jacksonville, Fla.	79.7	81.5	77.4	69.4	64.5	59.1	56.4	55.4	64.0	66.6	74.9	80.2	69.1
Keokuk, Iowa.	80.5	76.8	67.1	55.7	40.2	31.6	16.7	18.1	34.1	49.5	62.9	71.4	50.4
Key West, Fla.	83.0	84.0	75.0	77.0	75.0	73.7	74.8	73.3	75.8	74.2	79.5	81.9	77.3
Kittyhawk, N. C.	.....	.....	.....	.....	.....	.....	.....	40.4	48.1	51.4	63.6	71.3	.....
Knoxville, Tenn.	77.1	73.8	69.2	56.6	46.9	40.6	34.8	35.1	46.9	52.7	66.4	72.9	56.1
La Crosse, Wis.	77.1	71.9	62.9	52.4	34.8	26.6	5.6	6.8	28.1	44.0	60.6	65.8	44.7
Leavenworth, Kans.	82.8	81.3	66.8	57.0	40.0	32.7	16.7	22.3	37.6	49.8	65.8	76.7	52.4
Lexington, Ky.	77.8	75.1	70.9	56.4	45.6	38.7	28.2	30.3	42.8	49.6	63.6	72.2	54.3
Long Branch, N. J.	71.4	69.9	67.5	54.4	42.6	37.4	27.9	27.1	34.3	41.9	56.2	66.0	49.7
Louisville, Ky.	80.7	79.3	72.2	57.5	45.8	39.2	26.4	29.1	42.4	52.7	66.3	75.3	55.6
Lynchburgh, Va.	77.9	72.0	69.0	56.0	44.8	40.7	32.3	34.3	45.5	53.1	66.5	74.1	55.5
Marquette, Mich.	64.5	62.9	60.2	46.8	31.0	22.5	7.2	2.3	20.0	33.9	49.4	57.2	38.1
Memphis, Tenn.	82.8	82.9	73.2	60.3	52.0	45.6	34.1	40.2	50.6	57.7	68.6	79.1	60.8
Milwaukee, Wis.	71.5	68.1	63.6	50.2	35.5	25.4	10.4	•8.4	26.0	38.0	51.9	60.0	42.4
Mobile, Ala.	80.8	83.8	77.9	67.4	60.2	54.3	49.8	50.9	60.2	63.2	75.3	80.8	67.0
Montgomery, Ala.	79.9	82.6	76.2	65.1	58.2	51.7	47.2	49.6	57.4	62.6	74.5	80.7	65.5
Morgantown, W. Va.	74.1	69.5	66.9	52.4	42.9	37.6	27.7	27.2	40.0	47.9	63.7	70.6	51.7
Mount Washington, N. H.	48.5	43.9	43.4	29.7	17.2	7.8	−2.0	−2.5	8.8	19.0	31.5	43.0	24.0
Nashville, Tenn.	83.4	81.5	73.4	59.8	49.8	44.0	33.7	38.2	49.1	56.3	68.3	77.0	59.5
New Haven, Conn.	72.2	67.9	64.8	52.8	41.9	33.9	24.2	24.5	32.4	43.0	58.2	67.9	48.6
New London, Conn.	70.9	67.7	64.5	53.3	41.7	33.8	24.3	23.7	32.4	41.8	54.5	64.1	48.5
New Orleans, La.	81.4	83.9	78.9	70.4	63.3	58.8	54.2	55.9	63.5	65.3	76.2	80.1	69.3
New York, N. Y.	73.9	70.8	67.2	55.5	43.6	34.5	25.2	24.9	32.5	42.9	58.5	68.0	49.8
Norfolk, Va.	76.9	73.2	70.4	59.8	50.5	43.9	36.2	37.9	46.7	52.2	65.2	74.9	57.3
North Platte, Nebr.	.....	.....	.....	52.4	35.7	28.3	7.4	21.3	33.2	42.2	61.3	69.9	.....
Omaha, Nebr.	80.0	77.3	63.0	54.0	36.0	28.4	11.1	13.8	30.5	45.4	63.2	71.1	47.8
Oswego, N. Y.	69.8	67.5	65.4	50.9	39.1	29.1	21.1	16.9	28.3	38.9	53.0	63.2	45.3
Pembina, Dak.	69.9	67.0	56.2	42.2	14.4	.....	.....	.....	.....	32.9	53.3	59.2	.....
Philadelphia, Pa.	74.7	71.1	68.0	55.0	43.1	35.7	26.1	26.1	34.9	45.5	61.4	70.5	51.0
Peck's Beach, N. J.	70.2	69.2	67.5	54.6	43.2	35.9	28.9	29.2	35.3	42.9	55.7	60.9	49.4

Monthly and annual mean temperatures—July, 1874, to June 30, 1875, inclusive—Continued.

Stations.	1874.						1875.						Annual means.
	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
	°	°	°	°	°	°	°	°	°	°	°	°	°
Pike's Peak, Colo...	42.0	39.5	29.6	21.5	11.8	6.7	0.5	0.5	−0.9	11.5	23.4	34.5	18.4
Pittsburgh, Pa	74.7	70.4	67.6	52.5	40.9	35.2	23.3	21.6	35.6	46.5	62.0	70.2	50.0
Port Huron, Mich ..	.....	.....	65.0	49.6	36.8	27.4	13.6	9.8	26.5	37.3	53.2	62.8	.....
Portland, Me.....	67.2	64.6	60.3	50.6	37.6	27.1	17.1	19.5	29.5	40.2	54.3	62.8	44.2
Portland, Oreg.....	68.3	64.7	61.0	56.1	45.3	42.6	30.3	40.5	44.1	56.2	56.1	62.2	52.3
Punta Rassa, Fla...	79.7	83.7	79.2	74.7	70.8	66.4	70.3	62.9	71.2	70.2	76.7	79.2	73.7
Rochester, N. Y....	70.7	68.0	65.5	49.6	37.9	28.5	18.4	15.0	27.5	39.1	56.2	66.3	45.2
Salt Lake City, Utah	78.2	74.7	62.6	55.6	43.4	33.0	29.4	33.7	35.2	50.3	60.1	69.1	52.1
San Diego, Cal.....	68.7	68.2	65.3	62.6	56.2	52.8	53.1	54.1	55.0	58.0	62.9	64.9	60.1
Sandy Hook, N. J...	73.1	70.2	67.2	55.6	44.4	35.6	26.1	26.0	33.9	42.9	57.5	67.3	50.0
San Francisco, Cal..	57.7	58.7	60.8	59.6	56.4	50.7	49.3	52.0	51.5	54.5	57.2	58.5	55.6
Santa Fé, N. Mex...	71.1	69.9	61.0	52.3	38.7	29.2	28.1	31.4	34.4	47.4	59.2	67.9	49.2
Savannah, Ga	79.0	79.0	75.3	66.3	59.6	54.6	49.7	50.7	59.2	62.5	73.0	79.4	65.7
Shreveport, La	82.5	86.0	75.4	65.6	58.7	52.9	41.4	49.9	57.2	63.0	74.7	83.1	65.9
Saint Louis, Mo	81.5	78.3	70.2	58.1	44.3	37.8	24.1	26.2	40.0	52.0	64.9	73.2	54.2
Saint Mark's, Fla...	.....	.....	.....	.....	62.0	55.2	55.9	53.1	61.5	62.6	73.1	78.6	.....
Saint Paul, Minn ...	74.7	70.5	60.9	49.4	28.7	18.8	−2.3	−1.8	22.0	39.7	58.8	63.6	40.2
Saint Paul's Island, Behring Sea.	49.09	50.82	47.29	40.22	37.81	33.31	34.95	35.26	29.03	28.93	34.20	41.96	38.54
Springfield, Mass ..	.....	.....	.....	.....	39.5	30.5	20.0	20.7	29.9	41.9	58.0	67.2	.....
Squan Beach, N. J..	69.2	68.8	66.4	52.8	40.1	34.2	24.9	24.1	33.2	41.3	54.6	64.4	47.8
Toledo, Ohio.....	74.7	72.0	67.5	53.4	40.5	32.1	18.0	17.5	32.0	43.9	59.9	68.6	48.3
Tybee Island, Ga....	.....	.....	.....	67.8	59.9	54.2	47.8	49.2	57.6	61.4	71.6	77.2	.....
Vicksburgh, Miss ..	81.1	84.6	76.9	64.7	58.6	53.3	42.9	50.0	58.4	61.8	74.6	80.5	65.6
Virginia City, Mont.	67.7	61.8	50.2	45.8	25.7	24.9	1.7	22.8	22.8	37.2	47.1	56.2	38.6
Washington, D. C ..	78.4	73.2	70.4	56.1	44.8	39.7	29.7	29.1	39.5	48.1	63.7	73.0	53.8
Wilmington, N. C ..	79.1	76.7	74.1	63.8	56.6	49.4	43.3	45.9	54.4	58.5	68.4	74.2	62.0
Wood's Hole, Mass	67.8	66.2	63.8	54.8	43.6	34.4	24.8	24.1	31.8	40.3	52.1	61.0	47.0
Wytheville, Va....	69.9	66.5	61.9	51.1	42.6	37.4	32.5	30.7	42.1	47.6	61.0	66.9	50.8
Yankton, Dak.....	78.2	74.2	61.7	49.4	30.4	23.0	0.6	2.5	23.7	40.4	61.2	66.1	42.6

PAPER 17.

STATION STATISTICS.

Monthly and annual amounts of rain-fall, in inches, from July, 1874, to June, 1875, inclusive.

Stations.	1874.						1875.						Annual amounts.
	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Albany, N. Y.....	6.78	1.94	4.01	1.77	2.19	0.76	2.14	1.65	3.27	3.63	2.57	3.98	34.69
Alpena, Mich	2.06	1.77	3.86	3.27	1.63	0.61	0.92	1.12	1.60	0.74	3.22	1.76	22.56
Atlantic City, N. J..	1.56	1.23	5.37	1.78	2.30	3.24	2.99	2.01	4.18	6.05	1.92	3.53	36.16
Augusta, Ga.....	5.35	6.81	5.85	1.09	2.21	4.04	6.77	5.11	11.88	4.71	1.10	6.59	61.51
Baltimore, Md.....	4.30	3.47	4.83	0.16	2.48	1.90	2.51	2.86	4.72	4.27	1.49	2.85	35.84
Barnegat, N. J.....	3.30	2.57	9.29	2.23	3.80	3.94	6.33	2.42	4.30	3.70	1.35	2.79	46.02
Benton, Mont.....	0.10	1.17	0.49	0.56	0.58	0.60	0.66	1.11	0.22	1.04	1.60	2.57	10.70
Bismarck, Dak	.....	.....	0.64	0.83	2.18	0.37	1.05	1.32	2.06	4.22	3.40	5.02	.....
Boston, Mass.....	3.47	6.67	2.05	1.39	2.85	2.14	3.68	3.74	5.04	4.82	3.76	7.25	46.86
Brockenridge, Minn	1.23	7.27	1.43	1.55	0.25	0.54	0.30	0.67	2.11	1.07	2.01	4.95	23.38
Buffalo, N. Y	4.64	0.46	3.39	2.12	2.62	1.12	1.46	1.26	1.87	1.52	3.37	2.88	26.71
Burlington, Vt	7.15	1.07	4.21	1.09	0.82	0.75	1.26	0.86	1.12	1.38	3.56	3.00	26.27
Cairo, Ill	0.52	2.79	3.14	1.54	7.34	3.81	3.21	2.17	6.73	3.01	3.11	8.41	45.78
Cape Hatteras, N. C.	.....	.....	7.43	2.91	3.94	3.02	5.95	5.89	9.89	7.09	3.00	4.53	.....
Cape Henry, Va....	4.79	3.69	3.24	0.16	3.99	4.18	7.12	3.74	8.61	4.07	2.66	3.27	49.52
Cape May, N. J.....	4.42	2.08	6.71	0.07	2.61	5.09	4.34	4.67	5.98	5.57	1.35	2.82	45.71
Charleston, S. C	13.74	7.06	6.66	1.85	2.11	2.94	7.77	4.27	6.37	4.56	8.51	3.15	68.99
Cheyenne, Wyo.....	1.87	0.44	0.93	1.86	0.04	0.16	0.42	0.06	0.23	0.50	1.20	0.29	8.00
Chicago, Ill.....	0.58	3.15	3.76	2.52	2.83	0.63	0.95	1.99	1.43	2.32	3.64	5.17	28.97
Cincinnati, Ohio....	3.42	1.03	2.33	1.31	5.35	2.58	1.59	1.83	3.69	2.12	3.92	4.83	34.00
Cleveland, Ohio	4.06	1.82	4.66	1.63	2.09	1.64	1.60	0.99	2.87	2.11	4.17	4.29	31.93
Colorado Springs, Colo	0.81	0.91	3.37	0.19	0.35	0.15	0.24	0.56	1.12	0.30	1.03	1.82	10.85
Corsicana, Tex	.....	.....	3.34	0.07	2.94	0.52	1.08	0.76	2.33	2.26	2.03	0.79	.....
Davenport, Iowa ...	3.10	3.68	7.26	1.30	2.47	0.50	0.38	1.09	0.88	2.30	2.01	4.91	30.48

Monthly and annual amounts of rain-fall, in inches, &c.—Continued.

Stations.	1874.						1875.						Annual amounts.
	July.	August.	September	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Denver, Colo	3.35	0.68	1.34	0.64	0.08	0.17	3.38	0.60	0.39	2.24	1.94	0.43	15.24
Detroit, Mich	3.65	2.11	0.67	0.78	2.26	0.60	0.97	1.82	3.00	0.70	5.83	3.25	25.64
Dodge City, Kans	.....	.....	0.94	0.22	0.23	0.05	0.12	0.10	0.04	0.72	2.26	0.73	.....
Dubuque, Iowa	3.34	2.13	7.68	2.14	4.17	0.65	1.00	2.12	1.45	2.71	3.62	4.75	35.76
Duluth, Minn	2.62	5.62	5.59	3.07	1.97	1.37	0.86	0.98	2.17	2.82	2.45	1.84	31.36
Eastport, Me	3.27	5.13	3.67	1.73	4.12	1.94	0.89	3.93	1.39	1.80	2.90	5.86	36.63
Erie, Pa	7.03	1.99	4.43	2.29	2.51	1.72	1.41	0.94	2.68	1.69	5.14	5.45	37.28
Escanaba, Mich	3.58	3.74	3.94	3.27	4.44	0.50	0.62	1.82	3.95	2.08	3.71	2.70	27.35
Fort Gibson, Ind. T	1.99	1.54	4.41	0.81	4.64	2.70	0.64	0.73	2.48	8.74	5.59	3.52	37.79
Fort Sully, Dak	0.67	0.57	0.18	1.51	0.55	0.08	0.53	0.91	0.58	1.60	2.62	2.36	12.16
Galveston, Tex	9.31	7.19	5.84	0.12	1.58	6.92	4.31	2.94	3.51	2.55	1.50	0.89	46.66
Grand Haven, Mich	4.19	1.19	5.05	1.48	2.43	0.88	.....	.....	0.31	2.33	4.14	1.74	.....
Indianapolis, Ind	3.52	2.90	2.09	0.36	4.82	2.79	1.01	1.88	5.23	1.29	5.13	12.20	43.23
Indianola, Tex	5.76	1.25	12.89	0.62	2.56	4.86	1.17	2.23	1.02	2.51	1.45	0.35	36.67
Jacksonville, Fla	7.48	6.89	7.07	0.10	2.94	0.65	4.48	8.93	1.80	2.98	9.08	5.41	57.81
Keokuk, Iowa	4.54	3.87	7.92	1.94	2.17	1.26	0.61	1.84	1.67	0.89	6.70	8.33	41.74
Key West, Fla	3.03	3.77	7.42	3.35	1.21	0.27	1.34	0.38	0.07	2.29	4.27	1.24	28.04
Kitty Hawk, N. C	.....	.....	.....	.....	.....	.....	1.25	2.88	5.09	6.89	3.06	3.34	.....
Knoxville, Tenn	3.13	7.89	2.43	0.64	4.99	2.69	6.92	10.18	13.07	5.86	1.23	4.96	63.99
La Crosse, Wis	2.31	3.41	4.99	2.20	2.89	0.46	1.31	3.35	2.23	1.45	3.47	7.16	35.22
Leavenworth, Kans	3.23	1.72	5.50	1.49	3.46	1.35	0.23	1.25	2.50	1.67	3.53	3.85	29.78
Lexington, Ky	6.26	1.57	2.89	0.92	4.17	3.85	1.96	3.12	6.18	2.06	2.43	4.16	39.57
Long Branch, N. J	3.41	2.22	10.99	3.16	3.37	3.05	4.01	3.75	4.12	4.66	1.80	2.88	47.42
Louisville, Ky	2.71	3.23	0.62	2.04	5.90	4.77	2.42	2.09	4.54	0.87	4.07	5.79	39.05
Lynchburgh, Va	3.89	3.61	3.68	2.59	2.50	1.72	2.82	5.29	6.48	3.09	1.56	3.49	40.72
Marquette, Mich	2.43	2.26	3.39	6.12	2.41	0.56	0.30	0.44	1.02	1.02	2.71	3.70	26.36
Memphis, Tenn	0.47	4.61	4.72	1.07	3.67	2.94	7.45	3.34	8.60	3.48	4.21	2.72	47.28
Milwaukee, Wis	3.86	1.79	4.63	1.90	2.69	1.00	1.24	1.82	2.93	3.13	5.06	4.23	34.28
Mobile, Ala	10.21	3.79	2.54	0.00	2.04	4.17	5.79	7.15	8.39	7.51	1.46	2.45	55.50
Montgomery, Ala	3.87	1.25	0.39	1.97	2.60	5.14	6.71	7.26	11.56	3.54	1.67	1.94	48.50
Morgantown, W.Va	5.75	2.16	5.05	0.24	4.72	5.30	3.12	2.74	5.41	2.90	1.69	4.09	43.17
Mount Washington, N. H	7.97	9.51	5.52	2.96	2.34	3.07	1.82	1.00	2.13	2.00	2.50	6.83	47.65
Nashville, Tenn	2.65	3.52	3.12	2.63	6.12	4.19	6.15	3.06	8.14	4.25	1.73	5.63	51.19
New Haven, Conn	4.90	12.99	4.07	1.86	3.44	2.85	2.72	3.98	3.24	3.28	2.71	3.50	49.54
New London, Conn	4.84	16.44	2.08	0.91	3.67	4.24	4.13	4.09	4.02	2.95	2.68	3.21	53.26
New Orleans, La	12.93	4.82	4.21	0.00	1.12	3.27	8.44	13.85	10.84	8.05	2.53	4.92	74.98
New York, N. Y	3.92	2.53	7.16	1.82	2.21	2.71	2.77	3.23	4.25	3.21	1.47	1.66	36.24
Norfolk, Va	8.81	5.04	3.78	0.04	3.39	4.58	5.89	2.95	6.09	2.24	2.29	1.38	49.48
North Platte, Nebr	.....	.....	0.85	1.46	0.57	0.34	0.24	0.26	0.40	6.21	1.69	1.62	.....
Omaha, Nebr	0.54	2.08	7.18	1.45	1.05	0.54	0.26	0.51	1.24	3.06	4.25	10.95	33.11
Oswego, N. Y	7.62	0.29	3.19	2.05	1.89	1.44	2.40	1.84	1.34	2.08	3.38	3.03	30.55
Pembina, Dak	1.40	3.02	1.70	0.40	0.30	.....	.....	.....	.....	0.47	1.87	3.83	.....
Philadelphia, Pa	2.25	5.65	6.01	2.87	2.32	2.48	2.83	3.20	3.10	2.83	1.36	4.13	39.03
Peck's Beach, N. J	3.10	1.73	9.08	0.32	3.18	4.65	5.17	3.57	5.67	7.10	1.00	3.49	48.26
Pike's Peak, Colo	6.00	3.72	2.31	1.80	0.36	0.22	0.76	0.50	1.03	0.92	2.08	1.70	21.40
Pittsburgh, Pa	7.68	1.98	2.56	0.06	3.36	3.30	2.17	1.57	3.45	2.09	2.79	2.85	33.86
Port Huron, Mich	.....	0.23	1.89	1.21	2.31	0.72	1.08	1.43	4.03	1.13	3.93	1.68	.....
Portland, Me	5.47	5.29	2.73	1.23	2.96	0.93	2.58	2.85	3.63	3.16	2.62	5.51	38.96
Portland, Oreg	0.19	0.83	1.70	0.36	10.22	5.24	4.49	1.99	9.41	2.10	2.87	2.05	41.45
Punta Rassa, Fla	8.06	5.11	4.73	0.09	1.21	0.71	0.84	0.03	0.70	4.59	2.07	3.33	31.47
Rochester, N. Y	4.37	0.84	2.73	2.17	1.97	1.00	1.19	1.21	1.92	1.99	2.76	3.33	25.48
Salt Lake City, Utah	2.42	1.03	0.20	1.74	2.16	0.73	3.05	0.79	2.81	1.50	2.91	0.90	20.24
San Diego, Cal	0.12	0.00	0.04	0.53	0.88	0.55	2.38	0.37	0.45	0.12	0.20	0.02	5.66
Sandy Hook, N. J	1.99	1.91	11.30	2.43	3.09	2.62	4.04	3.37	3.59	3.67	1.47	3.53	43.01
San Francisco, Cal	0.00	0.00	0.02	2.69	7.53	0.33	8.01	0.32	1.30	0.10	0.22	1.02	21.54
Santa Fé, N. Mex	3.92	1.73	1.42	2.47	0.58	2.26	0.67	0.72	1.37	0.33	0.88	0.33	16.68
Savannah, Ga	10.14	6.58	8.89	1.42	1.80	1.66	8.84	3.50	6.86	5.11	3.20	4.10	62.12
Shreveport, La	5.59	0.19	6.33	0.10	2.10	6.95	3.93	2.67	4.94	3.46	0.91	1.79	38.96
Saint Louis, Mo	5.71	4.70	2.32	1.09	2.32	1.46	0.54	2.59	4.08	2.53	5.48	10.84	43.66
Saint Mark's, Fla	.....	.....	.....	.....	1.67	1.80	9.58	3.32	7.31	5.98	3.25	5.73	.....
Saint Paul, Minn	1.95	3.90	5.76	3.21	1.90	0.72	1.41	1.72	2.19	2.27	3.06	4.33	32.42
Saint Paul's Island, Behring Sea	3.81	2.62	3.01	4.82	0.28	6.59	7.75	4.27	3.38	2.79	2.15	5.38	55.85
Springfield, Mass	.....	.....	.....	.....	3.89	1.87	2.87	3.78	4.05	3.83	2.54	3.82	.....
Squan Beach, N. J	2.33	4.36	11.69	2.44	3.51	3.68	4.40	4.37	7.19	6.28	1.83	5.03	57.11
Toledo, Ohio	2.09	2.43	0.80	0.35	2.99	0.64	1.67	0.80	1.21	0.92	3.12	3.70	20.72
Tybee Island, Ga	4.55	3.68	5.90	1.23	1.65	1.41	6.02	3.16	6.26	3.54	1.43	3.12	41.95
Vicksburgh, Miss	7.39	0.06	6.20	0.00	3.21	4.75	5.48	7.01	14.51	5.07	1.69	4.05	59.42
Virginia City, Mont	1.10	3.11	1.46	1.12	1.20	0.16	1.29	1.37	1.50	0.50	4.61	1.54	18.76
Washington, D. C	2.34	1.71	7.84	0.29	2.08	2.59	1.86	2.65	3.96	2.29	1.01	2.06	30.68
Wilmington, N. C	5.81	4.04	9.35	3.38	0.91	2.67	5.52	1.97	4.55	3.92	2.84	11.67	56.63
Wood's Hole, Mass	2.26	3.80	2.03	0.61	3.36	4.18	4.20	2.88	5.34	3.95	4.52	2.23	39.36
Wytheville, Va	6.06	2.58	5.58	1.04	2.89	1.27	2.95	4.70	6.70	3.71	0.54	6.13	44.15
Yankton, Dak	3.84	4.05	1.74	1.64	0.56	0.51	1.07	1.51	1.79	5.26	2.04	9.21	33.22

PAPER 18.

STATION STATISTICS.

Maximum, minimum, and mean temperatures.

STATION, ALBANY, N. Y.

Date of month.	1874.												1875.									
	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	51	72	63	77	52	56	41	45	35	30	12	24	2	26	12	10	— 1	50	37	52	32	79	45
2	77	63	74	57	81	57	58	48	44	33	39	29	34	17	29	7	27	8	48	37	51	32	79	52
3	74	60	67	48	85	55	55	43	50	29	48	36	30	22	45	11	22	9	44	35	54	34	69	51
4	75	53	71	49	67	46	52	40	51	29	41	17	28	22	39	6	27	9	43	32	56	37	78	54
5	70	59	74	51	72	51	54	36	54	30	34	14	26	14	20	6	28	— 1	51	31	64	39	83	56
6	79	53	76	52	75	59	55	35	59	45	41	33	27	6	18	— 2	40	25	42	27	55	39	77	58
7	85	62	78	56	73	54	61	49	51	36	41	30	28	20	4	—12	36	27	44	25	56	38	59	52
8	87	63	75	66	78	53	61	52	60	36	32	19	26	16	10	—11	34	19	41	30	51	43	72	49
9	78	62	78	64	76	50	64	50	57	41	37	17	32	0	2	—11	36	9	50	32	76	43	74	53
10	75	62	85	59	86	52	62	50	57	33	35	28	11	— 6	10	— 8	35	20	58	36	68	49	76	56
11	75	68	83	58	85	65	60	42	55	35	38	26	13	—12	40	8	40	21	60	35	69	43	83	56
12	69	57	85	65	75	58	60	40	38	27	27	17	16	— 5	12	— 6	44	30	42	33	71	47	79	54
13	83	65	76	64	72	61	44	36	33	20	36	18	32	11	16	—18	34	23	37	29	64	41	57	45
14	85	58	68	61	77	56	50	36	30	14	37	3.5	34	15	9	—14	42	29	46	29	68	45	68	40
15	92	67	75	56	76	63	55	35	39	19	6	— 8	15	3	12	— 5	44	35	52	35	63	41	73	46
16	80	56	77	54	74	58	62	31	47	34	30	— 6	9	— 4	20	3	49	35	45	28	53	38	77	46
17	77	58	80	57	64	58	64	35	49	34	28	29	17	— 6	24	3	30	16	37	21	61	33	67	45
18	78	56	81	59	63	58	51	40	51	35	32	12	5	— 8	18	2	21	8	32	21	64	36	60	51
19	87	63	74	54	70	57	53	36	37	22	40	30	7	—16	27	— 2	26	9	37	18	59	44	71	47
20	82	68	84	64	68	57	59	33	34	26	34	16	16	— 4	32	25	15	8	32	19	68	46	76	50
21	77	64	77	59	63	45	57	42	36	29	22	5	18	— 2	32	15	22	6	35	20	80	43	82	49
22	76	56	70	51	63	39	59	30	31	20	36	9	34	12	36	— 2	21	2	44	23	78	59	84	58
23	80	56	66	45	70	46	59	32	40	20	41	27	32	8	48	35	24	— 4	53	33	82	58	83	67
24	81	63	69	54	72	45	57	44	39	30	41	30	(*)	— 6	49	40	32	0	49	30	81	57	90	69
25	80	62	71	44	76	51	58	40	33	27	33	21	.....	19	48	31	30	0	47	32	76	64	82	66
26	80	65	72	52	78	50	61	40	33	25	34	16	.....	9	30	16	38	15	52	36	78	55	82	58
27	81	67	73	47	77	51	60	49	43	25	41.5	22	.....	3	23	8	49	29	58	32	74	46	89	62
28	81	63	76	48	72	55	62	50	46	32	45	39	.....	— 9	15	0	37	24	63	32	81	47	88	65
29	72	62	78	55	67	52	64	48	50	26	44	21.5	.....	11	.....	.....	42	21	63	37	80	54	78	55
30	79	56	78	54	56	44	62	45	28	13	30	6	28	10	.....	.....	52	29	52	36	72	51	83	61
31	78	58	77	54	.....	.....	59	38	.....	.....	6	—11	23	7	.....	.....	52	31	.....	.....	72	48	.....	.....
Range	41°		41°		47°		34°		47°		59°		.....		67°		56°		45°		49°		50°	
Monthly means	71°.1		66°.9		63°.3		49°.1		36°.4		27°.3		15°.6		16°		26°.6		39°		57°.4		66°.9	

* Maximum thermometer broken.

Maximum, minimum, and mean temperatures—Continued.

STATION, ALPENA, MICH.

Date of month.	1874.												1875.											
	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	52	72	57	69	45	52	33	38	31	29	14	27	0	29	−10	7	− 5	58	33	34	23	63	49
2	73	57	70	51	85	53	54	42	44	31	46	27	27	16	22	12	15	− 5	37	29	37	28	78	53
3	67	51	69	45	67	44	51	36	60	36	47	14	17	9	35	2	18	−10	39	29	49	25	66	48
4	68	57	72	47	62	36	55	37	55	34	34	12	13	0	20	− 4	25	− 1	45	30	50	25	62	44
5	73	55	64	45	70	56	50	37	63	51	37	27	11	2	10	−12	23	5	33	27	47	33	63	45
6	84	65	66	56	76	51	54	47	58	39	39	31	16	1	1	−13	32	13	38	31	53	31	61	45
7	86	61	74	54	70	51	52	46	57	39	32	14	22	2	7	−26	28	5	35	31	44	36	65	37
8	78	62	78	54	76	57	56	43	63	43	31	10	21	2	−3	−19	25	4	39	32	79	39	73	46
9	73	53	70	56	80	60	65	41	56	38	32	22	15	−10	6	−22	25	7	53	35	66	40	62	53
10	82	57	72	58	81	61	56	44	55	35	30	22	12	−12	12	−18	33	19	52	30	58	40	61	53
11	68	53	83	61	79	64	45	38	37	28	24	14	16	− 1	13	− 8	29	5	45	28	61	31	92	54
12	66	48	81	62	79	60	38	33	30	24	21	12	24	− 5	− 4	−21	31	13	43	31	54	37	70	42
13	74	50	64	53	73	61	47	31	30	20	24	17	27	13	5	−21	29	16	53	28	56	36	61	35
14	89	59	70	46	76	61	50	26	39	22	19	3	13	− 2	5	−24	34	16	50	29	47	37	66	39
15	87	63	76	49	66	48	54	33	48	33	30	2	11	− 5	10	−18	40	29	46	14	53	36	65	39
16	67	54	69	48	60	42	62	41	45	28	33	24	16	4	17	− 4	32	10	14	8	57	32	62	50
17	67	54	86	61	62	57	59	44	46	30	33	14	10	− 3	12	− 5	10	1	16	2	60	35	61	50
18	76	57	73	52	66	55	51	35	31	21	32	15	14	− 1	16	−17	21	− 1	27	5	59	39	76	44
19	91	62	79	56	69	54	52	30	32	20	38	30	9	− 4	19	− 1	10	− 6	32	19	56	43	72	50
20	69	52	76	60	60	41	64	49	30	21	34	9	16	−18	22	− 8	19	3	33	19	74	46	64	43
21	77	47	66	54	62	34	49	30	30	25	30	11	25	14	21	− 4	21	− 5	33	18	64	47	75	51
22	74	51	61	50	70	48	52	29	40	27	33	26	25	7	22	4	25	1	43	25	65	44	69	55
23	77	60	65	49	65	46	53	44	43	26	34	23	22	− 2	22	3	31	4	38	28	57	45	82	59
24	76	60	71	45	80	48	54	40	24	20	29	19	29	16	26	12	34	18	42	25	66	48	81	55
25	84	66	68	48	70	51	60	45	26	18	31	14	18	10	25	8	29	9	48	27	76	56	63	56
26	78	61	68	48	67	61	67	49	36	23	35	26	16	6	20	− 1	48	28	48	27	61	49	80	56
27	71	53	69	51	68	49	54	43	39	22	37	19	21	12	13	− 8	39	18	42	25	59	42	77	57
28	72	51	69	48	62	44	49	40	27	20	38	28	24	8	5	−11	28	7	54	30	65	53	62	53
29	76	50	70	54	61	42	56	40	21	8	28	4	13	0	.....	.....	36	18	39	32	68	48	68	44
30	69	48	70	51	50	38	42	33	20	4	18	3	17	9	.....	.....	39	29	43	28	54	38	77	53
31	79	59	68	51	.....	.....	35	29	.....	.....	22	1	15	− 4	.....	.....	59	34	.....	.....	57	50	.....	.....
Range	44°		41°		51°		41°		59°		46°		47°		61°		69°		56°		54°		57°	
Monthly means	65°. 1		63°. 3		60°		45°. 6		33°. 4		23°. 3		10°		4°. 1		19°. 6		32°. 2		47°. 8		58°. 7	

Maximum, minimum, and mean temperatures—Continued.

STATION, ATLANTIC CITY, N. J.

Date of month.	1874.												1875.											
	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	68	76	65	75	61	64	45	50	32	41	21	26	9	34	17	44	16	52	41	52	42	65	53.5
2	78	68	77	66	81	58	75	57	52	32	48	36	38	23	39	28	52	33	52	44	59	41	65	54.5
3	80	64	74	57	79	64	65	46	56	39	55	45	39	24	45	32	36	27	50	40	58	35	67	57
4	78	65	72	59	75	65	62	48	56	42	51	29	41	32	42	15	36	24	55	37	46	41	69	58.5
5	73	64	74	57	72	66	57	44	60	38	44	26	34	21	25	9	35	27	59	39	58.5	36	71	58
6	67	60	78	59	77	65	62	44	70	47	47	28	38	18	33	15	43	32	47	36	55	45	70	60
7	74	62	78	66	86	64	68	54	55	42	43	39	38	34	19	7	37	30	42	37	59.5	42	69	58
8	76	64	73	67	81	62	65	62	59	52	40	25	35	28	20	4	41	30	48	37	50	44	69	55
9	76	66	79	66	72	64	69	59	64	49	47	24	39	8	10	— 1	38	24	44	38	62	47	59	56
10	76	66	80	64	76	57	70	63	58	39	44	29	15	— 3	25	— 5	48	33	59	41	68	49	69	56
11	75	65	79	66	82	64	69	56	67	47	45	31	29	8	44	22	41	28	55	43	72	45	72	56
12	74	64	78	68	76	67	60	45	47	35	39	24	34	19	31	15	54	36	48	37	64	51	67	57
13	74	64	81	70	71	68	50	40	41	28	48	27	39	32	31	20	40	31	40	32	59	46	67	54
14	77	63	73	68	73	67	48	35	35	23	52	20	33	24	33	11	42	30	53	32	55	43	64.5	51
15	76	62	73	64	78	68	60	32	48	28	23	11	25	14	18	4	46	37	50	39	66	49	71	58
16	79	64	77	61	72	69	61	44	52	33	40	13	29	16	21	3	50	39	52	36	63	43	73	61
17	76	64	75	65	71	66	65	47	56	40	46	33	28	17	42	9	43	20	38	27	60	40	73	58
18	80	63	82	57	77	69	64	42	60	37	41	29	28	10	24	8	32	17	36	25	58	43	76	55.5
19	79	64	77	67	70	66	56	37	43	32	48	29	30	1	32	13	35	22	44	19	59	47	78	55
20	77	67	83	70	71	62	63	38	54	41	45	32	21	3	39	29	38	28	48	32	62	51	75	55
21	76	64	86	71	69	55	67	47	42	28	37	25	32	8	38	24	29	22	47	26	70	52	72	60
22	73	62	82	66	64	53	63	45	48	26	43	21	44	30	40	28	30	13	52	26.5	74	54	72	61
23	78	60	72	66	70	54	61	49	60	46	48	23	34	22	45	35	30	13	53.5	32	74	57	74	64
24	77	62	70	62	72	55	62	58	48	32	46	32	42	18	48	36	37	26	49	34	67	56	76	63
25	80	63	70	66	73	59	60	52	39	24	37	23	35	28	50	35	37	28	57	32	61.5	56	77	64
26	81	68	69	57	74	60	64	44	40	24	45	25	27	14	47	29	41	25	55	37	74.5	56	77	65
27	81	69	69	58	73	61	64	49	49	29	49	38	34	13	47	24	57	29	48	43	63	52	82	65
28	82	67	69	57	68	64	67	53	53	38	54	43	38	19	25	17	48	33	46	40	68	50	81.5	66
29	74	69	70	55	71	56	65	58	55	30	55	33	38	29	.....	.....	42	35	48	37	69	54	74	60
30	82	62	74	57	66	50	64	44	32	20	34	23	40	23	.....	.....	46	33	68	43	72.5	57	84.5	63
31	79	64	74	60	.....	.....	51	34	.....	.....	27	12	38	29	.....	.....	47	40	.....	.....	68	52	.....	.....
Range	22°		31°		36°		43°		50°		44°		47°		55°		44°		49°		39°		33°.5	
Monthly means	70°.3		69°.5		67°.8		55°.6		44°.3		37°		28°.3		26°.2		35°.1		42°.6		54°.8		64°.5	

Maximum, minimum, and mean temperatures—Continued.

STATION, AUGUSTA, GA.

Date of month.	1874.												1875.									
	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	74	93	68	84	66	77	56	55	33	56	32	36	30	48	28	76	50	76	58	81	61	87	65
2	90	72	96	75	85	64	84	54	62	30	66	33	51	34	61	31	73	61	74	52	79	61	87	67
3	85	72	94	75	87	67	86	56	66	35	71	39	44	40	69	45	70	48	65	47	77	49	80	69
4	88	70	92	74	88	66	83	60	73	43	65	48	51	38	45	31	57	39	70	43	73	60	90	67
5	97	70	88	69	87	67	75	60	77	48	59	42	47	44	40	24	50	44	81	17	75	51	82	69
6	92	76	87	70	86	69	75	53	78	50	53	48	46	39	49	22	47	41	77	53	85	58	88	67
7	89	71	82	70	88	67	75	60	77	51	57	43	45	36	48	28	63	40	81	50	89	62	83	67
8	90	68	90	69	91	69	77	61	77	57	51	33	48	38	42	26	58	35	82	52	88	65	78	65
9	91	72	92	68	92	67	78	58	73	60	59	28	53	33	46	27	66	37	82	58	90	68	81	59
10	89	70	92	68	83	69	81	62	78	58	62	33	37	26	40	29	62	46	79	61	85	66	86	58
11	85	69	97	71	86	68	79	53	79	57	58	39	35	28	51	33	66	34	67	60	82	57	91	64
12	80	68.5	101	78	85	66	74	56	65	51	37	52	37	33	57	30	66	53	78	62	84	61	95	70
13	85	69	95	74	87	68	63	43	57	43	55	35	45	34	64	36	69	57	65	49	82	66	91	69
14	89	69	94	72	81	71	62	40	55	35	63	37	49	40	62	51	75	55	66	41	85	64	93	70
15	92	71	91	67	86	73	69	41	65	39	50	32	53	35	62	44	72	62	69	47	86	64	97	68
16	94	70	89	73	87	71	77	55	71	53	53	33	59	32	57	41	63	49	73	51	75	60	97	74
17	95	71	86	68	88	70	70	56	65	55	58	43	50	38	53	33	55	41	54	39	73	52	93	68
18	93	71	88	66	89	69	77	53	74	57	54	38	47	39	55	38	61	33	57	37	76	49	92	69
19	84	71	90	73	85	69	70	52	66	53	59	29	48	40	47	42	58	46	71	35	81	55	89	71
20	89	69	92	74	87	69	73	44	68	48	59	42	43	36	48	42	74	56	81	50	85	57	78	67
21	89	71	95	73	81	66	75	46	62	41	58	32	50	39	58	31	69	50	70	49	85	62	85	70
22	92	72	93	72	79	62	75	50	68	41	61	44	61	48	65	33	58	39	57	45	86	58	91	67
23	87	71	90	71	80	59	76	53	74	55	59	40	56	46	67	46	55	33	51	45	78	67	93	68
24	86	70	92	73	84	64	72	62	67	44	57	38	57	50	78	61	64	39	71	39	87	68	91	70
25	86	70	81	70	84	67	75	59	65	41	54	33	55	40	71	49	65	39	68	44	91	67	91	71
26	81	73	84	61	84	67	75	55	56	37	49	41	55	33	59	37	73	42	77	50	91	68	90	70
27	85.5	70	81	65	81	64	78	50	64	38	66	47	58	35	69	43	67	59	72	58	89	70	90	70
28	84	71	72	62	70	60	81	51	71	46	77	57	67	47	65	38	63	55	76	52	87	69	92	73
29	90	73	67	61	76	57	80	54	64	44	75	57	68	53	.....	.....	60	45	81	51	90	66	90	72
30	86	72	76	62	79	53	77	55	55	37	64	42	58	43	.....	.....	57	46	83	61	91	69	90	70
31	90	70	81	65	.....	.....	64	42	.....	.....	42	35	57	38	.....	.....	69	53	.....	.....	87	70	.....	.....
Range	29°		40°		39°		46°		49°		49°		42°		56°		43°		48°		42°		41°	
Monthly means	78°.5		78°.8		74°.7		63°.5		56°.7		49°.1		44°.9		46°.9		55°.4		60°.9		73°		78°.4	

Maximum, minimum, and mean temperatures—Continued.

STATION, BALTIMORE, MD.

Date of month.	1874.												1875.											
	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	67	86	70	83	63.5	64	48	60	36	37	21.5	27	15	33	20	35	19.5	72	46	61	47	80.5	59
2	86	69	84	68.5	82	59	75	52	60	36	58	32	43	27	45	25	51	33	69	53	59	45.5	72.5	60.5
3	87	69	81.5	62	88	65	67	47	56	34	67	36	41	29	52	37.5	32	29	58	41.5	62	42	74.5	63.5
4	92	67	79	61	75	65	63	50	58	36	56	36	43	32	41	19	35	27	68	42.5	62	45	83	59
5	80	69	79	59	78	64	59	44	62	44	43	27	36	25	28	15	35	25.5	62	48	64	42.5	84	62.5
6	81	65	82	63	81	67	63	43	71	52	48	32	30	18.5	37	20.5	45	32	62	44.5	67	50	84	66.5
7	83	65	74	67	85	65	71	57	63	43	50	39	38	29	15	12	38	31.5	55	42.5	65	46	74	61
8	92	68	76	68	90	66	69	61	60	39	47	30	39	29	25	10	42	33	56	41	61	49	74	56.5
9	92	74	87	66.5	80	66	71	56	63	51	44	27	38	6	10	6	42	29	52	45	79	51.5	71	60
10	95.5	75	86	69	82	59	71	56	61	31	46	35	15	− 1.5	20	3.5	47	34	65	47	74	60	82	56.5
11	86	73	86.5	65	88	66	73	53	64.5	49	45	35	32	1.5	40	13.5	51	31	64	48	73	55	85	63
12	84	72	88	67	89.5	70.5	60	48	52	40	41	30	31	24	32	18.5	63	36.5	56	41	76	58	75	66
13	87	71	87.5	72.5	77	68.5	52	45	46	35	47	31	37	27.5	35	23.5	48	35.5	45	35	69	50	72	56.5
14	92	69	79	65	76	69	50	41	40	27	52	28	37	31	38	20.5	47	34.5	57	34.5	74	49.5	76	54.5
15	94	73	86.5	65	78	68	60	35	45	29.5	32	17	32	16	24	10	61	42.5	59	41.5	74	54	78	57
16	89	74	84	61	72	68	60	40	53	34.5	38	21	30	21	24	6.5	58	48	54	36	67	45	87	64.5
17	84	66	82	61	73	64.5	69	43	56	39	50	32	30	21.5	44	12.5	42	25	39	27	68	44.5	83	61
18	86.5	66	91	60	77	64	62	52	62	47	44	31	31	21	23	9	37	23	34	26.5	62	46	73	63
19	88	68.5	86	71	79	67	60	42	48	39.5	52	32	26	19.5	32	16	40	29	53	23.5	69	48.5	82	57.5
20	91	69	97	69	73	62	68	45	50	36	43	36	28	14	36	28	38	30	51	37	84	53	83	59
21	81	69	96	75	69	55	71	44	34	33	42	31	33	21	42	25.5	36	26.5	50	32	85	60	83	59
22	84	65	82	66	70	51	67	47	46	31.5	50	31	52	32	48	29	34	19	52	32	88	67	83	65
23	84	64.5	71	61.5	73	52	68	47.5	65	45	49	37.5	42	27	54	32	38	21	57	36	87	67.5	88	70.5
24	82	67	70	59	75	58	66	54	48	36	46	35.5	38	27	59	41	42	30	59	40	80	66	96	71.5
25	84	70.5	69	63	76	58	63	52	40	29	39	30	41	31	58	38	42	30	60	36	79.5	67	96.5	75
26	85	71.5	73	56.5	79	59	67	47	43	28	34	27.5	33	21	52	33	54	31	65	40	85	66	95	76
27	76	71	72	55	79	59	75	48.5	53	32	48	37	39	21	50	29	62	46.5	61	48	81	64	97	76.5
28	83	71	75	53.5	72	64	68	45	49	38	60	41	42	32.5	30	18.5	54	38.5	50	46.5	81	55	94	73.5
29	78.5	67	74	52	63	59	78	50	43	34	56	35.5	42	34	.....	.....	53	38	59	41	88	57	93	74
30	84	64	75	54	64	53	72	44	37	26	38	25	43	32	.....	.....	58	38.5	74	48	78	57	90	70.5
31	87	62.5	77	63	.....	.....	50	36.5	.....	.....	35	21	40	34	.....	.....	59	47	.....	.....	81	56	.....	.....
Range	33°		45°		39°		43°		38°.5		50°		44°.5		53°		44°		47°		46°		41°.5	
Monthly means	77°.3		72°.8		69°.9		56°.6		45°.3		39°.0		30°.1		29°.3		39°.5		49°.4		64°.1		73°.7	

Maximum, minimum, and mean temperatures—Continued.

STATION, BARNEGAT, N. J.

Date f month.	1874.												1875.											
	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	.....	87	.....	77	.....	61	(*)	.....	.....	38	22	24	8	26	19	39	12	55	37	52	42	68	51
2	80	.....	84	.....	82	.....	74	.....	.....	.....	50	32	37	21	40	22	41	30	56	46	61	43	65	50
3	76	.....	79	.....	84	.....	64	.....	.....	.....	58	32	34	23	47	36	34	32	49	37	59	43	67	55
4	80	.....	74	.....	66	.....	59	.....	.....	.....	49	34	37	26	27	11	35	20	52	35	51	38	71	56
5	76	.....	73	.....	73	.....	56	.....	.....	.....	43	26	32	22	22	10	34	21	58	35	60	39	71	57
6	67	.....	77	.....	74	.....	64	.....	.....	.....	48	30	37	15	30	8	37	33	47	35	55	45	68	57
7	78	.....	80	.....	83	.....	65	.....	.....	.....	42	32	38	35	17	6	34	30	41	36	55	42	70	57
8	80	.....	75	.....	78	.....	64	.....	.....	.....	37	26	37	30	18	4	36	29	48	35	52	40	66	53
9	84	.....	69	.....	73	.....	71	.....	.....	.....	47	24	35	7	11	1	40	29	43	38	57	43	59	55
10	85	.....	84	.....	79	.....	71	.....	.....	.....	42	29	13	— 3	22	— 1	45	31	62	41	65	57	66	56
11	81	.....	78	.....	80	.....	68	.....	.....	.....	42	32	27	7	44	21	45	30	59	48	72	43	70	56
12	76	.....	83	.....	72	.....	60	.....	.....	.....	38	27	34	18	30	12	60	36	49	36	63	49	73	57
13	84	.....	83	.....	71	.....	49	.....	.....	.....	45	27	37	17	30	11	41	33	37	32	62	46	66	54
14	82	.....	70	.....	74	.....	46	.....	.....	.....	45	20	39	17	29	18	39	31	52	30	55	47	65	51
15	84	.....	73	.....	79	.....	60	.....	.....	.....	22	10	21	14	18	5	50	35	60	36	60	47	73	55
16	85	.....	74	.....	71	.....	64	.....	53	.....	33	12	31	10	19	1	50	37	47	35	63	42	70	60
17	70	.....	73	.....	68	.....	66	.....	59	34	45	30	26	15	41	1	45	21	38	28	59	42	74	59
18	78	.....	89	.....	69	.....	60	.....	57	37	35	27	25	4	20	6	30	15	36	25	55	44	76	57
19	81	.....	75	.....	69	.....	53	.....	40	32	44	26	18	—12	31	11	37	23	44	19	66	47	78	55
20	77	.....	95	.....	72	.....	67	.....	53	33	43	26	18	— 1	40	30	36	26	46	32	71	50	75	53
21	78	.....	86	.....	67	.....	61	.....	41	29	33	28	31	3	36	25	31	21	46	27	86	53	73	54
22	71	.....	77	.....	62	.....	64	.....	46	28	43	28	37	21	41	25	30	16	52	27	83	59	73	59
23	80	.....	70	.....	71	.....	59	.....	59	45	45	33	32	20	42	32	30	10	50	33	77	57	73	63
24	77	.....	72	.....	73	.....	62	.....	46	30	45	32	40	19	48	36	35	22	47	37	74	52	75	59
25	83	.....	68	.....	76	.....	58	.....	33	25	35	28	39	21	49	36	36	28	55	32	68	55	88	59
26	82	.....	70	.....	74	.....	(†)	.....	37	25	45	24	27	9	50	29	44	25	63	36	71	52	77	65
27	83	.....	68	.....	71	.....	.....	.....	49	30	44	35	34	12	39	20	58	40	48	40	62	53	80	60
28	81	.....	69	.....	65	.....	.....	.....	50	38	54	40	40	27	24	11	45	34	46	40	74	48	93	61
29	72	.....	69	.....	66	.....	.....	.....	53	31	50	32	38	27	.....	.....	39	32	48	37	79	47	73	62
30	78	.....	74	.....	59	.....	.....	.....	32	23	30	21	38	23	.....	.....	48	39	66	41	69	56	85	65
31	82	.....	75	.....	.....	.....	.....	.....	.....	.....	19	13	37	26	.....	.....	45	40	.....	.....	67	53	.....	.....
Range	70°. 2		69°. 1		66°. 6		54°. 9		42°. 8		48° 34°. 8		52° 25°. 7		50° 25°. 4		48° 35°		39° 43°. 2		48° 55°. 9		43° 65°. 2	
Monthly means																								

* Minimum thermometer broken.

† Maximum thermometer broken.

Maximum, minimum, and mean temperatures—Continued.

STATION, BENTON CITY, MONT.

Date of month.	1874.												1875.											
	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	*	52		41		47		35		29		34		− 7		−13		5		35		35		37
2		57		55		38		50		22		35		− 6		−22		6		38		44		43
3		55		56		40		50		29		34		−36		−32		19		6		40		51
4		65		54		46		43		35		31		−50		−13		0		2		52		42
5		45		61		44		33		23		30		−34		−14		2		− 4		56		44
6		53		56		57		44		28		41		−33		−16		16		− 3		50		38
7		51		55		50		47		19		45		−34		− 2		28		− 6		42		45
8		50		53		42		38		36		26		−43		14		28		− 4		32		49
9		53		45		47		40		24		23		−45		15		31		2		44		52
10		52		49		47		39		18		18		−22		− 7		32		33		41		47
11		57		54		44		40		19		17		−25		−18		29		30		33		46
12		56		43		30		38		23		25		−45		8		27		20		44		51
13		64		55		39		36		21		23		−45		12		15		33		39		54
14		55		50		27		35		12		40		−55		3		10		38		46		59
15		49		56		41		39		5		30		−36		− 9		− 4		43		53		54
16		52		51		47		42		−22		18		−49		11		−16		33		55		55
17		62		54		40		36		−23		22		−49		7		− 9		41		49		56
18		62		63		35		37		−29		34		−47		27		−20		52		43		51
19		46		53		43		42		−25		13		−43		30		3		46		39		50
20		52		56		32		28		26		31		−15		30		22		48		41		52
21		58		62		38		32		6		18		−16		14		22		37		55		54
22		56		53		34		34		− 4		23		10		14		25		41		50		46
23		67		50		41		39		− 7		13		− 2		− 3		11		46		49		48
24		60		61		45		33		− 4		19		−15		−12		24		32		48		54
25		50		61		48		26		− 4		16		− 1		3		33		35		45		47
26		37		55		35		15		−11		6		−15		−19		31		39		43		49
27		54		69		33		20		−14		1		−24		6		33		33		39		42
28		52		58		45		18		−15		−23		−11		18		29		34		32		60
29		62		48		46		25		5		2		16		6		29		30		44		45
30		55		49		50		16		40		−14		10				19		28		49		55
31		53		49				15				− 8		10				22				40		
Range																								
Monthly means		75°. 1		69°. 1		58°. 2		49°. 8		19°. 4		29°. 6		− 8°. 6		13°. 9		27°. 8		43°. 0		58°. 1		62°. 0

* No maximum thermometer on station.

Maximum, minimum, and mean temperatures—Continued.

STATION, BISMARCK, DAK.

Date of month.	1874.												1875.											
	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	41	40.5	14	33	17	15	−11	14	− 9	10.5	− 8	47	16	44	21	59	44
2	.....	.....	.....	.....	.....	.....	67.5	30	44	20.5	41.5	21	− 4	−14	− 9	−25	17.5	− 7	55	30.5	49	27	59	42
3	.....	.....	.....	.....	.....	.....	70.5	42	49	22.5	31	17	− 4	−17	−19	−28	24	0	49	29	58.5	29	59	32
4	.....	.....	.....	.....	.....	.....	70.5	39	49	23	34	20	−12	−21	− 4	−31	28.5	8	36	22	66	35	59	37
5	.....	.....	.....	.....	.....	.....	66.5	38	52	32	39	33	− 3	−28	− 5	−12	22.5	4	23.5	8	63.5	38	59	40
6	.....	.....	.....	.....	.....	.....	66.5	33	54	30.5	35	19	5	−19	− 3	−16	19	− 6	21	10	69	46.5	67	39
7	.....	.....	.....	.....	.....	.....	77	42	34	28	40	13	− 5	−21	3	−15	23.5	0	27	18	61	48	71.5	41
8	.....	.....	.....	.....	.....	.....	67.5	42	41	10	43	16	−20	−34	5	−12	20.5	5	32	16	63	38	76	49.5
9	.....	.....	.....	.....	.....	.....	68.5	39	38	13	11	− 1	− 1	−26	11	−10	20.5	3	26	13	60.5	41	79	41
10	.....	.....	.....	.....	.....	.....	55	34	29	23.5	20.5	4	− 7	−20	14	−12	32.5	7	30	21	65	37	74	48
11	.....	.....	.....	.....	.....	.....	47.5	20	27	4	14	− 8.5	−14	−31	−10	−26	26.5	15	32.5	22	61	39	59.5	40
12	.....	.....	.....	.....	.....	.....	57	18	26.5	4	18	13	−20	−30	1	−20	29.5	10	38	13	67	34	71	39
13	.....	.....	.....	.....	.....	.....	68	42	38.5	24	19	5	−25	−34	1	−14	24	10	48.5	22	68.5	42	83	54
14	.....	.....	.....	.....	.....	.....	69	37	35	18	32	9	−15	−30	− 3	−24	5	− 1	58.5	32.5	67	37.5	64	54
15	.....	.....	.....	.....	.....	.....	75.5	32	31	21.5	30	13	−12	−22	10	−23	4	− 6	43	18	72	44	84.5	51
16	.....	.....	.....	.....	.....	.....	73	40	21	− 6	25	4	− 4	−22	22	−15	2	−11	35	15	69	51	84	56
17	.....	.....	.....	.....	.....	.....	69	32	5	−14	32	− 1	−12	−21	6	−30	1	−25	56	24	68	54.5	75	60
18	.....	.....	.....	.....	.....	.....	83	40	4.5	−16	40	21	0	−20	19	1	8	−20	67	29	74	53	67.5	56
19	.....	.....	.....	.....	.....	.....	72	40	20	−13	29	16	2	−32	30	15	18	−14	49	32	83	48	66	54
20	.....	.....	.....	.....	.....	.....	55	28	29	17	35.5	10	20	2	23	− 5	24.5	2.5	53	28	73.5	47	78	57
21	.....	.....	.....	.....	.....	.....	63	14	32	23	34.5	11	7	− 8	12	−11	34	15	51	37	82	49	78.5	58
22	.....	.....	.....	.....	.....	.....	72	32	29	1	32	13	10	−14	18	− 8	36	14	51	37	88	52	68.5	52
23	.....	.....	.....	.....	.....	.....	69	43	2	− 7	26	10	5	− 2	6	−11	30	9	42.5	32	75	54	73	53
24	.....	.....	.....	.....	.....	.....	67.5	32	5	−12	20	2	0	−18	7	−15	28.5	17	53	28	72	52	89	60
25	.....	.....	.....	.....	.....	.....	50	39	13	4	19	0	6	−19	1	−12	43	21	53	28	85	46	75	53
26	.....	.....	.....	.....	.....	.....	39	25	13	0	21	− 6	4	−10	3	− 9	37	22	63	31	67	55	59	49
27	.....	.....	.....	.....	.....	.....	42	18	5	− 9	21	0	13	−11	4	−16	36.5	10	57	39	60	47	75	47
28	.....	.....	.....	.....	.....	.....	31.5	28	8	−10	6	−24	7	− 4	11	−15	51	27	51	30	62.5	38.5	83	51
29	.....	.....	.....	.....	.....	.....	34	20	7	− 8	− 7	−28	16	− 1	.....	.....	44.5	31	39	21.5	77	38	74	46
30	.....	.....	.....	.....	.....	.....	23	14	30	7	−13	−29	1	− 8	.....	.....	34	23	42	23	69	49	77	47
31	.....	.....	.....	.....	.....	.....	40	6	.....	.....	21	−13	38	−14	.....	.....	38.5	16	.....	.....	65.5	48	.....	.....
Range	.....	.....	.....	.....	.....	.....	71°		70°		72°		72°		61°		69°.5		59°		67°		57°	
Monthly means	.....	.....	.....	.....	.....	.....	41°.3		18°.1		15°.6		− 8°.9		− 5°.9		15°.3		33°.9		56°.1		60°.9	

Maximum, minimum, and mean temperatures—Continued.

STATION, BOSTON, MASS.

Date of month.	1874.												1875.									
	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	60	86	66	77.5	61.5	59	46	50	39	36	15	26	6	32	17	31	2	55	35	58	37	62	48
2	81	62	82	63	81	58.5	64	48.5	54	37.5	51	28	34	17	36	14	34.5	16.5	69	43.5	58	40	65	51
3	81	62	75	55	87	62	63	45	56	37	59	35	34	24	51.5	29	29.5	17.5	56	42	57	37	76	47
4	74	60	78	53	69	51.5	57	43	62	40.5	42	21	36	26	47	10	29	15	43	37	52	42	83	53
5	65	54	75	56.5	68.5	52	60	38.5	59	40	42	21	35	19	20	9	33	16	54	34	65	42	89	60
6	68	57	76	58	77	61	61	44.5	64	51	45.5	34.5	28	12	25	7	39	29	51	32.5	57	42	80	63
7	83	56	85	60	74	60	61	51	57	45	42	35	35	25	9	− 5	44	29	44	31.5	55	42	72	52
8	87	65	75	64	76	59.5	61	53	59	42	44	25	32	22	19	0	45	28	47	31.5	55	41	71	52
9	86	70	69	60	70	59	68	50.5	62	49	45	19	32	6	9	− 5	42	26.5	44	33	55	43	58	52
10	80	69	89	63	90	60	64.5	59	62.5	44.5	42	31	14	− 1	22	− 5	41	31	58	37	81	42	69	52
11	84	70	91	68	83.5	69	64	53	60	40	39	30.5	35	0	43	14	44	27	62	40	72	47	71	54
12	73	56	88	67	69.5	57.5	62	43	42	28.5	34	21	25	7	35	6	51	32	43	34	73	52	79	57
13	82	56	76	66	70	51	51	39	36	24	35	19	35	19	20	3	40	30	42	31	69	46	67	50
14	87	64	65	59	76	56	52.5	35.5	38	23	44	4	32	16	19	3	45	28.5	46	29	72	48	70	46
15	94	68	70	59	76.5	57.5	60.5	38	42	21	14	− 2	18	8	15.5	− 2	40	33.5	60	33	60	46.5	73	52
16	91	68	74	58	74	65	69	44	51	32	35	7	22	6.5	20.5	2	45	33	58	39	55	43	80	53
17	85	63	72	58	67	59.5	70.5	45	52	35	42	28	19	5.5	32	8	43	19	44	30	65	41	73	55
18	82	62	84	59	61.5	59	60	42.5	59	37	39	19	11	1	20	8	26	13	41	25.5	56	43	61	50
19	89	66	77	62	61	57.5	51.5	38	36	27	44	28	17	− 2.5	34.5	12.5	33	16	37	22	59	44	71	49
20	86	66	84	66	66	57	63	38	41	28	37	28.5	19	4	40	31	27	16	37	23	73	47	78	54
21	77	66	80	65	69	52.5	60	45	40	32	34	19	21	2	35	22	31	15	39	21	77	53	86	58
22	82.5	46	72	56.5	63.5	46.5	68	41	39	27	46	14	27	15.5	38	15.5	27	9.5	53	26	84	(*)	87	61
23	80	60	67.5	56	70	47	58.5	41.5	56	30	45	31	28	16	58	37	33	10	64	33	81	59	87	64
24	85.5	64	69	51	70	51.5	59	38.5	45	30.5	40	32	34	6	60	42	37	19.5	53	38	84	55.5	94	69
25	88	63	70	53	79	56	67.5	46	39	25	43	26	35	21	53	44	40	27	58	38.5	84	(*)	88	70
26	83	65	70	51	72	57.5	66.5	48	37	25	42	22	25	13	44	23	45	22	56	38	83	62	80	63
27	87	64	71	51	63	53.5	71	49	53	25	47	33	23	8	27	18.5	56	35	62	37	79	56	90	65
28	87.5	64	75	53	65	52	65	49.5	58	38	49.5	36	33	9.5	19	5	45	31	52	39	81	(*)	93	69
29	81	67	78	58	63.5	58.5	67	47	59	31	49	25	36	29	.....	.....	47	27	52	35	68	53	70	61
30	82	63	81	56	64	51	66	46	28	17	26	8	35	23	.....	.....	48	32.5	61	41	68	51	86	61
31	86	62	83	60	.....	.....	54	42.5	.....	.....	16	− 2	32	21	.....	.....	45	33.5	.....	.....	66	50	.....	.....
Range	40°		40°		43°.5		33°		47°		61°		38°.5		63°		54°		48°		.....		47°	
Monthly means	72°.2		67°.7		63°.8		53°.4		41°.5		31°.9		20°.9		22°.8		31°.7		42°.2		57°.3		66°.5	

* Minimum thermometer out of order.

Maximum, minimum, and mean temperatures—Continued.

STATION, BRECKENRIDGE, MINN.

Date of month.	1874.												1875.											
	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	55	74	49	78	62	65	42	43	22	34	15	5	— 5	13	— 6	6	— 1	35	22	.....	19	70	53
2	88	59	67	54	60	47	56	30	42	29	38	17	— 2	—20	— 6	—13	14	—18	45	27	.....	23	54	39
3	89	75	81	53	68	37	60	33	49	20	28	5	— 8	—24	—13	—25	17	—13	38	30	.....	31	56	33
4	89	60	75	62	67	48	62	47	51	28	32	20	—11	—18	— 7	—33	22	2	43	28	54	40	55	36
5	79	66	79	59	75	38	54	34	50	29	40	18	— 2	—27	— 7	—16	20	2	40	24	57	31	64	42
6	85	60	83	59	88	49	64	27	64	35	33	20	0	—19	—10	—28	13	0	34	23	54	40	64	39
7	88	59	79	59	91	58	70	26	42	34	30	18	0	—28	— 8	—22	27	0	36	28	54	41	70	43
8	85	63	87	56	91	59	66	45	42	27	37	17	— 5	—35	— 6	—25	30	20	38	31	51	40	72	48
9	80	61	89	61	78	68	70	33	42	25	17	7	— 3	—33	3	—24	29	6	31	23	52	33	74	50
10	72	52	82	60	71	55	49	38	33	29	21	3	— 8	—20	3	—14	32	— 1	36	22	65	38	66	56
11	78	52	79	64	74	54	40	22	26	24	6	—10	— 9	—31	—17	—29	26	7	48	27	59	38	61	49
12	83	64	67	56	67	40	49	10	27	20	19	— 3	— 8	—20	— 6	—33	34	5	44	26	67	33	68	39
13	86	57	74	60	68	37	49	28	37	18	17	0	—20	—34	— 6	—22	31	11	49	29	63	43	70	48
14	84	65	82	61	55	31	59	30	37	17	27	— 3	—12	—31	— 7	—34	20	— 2	57	33	63	44	63	52
15	76	50	85	63	65	26	52	26	24	11	40	18	— 4	—26	— 8	—34	8	4	48	14	69	32	78	55
16	87	55	81	63	66	45	67	34	29	9	38	— 7	—13	—28	4	—20	8	— 5	23	8	72	40	82	57
17	84	59	74	51	63	48	60	31	10	— 4	31	—13	—10	—28	— 2	—28	— 4	—24	40	14	68	48	72	52
18	92	62	74	50	55	43	72	29	8	—10	32	11	— 3	—27	16	— 6	3	—25	56	30	82	50	65	50
19	70	56	75	63	54	36	73	43	24	— 8	11	— 5	— 6	—35	27	5	13	—13	48	33	83	50	71	52
20	81	44	71	53	62	34	60	34	26	15	18	—11	21	— 6	11	— 7	18	— 6	52	26	81	51	73	58
21	86	50	74	58	79	39	57	21	33	24	27	10	19	— 6	10	—22	26	3	(*)	36	80	48	79	57
22	87	55	72	56	70	36	68	37	30	9	26	— 2	7	—20	10	—12	30	2	.....	39	88	40	72	57
23	79	60	70	58	81	41	71	42	9	2	26	7	2	—10	3	—13	30	8	.....	31	89	51	65	52
24	83	56	76	58	83	40	76	50	3	— 4	14	—12	— 5	—16	1	—22	20	— 2	.....	26	82	47	84	59
25	75	58	80	58	76	53	68	44	13	— 4	19	0	4	—30	1	—12	42	15	.....	31	82	36	75	57
26	69	51	66	61	59	49	45	35	19	1	15	— 5	23	—10	0	—18	38	17	.....	35	81	54	63	53
27	77	45	68	62	64	40	40	32	10	0	15	0	8	—15	— 4	—24	33	4	.....	36	75	53	65	50
28	81	56	91	66	75	32	42	31	6	0	0	—16	8	—12	8	— 8	38	10	.....	31	63	44	79	39
29	78	50	74	59	65	32	31	24	2	—18	— 4	—27	8	—10	.....	.....	45	32	.....	23	67	34	74	55
30	88	51	77	48	78	30	22	18	20	— 4	— 6	—30	— 1	—18	.....	.....	35	22	.....	21	82	49	76	50
31	74	60	79	56	.....	.....	41	10	.....	.....	14	—23	13	—26	.....	.....	30	18	.....	.....	79	50	.....	.....
Range	48°		43°		65°		66°		82°		70°		58°		61°		70°		.....		.....		51°	
Monthly means	70°.2		67°.8		57°.7		43°.8		21°.4		12°.8		— 9°.5		— 7°.9		14°.7		36°.1		56°		60°.8	

* Maximum thermometer out of order.

Maximum, minimum, and mean temperatures—Continued.

STATION, BUFFALO, N. Y.

Date of month.	1874.												1875.											
	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	77.5	54	74	63.5	77.5	53	59	42.5	39	34	37.5	16.5	32	14	23	9	26	6	66	39	50	30	85	55.5
2	72	62	67	56	75	54	61	47.5	49	36	49.5	30.5	32	24	36	19	26	10	39	32	47	32	78	67
3	71	56	66	51.5	72	56	54.5	37.5	57	44	49.5	28	25	17	45	13	18	7.5	43	26.5	39	31	68	56
4	76	58.5	69	48.5	71.5	49	52	38.5	56	44.5	30	21.5	23	15	16	— 4	23	14	48	38	41	33	68	54.5
5	77	58.5	75.5	49	81.5	56	57	44	56	51	39	24.5	17	9	13	2	35	15	50	35	54	33	72	59
6	76	61.5	74	56	71	63	55	49	57	47	39	34	21	8	16	0	36	26	54	33	45	35	64.5	54
7	82	70	79.5	64.5	77.5	61	60	48	61	35	37	23	26	17	7.5	— 4	29	23	46	31.5	60	30.5	57	50
8	76.5	69	80.5	65.5	75	67	60	45	66	54	30.5	15.5	25	15	5	— 8	31	20	64	38.5	79	54	60	50
9	85	67	75	63.5	76	57	59	49	55	50	39	26	27	— 5	— 1	—13	35.5	13	50	37	66	46.5	77	45
10	64	66	75	67.5	76	65	59	50	60.5	45	32	27	7	— 3	23.5	— 3	34	25.5	42	35	55	39	71	55
11	74	63	87	62.5	75	69.5	55	44.5	50.5	35	34	21	17	— 1	25	1	42	23	58	34.5	57	38	84	61
12	64.5	58.5	82.5	70	80	65	46	38	36.5	29	24	18.5	23	7	1	— 5.5	41	28	45	37	54.5	37.5	76.5	49
13	68	57	73	61	84	60.5	40	34	30	25	37.5	22	37	22	10	— 4	37	27	43	34	49	36.5	53	41
14	77	65.5	75	51.5	83	70.5	46	36	37	20	38.5	9	26	10.5	10.5	— 2	52	32	39.5	32.5	60	45.5	61	47
15	78	71	73.5	55	77	61	54	34.5	50	35	22	6.5	15	6	4	— 7	56	36.5	52	35	51	38	71.5	54.5
16	73.5	61	76	56	63	59	60	42	47	30	40	22	20	11.5	7	0	36.5	21	35	20	52	37	72	48
17	69	56.5	78	61	69	58	60	51	51	45	42	22	15	10	19	4	21	10	22	15	46	38.5	63	48
18	78	57	75	64.5	75	58	51	38	47	30	35	15	15	10	10.5	0	16	5	23	14	63	42.5	71	48.5
19	82.5	66	80	53	80	62.5	52	34	36	29	36	33	14	9	27	6	20	10	34	21	58	41	71	56
20	77.5	67	78	72	68	56	60	49.5	34	28	37	20	15	10	26.5	20.5	16.5	11	34	23.5	51	44.5	75	47
21	72.5	56	81	61	62	48.5	56	42	33	27	33	20	34	12.5	20.5	11	19.5	10	32	21	64	49	83	53
22	78	58.5	70.5	57	66	46	60	36.5	36	24.5	39	33	34	17	47.5	4	22	3	34	26	57	50	74	66
23	79	57.5	72	50.5	70	51	66.5	43	55	34	36	33	24	11	47	36	29	7	39	30.5	82	50.5	71	64
24	83.5	61	72	49	72	61	72	50.5	34	22	37	25	33.5	16.5	52	36	35	23	37	30	78	59	79	66
25	82	69.5	74	50	76	56	68	55	29	23	28	22	29	13	40	24	28	17.5	37	32	67	59	74	64
26	79	72	73.5	50.5	80	55	66	53.5	38	23	41	27	16.5	12.5	28	15	41	25.5	43.5	31	74	53	73.5	68
27	74	63	77	58	71	62	61	49	48	38	45	27	32	10	17	11	37	31.5	53	35	82	51	76	66
28	60	57	79	50.5	64	54	50	47	38	28.5	49	36	36	22	11	3	34	20	60	36	85	61	76	60
29	74	58.5	79	53.5	64	54	67	47	28.5	16	36	14	22	16.5	.....	.....	54.5	29	60	37	71	52	68	56
30	72.5	57.5	77	58.5	55	44	49	39	20	13	18.5	10	26	13	.....	.....	60	37	40	34	62	51	69	62
31	73.5	66	79	60	.....	.....	42	34.5	.....	.....	19.5	3.5	30	10	.....	.....	72	41	.....	.....	75	44.5	.....	.....
Range	31°		39°.5		40°		33°		53°		46°		42°		65°		69°		52°		55°		44°	
Monthly means	69°.4		67°.9		65°.5		50°		38°.4		29°.1		17°.3		13°		27°.4		36°.3		51°.9		64°.1	

Maximum, minimum, and mean temperatures—Continued.

STATION, BURLINGTON, VT.

Date of month.	1874.												1875.											
	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	52	73	64	74	50	55	45	42	30	27	1	20	3	28	17	16	— 3	51	38	56	35	80	46
2	77	59	70	57	75	49	58	49	45	36	40	27	30	19	32	19	19	13	47	36	49	37	81	57
3	73	60	65	52	76	51	50	44	51	34	47	29	27	16	42	23	20	11	47	34	46	36	77	58
4	73	57	76	55	68	42	51	36	53	39	30	14	26	15	35	6	23	9	43	33	51	37	80	54
5	75	59	74	50	69	50	55	43	55	43	34	13	17	13	18	0	30	9	47	33	59	42	80	38
6	80	56	76	51	78	62	56	39	57	48	39	33	19	10	13	3	39	27	33	24	59	43	70	56
7	84	66	73	57	70	59	61	47	59	42	40	33	22	17	3	—15	35	24	42	24	61	41	56	52
8	85	68	76	58	71	52	67	49	58	43	34	14	20	15	2	—14	30	17	42	24	52	42	77	50
9	79	65	76	59	74	48	61	49	53	46	35	14	23	4	— 1	— 7	41	13	52	29	71	44	76	52
10	76	62	83	61	80	50	60	50	48	40	35	21	10	2	10	— 7	36	27	53	39	66	51	73	52
11	77	66	86	61	69	51	59	51	50	32	33	16	12	3	32	7	40	30	46	33	69	47	87	53
12	65	58	87	69	69	53	52	38	33	29	16	13	18	1	16	— 6	42	32	50	27	67	47	82	60
13	80	61	70	62	75	50	43	36	29	25	23	15	31	10	10	— 7	31	22	43	35	59	42	60	45
14	87	61	69	57	79	60	49	37	28	19	17	— 1	31	9	6	— 7	41	24	47	28	62	46	66	45
15	88	67	76	56	74	62	55	35	37	19	— 1	—10	9	— 5	3	— 6	47	33	56	33	55	39	70	47
16	78	65	79	51	70	58	62	40	40	30	27	— 5	2	— 7	15	— 5	46	30	47	30	43	36	70	46
17	77	60	81	59	63	54	62	45	46	30	35	20	1	— 7	21	5	27	14	32	23	60	36	68	44
18	82	57	79	63	61	54	49	39	47	23	26	9	— 2	— 9	14	0	16	6	31	16	63	35	58	47
19	88	64	74	51	72	54	42	37	32	18	29	22	10	—12	25	10	17	6	32	18	53	44	73	50
20	78	62	78	63	70	56	58	32	34	28	26	9	8	— 5	37	23	11	3	29	16	59	45	75	56
21	75	55	72	59	60	45	50	40	38	26	14	— 5	16	— 7	27	13	17	— 3	29	14	69	44	82	57
22	76	54	66	52	64	39	56	33	26	16	37	14	32	11	33	3	14	4	35	25	81	52	86	59
23	82	55	67	43	68	52	56	33	40	21	40	32	22	3	39	29	26	— 2	52	33	72	54	85	66
24	84	67	67	46	71	47	62	46	38	29	38	31	28	2	50	29	30	12	47	35	79	54	92	67
25	84	66	71	45	74	53	62	46	31	23	34	10	30	10	44	29	33	26	48	37	83	63	72	61
26	84	67	73	52	75	56	65	46	33	21	33	21	18	1	32	16	37	18	46	37	71	55	78	57
27	76	60	74	50	77	52	66	53	40	27	35	26	14	3	17	9	45	33	52	32	69	47	87	68
28	65	59	77	51	72	55	50	46	40	36	45	35	26	1	11	0	42	20	58	31	74	45	77	60
29	70	61	77	57	64	52	65	45	37	27	40	10	26	3	.....	.....	42	20	67	39	81	54	78	51
30	80	57	79	62	53	44	56	45	27	4	15	— 9	22	1	.....	.....	49	33	53	39	68	33	81	63
31	76	60	79	52	.....	.....	46	37	.....	.....	3	—11	31	15	.....	.....	55	32	.....	.....	70	47	.....	.....
Range	36°		44°		41°		35°		55°		58°		44°		65°		58°		51°		50°		54°	
Monthly means	70°.4		66°.1		61°.9		50°.4		36°.1		22°4.		12°.7		14°.1		25°.9		38°.5		55°.8		67°.3	

Maximum, minimum, and mean temperatures—Continued.

STATION, CAIRO, ILL.

Date of month.	1874.												1875.											
	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	68	84	68	86	65	77	50	57	24	60	27	35	27	44	15	69	30	61	39	68	46	86	71
2	94	72	85	68	90	66	77	59	64	37	66	49	37	27	46	38	31	24	56	39	56	37	86	73
3	92	72	88	66	90	69	77	52	62	41	62	41	36	26	46	14	34	23	69	45	51	44	83	67
4	96	73	89	66	87	68	72	51	65	47	50	37	30	14	18	5	34	19	75	54	57	46	88	63
5	94	70	71	66	82	68	74	48	68	57	53	38	20	6	34	11	56	31	76	60	65	46	75	65
6	95	72	89	67	85	69	74	53	77	49	49	39	27	11	37	20	42	29	79	61	72	52	69	59
7	99	76	94	76	87	71	63	50	78	58	44	33	31	21	20	8	37	24	75	63	85	65	69	55
8	94	69	92	75	86	68	62	52	68	81	46	25	30	10	21	13	45	24	76	51	78	72	71	54
9	87	72	82	69	89	72	70	47	64	59	49	37	12	−11	23	4	55	34	65	47	76	53	80	59
10	84	67	101	75	87	70	76	50	66	56	42	32	17	− 4	42	19	55	34	64	48	76	49	87	67
11	86	69	101	76	90	68	67	52	56	45	47	25	32	9	35	13	61	42	63	43	80	59	89	70
12	90	69	101	75	89	69	57	40	52	43	50	31	40	27	52	18	60	37	55	42	70	53	81	68
13	92	67	101	78	92	66	58	35	52	33	51	44	40	19	43	28	73	44	59	39	77	53	79	57
14	91	73	90	77	88	69	64	38	63	40	59	28	22	7	38	19	77	60	55	45	86	56	87	62
15	81	70	83	70	76	63	57	43	58	47	41	24	30	5	28	10	59	37	70	43	68	58	81	71
16	85	73	89	65	69	61	56	51	65	48	52	38	30	19	41	22	46	34	53	33	68	51	81	67
17	89	70	93	69	78	65	67	52	61	45	48	33	30	11	35	20	46	27	47	24	73	48	86	66
18	89	73	96	71	87	64	67	47	45	38	40	25	29	19	35	14	59	35	60	32	75	52	84	67
19	93	73	93	70	76	61	69	45	43	37	35	20	34	17	41	33	55	32	76	42	76	52	77	66
20	94	75	90	74	74	53	73	46	37	31	35	32	45	19	44	23	34	27	67	49	80	58	81	64
21	92	76	84	73	75	51	71	51	46	27	37	30	53	41	49	37	38	25	58	43	73	63	87	71
22	90	74	91	71	76	55	62	56	68	46	40	33	43	30	65	38	48	32	57	42	78	60	92	75
23	92	76	81	72	82	55	67	57	66	41	50	30	43	23	62	52	56	36	64	41	77	64	91	75
24	96	77	86	68	72	66	67	55	42	26	46	29	44	34	62	40	55	43	56	46	85	65	89	73
25	95	76	84	67	81	68	76	59	34	19	52	32	46	24	43	28	58	37	60	43	89	66	86	72
26	95	76	88	71	76	65	81	60	50	25	48	42	54	34	59	34	61	48	57	48	88	68	87	70
27	86	75	77	71	75	60	80	59	57	37	65	47	52	42	50	29	56	41	57	48	84	69	87	72
28	82	65	77	72	66	50	79	62	37	24	65	39	54	36	56	23	55	45	70	48	81	66	74	64
29	85	64	87	72	76	51	70	49	30	15	40	25	37	31	.....	.....	63	49	76	58	75	58	81	62
30	89	66	79	68	75	57	53	38	30	17	30	22	40	29	.....	.....	73	56	66	50	82	57	85	67
31	89	68	81	67	.....	.....	42	31	.....	.....	31	22	36	13	.....	.....	69	61	.....	.....	84	63	.....	.....
Range	35°		36°		41°		50°		63°		44°		65°		61°		58°		47°		52°		38°	
Monthly means	81°.3		78°.6		71°.9		58°.2		47°.6		40°.4		28°.1		32°.5		41°.9		54°.8		65°.9		74°.2	

Maximum, minimum, and mean temperatures—Continued.

STATION, CAPE HATTERAS, N. C.

Date of month.	1874.												1875.											
	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	.....	57	.....	43	.....	38	57	36	45	35	65	42	67	56	72	58	67	60
2	.....	.....	.....	.....	.....	66	.....	57	.....	42	.....	40	62	47	54	34	67	60	69	59	74	57	67	61
3	.....	.....	.....	.....	.....	62	.....	67	.....	56	.....	54	58	44	66	53	69	53	65	46	61	53	77	63
4	.....	.....	.....	.....	.....	65	.....	65	.....	63	.....	48	59	46	60	34	53	38	51	44	69	49	79	68
5	.....	.....	.....	.....	.....	69	.....	60	.....	61	.....	46	48	43	45	29	60	38	59	46	59	48	78	68
6	.....	.....	.....	.....	.....	69	.....	58	.....	58	.....	46	58	42	45	25	60	42	55	46	68	59	77	70
7	.....	.....	.....	.....	.....	67	.....	61	.....	59	.....	47	58	44	46	28	67	43	65	47	64	53	79	68
8	.....	.....	.....	.....	.....	72	.....	65	.....	61	.....	39	47	42	30	22	49	42	58	47	69	51	70	65
9	.....	.....	.....	.....	.....	68	.....	64	.....	56	*54	32	54	41	32	22	47	41	66	57	72	64	70	63
10	.....	.....	.....	.....	.....	70	.....	69	.....	64	53	44	41	27	38	20	54	44	63	47	74	64	67	63
11	.....	.....	.....	.....	.....	72	.....	66	.....	63	55	46	43	34	60	38	55	40	67	49	70	58	69	62
12	.....	.....	.....	.....	.....	69	.....	60	.....	51	46	43	48	43	53	35	62	52	64	52	75	63	76	65
13	.....	.....	.....	.....	.....	72	.....	51	.....	46	56	39	48	39	60	48	64	49	61	50	70	59	75	63
14	.....	.....	.....	.....	.....	72	.....	50	.....	45	56	42	46	40	54	41	60	45	53	47	63	59	69	62
15	.....	.....	.....	.....	.....	75	.....	53	.....	45	42	32	43	32	41	32	69	56	64	50	73	63	77	69
16	.....	.....	.....	.....	.....	72	.....	59	.....	47	46	32	47	34	34	27	65	54	68	47	65	55	80	65
17	.....	.....	.....	.....	.....	74	.....	64	.....	56	59	46	44	32	52	31	54	46	50	41	57	52	75	64
18	.....	.....	.....	.....	.....	72	.....	60	.....	60	43	32	47	34	48	32	50	39	45	34	55	49	79	68
19	.....	.....	.....	.....	.....	71	.....	50	.....	55	42	36	36	31	46	35	61	42	56	31	68	46	75	65
20	.....	.....	.....	.....	.....	71	.....	43	.....	51	65	38	36	32	60	41	67	61	53	46	72	59	77	66
21	.....	.....	.....	.....	.....	65	.....	49	.....	44	43	40	55	35	45	38	61	41	47	39	73	64	80	71
22	.....	.....	.....	.....	.....	64	.....	54	.....	38	58	41	55	31	55	39	41	33	46	42	76	65	80	72
23	.....	.....	.....	.....	.....	65	.....	63	.....	59	51	47	51	40	62	52	36	32	49	43	77	68	81	72
24	.....	.....	.....	.....	.....	67	.....	65	.....	50	53	45	64	43	67	60	59	35	58	46	72	67	82	74
25	.....	.....	.....	.....	.....	69	.....	65	.....	49	46	40	53	39	68	56	53	31	49	44	78	68	82	75
26	.....	.....	.....	.....	.....	67	.....	62	.....	47	62	46	41	34	56	43	59	40	65	48	72	64	82	75
27	.....	.....	.....	.....	.....	67	.....	56	.....	50	63	59	48	34	59	45	65	52	69	60	76	63	82	76
28	.....	.....	.....	.....	.....	70	.....	53	.....	59	46	56	62	47	49	42	56	50	65	51	69	65	82	76
29	.....	.....	.....	.....	.....	65	.....	65	.....	42	66	52	65	59	.....	.....	59	54	58	48	75	65	83	76
30	.....	.....	.....	.....	.....	61	.....	62	.....	41	52	40	60	42	.....	.....	62	53	70	56	70	63	83	72
31	.....	.....	.....	.....	.....	.....	.....	52	.....	.....	40	33	52	45	.....	.....	66	54	.....	.....	.....	.....	.....	.....
Range	.....	.....	.....	.....									38°		48°		38°		49°		32°		23°	
Monthly means	.....	.....	.....	.....	72°. 5		63°. 7		56°. 9		49°. 3		44°. 9		43°. 7		52°. 6		53°. 7		64°. 7		72°. 9	

* Station supplied with maximum thermometer December 9, 1874.

Maximum, minimum, and mean temperatures—Continued.

STATION, CAPE HENRY, VA.

Date of month.	1874.												1875.									
	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	74	92	69	80	61	72	56	60	41	47	31	44	25	42	29	66	32	70	52	74	52	72	56
2	83.5	71	87	71	85	65	80	55	54	39	54	40	51	37	47	30	71	43	74	51	72	52	69	59
3	83	72	75	69.5	87	65	69	64	61	45	72	50	45	37	66	40	46	37	66	43	56	49	71	62
4	84	68	74	67	83	67	76	60	65	58	57	40	47	40	61	28	45	31	57	42	62	50	73	63
5	88.5	71	78	67	76	66.5	65	52	65	57.5	55	39	43	33	36	23	41	34	60	50	58	45	78	64
6	71	66	83	65	87	71	72	50	74	56	52	40	42	30	45	24	48	37	51	45	71	45	89	70
7	73	65	78	68.5	85	68	72	58	66	53	48	44	46	37	35	23	50	39	57	44	64	50	89	65
8	89	68	82	66	89	65.5	75	63	64	55	49	35	43	35	28	18	49	36	51	45	73	48	66	60
9	91.5	73	84	67	74	66.5	78	61	74	55	55	32	52	28	27	15	45	33	78	47	93	69	65	59
10	93	75	90	69	73	67	81	63	66	59	49	40	28	15	32	11	49	39	51.5	48.5	89	58	77	60
11	89.5	75	85	69	83	63	80	59	76	56	60	40.5	34	21	57	32	52	37	56	47.5	74	56.5	80	60
12	84	71	80	70	89	64	69.5	58	57	47	52	36	41	31	46	32	68	50	53	46.5	84	63	80	59.5
13	87	71	84	73	84	68	57	50.5	47	41	60	37	41	35	60	41	68	40	54	44	64	54	72	64
14	87	72	82	71	76	72	57	47	46	37	60	37	46	35	51	32	56	38	57	42	61	53	77	61
15	90	74	81	70	79	72	66	46	60	38	37	28	36	23	36	22	73	52	67	47	84	56	81	62.5
16	93.5	72	75	69	76	70	65	50	58	44	43	28	41	24	33	18	63	44	69	43	62	51	75	63
17	78	70	78	70.5	76	70	68	56	63	50	59	38	35	27.5	52	23	52	37	50	36	56	47	73	61
18	79	67	84	68	80	71	68	59	64	52	51	37	36	27	38	20	50	33	38	29	59	47	84	66.5
19	81	67	90	68	78.5	69	64	49.5	56	44	56	35	31	23	37	25	63	39	57	28	71	45	80	64
20	82	67	93	73	80	68	71	46	55	48	58	36	35	23	48	33	65	46	55	44	82	58	78	65
21	92	72	95	75	72	65	75	52.5	53	41	46	32	38	27	47	33	45	35	51	40	87	64	76	67
22	77	68	92	74.5	70	64.5	73	53	55	38	54	36	51	38	53	34	40	31	54	37	89	66	77.5	68
23	76	69	77	73	71	64	71	53	70	53	55	42	41	34	64	34.5	39	29	54	39	86	67	81	69
24	77	68	75	68	72	65	69	63	60	46	56	40	55	36	71	50	49	32	61	42	70	61	91	73
25	79.5	67	73	67	74	64	65	62.5	52	39	52	33.5	50	34	77	46	50	37	60	41	70	62	95	75
26	82	70	71	65	81	58	65	60	46	35	59	39	40	28	55	37	63	35	69	44	73	64	96	78
27	81	70	70	64	82	61	74	58	56	40	62	46	44	26	62	41	60	45	60	50	67	61	96	78
28	81	69	70	64	74	64	76	53	65	50	74	52	54	39	41	30	49	43	63	47	67	59	96	78
29	85	69	73	64	72	61	82	59	64	37	60	46	55	40	.....	.....	44	41	62	45	81	56	95	76
30	80.5	69.5	72	60	74	54	73	57	42	32	45	35	45	36	.....	.....	49	43	69	54	75	60	90	75
31	81	64	69	61	.....	.....	63	46	.....	.....	37	26	49	26	.....	.....	57	45	.....	.....	79	55	.....	.....
Range	29°.5		35°		35°		36°		44°		48°		40°		66°		44°		50°		48°		40°	
Monthly means	76°.5		73°.8		72°		62°.4		53°		45°.1		36°.6		38°.2		45°.9		51°		63°.8		73°.4	

Maximum, minimum, and mean temperatures—Continued.

STATION, CAPE MAY, N. J.

Date of month.	1874.												1875.									
	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	.....	66	.....	65	78	61	64	51	49	39	44	21	28	13	34	21	47	21	52	42	56	46	65	55
2	.....	66	.....	67	76	59	72	59	51	42	55	40	40	27	39	31	48	36	51	44	57	46	64	56
3	.....	65	.....	60	79	67	64	50	56	38	57	46	39	30	47	37	40	22	48	42	57	39	64	58
4	.....	63	.....	57	71	65	63	50	60	43	51	31	41	33	47	21	40	26	56	37	49	42	67	58
5	.....	63	.....	58	74	67	63	45	60	38	44	25	38	26	25	16	37	29	59	43	51	43	67	60
6	.....	60	.....	62	77	67	62	46	67	35	48	40	36	18	36	23	43	34	54	38	58	46	71	60
7	.....	59	.....	65	81	66	68	61	58	47	43	40	40	34	19	10	38	32	48	39	59	44	68	58
8	.....	64	.....	66	83	69	69	63	58	51	42	31	36	30	21	9	39	32	47	34	51	44	66	56
9	.....	67	.....	65	76	63	67	59	63	53	46	27	41	12	9	5	39	27	48	42	67	48	62	56
10	.....	68	.....	66	76	57	71	64	59	43	45	35	16	2	26	2	45	36	59	43	64	51	69	57
11	.....	66	.....	65	83	66	69	57	64	51	43	35	28	10	45	26	43	31	57	45	67	48	70	56
12	.....	65	.....	67	84	68	64	52	51	41	39	32	35	22	34	20	57	38	49	38	64	51	67	57
13	.....	64	.....	68	72	68	54	41	43	28	49	37	40	32	33	19	44	34	41	35	60	46	65	57
14	.....	63	.....	67	74	68	50	39	41	24	50	25	34	27	35	18	43	33	51	34	67	44	66	52
15	.....	62	.....	63	76	68	56	37	50	29	30	14	25	16	20	10	47	40	47	37	67	48	70	60
16	.....	64	.....	63	74	68	61	52	53	38	40	17	31	20	20	8	50	40	57	36	64	45	70	62
17	.....	64	.....	60	75	65	65	52	58	46	47	37	28	22	28	16	41	23	38	30	59	40	71	60
18	.....	63	.....	59	74	66	60	44	58	43	41	31	29	15	24	11	35	22	36	27	61	41	73	62
19	.....	64	.....	67	71	67	55	42	45	33	47	35	24	6	36	17	38	27	46	24	62	48	75	61
20	.....	64	.....	70	73	63	63	45	55	43	36	48	22	11	40	32	45	30	45	36	69	53	73	57
21	.....	64	.....	71	67	57	64	51	40	35	30	38	36	15	38	28	36	25	44	30	68	56	71	62
22	.....	64	.....	66	65	51	64	47	49	33	30	45	38	33	41	32	32	17	48	31	73	55	70	62
23	.....	64	.....	66	69	53	66	50	58	46	34	46	32	22	43	33	32	17	54	37	76	57	71	64
24	.....	61	.....	60	70	57	64	55	52	34	34	46	43	24	50	40	41	30	52	35	65	56	73	64
25	.....	63	.....	62	71	61	64	51	38	31	39	29	36	28	50	41	41	30	54	37	62	58	82	67
26	.....	68	*70	53	76	63	62	46	39	26	30	46	27	19	44	32	43	31	56	41	76	58	82	67
27	.....	67	70	52	74	63	64	50	50	31	46	40	35	21	46	28	53	41	50	44	68	55	86	66
28	.....	67	70	54	71	64	64	54	55	44	59	43	41	33	25	20	50	35	47	41	68	50	83	67
29	.....	66	71	52	73	59	66	60	54	35	54	35	40	32	.....	.....	46	36	51	39	68	55	76	67
30	.....	65	71	58	65	55	64	47	41	26	35	26	38	28	.....	.....	51	34	66	45	73	58	79	65
31	.....	63	73	59	.....	.....	55	41	.....	.....	26	17	42	32	.....	.....	50	43	.....	.....	70	52	.....	.....
Range	.....		.....		33°		35°		43°		45°		41°		48°		40°		42°		31°		34°	
Monthly means	69°.2		68°.8		68°.6		57°.3		46°.1		38°.2		26°.8		28°.8		36°.9		44°.4		55°.8		64°.8	

* Station supplied with maximum thermometer August 26, 1874.

Maximum, minimum, and mean temperatures—Continued.

STATION, CAPE ROSIER, CANADA.

Date of month.	1874.												1875.											
	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	47	43.1	58	54.9	59	49.9	51	42.6	.....	27.7	.....	13.0	.....	2.7	.....	10.0	.....	— 3.2	.....	21.2	.....	30.0	.....	41.1
2	52	44.1	60	54.9	53	49.9	49	42.1	.....	27.7	.....	17.0	.....	9.0	.....	10.0	.....	6.0	.....	31.0	.....	29.0	.....	44.1
3	48	43.6	55	51.9	58	45.1	51	45.9	.....	27.2	.....	23.7	.....	14.0	.....	11.0	.....	4.3	.....	30.0	.....	31.0	.....	48.9
4	52.5	43.1	58	51.9	56	44.1	48	40	.....	39.1	.....	16.0	.....	1.3	.....	6.0	.....	3.3	.....	30.0	.....	31.0	.....	42.1
5	49	43.6	56.5	46.9	63	50.9	46	35	.....	41.1	.....	13.0	.....	— 5.2	.....	— 6.2	.....	10.0	.....	30.0	.....	31.0	.....	38.1
6	53	45.1	55.5	46.1	65	45.9	46	33	.....	37.1	.....	15.0	.....	— 4.2	.....	— 5.2	.....	15.0	.....	17.0	.....	32.0	.....	50.9
7	63.5	51.9	62	51.9	58	53.9	47	39	.....	22.7	.....	22.7	.....	— 4.2	.....	— 7.2	.....	16.0	.....	16.0	.....	31.0	.....	45.0
8	63	52.4	60	57.4	57	45.1	49	40	.....	22.7	.....	17.0	.....	5.3	.....	— 5.2	.....	11.0	.....	19.7	.....	33.0	.....	45.0
9	71	55.9	63	54.9	56	46.1	49	43	.....	34.0	.....	14.0	.....	4.3	.....	2.3	.....	0.8	.....	22.7	.....	38.0	.....	50.9
10	63	54.4	62.5	56.9	57	47.9	52	44	.....	33.0	.....	10.0	.....	— 5.2	.....	4.0	.....	3.3	.....	19.7	.....	38.0	.....	45.9
11	60	52.9	70	56.9	55	46.9	(*)	48.4	.....	32.0	.....	9.0	.....	— 4.2	.....	— 1.2	.....	15.0	.....	25.7	.....	40.1	.....	45.1
12	62.5	49.9	75	54.9	54	46.9	.....	40.1	.....	23.7	.....	0.0	.....	— 1.3	.....	5.2	.....	16.0	.....	23.7	.....	37.0	.....	54.9
13	57.5	49.4	62	48.9	55	41.1	.....	37.1	.....	24.7	.....	— 4.8	.....	— 2.2	.....	—13.0	.....	22.7	.....	21.7	.....	37.0	.....	46.0
14	65	52.9	66	48.9	56	46.9	.....	34.0	.....	25.7	.....	1.8	.....	4.3	.....	—14.7	.....	19.7	.....	18.0	.....	38.0	.....	45.0
15	72	61.0	62	47.9	59	46.4	.....	42.1	.....	20.7	.....	3.3	.....	— 2.2	.....	—13.7	.....	19.7	.....	24.7	.....	35.0	.....	43.0
16	71	56.9	62	50.9	59	51.9	.....	43.1	.....	20.7	.....	8.3	.....	3.3	.....	—12.7	.....	24.7	.....	28.7	.....	32.0	.....	42.1
17	60	51.9	68	51.9	52	39	.....	47.9	.....	30.0	.....	8.3	.....	7.3	.....	5.3	.....	24.7	.....	26.7	.....	32.0	.....	44.1
18	62	49.9	65	53.9	50.1	40.1	.....	42.1	.....	21.7	.....	15.5	.....	— 1.2	.....	— 3.0	.....	8.0	.....	29.7	.....	33.0	.....	49.4
19	72	59.9	63	53.9	55	46.9	.....	39.1	.....	12.0	.....	13.0	.....	— 7.2	.....	— 2.2	.....	3.8	.....	28.7	.....	32.0	.....	45.0
20	71	55.9	65	56.9	.....	.....	.....	38.1	.....	11.0	.....	3.3	.....	—11.7	.....	20.7	.....	0.3	.....	28.7	.....	36.0	.....	45.1
21	58	50.9	64	46.1	.....	.....	.....	37.1	.....	23.7	.....	1.3	.....	— 8.2	.....	15.0	.....	6.3	.....	27.7	.....	37.1	.....	56.9
22	62	49.9	55	45.1	.....	.....	.....	36.1	.....	7.0	.....	3.3	.....	— 6.2	.....	0.3	.....	9.7	.....	28.7	.....	34.0	.....	49.9
23	67	53.9	59	47.9	.....	.....	.....	31.0	.....	19.0	.....	20.7	.....	9.0	.....	15.0	.....	5.3	.....	35.0	.....	38.1	.....	47.9
24	71	57.9	59	45.1	.....	.....	.....	30.5	.....	24.7	.....	18.0	.....	10.0	.....	14.0	.....	5.3	.....	33.0	.....	38.1	.....	51.9
25	76	55.4	61	45.1	.....	.....	.....	39.1	.....	20.7	.....	9.0	.....	13.0	.....	21.7	.....	19.8	.....	34.0	.....	39.1	.....	43.1
26	71	65.9	59	47.9	.....	.....	.....	41.1	.....	18.0	.....	4.8	.....	— 7.2	.....	3.0	.....	17.2	.....	27.7	.....	39.6	.....	41.1
27	68.5	55.4	59	47.9	.....	.....	.....	45.1	.....	15.0	.....	9.0	.....	— 5.2	.....	1.3	.....	21.5	.....	23.7	.....	39.0	.....	53.9
28	59	54.9	64	52.9	.....	.....	.....	40.1	.....	25.0	.....	13.0	.....	13.0	.....	2.8	.....	22.7	.....	17.0	.....	38.1	.....	50.9
29	59.5	53.9	65	54.9	.....	.....	.....	36.1	.....	26.7	.....	— 5.0	.....	16.0	.....	.....	.....	15.5	.....	20.5	.....	39.1	.....	47.9
30	58	53.4	59	55	.....	.....	.....	39.1	.....	19.0	.....	—14.7	.....	11.0	.....	.....	.....	16.0	.....	27.7	.....	37.0	.....	47.9
31	59.5	53.9	67	51.9	.....	.....	.....	32.0	.....	.....	.....	— 8.0	.....	9.0	.....	.....	.....	17.0	.....	.....	.....	42.1	.....	.....
Range	32°.9		29°.9																					
Monthly means																								

* Maximum thermometer broken.

Maximum, minimum, and mean temperatures—Continued.

STATION, CHARLESTON, S. C.

Date of month.	1874.												1875.									
	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	77	88	74	77	70	73	61	56	39	57	37.5	41	32	50	32	68	45	70	61.5	76	65	78	65
2	89	75	91	78	80	69	81	63	61	41	61	42	54	36	63	38	73	58	74	63.5	83	68	79	70
3	84	70	83	73	81	71	81	66	68	47	68	51	52	44	64	51	70	58	63	49	71	60	84	69
4	86	74	83	73	81	69	80	66	73	52.5	62	50	51	41	56	34	58	43	66	44	76	63	85	70
5	92	74	80	68	81	71	71	60	68	56	57	44	56	43	41	29	68	47	74	52	68	50	84	72
6	82	73	81	73	81	70	71	59	72	57	66	47	51	40	47	28	53	44	65	54	81	63	84	72
7	82	71	85	73	83	71	76	63	70	57.5	65	46	47	38	55	36	63	44	75	54	75	66	86	72
8	85	73	83	73	85	71	78	64	72	59	51	36.5	47	40	45	31	56	39	74	57	84	68	75	70
9	86	77	84	71	85	71	77	63	74	61	57	38	58	41	46	26	61	44	76	62	86	71	77	61
10	87	74	89	72	77	66	82	68	78	64	59	43	41	30.5	48	28	58	48	79	65	83	71	80	65
11	84	74	91	71	77	69	78	66	78	63.5	60	46	37	32	58	48	61	42	73	59	76	66	86	66
12	86	70	90	78	79	70	75	63	67	51	55	40	41	34	55	34	63	54	75	64	83	69	85	70
13	85	69	87	73	80	71	62	49	55	44	61	44	52	35	65	43	66	54	65	55	73	66	83	66
14	85	75	84	73	78	68	61	45	54	39	65	45	51	45	63	53	66	57	63	47	73	62	82	74
15	87	76	85	71	84	75	66	47	64	42	49	36	51	39	61	49	72	59	70	52	76	64	85	75
16	90	75	90	59	85	75	72	63	66	54	54	33	55	39	55	44	64	43	76	55	72	63	95	68
17	91	77	75	52	87	73	69	57	64	49	65	50	51	39	50	42	55	45	59	47	69	56	84	67
18	86	79	88	50	84	75	75	54.5	67	60	48	43	49	40	47	43	55	38	55	39	67	54	90	72
19	80	73	89	58	83	78	67	54	63	53	58	41.5	47	38	49	39	62	51	63	39	75	60	81	74
20	82	71	82	58	84	75	69	54	60	48.5	64	46	45	34	64	46	71	57	80	54.5	78	67	79	72
21	86	77	81	57	77	70	71	56	61	45	54	38.5	57	39	53	39	73	56	71	50	75	66	86	72
22	90	73	88	48	77	66	73	59	68	51	65	46	64	49	59	39	60	46	52	45	75	64	87	73
23	81	73	92	74	79	66.5	74	61	72	61	59	51	65	47	67	49	50	35	55	47	72	67	89	75
24	81	71	89	74	80	68.5	67	61	67	48.5	59	49	66	47	73	57	66	43	67	46	77	68	88	75
25	82	72	80	71	80	71	70	60	60	48	53	38.5	54	44	72	57	60	46	62	47	86	68	89	77
26	84	72	81	68	79	71	74	60	54	37.5	62	49	54	39	57	43	68	53	60	54	81	70	89	77
27	80	72	77	65	79	72	73	56	62	44	71	56	56	39	69	47	70	59	72	63	82	67	90	76
28	81	73	74	66	76	63	74	59	68	52	51	57	67	49	58	45	65	56	74	55	79	67	89	78
29	81	71	73	63	75	57	77	62	65	48	73	58	64	58	.....	.....	60	47	74	57	81	68	90	77
30	79	71	78	69	76	52	79	63	55	40	64	45	61	48	.....	.....	61	44	82	63	80	67	90	77
31	82	74	79	71	.....	.....	66	50	..	....	45	34	52	45	.....	.....	71	54	.....	.....	77	69	.....	.....
Range	23°		44°		30°		37°		39°		40°		35°		45°		35°		43°		36°		34°	
Monthly means	79°.3		79°.1		75°.8		66°.7		58°.8		53°.1		47°.3		49°.2		57°.1		69°.8		71°.7		78°.2	

Maximum, minimum, and mean temperatures—Continued.

STATION, CHATHAM, N. B.

Date of month.	1874.												1875.									
	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	56.3	45.1	66.3	58.7	63.3	52.1	55.3	41.6	43.3	31.1	19.4	5.6	14.4	— 0.5	21.4	3.5	20.4	— 3.5	38.3	18.7	52.3	29.6	67.8	34.7
2	60.3	46.1	78.3	58.2	64.3	51.1	59.3	36.9	45.3	27.7	28.4	13.5	15.3	— 2.1	25.4	0.6	14.4	6.6	49.3	31.7	41.3	27.2	77.3	35.9
3	58.3	51.1	69.3	51.9	71.3	48.1	59.3	46.3	45.3	25.7	41.3	21.7	23.4	1.0	23.7	9.5	20.4	—12.3	39.3	33.9	45.3	33.4	83.3	39.9
4	65.3	50.1	71.3	48.1	68.3	42.1	53	35	53.3	34.9	38.3	12.0	19.4	— 5.6	37.5	6.3	21.9	—15.0	40.3	33.7	52.8	30.7	73.3	46.7
5	58.8	48.6	68.3	50.6	77.3	45.9	58	37	52.8	34.9	25.4	7.3	15.4	— 9.0	7.9	— 1.6	24.4	—16.0	40.3	32.2	51.3	29.7	81.3	48.6
6	77.3	46.1	61.3	49.1	73.3	47.1	60	33	54.3	41.3	28.4	14.1	11.4	—10.3	16.4	— 2.6	26.4	12.6	34.4	20.7	56.3	26.7	77.3	55.1
7	76.3	57.7	79.3	50.1	69.1	58.8	65	35	41.3	24.7	32.9	23.2	14.4	—10.3	9.4	—18.3	28.4	13.6	38.3	15.7	51.3	29.2	63.3	45.1
8	81.3	53.6	66.3	57.7	61.3	51.2	69	39	38.6	27.6	31.4	20.4	14.4	— 4.6	3.3	—21.0	27.4	2.6	39.3	15.3	57.1	25.2	69.3	46.6
9	75.3	56.1	71.3	57.7	73.3	44.1	62	38	44.3	38.6	23.4	6.3	15.8	—15.3	15.4	— 4.0	20.4	— 5.6	43.3	14.6	55.3	27.5	74.3	48.6
10	84.3	53.1	66.5	62.8	72.3	51.1	67	47	46.3	34.1	19.4	— 2.6	19.4	— 3.6	19.3	— 1.0	25.4	— 5.6	37.3	21.7	58.3	41.1	63.3	47.9
11	83.3	62.2	86.3	55.6	61.3	43.1	64.3	46.1	38.3	27.7	18.4	— 8.0	9.4	—15.3	23.2	—18.8	31.4	15.3	33.4	21.2	65.3	37.9	74.3	55.1
12	70.3	53.6	84.3	62.7	59.3	41.8	60.3	38.1	34.3	20.7	14.9	— 7.0	13.4	—16.0	34.4	— 5.6	36.3	10.7	34.4	15.8	73.3	34.9	78.3	59.2
13	74.3	49.1	68.6	54.7	70.3	35.5	49.3	34.9	31.3	23.7	7.4	—17.3	10.4	—13.3	3.1	—17.3	39.3	17.3	36.3	5.6	57.3	42.1	75.3	49.1
14	84.3	65	7.3	51.6	74.3	43.6	46.3	33.7	31.3	21.7	10.4	1.0	18.4	0.6	4.4	—25.5	38.3	13.1	34.4	12.6	60.3	35.9	57.3	45.9
15	85.3	59.2	73.3	54.1	74.3	54.1	56.3	31.7	31.4	18.7	6.4	— 9.3	2.5	— 7.8	— 1.5	—24.5	45.3	4.6	46.3	10.6	54.3	39.1	61.1	39.9
16	84.5	64.7	74.3	45.6	69.3	55.1	60.8	39.9	38.3	26.2	17.4	—10.0	16.4	0.5	19.4	—26.6	29.1	20.2	48.1	16.4	41.3	36.6	63.3	38.4
17	76.3	58.6	79.3	47.3	38.8	47.1	67.3	36.9	37.3	21.7	16.4	— 4.0	5.4	— 0.5	16.4	—15.6	42.3	27.2	33.6	25.7	50.3	33.1	68.8	44.1
18	83.8	52.1	65.3	58.2	56.3	44.1	57.1	43.6	48.3	23.7	23.4	7.8	11.4	— 5.6	16.4	— 9.3	28.4	1.5	45.3	31.7	58.3	29.7	74.3	42.1
19	84.3	58.2	75.3	51.1	59.3	50	48.3	39.9	23.8	12.0	22.4	— 2.6	8.4	—20.3	24.4	— 7.0	19.4	— 1.4	42.3	30.7	42.8	35.9	52.3	48.1
20	76.3	60	61.3	54.1	73.3	56.2	43.5	37.8	25.5	13.6	18.4	— 0.6	3.9	—22.5	34.4	20.2	24.4	— 0.9	34.4	20.7	61.3	39.5	74.3	48.1
21	77.1	52.1	72.8	51.3	67.1	49.1	49.8	37.9	34.4	25.2	8.4	— 7.1	3.9	—16.5	34.4	15.3	26.4	2.6	42.3	23.7	56.3	43.6	85.3	55.1
22	77.3	53.1	68.3	45.1	64.3	40.1	51.3	28.7	29.4	13.4	27.8	— 7.1	5.8	—18.5	20.4	1.0	24.4	3.6	55.3	35.9	74.3	38.3	70.3	52.9
23	79.3	48.1	68.5	44.1	69.3	35.9	52.3	26.7	28.6	4.6	38.3	27.8	17.4	5.6	39.3	18.7	28.4	1.0	53.3	36.9	65.3	41.9	79.3	57.2
24	85.3	55.1	69.8	42.6	71.3	43.6	59.3	24.7	40.3	28.6	29.6	16.2	16.9	— 9.3	36.6	25.7	34.6	— 8.0	55.3	31.7	84.3	41.1	78.2	61.0
25	88.3	58.2	72.9	42.6	73.8	40.4	68.3	31.5	33.4	25.2	29.6	10.0	31.9	7.3	36.3	25.7	26.4	18.7	50.3	31.7	81.8	49.1	62.3	48.9
26	83.3	57.2	73.3	45.1	69.3	48.9	69.3	34.4	32.4	14.0	18.4	2.0	10.4	— 9.5	32.9	5.6	37.3	20.6	44.8	30.6	66.3	49.1	78.8	46.6
27	84.3	56.2	75.3	42.1	.....	.....	64.3	50.1	35.6	4.6	30.4	5.8	23.7	— 8.5	21.4	1.6	45.3	25.5	43.3	23.7	58.3	37.9	88.3	56.2
28	65.3	59	80.1	44.1	.....	.....	57.3	47.1	42.3	31.1	33.1	2.6	30.4	11.1	15.4	5.8	36.8	19.4	47.3	23.7	62.3	32.9	82.3	54.6
29	64.3	58.2	65.3	49.6	.....	.....	48.3	34.8	54.3	31.1	37.3	— 2.0	32.4	17.3	.....	.....	37.3	7.4	56.3	20.7	56.3	39.1	77.3	44.1
30	71.3	56.1	71.1	59.2	.....	.....	55.3	41.1	33.9	12.0	— 0.5	—12.3	24.4	16.3	.....	.....	37.3	7.6	49.3	25.5	55.3	37.9	66.3	50.1
31	82.3	52.6	75.3	58	.....	.....	47.3	36.9	.....	.....	6.4	—13.0	27.4	7.6	.....	.....	35.3	10.5	.....	.....	61.3	34.9	.....	.....
Range	43°		.....	.....	.....	.....	44°.6		49°.7		58°.6		54°.9		65°.9		61°.3		50°.7		57°.1		53°.6	
Monthly means	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Maximum, minimum, and mean temperatures—Continued.

STATION, CHEYENNE, WASH.

Date of month.	1874.												1875.									
	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	54	77	52	70	44	75	45	57	25	61	39	34	15	33	19	30	8	37	2	57	25	57	38
2	96	56	84	50	39	33	80	45	58	38	51	27	41	12	19	— 6	30	3	48	30	55	34	69	35
3	96	50	89	49	49	32	70	47	50	32	54	25	32	— 9	4	—11	33	21	50	28	62	29	77	35
4	98	48	88	60	71	44	62	43	50	34	39	26	1	—13	34	2	27	13	46	13	65	38	54	43
5	89	59	82	61	78	45	54	46	59	36	44	22	12	—12	39	17	26	9	24	6	75	42	67	45
6	91	54	77	54	82	48	56	43	63	30	55	30	21	—13	35	22	36	6	23	12	80	48	61	37
7	91	54	85	52	85	48	56	44	38	32	61	28	31	— 4	41	22	35	19	14	2	64	38	74	42
8	90	54	90	53	82	46	66	41	47	28	53	38	—16	—37	45	30	31	19	31	5	54	31	77	49
9	91	52	87	52	83	49	70	44	52	37	50	24	19	—38	36	24	34	20	35	14	53	31	85	47
10	91	50	84	56	70	41	72	41	55	26	45	15	26	8	24	9	35	21	35	19	64	35	69	50
11	92	51	85	49	64	43	60	36	46	28	47	24	28	— 5	38	19	34	17	21	12	64	31	72	38
12	91	63	93	44	64	32	63	34	44	24	55	20	— 5	—27	43	22	40	20	38	19	69	33	84	43
13	93	62	83	54	69	48	66	44	58	31	44	15	1	—26	44	27	31	15	48	27	75	32	84	50
14	86	63	91	51	61	34	65	36	45	26	49	12	24	—15	37	22	18	9	57	30	75	37	81	52
15	86	52	90	54	78	35	70	35	43	16	46	20	28	— 8	38	16	19	7	48	34	65	38	86	41
16	91	47	90	59	73	42	69	39	44	19	35	18	19	— 8	40	10	24	— 2	60	29	75	48	88	49
17	88	53	75	52	66	36	69	35	23	13	29	5	12	— 1	33	16	34	5	66	30	64	38	87	55
18	83	60	88	50	48	33	70	32	13	5	43	10	25	7	30	18	9	— 9	.....	.....	73	36	72	46
19	68	50	89	53	60	29	58	39	33	2	33	15	46	6	30	17	33	— 1	.....	.....	79	43	85	43
20	78	55	82	58	53	36	47	34	47	21	41	12	46	26	37	22	28	18	.....	.....	74	43	89	47
21	80	58	81	57	69	37	61	32	49	32	30	10	28	12	35	19	39	10	.....	.....	79	39	93	46
22	83	57	83	48	64	36	69	31	39	24	39	19	38	20	29	12	51	27	.....	.....	75	45	79	52
23	84	56	87	50	70	37	70	43	48	20	27	3	24	11	24	9	39	29	.....	.....	55	47	78	55
24	86	62	85	49	77	34	59	37	52	35	42	13	38	9	23	— 4	58	23	.....	.....	73	42	86	48
25	79	52	77	60	75	40	60	29	53	34	35	12	39	14	44	19	61	29	44	27	73	48	84	53
26	55	47	79	53	68	37	44	34	45	21	28	5	38	19	41	29	53	20	64	27	70	46	80	46
27	81	51	78	55	76	31	44	36	35	19	23	9	33	12	55	24	52	29	56	45	60	40	79	38
28	83	54	77	48	80	39	41	29	46	21	15	4	31	— 5	42	24	58	29	49	35	64	37	88	44
29	91	53	84	45	81	42	38	22	51	34	37	4	28	5	.....	.....	62	28	66	29	73	44	82	52
30	90	61	78	50	81	36	29	17	55	40	26	12	23	14	.....	.....	21	15	63	22	71	46	77	56
31	76	56	83	52	.....	.....	45	11	.....	.....	39	8	39	12	.....	.....	21	7	.....	.....	67	38	.....	.....
Range	51°		49°		56°		69°		61°		58°		84°		66°		71°		.....		55°		58°	
Monthly means	71°. 8		68°. 6		54°. 2		46°. 7		35°. 8		29°. 1		12°. 5		25°. 6		24°. 3		36°. 9		54°. 7		63°. 7	

Maximum, minimum, and mean temperatures—Continued.

STATION, CHICAGO, ILL.

Date of month.	1874.												1875.											
	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	69	75	68	77	67	78	47	45	29	38	17	40	27	38	9	20	12	61	36	39	34	70	63
2	73	62	68	64	84	66	59	45	65	31	52	29	35	9	44	22	21	12	51	32	46	27	75	63
3	94	61	69	64	76	61	57	48	63	34	48	29	25	8	45	— 2	18	11	62	40	53	39	70	53
4	92	66	70	63	67	62	56	48	65	50	47	32	13	0	5	—10	26	10	52	36	58	39	75	60
5	78	64	73	66	72	59	59	48	68	51	48	37	13	— 7	35	— 1	30	23	55	36	59	38	64	52
6	99	72	73	67	84	62	57	52	61	47	51	33	21	8	8	— 1	33	20	72	48	51	35	59	50
7	97	70	74	68	89	67	57	51	72	56	35	28	23	7	13	—10	24	12	62	41	65	44	65	45
8	82	70	74	64	84	70	61	52	65	44	45	26	31	—11	6	— 7	35	18	69	51	79	52	73	51
9	75	70	85	66	81	70	62	52	65	41	42	30	1	—20	15	11	36	32	56	42	66	47	66	60
10	81	69	80	66	82	70	62	49	58	41	39	25	20	— 3	31	2	34	25	57	41	59	46	73	59
11	70	64	98	75	82	70	54	41	44	32	34	20	22	2	23	— 5	44	30	48	39	63	46	89	68
12	69	63	87	76	87	68	44	37	43	33	39	13	31	19	9	—13	42	35	44	36	54	42	68	47
13	84	62	81	66	75	69	50	35	47	26	45	29	21	2	10	— 1	54	35	41	34	60	47	52	46
14	93	71	70	69	73	65	56	39	54	39	30	17	6	— 8	15	— 1	45	32	52	38	58	42	58	48
15	87	70	75	65	65	54	60	47	51	38	44	24	21	— 9	12	— 9	41	26	54	30	47	41	59	53
16	75	62	82	67	64	59	60	50	56	43	49	(*)	22	1	22	6	26	12	27	18	51	41	64	52
17	81	60	91	70	70	63	63	46	56	36	42	21	14	— 1	25	0	24	9	26	17	59	44	64	54
18	89	68	75	71	74	64	55	43	36	27	41	19	17	3	23	0	20	14	44	23	60	44	59	51
19	92	77	93	72	71	55	65	43	33	23	47	30	16	— 4	30	23	22	14	58	36	72	48	67	53
20	80	66	74	72	64	44	72	50	28	22	37	29	32	3	29	12	26	16	36	32	73	55	72	58
21	74	65	91	69	68	51	61	44	44	23	40	28	40	32	28	11	26	20	36	32	74	60	67	56
22	80	65	71	65	72	56	61	55	52	37	37	27	40	3	43	21	35	20	55	30	63	53	80	40
23	86	72	70	64	74	58	63	58	52	21	39	31	42	14	35	28	44	28	58	34	64	50	87	66
24	89	72	69	58	72	62	64	59	26	12	34	15	42	9	35	20	38	31	51	31	66	52	86	68
25	98	76	77	65	76	67	72	51	34	11	43	23	18	0	34	17	50	30	40	31	64	57	75	59
26	88	69	75	67	77	60	70	62	47	32	46	32	40	10	24	14	49	42	48	31	64	51	84	72
27	69	63	76	64	63	53	58	50	46	24	49	36	42	25	15	5	52	36	53	38	70	54	81	57
28	72	62	83	69	60	50	75	51	39	21	46	30	33	20	20	8	42	35	68	41	79	60	64	50
29	78	60	78	66	66	51	64	42	29	11	32	1	31	19	.....	.....	51	36	58	40	73	52	71	50
30	87	65	71	68	59	44	42	33	22	0	24	9	34	9	.....	.....	73	44	50	32	66	55	73	63
31	86	70	69	65	.....	.....	39	30	.....	.....	30	6	13	— 7	.....	.....	67	55	.....	.....	79	59	.....	.....
Range	39°		40°		45°		45°		72°		.....		62°		58°		58°		52°		52°		49°	
Monthly means	74°.7		71°.9		66°.8		53°.3		40°.3		33°.5		17°.7		15°.1		31°.8		42°.7		55°.5		63°.	

* Minimum thermometer out of order.

Maximum, minimum, and mean temperatures—Continued.

STATION, CINCINNATI, OHIO.

Date of month.	1874.												1875.											
	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	68	85	70	86	64	72	44	48.5	32	48	23	37	26	34	9	61	35	69	45	72	44	83	60.5
2	89	69	82	64	88	62	70	55	60	37	60.5	39	35	24	47	29.5	39	24	49	35	52	37	86	67
3	91	68	81.5	66	88	67	67	46	61	37	57	43	37	21	45	15	37	21	63	36	55	37	80	64
4	92.5	68	82	64	86	66	63.5	46	63	37	47.5	38	30	19	15	5	32	16	71	44	57	42	83	55
5	93	77	81	63	81	72	64.5	45	64	52	55	33	23	9	25	6	53	30	68	44	60	42	80	71
6	98	69	83	67	86	69	66	52	68	50	50	40	30	11	31	18	44	33	79	51	60	44	73	58
7	103	73	85	72	88	66	60.5	53	69	47	41	34	29	20	18	11.5	33	22	78	56	87	51	70	54
8	94.5	76	85	68	88	69	61	52	72	56	40	30	34	18	19	9.5	37	21	78	56	85	72	73	51
9	94	77	92	66	92	68	63.5	44	64	52	42	34	29	— 6	14	— 1	47	26	73	53	84	58	79	55
10	82	73	86	69	86	67	72	54	73	50	35	31	15.5	— 7	36	9	47	33	67	44	71	50	86	65.5
11	77	69	96	75	89	62	62	49	54	43	39	29	23	6	36	16	58	33	62	51	79	54	90	69
12	79.5	64	96	76	89	63	62	39.5	54	37	46	33	33	18	20	9	54	35	64	41	65	51	81	62
13	89	66	97	74	92	64	61	35	54	35	50	44	41	21	31	15	62.5	42	51	38	68	46	71	53
14	94	71	86	70	86	68	61	31	54	32	49	29	21	9	24	11	74	48	60	41	80	55	74	60
15	90	77	82	66	85	69	66	38	51	46	49	25	26	5	19	2	67	38	60	44	65	49.5	73	63
16	85	70	90	63	71	64	64	50	61	45	52	33	26	16	31	11	42	30	50	24	65	45	80	65
17	86.5	65	92	66	76	63	71	52	61	51	52	36	21	10	26	13	30	13	29	19	66	38	81	65
18	92	65	92	69	83	66	63	45	52	41	45	29	24	19	30	7	35	22	46	18	73	47	76	61
19	95	69	95	71	81	62	62	41	45	35	49.5	31	23	18	39	26	37	31	71	37	77	48	75	57
20	88	74	95	69	71	53	69.5	41	43	29	42	35	35	18	34	28	32	24	62	40	81	54	85	59
21	79	69	91	75	69	49.5	71	44	(*)	28	44	35	46	29	37	32	30	23	51	31	75	65	85	69
22	83	66	81	75	75	51	73	51	60	37	46	38	46	32	59	27	34	24	51	32	77	64	86	67
23	89.5	67	82	72	80	53	69	58	60	35	50	34	43	26	55	46	43	26	60	34	73	63	93	69
24	93	69	81	63	80	61	69	59	35	24	40	32	40	31	68	47	48	35	51	36	83	65	93	75
25	89	72	82	63	82	64	73	54	35	18	44	27	34	24	47	32	51	30	62	34	81	65	94	76
26	96	77	81.5	61	79	66	75	52	45	26	51	37	42	27	51	28	59	43	56	49	89	68	88	75
27	84	66	83	68	73	60	76.5	61.5	56	38	60	41	45	37	46	22	58	34	61	48	94	65	88	71.5
28	78	61	74	67	67	55	78	55	47	29	62	43	47	38	36	21	54	40	72	46	88	71	83	69
29	82	64	78	67	73	50	73	45	30	19	43	29	38	32	.....	.....	59	43	71	50	79	60	77	68
30	84	61	84	67	63	49	51	41	24	6	32	20	37	27.5	.....	.....	73	46	67	49	83	59	85	65.5
31	89	67	86	62	.....	.....	51	33	.....	.....	32	21	34	10	.....	.....	77	57	.....	.....	88	58	.....	.....
Range	42°		36°		43°		47°		.....		42°		54°		69°		64°		61°		57°		43°	
Monthly means	79°.3		77°.4		71°.9		59°.8		45°.6		40°.9		26°.7		27°.4		41°.1		49°.8		65°.1		72°.9	

* Maximum thermometer broken.

Maximum, minimum, and mean temperatures—Continued.

STATION, CLEVELAND, OHIO.

Date of month.	1874.												1875.											
	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	77	67	73	42	65	47.5	45	20.5	40	7	36	15	25	6	44	12	65	39	64	33	85	63
2	76	64	71	65	77	57	64	52	55	28.5	53	35	32	12	41	21	22	13	42	32	40	31	81.4	61
3	76	58	71	52	69.8	60	58	47	59	36	56	33	25	10	43	11	30	10.3	57	30	50	31.4	67	59.5
4	85	64	71	51	68	57	56	47	62	36	37	29	19	11	10	2	24	14	50	36	52	38.8	78.5	49
5	77	63	73	49	77	62	59	41.5	59	48	38.5	28	16	— 1	22	2.8	41	19.5	49	32.5	61	38.8	69.8	61
6	88	58	78	59	73	57	57	47	57	40	38.5	31	20	— 4	20	5	41	19.5	72	32.5	52	37.9	64.2	53.4
7	95	74	79	63	79	61.6	62	51	70	38	37.5	28	25	16	9	0.5	37	19.2	44	32.8	63	39	63.5	51.5
8	84	73	77	66	83.5	68.5	58.8	50	68	52	31	23	27	9.5	5	0	28	18.5	74	40	86.5	56.6	65.5	46.5
9	82	71	79	60	80	63	60	46	58	43	41	28.5	20	—13	— 1	—10	44	21	65	40	77.5	49.2	73.1	48.6
10	79	69	80	62	76.5	58	61	41.9	62	40	35	25	6	—11.5	24	5	35	25	56	40.3	62	44	74.2	61.1
11	72	67	91	66	81.5	59	62	44	47	41	46.5	23.2	8.5	— 2	25	3	45	25.5	55	40.2	67	44	89	66
12	70	60	88	74	83	58	50	40.8	36	32	27	21	32	11	(*)	(*)	45	21.5	46	36	64	43.2	79	50
13	80	54	75	66	84.5	61	44	37	34	29	47	26.8	39	20	16	— 0.5	45	30	40	35.3	58.2	40.3	55	46
14	27	67	75	62	87	68.5	50	33	39	26	46	20	14	10	9	5	66	41	55	35.2	73.1	45.4	64	43.9
15	88	71	75	55	80	72.5	64	33	48	38.5	28	16.2	13	0	8	— 2.5	63.5	37	52	35.2	48.2	41.2	73	46.7
16	75	64	76.2	53	66	63	66	39	49	30	41	25	19	11	15	— 4	32	16	36	18	49.5	41	68.1	60.1
17	73	56	84	59	74	59.5	66	46	57	48	43	25	18	9	14	7	42	10	23	15	57	34.8	77	49.7
18	78	59	77	62	75	61	57	47	52	36	36.5	20	18	5	20	— 4	18	11	25.5	17	58	37.9	67.2	54
19	91	63	89.5	57.2	82	64.5	58	38	38	32	40.5	26.5	16	3	32	11	19	14.5	40.2	24.2	66	43	73	47
20	78	65	89.5	75	67	51.5	69	39	40	22	38	27	19	11	30.5	19	19.5	16	(*)	(*)	75.5	59	70.5	49
21	73	62	89.2	70.6	66	47	59	44	31	21	36	23	37	18	19.5	11	20	13	33	24	75.5	64	83	54.3
22	76	53	72.6	63.5	70	46.5	60	41	46	25	40	30	36	17	50	16	23	7.5	35	23	70.5	62	75	60
23	86	57	70.2	61.6	72	51.5	70	47	57	28	37	29	30	— 8.5	53.5	42.5	39.5	7	52	27.4	75.5	61	85	67
24	83	65	71	56	72	55	71	51.5	35	19.5	34	22	35	22	63.5	32	41	28	37.5	30.8	73	61.2	91.8	68
25	80	67	71.5	58.8	78.2	57	69	51	30	19.5	33	18	23	10	36.5	25	36.2	22.5	45.5	35	72	57	77	68
26	85	71	71.8	54	81	60.5	74	50.5	38.3	26.5	44	18	21	11	30	15	54	26	50	34.5	65.5	52.8	81.6	68.3
27	73	62	76.3	59.2	72	60.5	60	52	49.5	47.5	56	29	36	11	21	9	46	31	53	37.4	85.8	59	84.5	72
28	69	62	76	55.5	63.5	56	69	46	46	29	57.5	33	37	21	25	6	55	25.2	55	35.3	86	63	77.8	62
29	75	56	76	54	68	57	72	45	52	19	37	18	22	15	.....	.....	58	27	67	42	73.2	49	74	62
30	75	55	71	54	55	50	41	36	19.5	8.2	20	15.5	27.2	17.5	.....	.....	67	39	46	38.8	64.6	44.5	81	62
31	83	68	73	56	.....	.....	36	29	.....	.....	22	16	27	15	.....	.....	76	45.2	.....	.....	66	46.2	.....	.....
Range	43°		42°		45°		45°		61°.8		50°.5		52°		.....		69°		.....		55°.5		45°.8	
Monthly means	72°.4		70°.2		60°.9		52°.5		39°.6		31°.9		18°.1		16°.6		31°.5		40°.7		57°.6		66°.7	

* No observation taken.

Maximum, minimum, and mean temperatures—Continued.

STATION, COLORADO SPRINGS, COLO.

Date of month.	1874.												1875.									
	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	50	92	56	87	55	75	45	58	22	59	30	41	10	40	20	36	20	47	11	56	32	71	40
2	90	49	79	54	63	43	75	40	59	28	59	34	49	14	27	2	26	— 3	65	31	61	38	69	32
3	95	48	84	53.5	52	39	71	51	60	26	47	24	39	9	14	— 8	32	7	64	32	62	26	81	37
4	96	49	86	56	73	39	66	43	56	30	47	22	11	— 3	32	6	34	20	65	32	73	37	83	43
5	95	53	89	56	77	42	62	49	59	31	46	15	22	— 3	44	10	28	15	36	26	79	42	68	49
6	94	49	87	56	82	46	56	47	65	32	57	19	17	—11	42	23	32	7	35	22	84	49	58	39
7	92	51	89	56	81.5	48	63	46	52	35	52	22	45	8	49	14	45	16	26	12	70	51	76	43
8	93	54	92	57	78	48	68	45	58	26	59	32	45	— 9	58	20	37	24	42	6	60	36	81	47
9	95	61	90	55	85	46	73	43	61	30	49	21	10	—22	41	26	42	20	48	23	64	34	85	50
10	89	58	91	52	72	47	76	41	48	27	44	19	29	3	32	10	53	16	45	21	74	43	82	60
11	98	53	82	53	83	44	64	40	51	31	50	23	39	— 2	49	17	46	14	(*)	18	62	36	72	47
12	97	60	86	56	66	38	61	33	50	21	57	19	35	—14	51	29	50	23	.....	10	76	31	82	45
13	96	60	87	52	62	48	73	39	65	24	40	19	— 2	—25	51	27	55	25	.....	26	75	43	89	50
14	93	61	86	56	60	44	64	44	52	33	41	12	43	—20	39	22	27	5	.....	25	79	38	87	51
15	81	58	92.5	57	73	35	70	39	49	22	41	20	53	19	46	17	28	1	.....	39	80	43	86	53
16	82	59	86	58	78	46	71	40	50	22	43	20	28	4	47	18	30	11	.....	32	75	49	87	58
17	87	55	85	60	75	43	69	39	34	20	19	— 2	50	— 6	31	20	47	9	.....	32	74	47	83	55
18	94	56	86	55	57	39	67	35	26	8	32	— 4	32	11	32	20	27	2	.....	36	66	45	82	54
19	87	60	87	60	63	27	67	42	43	4	35	4	57	11	28	4	20	— 4	.....	40	73	45	86	45
20	88	54	88	57	70	35	52	40	45.5	2	25	7	60	37	44	15	35	4	.....	38	75	49	89	50
21	84	59	82	56	67	41	60	33	53	27	29	14	39	12	48	21	34	11	.....	37	74	43	91	58
22	93	57	82	56	57	42	68	32	47	26	45	6	36	1	32	19	56	22	.....	29	71	43	86	62
23	88	60	85	54	63	45	71	37	53	22	37	10	29	7	30	18	53	37	.....	41	60	42	86	55
24	94	58	82.5	52	65	41	63	44	58	37	44	7	35	— 1	31	6	57	29	.....	26	73	43	90	52
25	89	60	82	58	76	39	66	34	63	33	37	14	41	9	46	4	56	41	.....	24	75	49	89	59
26	61	53	78	57	64	46	56	32	64	25	31	10	44	18	49	30	56	32	.....	24	66	48	91	56
27	78	54	84	56	71	38	51	37	49	20	38	13	27	17	58	22	61	29	.....	35	62	43	74	45
28	84	53	81	54	77.5	41	52	30	40	12	32	8.5	28	2	51	26	59	25	.....	40	57	41	91	43
29	95	52	82	52	77	46	46	20	52	27	39	8	23	11	.....	.....	67	31	.....	29	71	41	87	57
30	94	61	83	54	75	41	35	24	57	29	29	12	32	8	.....	.....	47	18	65	41	77	48	84	57
31	92	56	86	52	.....	.....	44	24	.....	.....	31	9	46	5	.....	.....	26	13	.....	.....	76	46	.....	.....
Range	50°		40°.5		60°		56°		61°		63°		85°		66°		71°		.....		53°		59°	
Monthly means	73°.2		73°.3		56°.7		49°.9		37°.9		28°.1		19°.1		29°.2		30°.4		41°.6		57°.3		67°.9	

* Maximum thermometer broken.

Maximum, minimum, and mean temperatures—Continued.

STATION, CORSICANA, TEXAS.

Date of month.	1874.												1875.									
	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	.....	62	67	69	43	43	37	60	33	69	42	54	33	71	65	90	63
2	....	....	.....	.....	.....	.....	86	.....	70	34	73	53	43	36	69	49	42	29	70	36	75	43	91	73
3	....	....	.....	.....	.....	.....	87	.....	73	53	75	56	49	36	69	20	52	24	79	48	79	56	92	73
4	....	....	.....	.....	....	.....	86	.....	76	63	72	54	41	23	40	19	79	35	81	53	78	50	91	71
5	....	....	.....	....	.....	.....	86	.....	77	62	61	57	30	16	47	30	72	42	78	60	88	54	93	73
6	....	....	.....	.....	.....	.....	83	.....	78	64	60	49	36	29	54	38	57	30	77	65	91	62	82	66
7	....	....	.....	.....	.....	.....	83	.....	78	66	60	41	35	30	41	19	50	25	81	67	92	68	83	57
8	....	....	.....	.....	.....	.....	70	.....	82	67	67	40	54	15	63	29	69	36	72	56	85	73	90	59
9	....	....	.....	.....	.....	.....	77	.....	83	67	70	45	17	3	56	47	55	44	80	49	86	72	93	69
10	....	....	.....	.....	.....	.....	82	.....	82	67	61	43	30	13	73	42	72	40	68	51	88	55	95	73
11	....	....	.....	.....	.....	.....	85	.....	82	66	64	37	33	21	50	29	68	53	65	42	80	59	96	74
12	....	....	.....	.....	.....	.....	75	.....	62	50	66	52	45	32	69	26	78	49	61	41	77	53	95	71
13	....	....	.....	.....	.....	.....	72	.....	67	43	74	58	44	22	69	59	81	55	67	41	85	55	95	72
14	....	....	.....	.....	.....	.....	77	.....	68	53	52	47	23	14	65	54	76	66	78	42	92	65	97	68
15	....	....	.....	.....	.....	.....	81	.....	65	62	52	45	44	22	54	40	55	40	87	47	93	64	96	71
16	....	....	.....	.....	.....	.....	80	*62	68	60	67	46	44	27	51	35	35	64	67	48	92	68	96	70
17	....	....	.....	.....	.....	.....	72	49	70	56	49	42	32	23	51	44	66	35	79	44	90	65	97	70
18	....	....	.....	.....	.....	.....	77	49	56	45	44	32	35	29	55	40	70	53	85	57	88	65	98	75
19	....	....	.....	.....	.....	.....	80	54	37	32	38	36	42	21	56	43	60	32	70	59	90	67	98	71
20	....	....	.....	.....	.....	.....	81	53	50	36	45	32	52	28	59	30	56	29	67	59	92	68	97	73
21	....	....	.....	.....	.....	.....	83	60	65	48	53	35	72	45	69	40	64	40	73	53	92	69	98	73
22	....	....	.....	.....	.....	.....	80	63	76	56	52	32	56	33	72	50	72	41	60	46	91	70	98	74
23	....	....	.....	.....	.....	.....	81	54	64	46	56	39	50	43	77	58	78	54	74	45	91	67	97	74
24	....	....	.....	.....	.....	.....	84	54	64	46	51	34	53	34	70	46	71	60	75	50	92	70	99	73
25	....	....	.....	.....	.....	.....	85	62	54	34	58	35	55	42	55	29	72	59	70	56	87	64	99	75
26	....	....	.....	.....	.....	.....	85	60	67	36	66	49	57	45	72	39	75	65	64	43	75	63	100	74
27	....	....	.....	.....	.....	.....	86	60	67	42	73	59	73	57	68	40	78	60	72	44	87	64	101	75
28	....	....	.....	.....	.....	.....	84	61	48	33	73	55	65	41	79	54	80	66	85	53	89	68	93	69
29	....	....	.....	.....	.....	.....	68	52	62	33	55	38	45	33	.....	.....	87	63	78	65	78	62	102	72
30	....	....	.....	.....	.....	.....	67	40	61	39	45	36	48	29	.....	.....	75	67	81	61	84	66	101	75
31	....	....	.....	.....	.....	.....	53	37	.....	.....	43	39	46	28	.....	.....	72	45	.....	.....	90	69	.....	.....
Range	.....		.....		.....		.....		53°		43°		70°		60°		62°		51°		50°		45°	
Monthly means	.....		.....		.....		67°.3		58°.2		51°.1		36°.8		49°.5		55°.8		61°.3		72°.9		79°.5	

* Station supplied with minimum thermometer October 16, 1875.

Maximum, minimum, and mean temperature—Continued.

STATION, DAVENPORT, IOWA.

Date of month.	1874.												1875.											
	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	71	80	66	81	59	77	52	47	32	36	5	29	22	33	11	19	13	51	33	46	33	73	66
2	86	66	79	60	84	67	66	46	60	35	54	15	16	— 1	39	26	17	5	51	31	50	29	71	57
3	95	69	76	61	67	56	62	44	62	43	39	35	15	— 3	34	—10	19	10	62	43	45	42	74	51
4	97	75	80	62	61	56	64	46	63	51	39	35	0	— 6	— 2	—16	23	8	55	42	58	37	67	61
5	98	70	79	65	74	56	72	50	68	51	39	33	6	—10	34	— 4	29	18	70	39	56	48	73	61
6	98	74	76	69	84	63	56	49	69	44	38	31	13	5	4	— 1	31	19	69	51	54	43	69	53
7	94	72	82	65	86	62	60	50	71	61	34	26	16	0	7	—10	32	15	75	53	82	48	72	45
8	86	72	86	67	89	72	62	45	61	48	40	23	21	—20	4	— 6	36	21	64	44	74	55	72	54
9	86	72	86	68	84	70	58	52	63	43	34	25	— 5	—22	11	— 9	33	27	56	37	56	50	69	58
10	82	68	93	71	84	71	62	47	56	38	30	25	13	— 8	21	1	33	24	55	40	67	48	85	62
11	77	64	95	80	85	73	49	38	47	32	24	21	11	— 2	5	— 9	40	32	46	34	69	48	79	64
12	82	56	92	74	81	69	48	31	40	32	36	16	20	10	4	—14	37	28	46	36	65	42	70	56
13	88	66	87	72	75	65	53	36	40	25	41	22	18	— 9	14	—10	57	34	56	39	72	52	62	50
14	93	75	81	65	74	53	48	33	48	37	29	17	— 7	—15	13	— 5	49	35	56	41	65	50	69	51
15	83	67	84	66	62	43	53	43	48	30	40	24	13	— 9	4	—12	37	15	51	30	63	43	78	61
16	78	64	89	66	67	48	61	45	52	35	40	33	4	— 4	18	—12	15	7	30	19	66	38	76	63
17	83	64	91	68	73	53	65	46	50	30	35	11	7	— 5	7	— 6	21	1	34	18	71	43	81	66
18	89	69	88	66	66	60	63	41	28	22	39	10	7	— 3	17	— 9	20	12	58	29	75	49	74	56
19	88	77	91	74	62	51	67	46	22	17	41	27	7	— 9	20	9	22	8	71	40	77	51	69	60
20	78	64	93	73	63	43	69	50	28	17	32	26	29	2	28	9	27	9	46	34	81	61	72	58
21	76	65	93	76	66	54	62	51	37	23	32	24	33	17	26	6	31	20	47	29	68	53	77	65
22	83	64	82	65	71	53	65	54	48	35	30	24	24	7	36	20	35	24	54	29	73	62	85	62
23	90	69	77	63	75	57	68	54	40	19	35	28	34	9	34	20	44	31	66	39	76	69	90	70
24	86	75	75	60	76	57	64	53	19	10	33	15	11	4	32	21	36	26	52	29	85	61	85	70
25	96	79	78	58	70	66	71	55	29	12	40	24	12	— 5	29	10	46	30	58	37	87	65	88	67
26	87	70	72	61	71	57	74	56	41	27	32	23	39	6	26	14	50	36	55	48	87	60	89	72
27	78	63	70	64	60	51	61	47	23	20	37	25	39	19	14	1	56	35	64	39	84	66	80	64
28	80	59	69	66	66	45	72	51	32	19	33	6	30	22	20	5	58	36	66	48	75	56	74	59
29	83	65	75	67	72	52	42	39	28	1	9	— 8	26	13	.....	.....	54	37	57	42	73	51	81	58
30	92	72	77	64	67	44	39	32	16	0	15	6	28	— 2	.....	.....	74	49	49	36	77	60	83	68
31	83	69	74	60	.....	.....	34	29	.....	.....	22	1	11	— 9	.....	.....	64	45	.....	.....	77	63	.....	.....
Range	20°		37°		46°		48°		69°		53°		61°		55°		73°		56°		58°		44°	
Monthly means	78°.		74°. 4		65°. 5		52°. 5		36°. 4		27°. 9		9°. 4		10°. 9		30°. 4		46°. 3		60°. 9		68°. 6	

Maximum, minimum, and mean temperatures—Continued.

STATION, DENVER, COLO.

Date of month.	1874.												1875.									
	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	59	81.9	58.8	82.8	56	80	43.6	65.7	27.5	71	31	43	8	40	20	35	21	49	17	63	35	66	45
2	98	61	91.4	59.2	63.5	39.5	83	48.5	63.5	35	62	35.5	52	12	34	5	42	5	62	36	59	44	76	38
3	101	59	86	61.9	56.1	37.5	73.6	51.5	63	32	56.8	24	43	2	22	0	32	8	70	32	71	38	82	46
4	102	61	89	65.6	80.4	40.5	71.2	45	58	34	47.2	23.3	17	— 2	33	— 3	40	18	71	31	70	45	72	50
5	97	64.5	83.8	60.8	87	47.1	64	50	68.5	36	52	20	22	— 3	48	13	34	10	42	22	87	51	70	52
6	98.5	58.5	87.7	57.5	89.6	49.2	56.5	47	72	39	61.8	25	23	—15	46	21	47	11	32	16	86	57	59	42
7	97	59	92	58.2	91.8	52	72.4	41.8	57	41.5	66.8	22.5	48	0	50	18	47	16	23	11	70	44	80	47
8	99	64	96.3	62.5	85	53.1	73.8	45	63	31.5	61.5	41	39	—17	49	27	42	23	42	9	59	39	86	56
9	97	63	91.3	61.2	92	52.5	73.2	41.3	64.5	32	59	24	8	—29	46	29	47	20	48	25	66	39	89	54
10	98.5	60	94.4	58.3	83.1	46	81.2	43.2	52	25	50	19.5	32	0	40	22	55	27	50	27	73	40	85	61
11	98.5	58	91.6	56.7	79.5	49	69	38.5	56.5	32	51	24.5	40	— 7	50	33	49	21	30	23	73	40	85	52
12	99	63.5	87.4	53.5	76.3	42.5	66	38.8	61	27.5	61.8	20.8	13	—15	58	32	53	24	50	13	77	39	89	52
13	96	66	84	56.2	68.3	49.5	74.6	45.5	67	26.5	52	25.4	— 2	—20	53	31	57	26	59	31	82	45	88	58
14	92	66	94.8	56.5	71.8	46	69.3	46	57	27	48.3	12	1	—17	46	23	33	20	60	31	83	48	92	63
15	91	59	96.5	60	85.4	40	73.2	38.4	50	20	45.8	24.2	52	1	55	22	32	15	65	37	74	49	88	54
16	94	59	93.6	68.4	78.5	58	73.5	39	56.5	19	38	23	23	— 5	46	17	38	13	70	32	78	52	93	54
17	94	62	77	59.5	75.5	37	77.2	38	28	20.5	25	— 5	22	— 2	52	18	51	16	77	35	79	49	89	58
18	90	64.5	90.3	52	56.1	40.6	77.5	39.5	22	13	32.5	— 5	25	— 2	42	21	31	1	77	41	78	50	81	57
19	79	62	89.2	58.5	70.5	34.6	66	42.2	34.5	8	38	5	50	2	40	18	46	7	77	39	82	51	93	50
20	85.8	55	86.8	58.8	66.2	36	56	43.8	56	15	40.5	30	55	33	48	30	38	26	67	45	85	48	97	50
21	79.2	62.6	90	59.7	70.5	43.5	64.5	36.5	56.5	28	39	20	40	11	53	21	51	20	70	37	86	50	94	55
22	84.8	61.6	89.2	56	58.5	45	76.7	33.5	48	30	50	15	50	10	40	21	67	28	80	39	74	55	83	61
23	84.3	61.8	92.8	61.7	74.6	45	76.3	42	59	27.5	41	8.6	38	11	34	20	61	32	72	46	64	50	89	61
24	90.4	61.2	87	55.5	80	39	67.5	44	58.5	45	44	11.5	34	3	28	11	71	26	46	28	77	48	95	56
25	86	59.6	86	65.6	85.8	41.5	68.5	33.5	69.5	40	41	10.5	47	9	59	17	72	32	48	26	84	54	88	58
26	64	51	81.5	63.5	71.5	42	58.5	35	61.8	25.3	31	9	44	16	56	37	65	32	68	30	78	53	91	56
27	84.2	51.8	88	56.2	80.9	37.5	53.5	37.3	42	21	34	7	36	17	64	27	64	29	66	43	65	51	82	51
28	86.2	57.8	87.5	52.6	85	39.8	54	38.5	53.5	20	33	4	37	8	56	28	69	27	60	40	64	44	95	53
29	96.8	60.8	91.2	51.2	86	45	49.2	29	63.2	35.5	43	1	43	17	.....	.....	73	39	72	36	80	48	83	61
30	94.2	65	84.2	63	85	44	38.5	27	64.1	32.4	35	6	39	13	.....	.....	42	21	71	40	80	53	81	66
31	87.8	63	88.9	58.1	.....	.....	28	13	.....	.....	40	0	56	16	.....	.....	33	17	.....	.....	82	49	.....	.....
Range	51°		45°.3		57°.4		70°		64°		76°		84°		67°		72°		69°		52°		59°	
Monthly means	76°.1		73°		59°		52°.9		42°.2		29°.7		16°.8		32°.3		33°.4		44°.5		60°.2		70°.4	

Maximum, minimum, and mean temperatures—Continued.

STATION, DETROIT, MICH.

Date of month.	1874.												1875.											
	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	59	81	63	78	56	67	37	40	29	33	12	41	14	29	0	19	9	67	39	47	33	83	59
2	74	61	73	57	84	59	64	48	51	30	48	27	36	13	39	20	26	5	41	33	40	29	80	62
3	75	56	72	42	68	52	59	44	61	41	52	28	23	10	42	3	18	0	54	31	58	32	70	55
4	91	64	72	49	69	47	55	38	60	42	42	22	19	8	23	−10	26	7	56	37	57	37	78	56
5	80	56	70	54	77	61	56	36	59	49	40	28	12	− 1	21	− 5	33	18	51	31	53	43	73	62
6	91	63	76	61	79	56	58	48	62	42	38	31	21	− 2	23	0	34	24	66	36	58	33	65	51
7	97	71	80	63	88	61.5	57	48	68	42	37	21	21	6	10	−10	30	16	49	34	55	41	57	38
8	87	70	80	61	92	66	61	50	66	49	32	15	30	3	7	−10	32	9	75	35	84	48	71	46
9	83	68	84	61	87	64	62	46	62	38	40	30	18	−12	7	−20	38	15	60	45	68	49	70	56
10	82	68	86	57	88	64	61	45	66	41	40	26	9	−15	27	− 4	34	25	62	39	60	45	77	59
11	71	59	88	69	88	59	54	41	46	32	29	22	16	− 1	29	− 1	43	19	53	42	61	44	86	64
12	62	57	88	69	88	63	46	36	42	27	34	12	25	10	2	−14	39	30	59	36	60	40	76	50
13	82	55	74	60	97	61	51	31	37	21	40	25	37	18	14	−10	44	27	48	35	62	40	64	42
14	89	66	74	53	86	64	51	27	43	27	31	12	18	2	11	− 4	59	34	55	32	69	45	70	46
15	86	72	77	52	72	53	63	39	53	26	32	8	11.5	− 6	11	−10	59	33	48	23	66	39	73	52
16	72	56	82	56	67	46	65	47	50	32	40	24	20	9	12	− 8	32	14	25	17	56	37	77	55
17	75	55	85	60	68	58	68	43	55	42	42	23	18	6	21	3	17	9	26	10	65	40	64	55
18	83	61	79	67	78	64	57	38	42	30	37	19	22	7	13	− 7	23	7	33	8	66	44	73	48
19	89	67	86	59	82	58	61	33	36	24	47	27	19	4	29	12	21	12	41	25	73	52	79	49
20	76	64	93	62	64	49	71	39	32	23	30	19	17	8	25	17	23	12	37	21	82	56	79	52
21	73	58	77	65	67	41	58	42	35	21	37	16	36	16	23	5	26	8	39	21	77	62	81	54
22	80	56	72	61	68	50	56	40	42	26	39	30	31	13	47	11	33	5	45	20	78	60	79	64
23	83	57	76	60	77	50	63	44	54	26	40	27	28	5	46	28	34	13	53	25	77	59	87	66
24	85	68	72	56	81	53	69	51	29	19	36	21	34	15	51	25	40	26	46	27	77	51	90	69
25	75	67	73	54	83	51	75	56	31	19	34	16	19	8	30	22	36	17	51	29	80	59	76	66
26	84	70	75	55	78	66	75	54	39	26	45	32	21	3	28	15	48	35	55	34	75	51	85	68
27	70	60	76	62	69	57	65	50	41	28	46	29	35	13	20	5	46	32	58	33	77	48	81	68
28	73	57	75	60	66	51	67	45	31	22	50	33	39	18	13	− 1	36	23	65	35	86	63	75	57
29	77	54	75	59	70	44	61	40	27	9	35	9	21	9	....	....	52	27	50	40	75	54	74	53
30	75	59	77	55	57	43	43	33	20	4	21	10	23	11	....	....	65	39	51	35	72	49	82	61
31	83	67	74	58	....	....	44	29	....	....	32	6	21	12	....	....	75	43	....	....	75	52	....	....
Range	43°		41°		56°		48°		64°		46°		56°		61°		75°		59°		52°		53°	
Monthly means	71°.4		67°.9		66°.7		51°.3		38°.4		29°.7		15°.3		12°.3		28°.3		40°.9		57°.5		67°.2	

Maximum, minimum, and mean temperatures—Continued.

STATION, DODGE CITY, KANS.

Date of month.	1874.												1875.									
	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	51	52	18	55	31.5	38	9	46	21	31	19	42	37	58	35	86	52
2	.....	.....	.....	.....	.....	.....	80	48	65	30	61	35	29	— 6	18	1	41	12	60	39	64	39	78	45
3	.....	.....	.....	.....	.....	.....	81	53.5	64	34	56	31.5	6	0	16	— 4	42	23	42	38	65	41	83	51
4	.....	.....	.....	.....	.....	.....	81	60	68	47	47	31	4	— 9	40	7	36	22	40	33	79	38	87	60
5	.....	.....	.....	.....	.....	.....	70	63	75	34	43	29	10	—15	51	18	32	22	42	38	85	59	66	51
6	.....	.....	.....	.....	.....	.....	67	56	75	34	58	27	13	—12	16	5	35	20	47	33	93	56	64	50
7	.....	.....	.....	.....	.....	.....	64	49	69	45	54	27.5	26	— 9	55	10	51	23	59	33	80	56	70	47
8	.....	.....	.....	.....	.....	.....	71	49	63	31	63	33.5	—10	—12	57	21	51	31	50	22	69	50	85	55
9	.....	.....	.....	.....	.....	.....	76	49	64	39	46	29	11	—11	29	16	54	25	56	24	68	44	83	58
10	.....	.....	.....	.....	.....	.....	80	48	61	34	50	21.5	21	— 4	34	15	68	23	55	34	80	42	100	64
11	.....	.....	.....	.....	.....	.....	70	43	50	31	42	27	22	— 9	57	15	58	22	37	27	65	48	78	62
12	.....	.....	.....	.....	.....	.....	54	38	51	24	42	26	10	— 9	59	20	65	35	54	27	74	50	90	60
13	.....	.....	.....	.....	.....	.....	72	39	56	30	48	24	—13	—19	56	20	79	29	56	32	70	59	89	65
14	.....	.....	.....	.....	.....	.....	70	42	56	34	48	22	— 5	—14	40	20	60	29	68	36	83	64	101	70
15	.....	.....	.....	.....	.....	.....	41	49	57	29	38	31	11	— 3	47	24	42	16	63	40	78	60	99	64
16	.....	.....	.....	.....	.....	.....	74	39	56	35	42	25	4	— 6	56	25	35	19	66	33	70	56	99	63
17	.....	.....	.....	.....	.....	.....	76	74	39	19	32	22	5	— 2	29	13	55	12	82	34	76	59	97	68
18	.....	.....	.....	.....	.....	.....	75	48	20	9	40	21	11	— 3	32	23	25	12	75	40	73	52	97	67
19	.....	.....	.....	.....	.....	.....	78	49	15	2	42	23	26	— 2	33	24	28	8	80	49	85	53	97	57
20	.....	.....	.....	.....	.....	.....	66	49	37	1	41	27	46	11	52	25	50	20	68	46	83	58	98	73
21	.....	.....	.....	.....	.....	.....	62	48	42	11	33	30	39	23	47	26	52	26	55	41	84	58	96	69
22	.....	.....	.....	.....	.....	.....	74	40	45	14	43	35	42	2	36	26	73	29	73	34	82	60	97	69
23	.....	.....	.....	.....	.....	.....	78	48	48	25	42	31	37	21	32	20	65	33	74	43	79	53	96	68
24	.....	.....	.....	.....	.....	.....	76	49	36	18	45	30	45	10	18	10	58	29	62	37	85	63	95	70
25	.....	.....	.....	.....	.....	.....	74	57	52	18	50	23	49	30	56	11	81	47	38	31	84	59	95	70
26	.....	.....	.....	.....	.....	.....	60	49	58	31	45	22	51	37	40	13	67	29	51	32	81	62	96	72
27	.....	.....	.....	.....	.....	.....	73	47	34	11	35	30.5	31	20	47	13	67	37	76	34	80	57	80	56
28	.....	.....	.....	.....	.....	.....	69	47	38	16	42	11	25	13	66	30	72	44	74	44	74	50	85	49
29	.....	.....	.....	.....	.....	.....	55	30	40	21	37	6	33	23	.....	.....	87	51	74	37	75	50	95	59
30	.....	.....	.....	.....	.....	.....	52	31	53	20	33	16	34	18	.....	.....	49	38	70	46	82	57	97	69
31	.....	.....	.....	.....	.....	.....	52	19	.....	.....	28	10	43	15	.....	.....	38	25	.....	.....	89	59	.....	.....
Range	.....	.....	.....	.....	.....	.....	65°		74°		57°		70°		70°		71°		58°		54°		56°	
Monthly means	.....	.....	.....	.....	.....	.....	60°.7		38°.4		34°.2		13°.2		29°.8		38°.1		47°.9		65°.4		75°.4	

Maximum, minimum, and mean temperatures—Continued.

STATION, DUBUQUE, IOWA.

Date of month.	1874.												1875.											
	July.		Augnst.		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	65	81	63	85	57	72	43	45	30	35	16	32	7	31	9	18	9	39	32	44	33	74	64
2	76	61	80	59	82	65	63	44	39	31	36	29	27	— 3	34	19	18	— 2	52	29	54	27	72	56
3	39	66	75	62	68	54	61	36	39	34	42	34	12	2	20	— 9	20	6	62	39	47	32	70	46
4	90	75	83	59	59	54	64	41	57	48	37	34	5	—10	— 4	—13	25	—10	56	32	62	35	70	53
5	101	76	77	63	75	59	72	47	63	55	36	35	— 1	—16	23	—10	32	20	69	38	62	47	72	56
6	100	70	83	66	87	61	60	51	64	38	39	31	14	— 9	11	— 7	35	4	58	49	56	39	67	51
7	98	72	81	61	90	65	74	51	69	59	36	24	12	—11	— 6	—26	36	2	77	47	77	48	73	45
8	85	70	87	62	90	65	66	47	55	38	41	24	23	—18	— 1	—19	39	5	63	41	74	53	73	49
9	87	70	88	62	87	67	61	54	59	37	38	22	— 5	—23	9	—31	34	22	55	32	69	45	65	56
10	83	66	90	69	85	72	61	50	43	34	32	22	11	— 9	22	9	35	21	56	34	70	47	84	58
11	80	62	97	75	88	69	51	38	44	29	27	17	11	—10	13	—13	42	29	46	33	61	48	78	63
12	83	56	96	75	72	64	54	33	39	30	34	9	21	3	3	—19	40	20	49	35	68	42	73	52
13	92	63	96	68	75	62	53	25	36	22	35	31	20	— 6	15	—11	52	30	56	37	70	47	65	47
14	96	72	81	62	72	51	48	38	44	30	19	15	—10	—18	3	—10	42	33	59	40	64	48	60	49
15	85	68	84	66	65	43	55	42	48	31	46	23	8	—13	0	—17	37	16	51	31	65	43	78	57
16	80	58	90	63	67	43	59	42	47	32	39	32	9	— 7	12	—21	16	7	31	14	67	38	77	62
17	90	62	88	70	74	51	63	44	35	28	39	11	8	— 7	13	— 9	16	0	35	16	73	40	82	63
18	91	68	88	62	65	57	62	38	38	18	36	4	12	— 5	20	—16	17	5	60	26	78	44	73	54
19	85	73	95	70	61	51	68	40	23	16	37	14	8	—15	23	8	23	8	74	37	82	46	73	57
20	76	65	96	71	64	42	70	47	27	15	33	25	25	— 2	27	10	28	7	47	30	83	55	75	57
21	85	62	95	72	64	46	64	47	35	21	33	21	34	12	21	— 8	32	14	50	27	81	62	81	62
22	86	62	70	65	74	54	68	54	41	31	39	20	21	0	32	21	39	21	58	28	79	56	84	59
23	93	67	82	62	78	56	67	54	23	10	35	20	35	7	31	17	46	34	65	38	83	56	88	66
24	90	72	79	69	77	54	63	52	18	6	25	11	30	7	28	7	38	20	55	27	91	61	74	65
25	100	81	71	54	70	60	70	53	27	11	40	15	9	2	21	1	47	25	61	32	87	63	79	62
26	87	68	72	60	66	56	71	52	41	27	31	18	21	2	20	11	46	35	61	43	87	57	87	70
27	78	63	75	59	61	50	58	40	29	9	32	18	35	24	13	— 7	52	32	68	35	86	66	77	63
28	83	61	75	66	66	46	69	50	32	12	33	5	29	17	14	— 5	59	34	64	47	74	58	73	54
29	87	61	79	66	69	47	50	36	25	7	5	—14	24	9	.....	.....	52	34	58	38	78	48	82	54
30	92	65	79	65	67	41	36	30	20	6	12	5	17	1	.....	.....	75	46	46	31	80	56	80	59
31	86	64	80	55	.....	.....	35	36	.....	.....	7	—12	9	—14	.....	.....	65	39	.....	.....	69	59	.....	.....
Range	45°		44°		49°		48°		63°		70°		58°		60°		77°		63°		64°		42°	
Monthly means	80°		74°.2		65°.5		52°.2		34°.7		26°.0		6°.8		6°.5		29°.2		45°.0		60°.5		67°.5	

Maximum, minimum, and mean temperatures—Continued.

STATION, DULUTH, MINN.

Date of month.	1874.												1875.									
	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	48	72	58	73	60	65	52	38	28	33	12	23	5	15	6	12	1	31	23	38	27	50	43
2	65	53	68	55	67	53	56	40	54	28	32	28	5	—12	8	— 4	14	— 5	38	12	52	31	66	41
3	65	50	68	55	69	45	57	38	46	28	35	21	— 2	—18	1	—14	14	—10	47	32	59	30	50	38
4	68	50	65	55	65	51	53	44	47	39	38	28	— 4	—20	— 1	—25	17	—18	41	25	52	38	56	36
5	63	51	64	50	71	54	58	51	55	43	41	26	4	—23	5	—13	24	1	33	23	55	30	64	44
6	82	62	75	56	69	53	57	44	51	36	35	19	9	—17	2	—26	38	— 5	36	30	42	30	67	39
7	89	65	77	62	71	57	57	32	65	50	23	7	12	—17	5	—22	28	0	34	29	42	35	72	50
8	73	58	86	61	90	61	55	39	55	32	36	19	6	—30	1	—29	28	14	37	32	43	34	72	52
9	85	56	80	63	85	66	62	50	42	30	29	8	— 7	—38	4	—34	38	18	36	27	59	37	56	47
10	78	61	75	60	74	69	52	41	38	33	22	1	3	—19	13	— 4	41	22	37	28	66	44	58	43
11	75	56	70	64	72	65	44	34	34	23	16	— 8	1	—25	— 1	—23	37	23	45	30	58	40	64	44
12	71	57	65	56	70	57	50	27	28	20	15	— 5	13	—10	2	—33	25	9	46	24	63	36	62	39
13	89	60	64	53	66	57	52	31	34	20	17	2	4	—17	2	—23	30	12	54	33	51	37	59	42
14	80	68	63	52	59	46	54	43	38	27	17	—15	— 2	—22	7	—24	32	25	56	38	47	37	61	42
15	76	60	68	55	61	39	52	37	31	19	37	3	— 1	—19	8	—21	32	8	46	16	52	32	59	45
16	79	55	76	59	67	45	62	45	37	16	36	12	6	—18	9	—23	10	2	22	4	55	32	56	47
17	79	56	74	60	58	52	61	43	36	14	17	— 4	3	—25	—14	—13	20	— 3	44	11	58	35	64	45
18	69	59	75	52	61	49	56	40	17	0	40	12	4	—23	20	—13	12	— 8	56	27	60	36	62	42
19	74	61	77	58	55	45	72	40	24	1	32	10	9	—17	21	8	13	—26	45	30	64	43	66	45
20	78	54	70	59	57	39	64	43	27	10	22	0	18	—10	21	6	16	— 9	38	21	75	46	73	48
21	85	63	79	57	60	43	52	41	32	18	31	14	24	4	28	—16	23	— 1	38	21	75	46	73	55
22	84	62	61	54	68	52	54	42	36	29	31	22	15	— 6	22	4	24	—12	51	27	56	41	86	59
23	83	62	69	54	77	48	53	45	33	14	31	17	24	8	20	— 9	41	16	45	32	66	43	66	54
24	74	61	67	53	70	53	58	49	22	9	17	— 3	16	— 5	13	— 3	35	15	44	24	84	48	65	47
25	89	62	75	57	67	57	65	54	18	4	28	3	9	—20	14	— 4	45	10	57	24	70	53	67	48
26	73	61	73	61	63	54	57	43	25	8	24	4	17	0	12	—10	46	24	47	30	55	44	79	59
27	77	53	68	59	56	49	46	40	16	— 2	23	7	22	3	8	—12	36	12	58	28	58	42	70	5?
28	75	55	67	64	71	48	46	39	15	1	20	—11	11	— 8	5	—20	42	14	55	39	62	48	60	47
29	71	57	76	63	65	42	38	33	6	—11	0	—24	11	—15	.....	.....	40	22	46	29	73	44	79	45
30	84	59	74	56	66	43	34	29	15	—12	3	—19	6	—10	.....	.....	41	34	50	26	61	44	78	55
31	81	59	70	52	.....	.....	39.	23	.....	.....	10	—24	12	—20	.....	.....	38	24	.....	.....	56	43	.....	.....
Range	41°		34°		51°		42°		77°		65°		62°		62°		70°		54°		57°		50°	
Monthly means	6 °. 9		64°		. 59°		47°. 7		21°. 2		17°. 6		0°. 4		0°. 9		20° 1		35°. 3		. 48°. 9		55°. 8	

Maximum, minimum, and mean temperatures—Continued.

STATION, EASTPORT, ME.

Date of month.	1874.												1875.									
	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	48	66	56	66	54	56	45	47	39	28	7	16	− 2	30	21	18	− 1	36	28	51	36	59	43
2	56	47	71	56	64	50	58	45	44	35	38	27	32	6	28	15	24	13	45	34	42	35	68	42
3	51	47	68	54	65	50	58	44	49	35	50	30	23	13	42	22	22	9	47	35	44	34	65	45
4	59	46	68	50	61	44	51	38	53	43	46	19	30	12	45	12	22	10	41	35	48	34	55	42
5	55	46	67	55	62	46	54	41	52	43	30	16	22	11	15	− 1	29	7	37	34	50	34	70	42
6	63	48	61	51	62	49	56	47	53	47	41	23	17	1	20	5	30	24	36	25	45	36	61	47
7	58	46	67	53	69	51	58	43	47	37	42	34	29	16	5	−14	32	20	36	21	46	36	59	45
8	77	46	60	56	67	54	57	44	47	35	35	26	28	13	6	− 1	31	20	41	26	51	35	60	45
9	77	56	59	54	62	52	56	47	50	46	40	14	32	8	9	− 4	29	20	37	24	44	36	59	44
10	71	56	70	54	78	53	60	47	47	37	39	23	19	0	14	− 5	33	24	45	31	48	39	55	45
11	69	51	70	56	62	50	62	50	53	35	38	22	14	− 1	32	8	32	26	41	32	63	43	62	45
12	64	49	64	52	61	47	58	44	37	26	27	6	17	3	38	1	37	24	33	25	55	38	56	46
13	63	50	61	53	61	45	52	40	33	26	24	1	25	2	9	− 8	37	25	33	27	60	42	56	43
14	77	52	56	52	67	50	50	40	31	26	34	2	29	9	9	− 5	36	23	38	26	61	41	61	40
15	78	58	65	54	65	52	55	38	34	20	5	−11	9	4	8	− 7	38	29	42	25	50	37	62	44
16	70	53	71	53	61	55	60	42	41	28	17	− 4	15	5	15	− 3	33	29	44	33	48	38	67	44
17	71	58	68	51	58	52	59	43	44	27	35	15	13	7	24	3	40	23	40	31	54	36	66	48
18	71	51	67	54	55	49	54	46	50	29	30	9	5	7	15	6	24	12	40	30	48	37	58	43
19	71	49	70	56	55	50	48	36	30	17	30	10	4	11	28	5	23	9	38	25	45	38	55	30
20	69	52	64	55	59	53	54	38	36	19	27	13	6	5	35	26	20	8	32	17	49	39	74	46
21	66	49	72	57	65	52	52	42	38	29	24	8	6	11	35	18	25	9	39	17	64	42	70	47
22	73	51	66	54	60	47	56	36	28	17	38	7	25	3	33	8	20	6	48	31	61	45	63	47
23	73	55	64	48	60	45	47	37	44	13	41	35	15	4	43	32	25	14	54	35	65	48	60	47
24	69	51	66	50	61	46	54	36	49	32	39	32	27	0	41	31	31	15	51	35	69	44	63	47
25	70	51	66	50	59	49	53	43	36	30	32	11	37	15	38	32	30	21	54	35	65	42	70	46
26	70	52	64	50	57	53	51	42	30	22	33	7	15	6	38	17	34	19	50	35	74	50	69	49
27	68	52	69	51	58	50	53	46	41	20	33	23	15	8	26	12	46	31	47	28	63	46	63	47
28	67	49	69	50	60	52	55	49	47	38	43	32	31	9	19	5	39	24	44	32	63	44	74	47
29	68	55	63	55	68	55	51	40	54	32	40	10	33	30	.....	.....	36	20	50	31	57	42	68	48
30	69	56	69	55	61	51	58	46	35	12	10	9	30	21	.....	.....	37	26	44	35	58	42	55	47
31	72	56	63	54	.....	.....	52	42	.....	.....	8	13	30	17	.....	.....	36	22	.....	.....	63	41	.....	.....
Range	39°		24°		34°		26°		42°		63°		44°		59°		47°		37°		39°		44°	
Monthly means	59°. 6		59°. 2		56°. 3		49°		36°. 3		23°. 9		13°. 9		17°. 5		25°. 6		36°. 4		47°		53°. 6	

Maximum, minimum, and mean temperatures—Continued.

STATION, ERIE, PA.

Date of month.	1874.												1875.											
	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	.....	68.5	76	61	61	49	44	31	38	13	35	12	25	10	36	12	69	44	57	34	81	63
2	.....	65	.....	63.5	80	59	60	52	51	38	52	38	34	23	44	19	25	13	45	34	40	32	82	64
3	.....	60	.....	54	74	64	59	49	58	42	53	32	23	16	48	15	26	5	54	34	52	32	69	58
4	.....	67	72	60	68	56	55	48	58	41	34	30	26	17	15	— 2	28	19	53	40	52	40	81	53
5	.....	63	71	55	81.5	63	61	49	59	52	40	33	19	6	20	2	40	22	47	37	63	43	72	60
6	.....	62	74	65	76	66	59	50	57	48	40	38	26	2	21	2	38	25	50	36	50	39	62	58
7	.....	72	80	65	76	66	60	52	58	42	39	28	29	21	11	— 5	29	18	42	33	62	37	60	52
8	.....	75	78	69	78	71	61	51.5	66	55	30	21	23	20	5	— 5	33	23	61	36	89	58	70	49
9	.....	72	79	65.5	78	63	61	51	57	52	37	29	24	—10	2	—16	44	22	60	36.5	80	53	72	53
10	.....	68	81	68	79	66	61	52	62	46	35	31	6	—15	27	—10	35	28	60	41	60	44	75	60
11	.....	67	90	66	81	70	56	46	53	41	31	26	19	— 1	33	1	47	26	51	40	62	46	87	66
12	.....	59	87	79	81.5	66	50	42	38	34	30	21	32	9	5	9	45	32	44	36	62	43	79	49
13	.....	58.5	78	66	82	70.5	45	39	36	33	44	28	40	24	15	2	42	30	44	35	64	39	59	45
14	.....	66	76	59.5	87	71	52	39	41	28	44	15	24	9	13	1	54	41	52	34	67	48	66	44
15	.....	76	79	59	82	64	59	38	49	39	26	14	16	6	6	— 5	60	38	56	35	49	43	69	46
16	.....	65	80	60	72	64	63	45	50	36	42	23	21	14	11	— 2	40	19	36	21	54	41	75	56
17	.....	60	84	65	70	63	63	50	56	48	42	24	17	9	23	6	20	7	28	15	60	40	64	54
18	.....	62	.....	.....	72	63	54	42	47	36	36	23	18	11	16	— 2	20	6	25	14	63	43	67	52
19	.....	62	84	61	84	62	54	41	30	35	37	33	17	9	31	14	23	12	35	23	63	47	69	51
20	.....	67	86	77	69	60	65	45	40	32	40	29	22	8	30	20	22	11	35	25	75	58	72	50
21	.....	64	83	69	65	56	60	52	34	24	37	27	39	18	23	13	26	13	35	24	71	64	79	56
22	.....	61	75	65	68	55	58	47	41	30	42	33	39	18	50	11	28	5	37	27	74	63	79	69
23	.....	60	72	63	70	59	61	52	56	31	37	31	27	10	56	36	37	9	49	29.5	76	61	84	67
24	.....	60.5	73	61	73	59	72	56	26	21	36	26	28	20	64	36	39	27	38	31.5	76	64	91	72
25	.....	73	74	58	76	63	68	56	34	25	34	25	26	12	45	25	35	20	44	33	72	61	79	69
26	.....	72	76	59	80	65	70	55	40	25	46	34	18	11	27	16	48	33	55	35	68	58	80	71
27	.....	65	78	61	72	64	65	54	49	38	53	32	41	15	18	11	44	34	51	36	72	59	82	71
28	.....	63.5	75	57	72	60	62	49	41	31	54	38	40	23	14	2	35	23.5	51	33	83	66	80	64
29	.....	63	75	59	66	59	72	50	32	22	39	18	25	17	.....	.....	55	28	64	39	73	53	73	66
30	.....	61	76	57	61	50	50	36	22	17	20	17	25	18	.....	.....	60	41	47	39	68	47	76	67
31	.....	68	78	61	.....	.....	41	31	.....	.....	23	15	30	11	.....	.....	78	47	.....	.....	71	47	.....	.....
Range	.....		.....		37°		41°		49°		41°		56°		80°		63°		55°		57°		47°	
Monthly means	72°.7		71°.4		69°.4		54°		41°.8		33°.1		20°.1		16°.7		31°.4		39°.9		57°.4		66°.1	

Maximum, minimum, and mean temperatures—Continued.

STATION, ESCANABA, MICH.

Date of month.	1874.												1875.											
	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	52	68	52	71	44	57	39	36	30	25	11	25	0	23	− 3	9	3	39	21	34	26	62	51
2	71	50	66	47	73	57	52	40	47	32	37	20	21	10	15	5	13	− 5	31	26	43	23	62	54
3	70	53	70	39	64	42	51	34	47	35	35	22	12	− 1	15	− 4	20	− 20	41	27	47	27	56	40
4	72	54	72	45	65	42	54	32	50	45	33	16	4	− 10	5	− 8	26	− 4	37	23	46	25	58	45
5	73	49	64	48.5	63	51	54	51	59	45	36	29	4	− 13	1	− 13	32	2	41	22	46	29	63	44
6	80	62	69	56	67	46	51	44	61	37	34	23	9	− 5	4	− 22	22	7	42	30	51	30	58	42
7	79	62	73	51	74	50	55	40	55	49	23	21	14	− 6	0	− 32	28	− 9	39	32	47	38	64	44
8	79	51	77	53	79	58	58	43	55	44	33	13	15	− 9	10	− 23	33	5	51	32	52	32	64	47
9	75	46	77	61	79	59	56	47	49	36	32	19	− 2	− 22	− 2	− 32	35	17	44	36	51	40	62	52
10	78	46	74	54	77	65	53	42	39	32	24	10	1	− 17	16	− 16	35	11	46	32	56	40	67	50
11	73	44	78	57	78	63	44	33	33	25	15	6	9	− 9	12	− 13	33	16	47	25	50	34	71	47
12	74	43	76	56	73	60	38	29	30	22	15	1	15	− 1	− 6	− 24	26	1	46	29	55	39	56	38
13	80	54	70	50	69	57	45	25	35	16	18	10	20	3	2	− 26	33	24	48	27	52	40	62	34
14	78	56	70	42	68	50	50	39	40	35	19	11	8	− 6	2	− 23	36	14	46	31	49	34	66	40
15	79	60	70	48	57	43	55	40	39	31	32	11	5	− 10	5	− 23	34	25	40	13	48	39	70	41
16	71	47	72	51	61	38	56	40	43	25	34	30	10	0	7	− 26	25	4	13	5	53	38	67	53
17	75	55	79	62	65	55	(*)	43	43	32	17	12	2	16	10	5	25	− 6	19	6	60	41	66	53
18	74	53	72	50	67	55	.....	36	22	14	36	16	5	12	11	21	11	− 3	42	16	60	40	72	47
19	92	59	73	62	66	46	.....	34	26	10	33	24	5	18	17	6	19	−15	37	22	63	40	76	51
20	69	46	74	53	57	43	.....	39	27	15	25	15	18	22	19	2	22	− 13	35	15	61	43	71	50
21	75	47	65	53	64	39	.....	35	31	22	26	17	27	18	16	13	28	− 3	37	13	65	49	75	45
22	78	54	65	50.5	65	52	.....	34	39	26	32	23	24	1	22	12	31	− 3	40	16	72	48	76	53
23	79	61	65	47.5	65	55	.....	41	39	33	30	27	29	− 12	25	9	31	11	35	27	70	53	72	58
24	78	59	63	41	69	52	.....	41	25	20	22	14	22	5	8	5	28	14	38	24	70	53	66	57
25	73	64	71	48	69	53	.....	51	24	17	33	10	11	6	24	− 7	33	3	43	27	72	55	65	55
26	70	59	72	54	66	56	.....	50	35	19	31	17	23	− 19	15	44	47	32	44	26	71	46	78	60
27	71	46	74	54	60	47	.....	44	35	13	27	17	26	12	14	5	36	15	46	24	72	55	67	53
28	73	48	74	63	65	44	.....	43	17	9	27	6	12	− 3	11	11	37	9	65	31	65	52	66	47
29	74	46	72	61	62	42	.....	37	12	3	6	8	14	− 19	.....	.....	44	18	44	22	62	49	71	44
30	69	61	67	54	52	40	37	30	16	0	10	− 10	13	2	.....	.....	44	28	42	21	59	46	75	55
31	68	54	70	46	.....	.....	36	22	.....	.....	12	4	10	− 8	.....	.....	44	27	.....	.....	63	46	.....	.....
Range	46°		40°		41°		.....		61°		47°		51°		57°		67°		70°		49°		44°	
Monthly means	66° 9		64°. 4		60°. 1		45°. 5		31°. 3		21°. 2		4°. 8		− 6°. 1		19°. 4		31°. 9		49°		58°. 5	

* Maximum thermometer broken.

Maximum, minimum, and mean temperatures—Continued.

STATION, FORT GARRY, MAN.

Date of month.	1874.												1875.											
	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	47.4	71.5	54.3	66	49.5	63	34	39	27	23	13	11	−14.8	−7.4	−21.9	5	−12.3	40	11.1	40	15	64.3	49
2	80.3	53.4	56.5	45	63.5	41	55	29.1	49.3	19	24.5	−2.5	−8.4	28.7	−13.4	−24.3	4.3	−25.7	45	26.6	47.6	17	40	35
3	84	64.1	70.2	52.7	77	40.5	59	27.1	38	18	20	15.3	−10.9	−27.8	−18.4	−30.6	12	−7.6	34.5	22.0	57.5	16.5	46	30
4	85.3	65.4	72.8	60.5	78	46.1	62.5	43.5	49.5	18.5	20.5	12.1	−11.7	−24.8	−15	−36	23	0.5	33.5	17	48.3	21.7	57	33.4
5	85.5	61.1	77.2	64.4	73	45	60	39.1	40	19	31	11.1	−9.7	−29.7	−13.4	−29.3	27	9	31.5	23	58	23	51.3	35.4
6	86.2	57.4	85	65.7	80	48.5	62.8	29.1	47.3	18	22.7	10.1	−10.7	−30.3	−10.4	−38.3	11	−7.3	32.5	20.6	47.5	35	72.3	35.7
7	82	55.4	84.9	51.5	87.5	55.3	71.5	40.5	40	27.5	27.5	20	10.4	−23.5	−9.4	−24.9	20.6	−7.8	36.5	23	55.5	36.5	71.5	44.4
8	85.1	57.4	86.2	55.1	88.5	52	66	45.5	32.5	26	30	12.6	−15.6	−41.3	−11.4	−36.3	29.3	15	43	23.4	51.5	40	77.5	42
9	77.5	57.1	89.2	57	57	65.5	63	40.5	39.3	25	12.5	2.7	−12.9	−35.8	3	26	29.3	0.8	36.7	26	59	39	83.4	45.5
10	76.5	52	84.8	53.2	80	54.6	47.5	31.1	31.5	22.5	13	−11.3	−11.6	−33.8	3	−22.3	24	4.8	37	25	55.4	28.5	62	43
11	79.7	53.5	68.4	53.1	64.5	43.1	40	19.5	26.4	13.5	−4.7	−25.3	−19.7	−36.6	−17.4	−33.3	30	−16	45	24.5	54.5	28.5	58.7	39.6
12	84	64.6	69.5	54.3	70	37.5	45.5	13.5	27.3	18	9.2	−11.3	−17.4	−32.8	−11.4	−37.3	31.4	−0.7	45	25	60	25.7	66.6	30
13	79.3	57.6	77.4	46.1	71	45	58	35	30	15	−6.2	−15.8	−17.7	−34.6	−12.4	−33	18.3	−2.2	56	24	54.5	35.3	75.5	50.4
14	78	54.4	80	50.2	53	35.1	62	29.5	30.5	10	16	17.3	−13.6	−32.3	−6.7	−28.3	6.5	−9.3	40	21.5	60	31	84.6	56.1
15	80	50.1	80	62.2	63.3	28.5	60	39	20.5	6.6	30	12.1	−10	−28.6	−4.6	−15.3	8.4	−8.3	22.6	7.6	67.5	31.4	79	58.4
16	79.6	53.4	(*)	(*)	60	44.7	70.8	36	18	5.3	21	−14.6	−13.4	−26.6	−2.2	−15.3	9	8.1	20	1.2	70.3	42.5	76	59.1
17	87	53	.....	.....	57	46.5	58.5	28.5	7	−17.3	29	−15.3	−16.6	−35.6	−2.2	−26.3	3.4	−21.3	41	10.1	75	49	81	52.5
18	89.6	59.3	.....	.....	55	44	68.2	30	4	−18.3	20.3	15	−12.4	−35.3	11	−3.2	9	−24.3	41	26.7	78	53	84.5	49
19	69.8	52.1	.....	.....	53	37.1	56.5	29	15	−12.2	15	−13.3	−4.4	−31.3	16	−10.3	10	−14.5	34.3	21	85.4	41	86.5	49
20	84.7	49.6	.....	.....	54.3	37	50.3	23	16.4	−1.2	21.3	12.3	10	−20.3	1.5	−21.3	19	−2.2	38	16	76.3	47	88.3	63.2
21	89.8	54.4	.....	.....	65.5	40.5	59.3	20	15	2.2	23	−6.2	10.3	−6.3	9	−16.3	24.5	8.6	44.7	30	84.5	36	80.5	60.4
22	87	57.5	.....	.....	69.8	36.1	66.5	33.5	24	12	13	−9.3	5.5	−23	6	−8.5	27.3	16.6	43	29	90	50	78.6	53.4
23	82.5	50	77	51	69	47.1	66.5	46.5	15	−3	18	−9.3	6.5	−10.3	−8.4	−27.7	23	8.8	41	18.5	75.5	50	63.5	49
24	91.8	64	81.5	51.1	80.5	44.4	61.5	46	8	−15	−5.2	−23.3	−5	−22.6	−2.7	−29.3	17	−10.3	49.5	20	73	48	85.3	53.5
25	68	54	83.5	50.8	81	52.1	60	38.7	5	−11	4	−11.8	−4.5	−30.7	−3.4	−24.3	39	10.1	52.6	34	68.3	36	80.5	53.1
26	72	46	77.5	57.8	58.5	42.5	40	38.5	3	−11	14.8	−1.2	9.6	−7.2	−2.2	−29	32	4	59.5	36	77.3	50.4	71.5	49
27	77.5	49.7	71	59.1	68.8	35.5	46.3	18.5	2	−16	6	−18.3	−1.7	−14.3	−6.6	−34.3	21.5	−9.8	56.3	33	62	49	71	38.3
28	75.2	53	69	64.1	67.0	33.1	40	19	−2	−25	−9.9	−34.3	−12.6	−28.3	4.5	−17.3	39.5	15	44	23	57.7	36.5	86	46
29	77.2	55.1	72	55.5	62.5	29.1	31.3	21.7	−4.2	−26.8	−20.4	−32.8	−3.2	−22.3	.....	.....	48	28	26	14	71.2	24.5	72	54.4
30	85.3	54.3	78	47.1	74.5	35.1	28	10	15	31.3	−13.9	−31.3	−8.8	−22.1	.....	.....	32.5	15	27.3	18	79.6	47	77.7	44
31	73	51	76	60.9	.....	.....	41	6.2	.....	.....	9.2	−27.8	20	−22.7	.....	.....	38	7.2	.....	.....	77	50.3	.....	.....
Range	45°.8				60°		63°.6		80°.8		64°.3		52°.3		54°.3		73°.7		61°		75°		58°.3	
Monthly means																								

Maximum, minimum, and mean temperatures—Continued.

STATION, FORT GIBSON, IND. T.

Date of month.	1874.												1875.											
	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	69	98	74	98	65.5	86	52	66	20	67	41	40	32	51	25	56	29	51	32	61	41.5	86	65
2	90	67	88	70	98	74	86	51	69	40	69	52	41	19	57	20	41	26	65	37	60	37	82	69
3	92	67	98	70	89	64	85	56	70	45	70	39	36	27	23	6	41	17	72	47	65	47	85	60.5
4	92	67	101	77	89	59	85	58	72	60	68	51	29	12	30	9	51	33.5	77	53.5	67	39.5	85	71
5	85	69	105	80	91	61	81	61	81	60	61	45	27	5	42	20	47	32	75	60.5	80	56	79	63
6	91	71	105	75	93	73	73	63	84	62	61	35	30	22	41	16	36	27	76	61	87.5	55	70	57
7	96	71	106	75	82	73	75	58	85	63	50	32	33	.....	30	5	47	32	75	66	88.5	71	69	53
8	98	75	104	74	81	70	71	51	81	58	63	29	33	− 4	46	21	60	29	72	48	81	67	78	51
9	88	73	105	75	82	69	78	45	82	51	62	35	7	− 9	49	26	62	28	72	38	74	56	85	64
10	90	71	105	83	84	71	84	48	81	58	53	31	27	1.5	42	23	67	26	61	42	81	50	87	71
11	89	69.5	104	82	86	71	74	50	64	50	59	27	37	15	35	13	59	45	51	35	73	53	90	71
12	90	65	104	76	91	69	67	40	63	46	62	44.5	44	27	55	25	71	32.5	50	34.5	75	43.5	90	69.5
13	94	73	103	76	91	69	66	42	60	36	60	42	29	4	62	33	83	40	58	33	80	50	93	69
14	94	71	101	72	87	64	69	43	60	50	60	32	17	0	51	32	81	49	58	41	84.5	61	92.5	70
15	89	69	96	79	73	53	77	48	64	50	41	30	40	8	44	26	50	31	76	40.5	72	61	92	72.5
16	91	69	97	75	77	54	63	41	69	56	59	36	32	13	33	27.5	46	27	53	35	73	57	92	70
17	92.5	72	101	75	86	62	70	37	62	41.5	43	28	30	18	47	29	56	20	60.5	32	76	59	92	71
18	94	71	95	74	91	66	76	38	52	36	39	20	24	14	44	29	50	34	75	40	81	61.5	94	72
19	96	71	94	71	74	52	78	43	45	28	35	31	32	16	41	30	34	26	82	58.5	84	63	88	65
20	97	73	96	72	77	49	79	46	48	20	35	24.5	53	17	51	21	35	24	75	58	82	63	88	64
21	100	76	94	72	67	53	76	53	58	27	42	25	52	35.5	58	29	57	30	65	47	80	60.5	93	71
22	98	74	101	72	72	57	69	45	70	44	45	25	46	20	66.5	50	65	29	61	44	72	63	93	71
23	101	79	90.5	72	67	62	74	44	51	33	48	30	43	31	71	43	65	21	67	38	81.5	63	93	71
24	102.5	75	97	67	80	61	81	36	50	27	47	19.5	44	25	44	23	65	43	72	50	86	62	88	75
25	104	81	100	75	82	63	83	61	40	21	55	34	48	22	48	25	71	45	61	47	85	62	92	75
26	102	78	99	73	82	62	87	65	66	32	56	41	55	41	66	32	67	53	51.5	45.5	80	63	93	74
27	96	73	97	79	78	43	87	58	58	33	66	50.5	60	47	52	23	66	47.5	63	44	83	65	92	67.5
28	96	92	100.5	79	76	45	87	59	37	22	62	37	53	30	57	36	69	51.5	76	47	73	61	78	56
29	91	64	100.5	73	84	45	72	41	61	25	39	22	44	28	.....	.....	79	53	72	59.5	74	55.5	87	56
30	93	66	93	71	87	51	56	37	61	26	38	22	39	21	.....	.....	79	63	64.5	56	79	53.5	91	65
31	99	67	91	66	.....	.....	47	24	.....	.....	38	30	31	9	.....	.....	75	37	.....	.....	85	63	.....	.....
Range	40°		40°		55°		63°		65°		50°.5		.....		61°.5		66°		50°		51°.5		43°	
Mouthly means	83°.1		86°.1		71°.5		60°.9		50°.7		43°.4		27°.7		38°.7		47°.7		56.°7		67°.6		77°.9	

Maximum, minimum, and mean temperatures—Continued.

STATION, FORT SULLY, DAK.

Date of month.	1874.												1875.											
	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	59	91	57	82	65	70	50	42	18	44	28	24	- 3	24	3	16	4	50	23	40	25	61	47
2	80	70	96	63	65	52	72	38	39	21	50	27	10	- 8	3	-16	25	5	60	33	41	30	69	47
3	106	79	92	55	70	39	71	54	37	27	47	29	0	-13	-12	-24	24	8	58	33	60	33	73	40
4	101	72	103	69	71	49	73	52	45	25	44	32	0	-15	5	-30	35	16	47	22	72	38	59	44
5	105	71	91	67	94	55	71	44	53	35	48	32	3	-21	6	-10	28	15	23	11	66	40	74	37
6	91	67	95	67	101	55	66	32	59	45	45	35	11	-16	4	- 9	27	- 3	25	15	79	52	66	43
7	93	67	94	60	107	69	81	41	57	32	48	26	12	- 16	9	-12	22	6	30	21	64	54	84	42
8	99	70	92	64	95	72	71	48	52	32	46	26	- 2	- 31	11	- 4	24	18	30	15	66	47	77	54
9	97	66	96	70	83	70	79	42	44	27	27	20	12	-23	27	- 9	37	15	40	20	64	44	82	47
10	91	57	92	70	82	51	57	43	42	24	32	21	8	-10	22	- 4	41	18	41	26	58	39	83	58
11	91	64	86	59	75	55	63	30	32	25	24	8	11	-13	2	-21	35	20	34	23	64	44	71	45
12	96	67	89	55	81	38	63	22	30	25	37	12	- 3	-27	14	- 2	45	15	39	22	75	40	88	44
13	98	64	94	57	77	49	69	42	51	30	30	16	-20	- 32	14	5	34	20	52	28	78	45	100	61
14	94	67	99	63	65	39	70	45	39	32	57	11	- 6	- 31	11	-13	25	4	66	21	80	45	101	63
15	86	55	102	68	82	41	72	36	35	26	50	20	- 6	-14	16	- 2	5	- 6	53	26	74	49	97	61
16	93	73	93	64	74	55	83	41	29	7	32	17	0	-21	25	- 8	7	- 7	45	18	73	51	95	68
17	94	60	78	57	65	42	74	40	15	0	45	9	2	-17	13	-22	9	-13	65	25	71	58	80	66
18	100	74	97	60	60	50	85	42	9	- 7	48	31	- 5	-27	25	5	8	- 6	83	33	81	52	76	61
19	81	61	91	66	68	46	79	48	23	4	36	18	15	-30	32	9	20	-14	66	44	92	56	64	57
20	71	59	100	66	71	45	61	37	36	12	48	14	30	9	32	- 3	30	7	60	35	87	56	85	54
21	69	61	82	61	76	43	63	28	47	20	38	23	32	14	28	-13	29	8	65	42	87	55	94	60
22	102	67	94	63	83	46	72	34	30	9	44	22	26	-10	17	- 2	42	14	69	37	94	59	86	60
23	97	65	88	59	91	45	71	44	10	2	34	23	22	- 6	14	-10	40	22	53	35	83	59	82	61
24	101	73	85	58	91	50	71	45	16	- 4	40	14	20	- 7	7	- 9	40	10	54	34	84	56	97	58
25	85	62	91	59	85	54	59	42	25	12	36	7	16	-11	7	-16	57	30	53	32	93	54	82	59
26	78	52	93	68	72	47	46	32	29	7	29	6	15	- 6	6	- 6	51	28	68	29	88	54	77	55
27	87	61	93	63	60	51	42	37	22	- 3	33	10	14	- 1	11	- 8	41	25	64	40	63	53	83	54
28	97	59	86	65	66	45	40	29	23	3	23	-12	15	- 3	15	- 6	57	24	59	42	74	42	92	54
29	99	66	89	62	72	52	34	26	14	4	9	-15	24	3	.....	.....	57	35	47	31	89	46	83	60
30	106	65	95	57	67	44	26	15	44	12	15	-13	22	- 1	.....	.....	36	29	38	30	83	59	73	58
31	88	69	103	72	.....	.....	36	9	.....	.....	38	- 4	31	- 9	.....	.....	38	22	.....	.....	79	55	.....	.....
Range	54°		48°		69°		76°		66°		72°		64°		62°		71°		94°		69°		64°	
Monthly means	79°.2		76°.1		65°.2		50°.9		26°.2		26°.9		6°.1		4°.2		22°.3		39°.2		60°.1		66°	

Maximum, minimum, and mean temperatures—Continued.

STATION, GALVESTON, TEXAS.

Date of month.	1874.												1875.											
	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	81	91	80	91	80	82	69	57	43	65	57	62	50	62	47	77	66	60	48	88	68	91	77
2	96	75	91	81	90	79	81	71	65	52	72	63	53	41	68	58	67	50	65	48	74	63	91	77
3	91	77	91	79	86	76	83	73	74	62	72	63	52	44	62	40	53	36	71	55	81	62	92	77
4	89	74	94	80	83	74	83	74	78	68	69	61	52	40	43	36	64	50	74	61	79	64	92	77
5	89	74	94.5	80	84	75	82	75	79	69	68	62	41	34	47	35	65	59	74	66	81	64	92	77
6	88	80	92	80	87	76	81	70	73	69	57	51	44	38	50	41	63	40	76	66	84	69	82	77
7	92	80	92	80	82	79	81	74	79	69	62	47	45	41	49	37	54	34	78	67	84	72	78	69
8	90	79	94	81	82	81	78	71	77	70	64	53	56	41	56	40	65	48	75	61	85	73	85	72
9	90	80	93	82	88	80	75	66	78	68	69	58	50	26	58	53	72	59	74	59	86	73	91	75
10	88	81	92	82	87	80	77	65	80	71	70	60	34	24	67	56	65	53	75	69	83	71	92	78
11	87	76	93	82	86	74	81	65	81	71	68	60	43	31	61	45	68	58	70	54	86	72	93	78
12	90	74	93.5	82	87	77	78	68	75	59	67	60	53	39	66	49	72	62	63	54	76	71	91	78
13	90	79	94	83	86	78	70	57	66	54	72	64	53	43	71	60	75	66	68	53	84	70	93	76
14	87	78	94.5	80	86	77	71	60	76	65	71	61	45	35	74	64	75	67	74	53	85	70	93	75
15	82	76	96	79.5	83	74	77	64	75	68	67	59	50	40	67	45	70	55	76	53	89	70	93	77
16	84	72	92	79	85	73	80	69	73	63	67	59	55	46	50	42	63	48	76	60	90	70	95	78
17	87	72	92	80	87	76	73	65	70	63	65	56	51	41	53	46	64	53	71	58	86	72	95	79
18	89	77	89	78	84	80	71	61	70	63	56	48	50	44	55	48	68	60	78	62	89	72	96	79
19	90	78	87	74	82	73	73	65	68	52	65	43	45	42	59	52	72	52	78	65	87	74	95	80
20	90	78	83	75	85	73	76	66	57	44	52	39	56	42	56	44	62	41	76	60	88	73	94	80
21	91	80	79	77	83	73	76	69	75	57	61	48	70	57	65	48	66	52	71	60	82	74	95	80
22	90	79	92	82	84	78	78	67	78	70	54	45	66	49	64	56	66	55	69	53	88	74	97	80
23	90	79	85	79	84	72	78	67	72	63	62	50	58	50	71	62	72	58	71	51	89	74	95	80
24	90	81	84	74	83	74	80	69	72	58	57	48	56	49	74	63	69	65	74	59	89	73	96	81
25	90	80	90	80	80	75	78	70	63	46	55	45	56	48	64	46	72	63	75	65	89	73	96	81
26	90	81	91	79	84	75	80	73	67	54	64	53	63	56	65	51	78	65	69	59	88	66	95	81
27	90	78	91	81	85	73	78	69	74	65	71	62	69	61	69	58	78	67	75	58	85	70	94	80
28	95	76	90	80	75	70	81	70	67	46	72	64	70	57	74	62	78	69	79	63	88	77	94	79
29	89	81	90	81	75	66	81	71	56	42	69	62	57	49	.....	.....	76	66	79	63	86	76	95	80
30	93	81	93	79	77	66	72	61	62	49	62	55	52	40	.....	.....	76	67	80	70	88	74	93	80
31	92	80	92	81	.....	.....	62	50	.....	.....	56	48	52	42	.....	.....	73	60	.....	.....	91	74	.....	.....
Range	23°		24°.5		25°		33°		39°		33°		46°		39°		44°		32°		29°		25°	
Monthly means	82°.5		84°.4		79°.5		71°.8		65°.1		59°.5		48°.3		55°.3		62°.1		65°.9		77°		83°.5	

Maximum, minimum, and mean temperatures—Continued.

STATION, GRAND HAVEN, MICH.

Date of month.	1874.												1875.											
	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	64	77	64	.....	.....	64	40	44	38	40	13	36	16	33	17	17	6	45	36	37	33	71	62
2	71	59	68	58	.....	.....	64	40	55	36	50	32	32	22	40	20	20	10	40	30	39	28	74	49
3	81	55	66	51	.....	.....	54	40	56	50	40	22	32	15	42	7	19	7	49	27	47	35	57	47
4	72	49	71	53	.....	.....	55	36	61	43	37	24	12	11	14	2	26	0	48	35	50	36	70	48
5	72	58	65	56	.....	.....	61	42	56	52	44	33	16	7	23	9	29	13	58	36	45	38	60	51
6	74	66	75	58	.....	.....	61	51	57	47	45	35	20	5	12	— 1	32	19	63	42	44	36	61	46
7	85	66	75	61	.....	.....	60	45	60	50	37	23	21	6	17	5	33	1	71	42	62	39	56	46
8	80	68	71	60	.....	.....	55	46	65	50	41	23	30	9	8	— 9	35	7	72	44	68	50	67	43.5
9	78	66	78	61	81	64	60	47	54	44	42	31	7	?	5	24	36	24	69	38	53	42	67	56
10	74	59	76	63	80	63	60	51	55	42	37	22	25	15	22	6	36	29	50	36	57	41	77	58
11	75	57	91	66	78	59	54	40	42	35	35	22	26	12	23	1	41	25	51	39	55	41.5	80	59
12	73	52	83	69	70	62	44	36	36	30	28	17	24	13	7	— 3	39	22	50	37	49	38	59	47
13	71	50	75	64	76	65	70	34	38	29	32	24	22	20	13	2	46	31	46	35	58	37.5	53	41
14	79	63	70	56	72	64	54	34	52	29	28	17	16	10	9	2	48	31	44	31	54	45.5	62	43
15	79	65	74	56	69	51	59	41	52	33	39	11	23	9	12	— 7	44	28	42	22	52	38	72	54
16	67	55	78	54	63	43	59	46	52	31	40	29	18	10	25	14	26	16	20	14	50	42	63	49
17	77	52	78	67	70	47	56	47	52	40	40	22	19	11	20	3	20	5	19	14	56	53.5	71	52
18	74	60	78	61	74	53	52	37	41	25	39	25	20	11	18	11	23	4	36	16	58	40	70	50
19	73	68	55	59	70	56	59	31	34	23	42	31	21	12	31	17	32	5	49	25	59	38	71	46
20	71	61	79	59	80	52	61	53	35	24	37	72	22	13	28	15	33	10	39	24	69	48.5	74	45.5
21	77	52	81	63	64	43	60	47	43	29	32	17	33	19	26	2	29	10	36	23	70	50.5	79	60
22	77	55	75	59	65	52	57	43	40	24	37	30	32	11	36	7	24	9	36	22.5	70	57	73.5	60
23	82	58	(*)	(*)	68	51	67	48	47	33	38	27	35	5	29	23	41	16	45	30	75	59	76.5	59.5
24	86	71	.....	.....	70	57	64	52	32	21	39	25	37	19	32	12	36	25	32	30	70	56	76	61
25	85	68	.....	.....	76	54	66	46	37	22	39	14	23	12	33	22	43	13	43	30	70	54.5	74.5	58
26	78	64	.....	.....	72	60	64	57	45	29	40	21	25	10	25	8	43	37	50	31	78	57	73	57
27	74	55	.....	.....	63	56	59	46	45	24	46	17	43	23	17	— 8	37	28	54	33	85	52.5	78	54
28	73	56	.....	.....	59	52	68	46	35	24	42	29	33	17	10	— 5	40	25	57	35	74	56	64	53.5
29	73	58	.....	.....	62	48	68	45	37	17	32	9	22	6	.....	.....	49	24	45	34.5	60	47.5	70	57
30	76	61	.....	.....	56	42	48	40	28	12	24	13	27	15	.....	.....	65	40	40	31.5	66	45	66	55
31	80	63	.....	.....	.....	.....	42	33	.....	.....	25	14	29	7	.....	.....	67	46	.....	.....	76	53	.....	.....
Range	39°						37°		57°		41°		51°		66°		67°		58°		57°		39°	
Monthly means	70°.4		68°.4		63°.9		51°.6		39°.3		30°.7		16°.6		12°.9		2.°.5		39°.8		53°.6		61°.7	

Maximum, minimum, and mean temperatures—Continued.

STATION, HALIFAX, N. S.

Date of month.	1874.												1875.											
	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	47.8	76	55.1	75.3	52.8	65.1	45	52.7	32.2	27	16	18.5	— 7.5	29.5	16.2	28.3	— 0.2	34.4	18	48.6	31	56.1	36.7
2	61	47.2	74.5	60	71	51.1	63.6	41.4	48.9	29.4	42	23	37.5	11.2	30	8.2	30.9	12	45	29.8	39.8	28.9	65	32.9
3	54	43.3	75.8	54	76	55	65.2	48.9	52.9	26	48	27	37.5	15.3	35.1	18.1	21.3	7.3	53.1	33.1	47.9	32.7	72.8	34.5
4	60.9	47.1	67	49	69	48.1	61	39	57.6	35	47	29	32.2	13	47	18.7	24	8	42.1	31.5	55.3	32.7	75.9	41.3
5	54.2	48.8	73	47.5	74.2	45.7	59.8	37	51	29.9	32	22	32.5	15.1	19.8	9	34.1	4	40.3	31.3	50.8	33.7	72.8	39.4
6	70.6	47.9	57.8	53	67.5	46.4	62	39.4	55.8	44.7	38.6	24.1	17.2	0	20.2	6	35.8	2	36.9	28	56.4	32.9	76	52.2
7	69.9	50.5	77	51.3	65.7	50.7	66.1	36.6	42.3	34	51	32.9	29.6	4.9	12.2	— 5.3	35	27	38.8	22	51.2	31	72.9	48.3
8	73.8	49.8	77.1	51.3	71.1	51.8	62	37.1	45.6	28.7	40	32.9	32.5	13.8	24	— 5.3	31.1	20	44	18	54.3	27	73	51.8
9	83.8	53.9	70.5	56.8	73.6	50.2	70	51	45.6	35.1	38.2	25	34.2	11	25.2	— 2	31.1	13.3	43.3	17.8	49	26.8	64.3	49.7
10	86	52.2	65.2	56.5	72.8	50.4	65.1	50	53.7	37.1	43.1	25	38.8	5	21.8	0.1	31.1	13.9	39	25.3	55.9	36.2	62.4	48.1
11	80.8	57	65.7	57	65	43.9	63	51.1	53.5	29.8	37	18.1	17	1.8	30	— 4.9	34	22.3	43.8	28.7	69	43.1	78.7	54.4
12	82.8	60	62	57.6	61.3	46.1	66.6	42	40.2	24.5	38.6	10	19.8	1.7	39.9	7.8	34.9	26.5	37	26	72.9	33.9	74.3	53.1
13	74	56	81.2	59	69.6	42	51.7	39.3	35.7	23.3	22.7	5.2	14.9	3	14.8	— 1.8	41.3	24	40.3	20.3	72.7	41.2	72.4	53
14	78.1	59.9	63.4	58	76	41	52.7	37.9	34.2	26	45.5	18.8	36.3	12	16.5	— 5.3	32	18.3	42.8	24.7	67.5	36.5	70	44.9
15	85.5	58.8	66.7	56	74.9	49.9	62.8	36.1	36.3	21.4	22	1	12	— 5.3	9.3	—10	41.7	21	55.5	27.4	59	33.7	70.1	42.7
16	83.3	58.3	79.7	50	71.5	51	64	40	40.2	29.6	19.1	8	19.2	— 5.3	18.8	—14	33.9	20.8	48.8	24	53.9	39.5	71.6	41.8
17	72.5	57	78.8	48	65.1	52.2	65	39.1	39.1	29	24.9	19.8	14.6	3	26.9	— 0.2	43.9	29	35.8	30	61.1	38.2	73	42.3
18	75.1	55.1	73.7	52	59.8	49.2	59.3	48	49	34	33.7	16.8	19.6	0	27.5	1.7	31	11.7	52.5	31	56.1	37.1	71.4	43.3
19	81	49.1	78.9	53	57.7	49.4	53.2	41	37.5	19	28.5	12	11.3	— 3.3	26.1	— 6.0	26.8	10	48.6	29	54.8	39.1	63.4	45.7
20	72.5	51.3	66.2	49.8	63.1	55.9	49.3	37.4	35	18	32.7	12.2	17	— 6.8	37.3	25	29	10	33.9	19	70	37.4	75.9	46.3
21	73	55.9	82.2	55.3	69.4	58.8	57.2	36.2	44.5	31.8	25.3	15.4	12	— 6.6	41.8	23	29.1	11	37.8	17	59.9	42.1	76	47.3
22	82.8	57.3	74.9	51.9	69.4	47.6	60.6	35	36.3	14.8	32.3	9.1	21.1	3.4	27	13.1	29.4	5.9	51.5	31.3	69.3	42.1	81.8	49.6
23	76.1	52.2	74.9	45.1	64.5	41	52.3	29.5	38.2	12.3	41.7	30.8	27.1	10.9	42.3	18	23.3	5.4	57.8	35.6	62.2	42.2	77.8	54
24	82.5	51.1	73.5	45.1	74.1	40	57	27	52.1	38	37	26.1	25.9	8.2	41	29.8	29	— 1.0	62.9	33	69.5	38	75.2	55
25	83.8	50	73.1	43.6	69.1	43.2	61.2	32.2	43.3	33.3	31.5	16.2	39.4	8.1	47.5	32	37.1	16	48.1	32	72.8	44.4	76	51
26	79	49	71.5	51.5	70.6	43.8	63.9	38	38	23.7	29	8.2	25.9	— 3.4	44.1	21.8	40.4	17	57.4	30	71.2	50.9	80	48
27	77.8	52.3	71.8	47.5	70.3	43.4	56.7	40.8	39	19.7	39.5	24.5	7.7	— 5	32.9	15	49.5	27	46.4	27.1	62.8	39.8	56.5	47.2
28	79	60.4	72.9	48	61.9	54.6	54	39.3	48.1	33.2	42.3	19	32.1	6.2	28	9.2	45.5	24	48.8	28	60.1	36.1	79	51.2
29	85.5	60.5	71.3	55.2	69.8	58.9	57.1	43.8	56	33	43	19.9	31.8	18	.....	.....	38.8	18.3	51	24.1	51.9	40.3	75.8	46.4
30	69	61.5	67.9	56.1	72.9	54.6	60.6	45.3	53	25	20.2	— 0.6	34.9	23.1	.....	.....	39.2	21.6	52.4	28	56	40.1	60.2	41.2
31	83	55.8	70	52	.....	.....	58.9	37.8	.....	.....	9.8	— 4	36.2	21.3	.....	.....	34.8	17	.....	.....	68.9	38.9	.....	.....
Range	42°.7		42°.1		36°		39°.6		45°.3		52°		46°.9		61°.5		50°.5		79°.9		46°.1		40°.6	
Monthly means	.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....	

Maximum, minimum, and mean temperatures—Continued.

STATION, INDIANAPOLIS, IND.

Date of month.	1874.												1875.											
	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	64	84	69	84	59	70	42	50	27	44	19.0	35	27	36	— 6	53	23	68	41	68	40	85	65.5
2	84	66	81	59	83	60	68	50	61	32	57	40	35	16	40	— 30.5	27	19.6	49	36	46	37	87	69
3	88	61	80	57	82	64	64	42	62	41	55	36	27	13.6	41	— 8	25	16.6	68	39.6	53	37.5	72	60.5
4	96	70	82	56	82	63	65	40	66	40	44	36	24	10	10	— 2	30	9.6	67	43.5	56	41.5	78	57.5
5	91	73	82	62	75	62	67	40	63	53	45	35	10	— 5.8	26	— 4	41	28.6	69	47	57	46	77	66
6	95	70	85	69	83	56	65	52	67	43	45	36	20	— 1.3	24	—15.5	38	27.5	78	55.6	58	40	69	59
7	97	74	85	72	88	61	59	50	71	52	40	30	22	—14.3	17	— 9	36	25.6	79	56	81	50	63	54.5
8	91	76	83	64	88	64	60	49	61	58	36	28	26	5	14	— 3.5	38	18	78	61	82	62	71	48.5
9	93	73	90	65	90	62	65	43	62	48	35	29	28	—18.5	12	— 5	40	31.5	69	48.5	72	50	73	56.5
10	86	70	88	66	88	64	67	53	63	46.3	32	27	10	—10.4	33	— 7	43	32	66	43	72	38	84	60.5
11	77	66	95	74	86	57	58	44	48	38	34	27.0	20	— 0.5	33	— 4	50	31	58	48	72	44	87	72
12	83	62	93	77	87	59	51	37	46	30	43	28	33	14.5	13	— 3	49	34.6	52	38.5	62	49	81	51
13	89	66	92	69	90	60	50	30	42	27.6	49	40	34	11	23	— 3	60	33	52	38.5	70	45.5	70	46.5
14	92	71	82	66	86	66	56	30	51	33.5	40	26	11	— 2.5	14	— 3.2	75	49	57	43	73	54	70	53
15	82	72	82	60	76	60	59	42	51	44.2	37	23	19	— 5.5	11	— 8	56	30	56	38	63	46.5	72	62
16	78	64	87	59.5	67	54	60	48	56	46.7	45	31.5	19	7	27	— 1.3	34	18	38	21	62	43.5	80	64.5
17	84	56	89	61	72	58	66	47	59	44	42	29	16	— 4	26	— 2	27	10	26	19	66	45	80	67
18	89	60	92	63	83	61	62	42	44	34	36	29	20	—13	24	— 8	26	17.5	46	19	72	70	75	61
19	91	72	92	68	75	57	63	34	41	31	42	26	19	— 9.4	35	—23	28	23.4	69	37	75	49	72	59
20	83	75	92	68	68	47	69	40	36	24.2	38	33	30	— 9	30	17	29	18.8	60	38.5	80	54	82	54.5
21	73	67	88	73	64	42	72	42	41	27	37	31	41	—30	35	26	31	21.5	48	31.5	71	65	82	65
22	83	62	78	70	74	44	74	53	56	39	38	31	39	—24	55	26	33	19.7	50	31.5	75	62.5	81	67.5
23	89	62	78	68	78	42	64	56	58	27	44	31	42	—21	51	44	42	27.5	58	30	75	63	91	71
24	95	71	78	59	79	55	65	58	26	18	34	27	39	23	52	37	42	32	54	33	80	63	89	75.5
25	91	71	81	60	81	66	74	55	34	17.5	42	26.6	28	17	37	23.6	48	28.5	58	32.5	87	68	88	72
26	95	77	82	61	74	66	77	53	41	26.5	47	37	43	19.5	49	28.5	54	41	54	37.5	84	65.5	84	71
27	79	67	80	62	71	55	72	60	42	31	60	35.6	43	38	35	13.5	55	36	62	42.5	88	59.5	86	72
28	77	60	74	64	64	52	78	56	31	25	61	38	44	33	34	15.6	54	41	72	42.5	83	69	75	65
29	81	58	75	65	71	41	61	41	27	10	37	17	34	28.4	.....	.....	60	39.6	65	48	71	57	73	67
30	84	60	80	61	64	46	45	33	21	— 2	23	12	33	24	.....	.....	75	49	63	41.5	77	51.5	83	63
31	87	66	81	63	.....	.....	37	28	.....	.....	27	13	32	— 3.5	.....	.....	77	60.5	.....	.....	83	55	.....	.....
Range	39°		39°		49°		50°		73°		49°		74°		85°.5		67°.4		60°		53°		42°.5	
Monthly means	78°.5		75°.9		69°.6		55°.5		42°.4		35°.6		20°.5		21°.6		37°.3		49°.7		62°.6		70°.8	

Maximum, minimum, and mean temperatures—Continued.

STATION, INDIANOLA, TEX.

Date of month.	1874.												1875.									
	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	90.5	76.5	93	78.5	88.5	79	80.5	69	51	48	64	57	54	46	67	48	78	68	61	32	86	66	88	76
2	93.5	73	94	78.5	87.5	77.5	80.5	72	66	48	77	60	51	44	76	61	71	44	67	45	73	59	89	75
3	90.5	71	94	78	88	71	83	74.5	79.5	65	70	61	53	43	62	39	55	39	72	54	76	68	86	75
4	87.5	71	94	78.5	80	70	82	75.5	79	72	68	63	53	35	42	34	68	50	76	61	76	65	88	76
5	88	74	95	77.5	75	70	82	74	83.5	68.5	69	53	37	27.5	44	35	68	55	76	66	81	63	90	75
6	90.5	78.5	92.5	77	83	76	86	72	79	69	58	40	43	35	49	39	64	46	78	67	83	68	88	75
7	90	78	93	78	87	72.5	86	70	83	70	67	43	43	40	49	33	60	37	80	68	83	72	76	67
8	93	76.5	90.5	78.5	87.5	78	79.5	69.5	83	71	70	52	49	39	53	40	64	49	77	61	86	74	81	71
9	92	77.5	95	79	87	78	75	65.5	81.5	69.5	73	58	49	17	60	50	68	60	71	62	84	74	88	74
10	91	78.5	95	79.5	88	75.5	78.5	65.5	82	70	69	60	32	19	72	53	64	56	81	69	79	70	89	76
11	95.5	76.5	94	79	82.5	76.5	80	66.5	82.5	71	66	57	41	31	62	43	74	61	71	54	85	72	90	77
12	92	77.5	88.5	80	85	74.5	80	68	79	65	68	62	53	37.5	70	50	70	63	66	52	77	68	87	76
13	94.5	77	93	80	84.5	76.5	76	59	57.5	68	75	64	42	35	76	60	78	69	70	51	78	69	88	73
14	92.5	77.5	97.5	76.5	87.5	74.5	73	63.5	79	64	69	64	38	28	76	61	76	68	74	53	80	68	91	74
15	93	73	100	76	79	73.5	78	65.5	75	70	74	61	47	32	64	49	70	54	82	55	80	69	91	74
16	80	71	91	74	82	69.5	80.5	68.5	73	60	65	57	52	37	50	43	62	47	81	60	82	67	93	76
17	84	72	91	74.5	80.5	74.5	74	63	75	60	66	53	39	33	56	47	67	52	70	60	81	68	91	78
18	83	75	88.5	73	88	79	73.5	59.5	71	60	56	49	46	37	56	50	68	52	80	64	84	71	92	78
19	86	74	87.5	76	83	69	74	65.5	70	50	55	41	44	35	62	54	73	42	78	58	84	71	93	77
20	86	74	82.5	73	82	71	82.5	68	56	41	56	40	55	42	60	44	64	37	78	60	86	72	93	77
21	86	77.5	88	78.5	81	70	78.5	70.5	74	55	59	47	72	51	72	49	67	50	80	67	88	73	93	77
22	85	76.5	88	80	86	70	81	66.5	80	69	53	44	66	46	74	58	65	55	71	40	86	72	94	77
23	91	77.5	87.5	78	86	74	82	67.5	73	61	64	47	52	47	79	64	75	67	72	49	84	73	92	77
24	92	77.5	88	73	82	68.5	84	70	78	55	66	47	55	49	80	66	79	65	76	59	85	70	93	78
25	91	79	92	78	80	72	85	70	63	45	57	45	54	49	68	46	71	66	71	67	89	73	92	79
26	90	78.5	92.5	78	86	73.5	81	73	74	53	67	53	75	52	69	50	80	68	70	57	88	67	91	79
27	93.5	77	93	78	85	74	82	73	78	64.5	76	59	73	59	68	60	80	68	74	57	86	72	91	78
28	97.5	73.5	93	77.5	80.5	66	82	68	70	40	75	63	73	57	76	63	75	68	79	63	89	77	94	77
29	93	74	93.5	78	78	65	82	68	52	38	70	53	59	49	.....	.....	79	68	80	68	87	76	95	78
30	93.5	78	96	79	78.5	66	73.5	57.5	60	45	56	50	56	42	.....	.....	80	69	80	71	90	74	95	77
31	94	78	95	78.5	....	....	64	51	.....	.....	55	48	56	43	.....	.....	73.5	55	.....	..	89	76	.....	.....
Range	26°.5		27°		24°.5		35°		25°.5		37°		58°		47°		43°		50°		30°		24°	
Monthly means	82°.3		84°.3		79°.2		73°.2		66°.4		59°.1		46°		56°.4		63°.4		66°.4		76°.3		82°.2	

Maximum, minimum, and mean temperatures—Continued.

STATION, ISLAND OF SAINT PAUL, BEHRING SEA.

Date of month.	1874.												1875.											
	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	50	44	53	47	48	43	43	38	45	41	37	35	39	35	40	36	26	20	36	33	38	30	41	34
2	48	44	54	46	52	46	45	38	43	37	35	31	38	36	38	34	22	17	37	36	31	28	43	40
3	54	43	51	47	50	47	47	44	41	39	33	29	40	36	41	36	28	21	38	34	32	25	48	40
4	49	45	52	48	50	43	43	45	41	38	30	26	39	33	40	37	30	24	36	28	34	29	48	40
5	51	46	54	47	51	41	48	43	41	36	29	25	38	35	37	30	35	27	40	32	37	29	47	38
6	51	46	52	47	53	46	43	40	41	34	35	25	39	38	30	22	37	33	36	24	35	31	43	39
7	49	43	58	47	50	44	41	36	41	39	39	35	39	35	35	23	39	34	25	17	39	30	45	39
8	50	46	57	46	53	50	43	35	44	39	39	37	41	37	38	33	36	31	22	18	37	33	51	40
9	50	44	54	49	52	47	41	36	45	38	39	36	38	35	39	35	35	29	20	18	37	31	51	39
10	52	47	54	50	52	49	43	35	42	38	39	34	41	34	35	31	36	33	22	19	36	31	44	38
11	53	47	54	51	56	48	40	36	43	37	37	34	40	38	39	35	39	33	25	19	39	33	43	38
12	51	46	54	50	52	47	38	34	37	33	36	34	42	39	39	35	36	29	32	20	36	31	45	37
13	52	44	55	50	55	46	41	32	38	33	35	32	42	38	36	32	33	30	32	19	34	30	47	39
14	54	42	58	50	51	42	41	38	43	35	33	27	38	35	37	32	40	32	32	18	31	28	45	39
15	53	46	57	50	52	42	44	34	44	37	27	23	41	38	38	33	40	35	39	30	33	28	48	39
16	53	47	60	51	50	46	43	34	40	31	27	22	38	31	39	34	35	27	38	31	43	33	48	41
17	49	46	56	48	50	46	45	40	34	31	29	23	35	31	39	34	34	24	37	31	42	34	43	37
18	51	46	60	48	48	44	42	35	34	31	34	28	36	30	39	35	32	25	35	30	40	33	45	40
19	54	47	57	47	48	46	38	33	36	25	38	34	36	31	38	36	25	16	32	30	38	32	48	41
20	52	48	62	48	49	45	37	34	40	34	38	32	32	28	44	36	28	17	32	24	32	27	45	40
21	56	48	50	47	51	45	40	38	44	40	36	31	34	29	36	33	37	28	31	26	33	27	44	40
22	52	48	52	45	48	45	46	40	45	43	39	34	29	19	40	36	38	34	30	24	39	30	46	40
23	52	46	50	44	47	40	44	43	43	35	39	35	32	19	40	36	36	32	30	25	41	32	44	38
24	51	48	51	46	49	42	44	39	35	30	39	36	36	31	39	35	32	12	35	21	39	32	45	39
25	53	48	51	45	50	40	45	39	36	33	39	35	36	30	43	38	17	13	32	25	39	31	48	39
26	56	48	54	47	53	45	45	40	36	32	35	31	35	31	42	35	26	14	30	26	42	36	47	41
27	55	49	53	48	49	43	45	40	38	34	34	31	36	30	40	34	34	23	39	29	42	36	48	41
28	55	47	56	46	47	43	45	39	40	34	34	28	36	24	37	21	34	17	40	33	47	32	45	41
29	53	48	52	45	47	39	45	38	38	34	37	33	35	31	.....	.....	35	18	41	35	44	36	51	41
30	54	47	53	48	47	41	40	36	37	35	39	36	38	35	.....	.....	36	25	37	33	45	30	47	42
31	53	49	50	48	.....	.....	43	37	.....	.....	40	31	39	38	.....	.....	37	21	.....	.....	45	37	..	.....
Range	16°		18°		16°		16°		19°		18°		23°		23°		28°		24°		20°		22°	
Monthly means	.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....	

Maximum, minimum, and mean temperatures—Continued.

STATION, JACKSONVILLE, FLA.

Date of month.	1874.												1875.									
	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	70	90	72	83	71	84	57	64	40	61	45	58	47	52	36	81	57	81	55	88	62	83	68
2	87	70	97	74	81	72	86	62	65	43	69	47	67	45	70	39	84	66	84	54	82	71	83	67
3	87	70	94	75	85	71	85	62	68	56	73	50	72	56	69	58	80	63	69	49	83	65	87	64
4	88	69	95	76	84	70	85	60	70	58	68	52	65	53	63	38	63	49	67	47	82	67	90	68
5	92	71	86	74	86	71	81	62	76	65	66	54	66	50	46	32	71	58	75	46	81	62	87	67
6	88	75	85	70	86	69	79	62	77	61	71	56	60	52	52	32	79	60	76	53	87	64	88	64
7	85	71	89	70	87	79	82	62	77	67	68	52	70	54	62	38	69	52	81	51	89	68	85	71
8	86	71	93	70	83	72	79	64	78	66	54	47	64	52	54	36	64	40	83	56	91	67	77	71
9	88	73	96	78	89	69	81	63	80	62	65	35	65	48	59	36	70	41	85	56	94	70	83	65
10	87	72	90	73	82	66	86	59	83	60	67	37	50	40	63	45	67	49	85	64	89	72	81	62
11	90	73	93	70	81	67	83	68	81	63	62	39	49	40	65	54	69	39	84	66	85	69	84	62
12	89	69	100	70	85	64	83	65	78	62	67	42	64	46	60	40	71	61	84	65	91	71	93	65
13	93	71	95	73	83	69	69	55	67	59	70	39	63	51	72	41	84	64	75	58	87	65	96	76
14	88	72	89	73	87	72	70	49	65	47	72	47	59	55	78	55	85	63	65	49	81	64	94	75
15	86	71	90	71	87	73	77	54	71	53	67	51	58	46	64	55	84	66	73	49	81	66	99	74
16	88	70	85	71	91	71	81	59	74	65	70	53	69	41	56	49	73	50	83	56	78	63	99	74
17	90	69	84	68	92	73	82	63	74	68	73	55	59	51	52	48	62	49	70	54	70	63	99	77
18	89	72	87	69	91	72	78	53	71	67	65	55	75	52	62	46	63	45	69	45	72	52	97	74
19	87	72	85	73	89	72	78	55	72	66	69	52	67	50	66	50	75	52	75	44	84	54	92	75
20	83	71	89	74	91	71	79	60	74	64	68	48	54	46	67	58	82	65	82	54	82	62	93	70
21	86	70	90	73	89	68	78	57	71	52	59	39	60	44	62	45	80	63	83	59	79	60	94	74
22	92	73	93	74	85	75	78	62	76	50	68	46	74	51	68	41	64	49	72	58	72	62	93	71
23	90	73	95	73	85	73	79	63	77	63	74	55	63	52	80	57	62	42	70	54	83	69	93	70
24	86	71	93	74	83	69	76	65	69	46	64	50	75	53	82	61	74	46	73	50	85	69	87	72
25	86	69	90	70	80	72	72	65	68	54	68	46	62	54	81	64	67	56	68	50	90	66	90	70
26	88	70	83	70	83	73	69	63	66	45	77	59	59	50	68	49	75	57	79	57	93	70	88	72
27	87	75	82	73	83	70	75	58	74	58	78	58	71	52	75	49	83	63	78	64	83	68	92	73
28	89	74	83	66	79	69	78	50	77	61	78	59	76	54	75	48	84	61	77	56	79	71	90	72
29	88	74	88	67	77	56	79	54	69	50	79	63	80	61	.....	.....	84	62	84	55	82	69	90	73
30	90	77	94	73	80	56	81	56	63	40	74	59	69	58	.....	.....	58	54	86	62	85	64	91	71
31	87	74	93	73	.....	.....	70	55	.....	.....	58	52	62	50	.....	.....	74	55	.....	.....	84	67	.....	.....
Range	24°		34°		36°		37°		43°		44°		40°		50°		46°		42°		42°		37°	
Monthly means	79°. 7		81°. 5		77°. 4		69°. 4		64°. 5		59°. 1		56°. 4		55°. 4		64°		66°. 6		74°. 9		80. °2	

Maximum, minimum, and mean temperatures—Continued.

STATION, KEOKUK, IOWA.

Date of month.	1874.												1875.									
	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	72	82	69	84	61	81	53	56	32	48	20	33	22	45	19	34	17	51	35	49	34	81	65
2	92.5	71	82	63	88	66	69	49	66	40	60	39	24	4	46	23	23	8	56	34	54	29	72	62
3	98	71	82	60	71	59	69	46	66	47	46	36	24	7	23	−25	25	13	67	46	47	42	78	56
4	100	75	83	61	64	56	69	46	68	52	43	36	12	0	10	−10	24	4	61	37	60	37	69	58
5	101	79	81	60	76	52	78	50	73	53	43	36	12	− 7	42	7	35	16	75	45	61	49	74	58
6	99	80	80	63	89	62	64	51	73	46	47	31	21	9	22	4	38	24	75	55	64	43	68	55
7	99	81	83	67	89	68	62	53	74	56	34	26	26	8	16	3	36	16	77	59	88	52	72	48
8	89	70	88	67	89	73	68	48	62	51	47	25	29	−12	13	1	40	16	66	46	80	62	72	57
9	88	68	91	69	87	67	63	52	65	48	40	30	3	−20	13	− 7	41	30	58	40	62	52	77	59
10	90	72	99	78	88	67	66	55	52	40	35	26	21	− 1	32	9	44	29	58	41	69	49	88	63
11	82	66	99	80	89	67	55	42	45	34	31	22	18	1	13	− 1	40	36	50	38	73	52	87	66
12	85	58	96	75	88	67	51	33	41	32	41	19	23	7	14	− 3	42	32	46	35	70	45	72	56
13	87	69	86	75	89	66	57	35	44	28	45	25	18	− 2	21	7	46	36	59	38	74	52	61	51
14	93	72	83	64	80	53	51	43	52	38	33	19	3	−10	15	3	71	38	56	38	72	53	82	52
15	87	71	85	65	64	45	57	45	52	31	40	25	20	− 7	16	− 3	40	17	52	31	64	46	81	65
16	83	63	90	63	70	48	61	49	54	38	43	32	18	2	35	− 6	20	12	31	21	67	36	81	66
17	87	64	91	65	77	54	70	49	52	30	36	16	13	1	14	1	30	8	41	20	71	41	85	67
18	91	64	92	68	75	66	67	47	32	24	41	12	18	6	23	− 2	26	14	60	29	77	48	77	60
19	97	73	94	75	67	55	70	45	25	21	45	26	18	4	32	17	24	11	75	47	79	54	33	64
20	80	68	93	76	67	46	71	49	34	18	36	25	36	13	42	17	30	13	50	37	82	62	77	63
21	74	64	96	77	70	55	70	55	41	25	36	24	38	22	34	13	40	23	51	30	66	61	80	63
22	80	63	87	67	76	55	66	55	56	40	36	25	46	17	48	25	38	24	54	30	75	61	89	67
23	91	69	77	64	79	54	68	55	42	28	39	24	42	25	42	25	50	24	68	39	81	59	92	80
24	92	76	79	63	76	58	71	50	25	17	34	20	25	12	39	26	43	32	57	32	85	55	91	70
25	97	80	82	63	72	65	75	52	32	12	44	19	32	9	37	20	45	32	59	40	88	68	89	71
26	91	71	78	61	73	58	78	62	47	24	37	26	48	27	38	18	53	41	54	46	88	60	89	70
27	80	65	72	65	61	50	66	50	37	22	47	29	43	33	27	10	60	36	65	43	84	67	81	65
28	79	62	76	68	69	46	76	54	35	19	36	14	35	25	36	13	61	41	69	51	76	58	73	59
29	86	67	83	68	75	54	54	40	31	11	15	− 1	35	18	.....	.....	57	41	58	43	75	52	82	60
30	91	74	79	68	69	49	42	33	22	9	18	8	36	6	.....	.....	80	41	56	37	77	57	88	70
31	86	69	79	61	.....	.....	40	30	.....	.....	23	3	20	− 2	.....	.....	66	46	.....	.....	78	57	.....	.....
Range	43°		39°		44°		51°		65°		61°		68°		73°		76°		57°		59°		44°	
Monthly means	80°.5		76°.8		67°.1		55°.7		40°.2		31°.6		16°.7		18°.1		34°.1		49°.5		62°.9		71°.4	

Maximum, minimum, and mean temperatures—Continued.

STATION, KEY WEST, FLA.

Date of month.	1874.												1875.											
	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	78	93.5	81.5	89	76	86	74	77.5	71	74.5	67	78	70	71	66	81.3	74	80.8	72.4	83.7	74.2	86	74.1
2	89	74	95	81	88	75	82	74	73	68	73	67.5	79	70	77.5	65.5	82.2	74.5	83.2	73.7	89	75.5	85.8	77.4
3	88	77	94	81	88	79	88	75	77	70	74	68	81	71.5	82	72	86.8	74.5	76.5	70.4	86.6	76.2	86	76.4
4	92	78	92	81	87	79	85	77	81	71	73	67.5	82	73	80.5	66.5	83	74	79.1	66.7	90.3	76.3	82	75.3
5	90	76	90	80	87	77	83	76	81	72	78.5	69	82	72	70.9	65.5	83	74.9	80	69	89.3	76.6	83	73.2
6	94	77	88	81	87	75	81	73	78	72	79	72	82	73	74	64.8	83.7	74.8	77.5	69	87.6	77.3	85.5	76.2
7	90	80	90	79	88	79	82	75	83	72	81	72	83	72.5	75	67.5	81.9	71.6	78	69.3	85.7	76.4	86	77
8	92	77	92	80	90	77	83	70	81	74	76	64.6	78	72	72.6	62.4	74.9	68.9	79.2	70.1	85.3	76.4	89.5	77.7
9	91	77	90	81	86	75	86	75	81.5	73	72.5	64	81	72	69	59	77.2	66.6	81	72.2	85.7	76.8	89.5	78.2
10	91	80	91	76	81	75	85	75	81	72	72	66	82	72	76.2	64.4	74.5	65.7	81.3	72.3	85	76.9	87	78.2
11	91	79	92	79	87	75	81	75	77	71	75.6	75	83	72	85	71.5	79.2	66.2	82.3	73	85.2	75.4	87	73.8
12	90	79	91	81	82	74	82	72	82	72	73.5	66	83	73.5	76.2	67.5	82.8	74	84.3	73.7	84.2	75.9	90	76.3
13	88	78	87.5	77.5	83	74	76	73	80	72	76	67	84	72	83.5	70	84.3	72.8	84	73.9	81.1	75.2	90	76.8
14	86	77	93	78	89	76.5	79	72	76	69	76	66	80	73	86	72.5	83.4	73.9	73.9	65.3	84.8	72.8	89.2	78
15	89	76	89	79	89	79	79	72	76	70.5	75	67	76	71	80.1	71.2	82.8	74.4	73.2	64.3	83	72.3	89.2	79
16	90	79	90	79	87	79	82	73	78	65	73.5	67	75	67.5	83.1	69.3	84.5	75.5	79.8	66.8	83.6	74.3	89.3	78.8
17	88	78	91	78	89.5	78	86	75	70	74	76	65.5	76	69	83.2	70.5	73.9	69.4	79.3	70.8	84.9	75.2	88.8	79.7
18	86	77	92	80	90	80	86	73	79	74	78	66.5	79	69	84.3	73.4	78	66.8	75	68.4	83.2	73.4	81.1	77.8
19	92	77	87	80	90	81	82	76	83.5	73.5	76	68.5	78	68	81.2	72.5	82.8	72.8	77.3	67.3	79.8	71	88.1	78.6
20	86	78	84	76	89	78	82	75	79	72.5	77	69	77	69	81.8	73.2	82.8	74.8	80	67.3	76.5	71.4	90.3	78.4
21	90	79	82	77	89	78	81	74	82	71	70.5	63	78	68	71	65.8	85	75.3	85	67.8	74	70.2	87.9	81.2
22	91	80	88	77	87	78	79	73	81.5	71	72	63	79.5	70.5	82	68.1	77.9	73.7	82	69.9	85.3	71.2	86.3	79.8
23	91	79	88	76	83	71	80	73	83.5	73	75	65	79	71	81.1	73.5	75	64.9	77.2	69.4	83.8	74.3	87.3	77.9
24	92	81	89	79	85	74.5	81	57	84	75	76	65.5	81	73	81.8	74	78.5	66.9	75	67.5	84	75	86.2	77
25	92	81	90	81	81	74	82	74	80	74	78	69	82	72	83.4	74.2	79.5	69.2	79.1	66	84.3	75.5	87.8	78.8
26	91	82	89	80	86.5	75	79	72	74.6	75	80	71	81	72	79	71.6	79	69.7	80.8	69.9	86.8	75.7	87.1	80.1
27	92	79	91	75	88	76	80	72	86	75	81	71	79	72	79	71.5	81.5	71.1	83	72.2	89	75.8	87.1	79.8
28	90	79	87	79	85	78.5	81	72	83	73	80	72	81	71.5	81.7	72.4	82.2	71.8	80.3	72.7	87.5	75.7	85.8	78.3
29	91	80	90	79	90	79	80	73	79	68	81.5	72	83	73	.....	.....	83.1	72.3	82.1	69.3	84.9	70	85.9	78.5
30	94	79	89	79	81	76	82	73	72	63.5	80	71	84	74	.....	.....	81.1	73.2	80.7	67	86.2	75.8	84.8	75.8
31	95	80	88	79	.....	.....	80.5	73	.....	.....	79.5	71	80	71	.....	.....	81.2	73.2	.....	.....	87.3	73	.....	.....
Range	21°		20°		16°		18°		23°.5		18°.5		16°		23°.6		23°.1		19°		20°.3		17°.1	
Monthly means	83°		84°		74°.7		77°		75°		73°.7		74°.8		73°.3		75°.8		74°.2		79°.5		81°.9	

Maximum, minimum, and mean temperatures—Continued.

STATION, KINGSTON, CANADA.

Date of month.	1874.												1875.											
	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	66	52.9	77.2	62.5	83	62	60.2	36.7	52.2	29.5	39	10	24.2	11.8	21.6	— 0.2	25.5	— 0.5	51.1	39.7	64.5	25.1	80.8	53.9
2	71.5	60.5	72.5	53.4	76.2	59	67.2	39.8	42.6	30.1	43	30	30.5	19.2	33.0	15.6	20.9	4.8	47.6	31.6	58.7	31.7	79.5	57.3
3	72.5	52.9	69.7	42.3	72.3	47.3	54.2	34.7	55.2	39.8	52	11	32.5	12.0	42.0	14.9	21.8	3.2	43.9	31.5	57.9	29.1	65.5	53.4
4	74.5	57.9	69.5	43.2	65.5	42.8	53.9	36.4	51.6	41.8	48	8	28.1	15.7	9.5	4.0	26.1	9.5	49.6	29.2	48.4	31.7	66.0	49.9
5	67.5	60.5	74.2	52.5	77.5	51.5	56.4	37.8	59.1	47.9	36	14	28.3	7.5	16.0	4.3	26.5	8.2	46.1	34.3	55.4	31.7	69.5	54.5
6	78.9	58.1	75.5	56.9	73.5	58.3	53.6	44.0	64.5	36.2	40.9	33.2	21.5	1.8	2.3	—14.7	36.0	25.4	42.8	22.5	46.7	36.4	67.0	55.3
7	78.5	64	74.1	62	74.3	52.9	56.4	47.9	52.0	35.3	44.4	15.7	26.3	9.9	— 2.5	—25.2	35.8	24.3	45.4	27.6	56.7	34.7	60.7	48.5
8	76	58.7	77.5	64	81.5	54.6	64.3	52.4	62.7	46.2	21.5	8.3	27.8	5.3	1.9	—24.2	34.4	19.6	43.4	31.1	55.7	46.2	65.0	48.3
9	81.4	61.5	81.6	61	81.3	55.7	64.7	51.9	52.9	42.8	42.9	17.9	32.6	— 3.2	4.5	—22.2	35.4	9.7	46.8	33.9	59.4	45.2	76.5	48.1
10	69.5	64	76.3	64	81.3	63	61.2	52.4	49.2	33.7	36.2	19.0	11.8	— 4.2	16.1	—16.2	37.5	23.2	57.1	32.9	57.8	43.7	76.0	56.9
11	71.5	59.4	79.1	66.1	81.6	64	63	44	45.9	27.0	47.4	11.9	19.8	7.7	31.2	2.2	47.0	19.3	52.3	34.7	56.4	40.3	83.1	53.9
12	67.4	52.9	83.5	70	79.8	56.9	48	35	33.7	21.4	22.3	13.2	16.9	0.7	2.7	—13.9	46.4	23.6	49.4	32.7	61.5	38.7	72.5	52.9
13	69.5	61.9	77	59.6	77.5	54.9	54	32	32.3	19.6	29.3	11.2	35.1	13.7	10.0	—16.2	38.2	18.1	43.4	31.5	53.7	37.4	60.5	40.1
14	79.5	56.9	78	51.5	81.6	66	50	30	30.1	17.0	13.6	— 7.2	36.3	— 0.8	2.4	—12.7	42.1	22.1	45.4	34.2	63.5	41.7	62.0	43.4
15	76.3	61.8	75.9	61.6	77.5	59.3	55	35	46.2	28.0	18.6	—14.3	4.7	— 9.2	6.3	—11.4	45.6	32.7	50.9	33.7	56.9	37.7	61.5	45.8
16	71	58	76	58.4	64.6	55.2	59	40	41.4	30.1	32.5	16.4	8.7	— 0.7	15.2	6.0	47.1	30.2	48.9	22.6	58.7	36.4	71.1	51.9
17	72.5	50	79.6	65	62.3	54.4	62	38	51.2	36.7	45.2	10.7	5.6	—10.7	20.7	4.8	33.8	7.8	42.0	19.2	53.0	38.7	64.5	49.9
18	75	61.5	67	62.6	68.6	57.6	46	35	51.4	22.4	44.2	2.7	6.9	—10.8	19.4	— 9.5	25.3	1.3	29.3	9.8	64.5	39.5	74.3	50.9
19	82.4	63.5	74.5	61	74	62	50	30	45.8	20.7	42.6	24.8	6.6	— 7.0	20.8	3.0	24.1	1.8	39.0	19.7	57.7	45.7	71.9	55.0
20	74.5	59.9	80	65	67.5	48.1	62	35	44.2	25.6	27.8	7.0	10.9	— 5.2	30.5	21.2	27.1	4.7	46.9	18.2	60.5	44.7	71.5	49.2
21	73.8	57.7	70.5	56.4	67.3	42.8	51	35	41.1	21.0	28.5	— 1.3	14.1	— 3.2	34.3	6.9	25.1	1.0	34.5	16.2	66.3	48.3	69.7	51.1
22	72.3	54.4	69.5	52.1	65.5	42.8	58	33	25.2	11.6	39.3	27.2	25.6	5.8	41.3	— 0.3	30.8	3.7	47.4	24.1	67.2	46.1	75.0	52.8
23	78.5	59.4	68.8	48	67.5	51.9	61	34	51.4	22.6	46.4	33.0	26.2	5.8	34.7	25.3	35.3	1.3	42.6	28.6	80.3	42.8	76.5	56.2
24	82.2	65.1	71.5	48.4	69.5	54.1	62	45	48.0	19.7	52.0	25.1	36.2	— 2.7	39.1	28.9	31.2	14.7	47.8	30.7	67.1	53.9	80.6	57.6
25	82.6	66	73.5	56.4	71.5	58.3	59.4	48.8	29.6	17.6	38.4	13.0	33.1	8.5	45.3	6.7	36.2	13.2	49.6	33.2	66.5	54.9	80.8	58.9
26	77.5	67	73.8	59.9	78.2	57	60.9	51.3	37.3	18.6	41.8	18.7	16.9	— 4.2	34.6	8.0	43.1	21.5	49.1	35.0	72.0	56.6	77.1	59.7
27	73.3	57.2	74.1	55.3	72.8	63.5	62.2	47.6	52.1	31.7	39.6	20.6	17.1	— 3.4	26.0	1.8	46.9	24.1	52.2	32.7	72.5	51.2	73.8	61.0
28	66.7	57.7	76.7	56.2	82.4	51.7	63.5	44.3	50.4	24.1	53.0	33.3	37.8	— 0.2	31.5	— 3.2	31.7	16.5	60.2	31.2	81.3	51.4	76.7	58.4
29	76.3	57.1	73.6	59.2	62.5	49.1	65.2	45.6	40	12	33.7	11.7	37.3	3.2	.....	.....	39.5	19.3	57.2	33.7	72.0	53.9	73.7	52.4
30	79.3	53.4	77.3	57.1	55.1	40.4	58.2	37.7	22	— 3	26.5	— 7.8	42.4	2.8	.....	.....	49.1	30.6	65.4	32.5	64.0	47.8	73.0	60.4
31	76.5	58.9	77.6	57.1	.....	.....	57.9	32.7	.....	.....	12.1	—11.3	30.1	10.7	.....	.....	64.5	36.7	.....	.....	.....	.....	70.0	45.9
Range	32°.6		41°.2		42°.6		37°.2		62°.1		67°.3		53°.2		70°.5		65°		55°.6		56°.2		43°	
Monthly means	.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....	

Maximum, minimum, and mean temperatures—Continued.

STATION, KINGSTON, JAMAICA.

Date of month.	1874.												1875.											
	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	76	.....	.....	88	79	82	72	85	75	85	75	85	75	84	48	83	.....	80	72	85	75	.....	.....
2	86	74	.....	.....	89	79	82	75	85	75	87	82	85	74	85	45	84	.....	82	72	85	78	.....	.....
3	.....	.....	.....	.....	87	80	80	71	81	76	85	74	84	73	90	46	84	.....	83	77	84	77	.....	.....
4	86	76	.....	.....	87	80	83	70	87	76	85	75	85	75	85	46	84	.....	82	74	85	75	.....	.....
5	84	76	.....	.....	88	76	88	70	85	76	85	73	83	72	86	45	84	.....	82	76	84	74	.....	.....
6	81	76	.....	.....	89	74	80	78	83	76	84	74	84	72	86	(*)	84	.....	85	75	84	75	.....	.....
7	86	77	.....	.....	89	75	84	71	87	75	85	74	85	73	85	.....	84	.....	85	75	85	75	.....	.....
8	85	80	.....	.....	81	75	86	82	84	75	85	74	92	68	85	.....	84	.....	85	76	84	70	.....	.....
9	85	79	85	74	80	74	86	82	87	75	85	74	92	68	85	.....	83	.....	79	75	85	75	.....	.....
10	86	79	84	75	80	76	86	85	82	75	83	79	83	67	84	.....	83	.....	80	74	85	76	.....	.....
11	84	82	85	75	81	76	88	78	85	74	85	75	84	64	85	.....	84	.....	81	73	87	70	.....	.....
12	90	75	85	75	.....	.....	87	79	81	74	85	75	83	63	84	.....	84	73	82	72	85	73	.....	.....
13	85	80	81	72	86	80	89	78	81	74	85	75	85	64	84	.....	85	73	82	77	83	70	.....	.....
14	85	80	84	74	80	74	89	70	79	72	85	75	85	62	84	.....	85	78	82	73	84	70	.....	.....
15	84	80	82	75	88	70	85	76	86	73	84	75	85	60	85	.....	82	76	83	74	83	73	.....	.....
16	84	80	81	75	88	70	86	75	86	74	84	74	85	60	85	.....	83	78	84	76	84	74	.....	.....
17	84	80	85	76	89	82	86	75	85	74	83	70	85	60	85	.....	83	77	84	75	84	74	.....	.....
18	85	80	83	77	81	70	85	80	86	72	85	74	85	60	85	.....	83	71	85	74	85	70	.....	.....
19	92	80	85	76	81	70	86	80	86	72	86	75	84	60	85	.....	83	76	85	75	81	75	.....	.....
20	85	76	86	76	87	70	87	77	86	74	83	75	83	52	85	.....	84	78	86	76	81	74	.....	.....
21	89	80	83	77	80	70	88	77	86	74	84	72	82	55	84	.....	83	78	84	75	80	75	.....	.....
22	81	74	80	79	81	77	87	85	86	72	85	73	82	55	85	.....	85	72	82	74	80	76	.....	.....
23	89	76	91	81	87	71	90	80	86	73	84	73	82	55	85	.....	84	73	84	75	82	77	.....	.....
24	84	74	91	81	.....	.....	90	75	87	74	85	73	85	55	86	.....	82	72	84	74	82	72	.....	.....
25	85	80	89	80	.....	.....	88	77	86	72	84	74	82	52	83	.....	85	76	84	76	83	73	.....	.....
26	.....	.....	88	76	.....	.....	87	77	85	75	85	75	84	52	85	.....	82	74	85	74	84	74	.....	.....
27	.....	.....	88	76	.....	.....	86	75	85	75	85	75	84	54	84	.....	84	74	86	73	83	73	.....	.....
28	.....	.....	88	76	.....	.....	85	76	81	76	85	75	84	54	83	.....	86	72	84	74	83	73	.....	.....
29	.....	.....	87	76	.....	.....	100	75	81	75	84	74	84	44	.....	.....	83	72	86	80	82	72	.....	.....
30	.....	.....	84	78	.....	.....	81	75	85	75	84	74	82	50	.....	.....	84	77	85	76	.....	.....	.....	.....
31	.....	.....	85	79	.....	.....	79	75	.....	.....	85	74	80	50	.....	.....	84	74	.....	.....	.....	.....	.....	.....
Range	.....	.....	.....	.....	.....	.....	30°		15°		17°		48°		.....	.....	.....	.....	14°		.....	.....	.....	.....
Monthly means	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

*Minimum thermometer broken.

Maximum, minimum, and mean temperatures—Continued.

STATION, KITTY HAWK, N. C.

Date of month.	1874.												1875.											
	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															41	32	63	33	70	47	80	53	70	57
2															47	30	70	44	74	51	75	50	73	57
3															60	41	65	44	65	43	56	49	74	63
4															44	30	46	34	48	41	67	49	76	65
5															31	23	48	36	59	48	57	44	83	67
6															46	23	41	40	51	43	73	54	86	69
7															42	21	65	39	64	42	60	50	85	58
8															31	15	52	38	55	45	74	48	62	58
9															38	18	50	33	80	50	89	68	63	58
10															30	14	48	33	60	45	88	56	67	59
11															50	32	52	38	60	46	68	53	77	56
12															41	30	63	48	58	49	83	59	76	62
13															56	40	63	43	59	45	59	53	69	60
14															50	38	63	41	57	44	60	52	70	59
15													*46	28	30	25	72	52	63	45	81	55	80	61
16													46	30	29	23	64	46	73	43	57	53	77	61
17													46	30	30	28	53	41	49	35	56	49	75	61
18													40	30	31	24	51	32	40	29	55	51	86	65
19													34	27	40	31	64	40	59	26	74	44	78	60
20													32	28	52	35	74	49	58	43	77	59	80	60
21													42	30	45	34	57	37	45	36	83	62	79	68
22													50	38	54	34	37	30	49	36	85	63	78	69
23													46	38	55	42	35	28	50	35	83	65	87	70
24													63	40	74	55	52	31	60	43	68	62	88	74
25													47	35	75	49	44	35	56	40	79	61	93	75
26													38	30	54	40	63	35	73	45	66	63	96	75
27													52	28	60	43	62	41	63	53	66	60	95	75
28													55	41	42	33	51	42	65	46	66	60	95	77
29													62	41	.....	.....	48	42	57	44	78	59	92	75
30													41	35	.....	.....	50	45	73	55	71	61	84	72
31													47	40	.....	.....	65	43	.....	.....	75	53	.....	.....
Range															46°		46°		54°		45°		39°	
Monthly means															40°.4		48°.1		51°.4		63°.6		71°.3	

* Station opened January 15, 1875.

Maximum, minimum and mean temperatures—Continued.

STATION, KNOXVILLE, TENN.

Date of month.	1874.												1875.											
	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	69	87	68	82	59	72	42	47	23.5	62	28.5	39	34	36	15	59	44	70	46	75	56	85	63
2	90	69	84	67	83	62	80	50	57	23.5	62	34	45	31	46	27	59	42	47	37	63	43	86	63
3	91	66	87	60	85	60	78	55	57	28	54	48	41	29	54	25	56	38	59	31	72	40	79	62
4	95.2	67	83	63	85	61	70	48	60	29	50	36	40	29	27	14	52	27.5	72	37	58	45	88	63
5	95.2	73	83	58	83	62	74	47	70	35.5	52	30	30	23	28	8	58	41	76	44	62	38	85	64
6	93	70	82	67	83	66.5	71	52	71	44	45	36	36	24	38	14	56	43	77	51.5	78	53	85	65
7	95	65	79	67	84.2	62.5	68	56	68	45	42	34	43	34	32	18	52	32	79	49	87	51	75	58
8	96	71	89	71	86	63	68	53	67	41	40	29	43	30	25	16	47	29	81	49	84	70	77	55.5
9	92	66	89	64	88	62	69	46	65	54	51	28	59	6	25	12	59	30	72	57	86	71	81	51.5
10	87	69	84	65	83	63	72	43.5	70	55	50	29	25	2	32	16	53	32	58	49	78	53	86	57
11	77	68	94	68	85	58	73	49	64	47	42	28	36	20	38	28	61	29.5	68	52	82	49	90	62
12	86	65	97	71	85	58	57	39	56	42	50	27	37	31.5	50	21	54	45	68	48	73	57	89	67.5
13	91	64	95	73	86.5	59	53	31.5	47	34	54	32	40	35	61	40.5	67	47	50	40	79	46	83	62
14	91	67	91	70	78	65	60	30	51	30	50	32	39	26	55	32	53	44	61	36	82	50	87	58
15	85	68	83	65	83	65	64	32	52	31	42	26	40	20	35	21	65	46	65	38	79	54	84	65.5
16	89	67	85	68	84	66	67	44	62	31	39	27	41	27	42	24	49	34	60	32	69	48	86	64
17	88	62	86	63	81.5	64	65	52	67	50	52	37	39	25	52	27.5	45	31	40	24	76	46	85	60
18	90	66	88	60	84	63	67	44	59	51	44	28	39	30	38	22	55	28	50	24.5	72	46	82	62.5
19	93	65	92	60	83	61	64	38	59	50	47	22	38	26	40	33	59	36	69	31	73	41.5	77	60
20	99	65	92	66	73	57	70	38	53	39	43	34	44	26	40	30	58	44	63	52.5	72	46	84	60
21	90	65	88	69	74	51	72	45	47	34	44	29	43	33	52	26	45	34	59	47	83	53	86	65
22	89	70	86	69	78	55	71	49	65	35	52	38	48	38	63	30	40	28	56	37	86	56.5	78	66.5
23	84	68	85	67	79	54	68	49	68	42	48	28	51	29	51	36	56	26	62	36	89	56.5	88	67
24	92	72	83	67	78	57	72	54	47	36	42	29	51	37	47	48	60	42.5	59	36.5	85	65	91	64
25	83	70	80	61	82	60	73	50	45	29	44	26	41	27.5	65	32	56	33	66	35	88	61	90	72
26	89	71	83	58	80	63	73	45	47	24	47	33	48	30	53	27	69	37	62	49	88	63	89	70
27	81	71	72	64	67	60	75	46	56	29	64	42	46	33	53	38	59	49	57	49	91	62	87	71
28	79	67	65	60	66	56	77	48.5	53	38	75	56	55	40	55	29	53	43	71	48	89	62	87	72
29	78	66	64	58	68	52	74	57	41	30	67	37	59	39	.....	.....	65	47	76	45.5	81	65	84	69
30	82	58	77	61	73	51	66	42	41	29	42	31	40	33	.....	.....	72	49	71	54	83	58	89	65
31	87	58	79	61	.....	.....	43	31	.....	.....	38	30	38	22	.....	.....	77	48	....	.....	85	64	.....	.....
Range	38°		39°		37°		69°		46°.5		40°		57°		57°		51°		57°		51°		39°.5	
Monthly means	77°.1		73°.8		69°.2		56°.6		46°.9		40°.6		34°.8		35°.1		46°.9		52°.7		66°.4		72°.9	

Maximum, minimum, and mean temperatures—Continued.

STATION, LA CROSSE, WIS.

Date of month.	1874.												1875.											
	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	77	61	81	55	68	47	45	30	43	15	29	13	25	— 6	16	7	40	31	40	33	71	64
2	86	61	75	56	76	60	61	44	64	30	51	34	15	— 6	18	12	16	— 3	53	28	52	29	72	53
3	95	62	70	64	67	49	59	35	59	63	41	34	11	— 6	13	— 9	18	—13	53	41	52	44	66	46
4	99	73	80	60	66	54	64	40	59	50	46	34	— 3	—14	— 1	—23	29	—14	57	32	63	42	68	49
5	101	72	73	60	71	52	67	49	60	50	44	34	5	—18	15	—15	34	17	66	39	57	37	67	53
6	100	74	80	61	83	55	60	49	68	37	39	34	17	— 2	— 1	—17	32	9	59	44	55	43	62	53
7	97	70	76	63	90	66	63	41	70	59	30	22	21	—14	8	—34	33	2	66	41	60	48	72	48
8	87	68	83	63	91	72	66	43	60	42	45	27	16	—25	(*)	—22	42	12	57	41	62	50	65	53
9	88	69	84	65	89	68	61	51	60	36	35	23	1	—31	.....	—30	35	29	51	32	68	47	67	58
10	79	68	88	65	80	71	58	48	52	36	34	12	15	—12	.....	8	38	27	54	36	65	50	79	60
11	84	62	96	73	86	68	48	40	43	34	20	9	2	—16	.....	—12	39	33	45	34	60	47	77	62
12	85	57	90	72	79	62	50	37	37	26	30	7	15	— 2	.....	—27	44	16	46	36	63	45	63	47
13	90	57	75	59	75	57	55	29	43	20	23	19	14	—10	.....	— 9	45	32	49	34	55	49	68	51
14	97	73	77	61	68	48	53	43	44	38	32	8	— 3	—26	.....	—14	40	33	59	34	56	48	67	56
15	76	65	81	67	60	42	62	44	45	26	48	24	7	—21	.....	—16	36	16	54	23	62	43	70	58
16	86	59	88	65	65	43	63	45	46	32	40	32	3	—14	.....	—21	16	9	23	13	69	43	77	59
17	87	62	79	67	68	50	63	43	42	21	16	10	6	—13	.....	— 8	16	2	36	15	73	46	74	64
18	89	69	81	58	62	52	63	37	23	11	40	— 5	8	— 8	.....	—12	15	— 3	58	30	78	51	74	54
19	90	68	92	70	55	50	71	43	25	9	41	26	9	—22	.....	13	19	— 4	58	35	81	51	80	60
20	75	63	84	71	60	41	71	51	37	17	31	19	25	—10	.....	14	25	— 1	48	31	78	63	80	61
21	83	58	87	67	65	45	61	45	42	22	35	16	31	10	.....	0	30	8	49	31	81	61	87	63
22	86	60	70	61	73	51	67	46	43	32	34	27	16	— 1	30	22	42	8	54	35	83	60	87	65
23	83	68	77	56	76	50	69	47	37	12	35	20	40	3	30	4	47	34	54	38	83	63	80	64
24	89	71	77	60	77	56	67	52	19	7	24	8	13	— 3	25	13	37	18	52	27	86	67	76	68
25	98	77	79	56	68	56	74	54	25	9	42	18	4	—14	19	9	46	24	57	34	81	65	85	63
26	76	69	72	59	67	52	67	47	42	14	31	12	29	— 4	17	3	49	34	64	42	86	60	76	67
27	77	61	78	66	58	51	50	39	21	8	29	15	27	23	8	— 2	43	26	66	41	87	63	70	58
28	82	59	80	68	68	44	66	45	30	16	31	— 6	24	13	16	3	55	35	60	49	72	59	74	53
29	86	62	82	69	66	47	51	38	18	— 1	13	—16	18	7	.....	.....	58	40	59	35	75	53	81	58
30	86	71	79	61	67	41	39	31	20	— 7	9	— 8	10	— 1	.....	.....	72	50	48	30	79	60	76	60
31	80	65	79	55	.....	.....	40	28	.....	.....	18	—12	12	—13	.....	.....	56	34	.....	.....	71	60	.....	.....
Range	44°		41°		50°		46°		77°		67°		71°		.....		86°		53°		58°		41°	
Monthly means	77°.1		71°.9		62°.9		52°.4		34°.8		26°.6		5°.6		6°.8		28°.1		44°		60°.6		65°.8	

* Maximum thermometer out of order.

Maximum, minimum, and mean temperatures—Continued.

STATION, LEAVENWORTH, KANS.

Date of month.	1874.												1875.											
	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	65	87	72	93	67	89	53	61	32	45	26	32	18	50	19	39	18	45	27	55	38	80	65
2	95	65	85	68	84	65	73	47	67	37	57	40	24	3	45	3	22	9	62	32	51	31	80	60
3	97	69	93	62	65	53	76	47	64	41	47	35	25	8	7	— 5	31	14	64	44	49	45	82	57
4	100	68	97	72	70	53	82	53	69	58	48	34	8	0	15	— 9	30	18	75	43	62	38	73	63
5	98	67	107	76	85	52	82	58	71	51	50	35	15	— 5	46	11	33	21	65	44	75	51	73	61
6	95	71	94	71	92	60	70	56	77	48	52	35	22	8	31	4	34	20	64	39	87	54	72	58
7	97	75	89	69	91	69	63	49	75	53	40	29	25	12	21	— 6	39	20	77	60	94	68	70	48
8	103	77	85	66	82	70	66	40	63	41	55	32	17	—14	19	11	52	21	61	41	78	58	75	53
9	92	68	105	72	85	72	72	38	69	40	44	32	6	—20	25	0	53	27	61	35	68	52	84	63
10	90	68	102	80	84	73	72	50	57	41	42	30	20	— 1	31	9	48	31	60	38	78	51	87	72
11	85	62	106	84	86	69	60	45	46	38	44	28	21	9	20	5	44	31	44	33	70	54	80	66
12	85	66	102	75	79	64	55	33	45	37	50	24	20	6	37	14	54	30	43	35	73	47	81	57
13	92	69	102	75	71	62	62	31	53	35	47	27	6	— 9	38	16	65	35	53	34	83	57	93	66
14	97	73	87	68	70	48	60	49	61	43	38	21	1	—13	25	12	51	34	61	39	68	54	93	73
15	87	76	88	71	65	42	53	46	53	31	42	28	24	— 5	27	16	34	16	56	37	69	53	98	74
16	88	65	91	71	71	44	59	50	55	45	42	26	12	2	43	11	34	10	39	24	69	47	94	75
17	85	71	94	66	79	58	70	41	45	30	26	14	16	4	33	3	36	10	53	23	72	54	97	66
18	92	68	94	67	87	54	72	42	30	18	43	14	16	5	28	14	31	19	69	29	69	59	93	71
19	95	71	94	67	67	49	74	46	24	17	41	24	26	9	30	19	37	15	82	45	81	53	94	68
20	96	73	92	71	69	46	71	56	31	15	32	24	42	20	38	10	37	20	65	44	80	61	93	69
21	95	74	98	71	67	56	63	56	38	19	34	24	37	24	37	18	47	25	55	41	78	60	99	73
22	93	71	88	71	75	52	64	57	54	35	38	17	45	17	44	30	59	26	61	37	84	64	99	77
23	102	74	83	66	75	56	66	51	35	20	37	31	41	27	43	27	61	39	72	38	84	63	95	75
24	101	79	96	63	73	63	75	54	25	16	40	16	31	15	31	20	50	29	61	40	90	65	95	78
25	104	81	90	63	78	65	77	61	36	15	42	30	42	17	43	11	70	38	49	41	89	66	96	74
26	86	62	90	68	71	56	77	63	52	31	37	24	63	34	39	17	64	38	49	40	88	67	90	72
27	86	62	87	72	67	49	66	54	35	22	38	29	44	28	32	8	63	31	66	43	79	65	82	62
28	88	68	97	73	74	47	76	45	34	10	38	10	31	22	56	26	69	44	68	45	70	57	77	56
29	92	64	91	69	82	52	47	39	27	20	20	— 1	30	19	.....	.....	78	49	67	43	76	50	83	60
30	96	66	87	62	75	51	40	28	31	8	25	13	32	6	.....	.....	77	45	61	42	79	50	84	65
31	100	73	84	58	.....	.....	42	21	.....	.....	25	13	29	— 1	.....	.....	48	32	.....	.....	83	66	.....	.....
Range	42°		45°		51°		68°		69°		58°		83°		65°		69°		59°		63°		51°	
Monthly means	82°.8		81° 3		66°.8		57°		40°		32°.7		16°.7		22°.3		37°.6		49°.8		65°.8		76°.7	

Maximum, minimum, and mean temperatures—Continued.

STATION, LEXINGTON, KY.

Date of month.	1874.												1875.											
	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.	Ma .	Min.
1	90	65	83	70	81	60.5	68	50	45	30	51	26	35	24	31	12	59	41	63	44	67	45	79	66
2	88	64	79	66.5	83	64	71	57	55	31	58	41	38	28	45	30	53	23	44	31	53	34	75	65
3	87	63	77	62	85	67.5	70	52	59	38	59	50	35	25	47	18	37	23	57	32	51	37	78	62
4	97	73	79	63	85	47	62	45	63	44	48	38	32	21	22	7	33	19	68	41	51	40	82	60
5	92.5	75	80	66	82	60	68	40	67	44	52	35	35	10	26	3	57	31	72	47	58	40	81	70
6	94	73	81	68	82	62	64	56	70	56	48	38	23	12	29	15	47	32	77	58	60	49	78	53
7	98	76	81	69	86	62.5	59	48	73	54	43	30	29	23	22	7	35	27	78	58	81	51	70	50
8	99	78	83	70	88	70	59	49	70	53	38	25	29	18	24	9	42	23	78	57	84	71	70	49
9	92	78	87	69	90	68	63	47	67	53	44	31	28	— 8	20	— 4	47	32	70	51	84	58	78	59
10	84	68	85	66	85	65	72	48	65	55	39	27	11	—10	28	5	49	32	61	50	70	54	84	65
11	74	66	94	73	87	67	65	52	61	44	39	27	24	0	38	17	59	36	62	54	78	57	87	70
12	78	64	97	78	89	66	54	40	45	32	48	29	35	18	42	18	55	40	63	38	68	51	83	63
13	85	66	92	74	89	71	50	31	45	28	49	42	42	21	48	22	63	47	47	37	66	45	72	50
14	90	73	86	66	85	71	55	35	53	28	47	26	32	10	36	17	69	54	54	36	79	57	75	56
15	88	74	76	60	85	68	65	41	59	43	39	22	26	4	33	2	62	44	58	38	62	50	77	62
16	82	71	84.5	62	80	65	58	48	63	44	47	31	34	16	39	16	46	36	47	20	58	39	82	67
17	84	61	87	68	72	62	67	49	57	48	46	32	27	10	32	10	38	15	31	17	65	38	64	60
18	88	68	92	71	80	65	63	44	57	38	42	26	28	11	33	4	44	25	43	15	67	48	72	58
19	91	70	93	71	74	61	63	45	44	37	43	28	23	13	43	28	55	35	68	34	73	52	70	60
20	90	78	93	71	69	57	70	47	39	33	38	32	38	15	37	25	50	23	58	38	77	55	75	56
21	81	68	89	73	68	49	73	53	45	29	37	31	48	30	42	33	31	25	47	29	76	61	83	67
22	83	65	82	73	73	55	74	57	62	36	45	31	47	32	58	33	31	23	46	26	80	63	80	66
23	85	72	83	70	78	62	68	57	63	42	45	31	45	29	56	40	48	25	55	32	82	65	89	72
24	91	72	78	64	78	65	70	57	42	22	40	30	44	34	70	49	50	33	49	35	83	70	90	73
25	83	69	78.5	62	81	65	72	55	34	13	44	28	46	27	58	28	50	30	55	36	83	61	88	73
26	89	73	81	64	80	66	73	58	43	25	48	37	47	31	49	25	61	44	56	49	84	66	84	72
27	83	67	73	65	71	64	77	60	55	37	59	46	49	37	49	29	56	34	53	47	88	67	83	71
28	71	60	68	64	65	52	77	57	49	27	64	52	57	35	43	25	55	40	68	45	86	73	78	67
29	75	60	71	62	68	48	74	43	35	19	53	25	37	29	.....	.....	59	47	71	47	75	60	75	65
30	79	60	76	63	66	47	53	37	31	7	29	17	37	28	.....	.....	74	48	68	47	75	52	82	65
31	83	64	80.5	64.5	.....	.....	45	31	.....	.....	27	17	34	17	.....	.....	75	56	.....	.....	86	60	.....	.....
Range	39°		37°		43°		46°		66°		47°		67°		74°		60°		63°		54°		41°	
Monthly means	77°.8		75°.1		70°.9		56°.4		45°.6		38°.7		28°.2		30°.3		42°.8		49°.6		63°.6		72°.2	

Maximum, minimum, and mean temperatures—Continued.

STATION, LONG BRANCH, N. J.

Date of month.	1874.												1875.											
	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	67	89	67	78	65	61	44	50	32	42	25	34	11	29	22	40	13	49	38	52	42	66	54
2	75	66	82	60	83	62	70	50	52	33	48	30	39	26	44	19	42	30	49	40	57	42	60	52
3	80	65	74	59	88.5	61	64	46	53	35	56	41	37	24	54	36	38	22	48	41	55	35	61	55
4	77	64	75	59	71	58	59	52	52	38	51	32	45	33	26	14	34	21	45	38	50	39	67	56
5	77	64	75	62	68	63.5	58	46	55	38	40	29	42	28	24	9	32	22	57	37	60	39	67	55
6	69	62	78	62	75	64.5	61	48	66	46	53	33	40	20	39	17	39	30	50	38	49	39	69	57
7	72	61	80	64	83	63.5	64	58	56	44	50	39	41	33	15	8.8	34	30	43	35	56	42	74	58
8	87	65	71.5	63	77	63	64	56	57	39	46	27	44	31	22	9.9	44	31	43	33	47	42	67	55
9	81	67.5	73	65	70.5	64	69	55	61	48	50	26	40	10	20	1.1	(*)	32	41	38	51	44	67	57
10	78	68	86.5	64	85.5	58.5	70	55	62	40	45	34	12	5.4	25	5.1	45	33	61	38	77	48	68	55
11	82	61	77	69	83	65.5	66	54	62	42	44	32	30	−4	45	18	44	28	62	44	70	49	69	55
12	72	57	77	70	72	65.5	69	47	46	33	45	27	29.5	21	32	11	54	30	51	36	65	48	70	58
13	82	57	77	68.5	67	65	58	42	45	27	50	30	36.5	20.5	35	17	37	32	35	33	61	46	65	53
14	89	68	70	65	70	64	47	37	45	25	54	20	33	24.2	37	14	44	30	49	31	55	44	70	49
15	91	69	75	63.5	72	62.5	56	34	45	25	45	11	30	14	23	3	50	34	49	35.5	65	48	70	54
16	94	71	74	64	71	68	65	40	52	33	38	14	31	17	23	6	45	35	48	36	61	44	69	59
17	78	65	72	65	68.5	62	65	43	55	38	43	35	35	18	45	10	44	20	38	27	62	44	67	61
18	77	64	88	60	68	62	60	42	58	40	39	26	25	16	28	11	28	15	38	24	56	45	74	61
19	77	67	76	65	65	64	53	41	50	34	43	29	26	−5	33	17	34	24	40	21	59	46	75	55
20	83	63	92	66	67.5	61	62	38	53	37	41	32	29	−4	40	28.5	30	22	43	32	79	52	76	55
21	78	63	86	74	67	55	62	45	46	29	38	28	35	10	40	25	35	21	44	27	86	60	76	57
22	78	65	77	63	72	51	63	44	43	27	48	26	43	30	38	26	34	15	50	27	81	61	70	57
23	83	63	67.5	63	72	51	57	49	59	42	48	34	38	21	49	35	33	15	55	33	77	61	66	56
24	79	63	68	64	75	55	58	54	52	29	48	32	44	22	48	36	38	24	45	36	69	54	78	55
25	75	63	67	64	77	56	57	51	44	24	39	26	39	22.1	51	34	37	29	52	33	58	51	94	68
26	76	66	67	60	74	60	62	46	40	25	55	30	31	16	45	30	46	26	60	33	78	51	70	66
27	74	66	67	61	70	57	66	46	48	28	50	38	35	14.5	40	21	51	35	49	43	65	57	93	65
28	75	65	69	61	64	58	64	52	51	38	56	42	42	24	32	15	51	25	45	42	69	53	92	70
29	72	66.5	68.5	57.5	65	58	65	54	53	32	57	32	41	31	.....	.....	42	35	45	37	71	58	70	65
30	81	62.5	74	56	64	51	64	44	32	25	48	22	36	26	.....	.....	51	34	63	41	71	58	82	64
31	84	63	73	58	.....	.....	53	36	.....	.....	41	15	40	27	.....	.....	50	39	.....	.....	70	56	.....	.....
Range	33°		36°		37°.5		36°		42°		46°		49°		52°.9		.....		42°		51°		45°	
Monthly means	71°.4		69°.9		67°.5		54°.4		42°.6		37°.4		27°.9		27°.1		34°.3		41°.9		56°.2		66°	

* No observation taken.

Maximum, minimum, and mean temperatures—Continued.

STATION, LOUISVILLE, KY.

Date of month.	1874.												1875.											
	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	63	85	71	83	64	74	46	48	30	55	29	39	26	37	12	65	40	70	45	73	44	84	70
2	88	71	81	67	84	66	72	60	60	36	62	44	37	26	50	32	40	25	53	42	50	36	90	64
3	89	66	82	63	88	71	69	47	62	39	58	41	38	22	42	17	34	22	65	36	55	43	78	64
4	98	73	86	64	87	66	66	45	66	38	51	41	30	18	17	6	34	18	74	47	53	41	86	59
5	94	79	86	65	80	73	69	44	65	54	56	34	18	8	25	8	52	31	74	50	60	44	82	69
6	97	71	87	72	82	68	69	55	71	47	53	40	25	10	33	20	44	33	81	53	63	48	78	59
7	102	75	82	71	88	71	62	51	74	49	40	32	27	21	22	12	34	28	82	57	87	55	68	56
8	94	77	85	63	89	73	61	52	71	58	39	27	34	15	20	9	40	22	81	60	86	72	72	54
9	92	77	90	68	90	68	67	46	66	56	45	33	29	−10	14	0	48	29	74	51	86	61	80	57
10	84	72	91	68	88	69	93	52	67	52	38	31	11	− 5	38	9	49	31	66	45	72	50	88	70
11	78	68	99	77	87	61	63	50	57	44	41	31	25	6	39	14	60	34	(*)	(*)	80	54	91	69
12	79	65	102	79	89	63	55	42	50	36	49	31	38	20	42	20	58	35	59	42	68	52	84	68
13	89	66	98	77	90	70	51	35	45	31	54	39	41	21	38	19	66	47	52	38	71	49	74	49
14	93	75	85	67	88	73	60	33	57	34	49	32	23	9	33	15	74	54	58	41	82	57	74	60
15	94	77	80	67	83	66	64	42	53	46	41	27	26	5	24	5	62	40	63	42	68	53	80	65
16	81	70	87	60	70	62	58	51	62	46	50	35	28	18	33	14	44	34	52	27	62	47	84	70
17	84	63	90	70	78	64	69	34	60	51	49	35	28	11	32	13	35	18	38	21	68	46	86	72
18	90	68	94	76	83	65	65	49	51	42	40	29	25	18	32	8	45	28	50	21	72	49	81	67
19	93	72	96	77	78	61	65	43	44	38	42	28	25	16	42	28	45	33	72	42	78	52	73	63
20	92	75	95	77	70	54	72	44	44	32	40	34	40	19	38	24	37	28	64	41	83	58	82	63
21	80	73	92	81	70	49	74	47	45	29	43	33	48	33	45	34	31	28	50	34	75	65	87	69
22	83	69	90	71	76	52	76	55	66	41	43	36	45	32	62	29	35	28	51	33	79	63	85	69
23	89	72	82	71	80	54	70	60	60	40	46	30	44	24	60	43	54	31	58	36	78	64	93	76
24	94	77	80	66	79	58	72	59	40	25	40	31	42	32	70	44	50	37	50	42	86	66	94	80
25	92	73	83	64	81	65	73	53	32	18	48	28	38	27	44	28	55	30	58	37	86	67	92	79
26	100	80	85	67	78	69	76	55	46	25	49	39	45	30	54	29	66	46	55	49	85	66	86	77
27	81	69	79	67	74	60	77	62	58	39	62	43	47	36	46	23	58	36	54	49	92	67	89	74
28	74	62	72	67	64	54	78	59	44	27	63	43	51	36	43	23	54	41	71	50	89	74	82	69
29	80	62	75	66	73	51	72	46	32	22	43	25	36	32	.....	.....	65	46	74	52	81	61	77	68
30	82	62	79	65	69	54	52	41	29	10	25	19	38	31	.....	.....	78	47	71	45	79	55	83	65
31	90	67	83	65	.....	.....	40	33	.....	.....	30	21	33	12	.....	.....	78	58	.....	.....	87	59	.....	.....
Range	40°		42°		41°		45°		64°		44°		61°		70°		60°		.....		56°		45°	
Monthly means	80°.7		79°.3		72°.2		57°.5		45°.8		39°.2		26°.4		29°.1		42°.4		52°.7		66°.3		75°.3	

* No observation taken.

Maximum, minimum, and mean temperatures—Continued.

STATION, LYNCHBURGH, VA.

Date of month.	1874.												1875.											
	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	70	88	67	82	55	67	44	47	34	40	25	30	22	40	20	38	26	71	58	69	55	80	55
2	85	72	85	66	84	56	77	50	51	31	62	35	52	30	50	26	68	37	67	50	64	51	72	63
3	89	70	82	62	85	58	70	49	56	28	65	41	45	30	58	34	46	35	55	43	66	44	84	64
4	93.5	72	80	65	84	61	68	50	62	33	53	34	50	34	29	18	43	28	68	37	64	48	84	63
5	93	72	80	60	84	68	62	48	67	36	48	26	43	31	30	14	34	29	68	42	66	45	84	63
6	86	63.5	76	63	85	63	67	47	70	45	46	31	30	26	42	22	54	33	71	39	71	54	85	69
7	87	60	72	67	86.5	64	64	55	63	40	46	35	37	29	18	9	43	33	78	49	72	46	77	60
8	92	68	84	65	89	63	65	58	61	33	43	31	40	31	24	3	48	34	70	44	87	53	75	54
9	94.5	72	84	65	81	65	70	53	67	47	49	27	40	14	20	12	55	33	72	51	91	67	77	55
10	93	74	85	63	79	59	71	57	65	47	47	32	25	7	24	5	54	36	66	47	80	56	84	57
11	85	74	89	69	85	55	73	55	70	51	47	33	32	13	44	19	58	34	56	51	80	52	87	65
12	82	69	90	67	88	61	60	45	53	38	47	29	32	28	41	26	66	47	59	48	78	62	78	69
13	85	67	89	69	85	63	55	40	45	30	53	28	38	30	55	31	70	47	55	43	73	48	79	61
14	90	70	83	70	78	70	54	34	42	25	55	34	44	31	54	34	55	44	62	47	78	49	75	60
15	91	67	81	64	72	69	59	34	52	29	37	24	33	22	35	24	67	50	66	43	84	56	79	63
16	90	71	81	60	80	68	67	37	52	38	38	20	39	18	36	22	52	44	60	34	67	46	77	64
17	85	67	80	60	78	68	66	47	55	35	58	34	37	28	52	20	46	34	40	26	66	42	83	64
18	88	65	86	61	84	65	66	48	62	44	45	34	37	26	30	19	55	30	32	26	66	46	81	63
19	88	67	89	64	79	70	64	44	55	41	55	36	35	24	30	22	57	33	65	28	72	40	78	56
20	91	64	92	65	76	58	67	36	53	37	41	35	29	19	43	30	52	38	58	47	82	52	77	64
21	89	72	92.5	68	71	52	74	41	46	33	48	35	37	19	46	27	50	34	57	41	86	59	80	64
22	83	68	87	71	71	53	72	42	39	31	51	35	54	36	56	27	41	29	58	33	88	62	87	65
23	84	65	72	65	74	51	72	44	65	39	50	34	47	27	46	31	45	25	62	37	88	59	88	67
24	86	67	70	63	73	54	61	51	50	41	45	33	39	31	59	43	55	37	64	40	74	66	94	68
25	82	69	75	63	76	52	67	51	46	30	45	29	43	33	62	39	51	33	65	40	82	67	95	73
26	75	67	72	62	78	52	69	44	42	25	42	28	43	29	54	32	65	30	67	39	85	66	93	73
27	76	67	70	56	73	62	74	45	52	26	48	36	50	25	52	37	67	53	55	50	82	62	93	76
28	73	68	72	50	68	59	78	49	61	31	68	47	46	40	48	31	64	37	60	48	80	53	92	75
29	75	67	73	52	66	55	78	51	56	35	63	43	45	39	.....	.....	46	38	72	42	84	58	91	74
30	80	60	68	58	66	51	67	45	37	29	44	37	47	31	.....	.....	57	40	75	57	78	56	86	72
31	85	59	72	60	.....	.....	50	36	.....	.....	32	23	45	34	.....	.....	68	48	.....	.....	81	49	.....	.....
Range	35°.5		42°.5		38°		44°		45°		48°		47°		59°		45°		52°		51°		40°	
Monthly means	77°.9		72°		69°		56°		44°.8		40°.7		32°.3		34°.3		45°.5		53°.1		66°.5		74°.1	

Maximum, minimum, and mean temperatures—Continued.

STATION, MARQUETTE, MICH.

Date of month.	1874.												1875.											
	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	65	50	60	53	82	51	59	38	38	27	33	11	30	8	28	7	9	— 1	38	26	36	26	70	(*)
2	63	51	65	47	67	51	49	41	52	31	39	29	16	4	12	4	13	— 9	48	25	45	26	72	.....
3	74	51	69	44	65	48	46	36	52	32	34	19	7	— 5	10	— 6	17	—14	49	30	46	29	55	.....
4	69	49	75	48	67	44	62	35	51	43	34	18	8	— 7	2	— 7	27	— 1	31	22	52	34	54	.....
5	85	52	64	57	64	53	53	48	56	44	41	30	13	— 9	8	—12	23	— 2	47	25	48	30	58	.....
6	83	66	73	59	75	53	50	44	61	36	36	25	19	— 1	1	—18	32	8	44	35	47	34	52	.....
7	80	61	72	56	87	59	57	44	66	49	24	19	15	0	7	—15	30	2	41	34	51	39	66	.....
8	70	54	89	62	97	59	65	45	63	43	35	17	15	— 5	—14	—21	40	9	55	36	56	36	73	.....
9	76	49	89	66	87	70	58	50	46	33	34	18	—10	—19	4	—23	35	24	50	38	57	41	70	.....
10	70	54	84	63	91	67	53	41	41	31	24	13	10	— 9	17	— 3	35	23	50	32	59	41	73	51
11	70	47	88	63	84	68	42	33	33	26	13	7	20	— 5	— 5	—17	33	14	46	29	49	41	88	41
12	82	52	66	52	75	58	39	32	32	22	19	8	19	— 3	2	—27	23	7	44	32	54	37	59	37
13	85	52	63	47	56	40	52	29	36	17	23	13	21	3	5	—18	38	18	39	30	48	34	63	38
14	93	64	63	44	67	40	51	38	38	30	20	12	9	— 5	7	—15	34	24	51	32	46	36	63	38
15	79	54	75	49	66	48	60	37	43	22	35	12	9	—10	14	—13	34	21	43	11	52	33	67	43
16	72	46	82	66	76	47	65	35	40	23	35	24	9	— 3	19	— 6	13	0	15	3	61	31	62	42
17	79	53	78	60	85	60	57	43	38	23	21	11	8	— 9	15	— 2	10	— 5	22	10	64	35	63	45
18	81	53	74	64	79	59	54	36	23	14	40	19	7	—10	20	— 7	12	— 5	46	21	68	42	73	40
19	88	55	81	61	73	55	75	38	30	14	38	19	13	—10	20	11	19	— 9	34	23	71	42	74	54
20	77	57	75	52	56	40	63	35	28	14	23	14	17	— 6	16	7	23	—13	34	19	67	49	78	52
21	77	58	71	55	67	40	58	30	31	17	34	14	32	17	33	— 8	30	— 1	37	15	68	48	82	60
22	88	57	67	53	66	48	61	39	39	26	35	25	14	— 5	22	5	37	3	45	16	72	46	88	63
23	78	56	68	47	76	47	67	47	35	22	30	27	33	— 4	22	1	33	22	43	27	86	53	68	52
24	79	54	69	45	85	60	67	47	27	20	20	17	19	5	9	— 8	30	19	36	23	78	64	64	44
25	88	67	72	49	79	59	71	55	27	17	34	14	13	— 7	20	— 6	35	10	48	32	70	47	82	52
26	73	54	80	58	73	55	64	43	36	19	35	23	23	— 8	12	— 4	52	30	45	29	59	(*)	72	56
27	72	49	81	63	60	50	47	42	23	9	32	21	26	12	13	— 7	31	14	39	31	81	.....	63	52
28	70	45	78	61	68	46	47	38	22	9	24	1	24	— 5	6	—14	43	15	62	34	81	.....	59	44
29	74	46	75	60	59	44	49	34	13	6	3	—11	18	— 7	.....	.....	54	28	60	28	61	.....	81	50
30	69	57	67	54	53	39	34	30	23	3	14	— 4	12	— 1	.....	.....	53	39	46	22	66	.....	68	53
31	81	53	72	49	.....	.....	37	28	.....	.....	21	6	15	— 3	.....	.....	44	27	.....	.....	70	.....	.....	.....
Range	48°		45°		58°		47°		63°		52°		52°		60°		68°		59°		.....		.....	
Monthly means	64°.5		62°.9		60°.2		46°.8		31°		22°.5		7°.2		2°.3		20°		33°.9		49°.4		57°.2	

* Minimum thermometer broken.

Maximum, minimum, and mean temperatures—Continued.

STATION, MEMPHIS, TENN.

Date of month.	1874.												1875.											
	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	71	96	69	88	68.5	76	52	52	30	61	38	46	32	45	23	72	52	62	42	71	53	92	73
2	92	71	86	74	89	69	82	62	61	35	66	47	39	34	53	40	53	31	57	40	61	44	90	75
3	92	72	89	70	89	69	80	59	62	35	68	52	38	31	54	22	53	30	69	43	60	47	86	72
4	94	72	90	69	90	69	76	51	70	47	61	39	33	24	29	13	44	29	75	51	59	45	92	66
5	93	72	91	66	82	74	71	51	72	57	61	45	24	16	33	15	59	41	77	55	70	45	90	67
6	92	74	98	73.5	89	69	76	52	76	54	56	44	33	19	44	24	51	31	81	59	85	55	78	67
7	96	76	99	77	85	74	69	57	78	54	48	38	32	25	39	15	44	28	78	62	87	68	74	57
8	97.5	76.5	95	80	86.5	71	64	50.5	78	62	53	29	35	22	37	23	49	26	77	55	85	72	81	55
9	82	72	97	77	82	74	69	78.5	77	64	57	41	32	2	32	20	57	36	67	49	82	62	87	60
10	83	72	101	80	90	69	77	53	80	65	50	38	22	2	47	31	60	38	68	52	77	53	94	68
11	85	66	100	80	89	68	72	55	67	50	50	30	33	8	48	25	61	47	64	45	81	59	92	71
12	89	66.5	100	80	89	67	60	44.5	55	46	56	35	45	29	55	28	61	51	58	46	74	56	90	73
13	91	69.5	101.5	80	90	67	56	38	56	37	59	50	44	29	60	41	76	53	59	45	77	52	86	67
14	92	70.5	97	76	89	71	65	36	66	41	58	32	31	18	55	33	79	60	61	44	84	55	93.5	67
15	89	70	91	72	80	67	65	50	67	52	43	27	33	13	34	22	65	44	71	42	84	60	92	75
16	91	73	90	71	71	63	63	53	67	55	56	42	43	30	45	24	51	37	64	44	73	57	94	73
17	92	73	90.5	69	80	65	67	52	63	55	49	37	31	21	45	32	49	33	56	35	76	51	93.5	73
18	93	71	92	66	89	65	70	49	55	40	41	32	34	28	44	24	65	37	63	39	80	57	95	74
19	94.5	72	93	67	69	65	69	47	47	40	40	29	36	22	49	38	57	44	78	45	72	58	85	76
20	95	74.5	95	77	72.5	56	73	45	46	35	45	34	29	25	46	30	45	34	70	57	79	64	87	70
21	95	78	88	74	75	53	74	50	54	33	46	33	60	42	60	30	47	34	57	48	82	67	92	72
22	95	78	87.5	72	78	55	75	59	71	52	50	39	56	36	65	45	54	35	60	44	82	67	93	74
23	95.5	79	91.5	74	83	63	70	57	67	45	37	31	44	31	67	55	64	40	63	42	79	64	94	75
24	96	80	83.5	69	79	66	71	53	52	38	48	33	49	35	72	58	62	36	72	44	89	66	91	73.5
25	96	79	91	68	83	70	76	60	39	25	55	35	48	29	59	36	65	42	65	47	90	71	86	74
26	96	77	93.5	74	78	70	76	60	52	35	55	43	56	39	62	35	66	52	63	50	91	70	92.5	72
27	93.5	78.5	94	78	73	62	78	57	62	40	69	53	68	51	52	37	59	45	60	51	79	66	93	75
28	83	71	86	76.5	68	52	77	59	59	31	72	57	61	46	61	37	62	52	72	48	81	68	83	69
29	82	66	89	74	73	52.5	71	54	48	29	58	34	46	36	.....	.....	74	53	78	57	75	61	83	65
30	86	66	86	71	76.5	59	61	41.5	45	32	39	29	41	31	.....	.....	78	62	67	56	84	60	88	66
31	91	67	85	69	.....	.....	50.5	34	.....	.....	34	29	38	24	.....	.....	71	61	.....	.....	88	61	.....	.....
Range	31°.5		35°.5		38°		48°		65°		45°		66°		59°		53°		46°		47°		39°	
Monthly means	82°.8		82°.9		73°.2		60°.3		52°		45°.6		34°.1		40°.2		50°.6		57°.7		68°.6		79°.1	

Maximum, minimum, and mean temperatures—Continued.

STATION, MILWAUKEE, WIS.

Date of month.	1874.												1875.											
	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	62	76	62	72	52	71	45	45	29	32	11	36	24	29	— 3	13	8	38	32	36	31	60	48
2	66	57	65	58	87	64	59	44	59	31	54	28	28	7	35	20	14	7	46	30	48	25	75	51
3	95	56	65	57	66	53	55	42	61	39	43	36	13	0	35	— 4	16	8	56	33	55	35	71	49
4	87	59	67	54	64	52	58	41	60	42	34	27	15	— 9	2	—17	26	4	43	31	65	37	78	46
5	76	58	65	62	70	56	57	45	67	48	36	33	4	—15	18	—14	25	19	45	32	51	33	64	47
6	90	67	67	62	85	58	55	50	62	40	38	31	16	— 2	4	— 8	30	14	74	38	54	35	58	44
7	91	68	78	57	94	60	54	47	70	51	32	25	18	— 3	5	—20	30	5	53	34	50	37	71	44
8	81	64	82	60	89	70	64	48	65	42	38	19	21	—17	— 3	—15	32	11	57	35	80	43	76	50
9	75	63	82	64	82	66	62	47	62	39	38	23	— 7	— 2	7	—20	34	24	57	32	60	46	63	52
10	84	64	82	65	83	67	54	48	50	40	29	17	11	—10	18	5	33	23	56	37	53	46	61	48
11	65	59	98	68	90	68	50	40	50	30	28	12	10	— 5	16	— 9	38	25	44	35	52	40	85	52
12	67	54	85	76	88	69	43	33	35	29	31	7	27	5	3	—22	35	23	42	33	56	41	65	45
13	86	56	70	62	69	64	47	28	37	24	33	21	22	1	11	— 5	36	29	46	35	59	40	54	43
14	95	68	68	61	84	57	49	35	46	34	23	10	1	—15	4	—12	35	30	59	33	48	41	54	41
15	88	65	70	58	59	48	55	42	48	32	39	12	12	—14	9	—15	37	22	51	25	46	39	55	40
16	67	57	79	57	61	53	59	46	49	34	35	28	12	—23	14	—11	23	8	25	12	50	37	70	51
17	86	59	89	68	67	60	65	46	49	30	35	13	7	— 8	13	— 6	18	0	25	14	62	36	62	48
18	90	65	73	61	71	60	57	40	30	21	36	11	12	1	16	—13	16	4	39	24	68	44	65	47
19	91	65	95	63	68	52	65	40	29	15	41	23	9	— 8	26	14	16	7	40	28	83	51	66	47
20	66	57	80	66	64	45	78	48	27	16	39	19	26	— 5	22	11	22	14	34	27	83	52	66	48
21	75	56	80	63	69	45	58	49	37	17	30	17	33	25	30	6	25	16	38	27	72	46	68	51
22	77	56	64	62	74	54	56	48	42	32	33	24	28	3	32	12	33	9	39	26	61	43	86	56
23	86	66	67	62	77	56	60	51	42	14	34	22	34	6	30	20	37	24	52	30	61	47	75	53
24	79	68	67	53	79	56	61	51	21	11	27	13	34	9	31	15	37	26	38	28	70	45	82	60
25	92	65	71	55	71	57	63	51	27	10	37	15	10	— 8	26	10	37.5	19	42	29	78	57	69	53
26	84	67	72	56	79	66	71	55	39	24	29	15	29	0	16	8	46	37	49	33	63	49	86	58
27	68	56	72	66	61	47	56	43	39	18	38	15	36	27	11	— 3	43	32	49	34	67	49	78	59
28	72	56	71	66	67	48	61	50	29	16	34	15	27	15	12	— 3	41	30	66	40	78	53	60	49
29	83	61	69	67	67	51	61	40	25	3	15	—11	22	8	.....	.....	42	31	55	33	72	50	81	48
30	90	64	69	63	62	43	40	32	19	— 1	9	1	20	3	.....	.....	50	35	42	30	73	51	79	62
31	85	66	66	55	.....	.....	34	30	.....	.....	29	— 4	8	— 4	.....	.....	66	34	.....	.....	62	48	.....	.....
Range	41°		45°		51°		45°		71°		54°		59°		57°		66°		62°		58°		46°	
Monthly means	71°. 5		68°. 1		63°. 6		50°. 2		35°. 5		25°. 4		10°. 4		8°. 4		26°		38°		51°. 9		60°	

Maximum, minimum, and mean temperatures—Continued.

STATION, MOBILE, ALA.

Date of month.	1874.												1875.											
	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	76	96	76	91	77	82	63	54	35	64	41	59	53	51	31	70	63	67	48	79	70	90	80
2	88	74	96	76	89	76	83	65	59	32	66	42	64	47	62	41	70	66	56	46	79	65	88	77
3	77	72	95	78	89	75	83	67	67	35	67	48	50	47	67	45	69	47	58	41	75	62	91	70
4	75	72	93	75	89	75	86	65	71	42	71	53	50	41	45	32	49	45	70	47	75	61	87	68
5	85	72	95	75	90	75	81	62	77	51	67	52	41	34	43	28	65	49	73	51	77	56	89	72
6	96	71	94	76	90	75	83	64	79	57	61	54	43	35	51	30	67	56	75	55	82	62	85	71
7	91	73	94	79	90	77	83	67	79	57	59	46	54	43	54	34	61	38	76	62	82	72	82	68
8	91	71	94	77	89	74	80	65	78	68	52	37	52	44	48	28	58	37	77	63	84	73	83	64
9	84	72	98	80	88	73	78	60	78	68	56	34	52	29	59	39	62	41	76	68	86	76	87	63
10	81	72	97	74	91	72	79	59	77	71	61	38	30	25	62	49	67	52	76	68	82	68	87	68
11	77	69	85	82	87	73	81	64	77	69	59	42	41	30	65	46	65	46	74	63	83	61	89	69
12	89	71	97	79	87	68	75	59	70	58	68	41	59	41	59	37	68	59	73	57	80	65	92	72
13	88	74	100	79	90	69	66	47	65	54	65	46	72	54	69	48	73	62	66	49	81	61	95	75
14	90	74	97	77	88	70	68	44	65	51	68	55	54	35	73	58	70	65	68	48	86	58	93	70
15	90	70	98	79	86	71	74	50	71	53	56	38	54	31	59	45	74	60	76	49	87	63	95	75
16	93	72	93	71	89	71	78	62	72	63	62	51	57	46	45	40	60	46	74	59	87	67	95	78
17	94	73	81	72	88	72	71	58	75	66	62	55	53	49	46	43	56	44	67	49	82	65	94	78
18	91	75	77	72	90	75	76	53	70	63	56	46	58	49	58	44	63	46	73	49	81	67	95	77
19	92	75	86	73	88	72	76	53	66	58	65	46	49	40	53	51	73	56	72	49	81	66	94	79
20	94	75	90	75	82	74	76	52	66	54	55	41	51	39	53	42	76	57	72	62	84	65	92	79
21	92	75	92	75	84	65	78	57	65	46	52	37	65	51	56	37	64	46	71	62	83	63	87	71
22	93	76	90	79	87	64	79	63	74	62	64	48	62	53	62	40	60	39	71	56	88	63	91	75
23	93	76	90	77	87	64	78	61	75	58	55	41	65	51	70	58	64	47	66	46	90	70	90	74
24	91	77	90	74	88	72	79	63	67	47	52	45	65	50	71	64	70	54	72	47	91	74	90	73
25	93	77	90	74	85	76	79	61	57	41	49	42	57	45	70	52	72	57	72	52	91	73	87	72
26	95	79	92	74	79	74	77	59	55	33	68	50	66	45	61	44	74	62	74	57	91	75	83	75
27	93	80	89	75	83	70	79	54	69	42	69	59	70	53	74	54	76	63	72	61	88	74	83	76
28	89	79	90	75	78	60	77	54	71	44	71	63	72	62	66	52	75	65	75	54	87	72	89	73
29	93	76	93	77	77	54	76	60	54	37	71	64	69	53	.....	.....	77	63	76	62	91	73	89	73
30	94	74	86	78	79	55	69	58	60	37	63	55	55	42	.....	.....	78	66	77	64	90	68	89	75
31	94	73	93	74	.....	.....	61	46	.....	.....	57	51	51	38	.....	.....	70	66	.....	.....	89	71	.....	.....
Range	27°		29°		37°		42°		47°		37°		47°		45°		40°		36°		35°		32°	
Monthly means	80°.8		83° 8		77°.9		67°.4		60°.2		54°.3		49°.8		50°.9		60°.2		63°.2		75°.3		80°.8	

Maximum, minimum, and mean temperatures—Continued.

STATION MONTGOMERY, ALA.

Date of month.	1874.												1875.											
	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	87.5	73	95	73	87	72	82.5	59	54	34	62.5	36	46	43.5	49	27.5	76	60.5	72	51.5	81.5	65.5	91	73
2	88	74	93	73	87	72	86.5	52	60	32.5	66.5	40	55	43.5	63	39	60.5	56.5	72	47	75	61	94	72
3	80.5	73	90	73	88	68	88	58.5	66	34	70	43.5	48	40.5	62	38	66.5	46.5	65	39	77	53	90.5	68.5
4	83.5	72	94	72	86	73	85	63	71	45	66	45	48	39	37.5	29.5	56	40.5	73.5	45	71	56	92	66
5	90.5	71.5	92	70.5	87	72.5	84	57	76	50	61	43	38	32.5	42	22	58	47	79.5	45.5	78	51	93	71
6	97	73.5	91	74.5	89	73	85.5	64	78.5	54	55.5	48.5	49.5	35	52	26.5	56.5	51	81	56	84	61	87.5	71
7	92.5	76	95	75	86	73	82	63.5	77	52	55.5	42	52.5	45	45.5	30.5	57	36.5	79.5	57.5	88	66	79	68.5
8	80.5	71.5	96	77	90	72.5	80	61.5	72.5	64.5	51	32.5	53	43	44.5	25	57	35	82	58.5	89.5	68.5	84	61.5
9	87	68	100	78	90	73	80	56	78	66	61.5	33	49	22	49.5	29.5	65	39	79	65	89	69	86	63
10	84	70	97.5	75	90	69.5	80	55.5	80.5	67.5	64	39	34	18	54	43	63	48	86	65	79.5	65.5	91.5	66
11	74	71	100	80	85	65.5	84	51.5	79	65	59	43	40	33.5	55	43	65.5	41	75	64	85	56	95.5	69.5
12	88	71	101.5	74	86	67	70.5	53.5	65	50.5	56.5	34	48	39	61.5	35	71.5	53	71.5	56.5	76.5	64.5	95	72.5
13	85.5	71	103	78.5	87	67	65.5	41.5	62	48.5	59	38	57.5	46	61.5	45	73	64	63.5	45	81	56.5	96	74
14	88.5	71	99.5	75	85	69	65	40	58	43.5	59.5	44.5	49	33.5	63.5	53	78.5	66	67	45	86.5	56.5	97	66
15	93	69.5	96	74.5	88	72	71.5	45	67	45	53	32	49	29	52	41	78	58	73.5	48	89.5	62	99.5	69.5
16	95	71.5	88.5	74	87	68	78	56	75.5	53	55	42	53.5	41	53	41	58.5	43	68	53	82.5	66	97.5	77
17	95	72.5	81	72	88	69.5	66	54	74	62.5	60	51.5	49	43	49.5	37	54	41	58	42	79	61	98	74.5
18	93.5	73.5	84	72	89	72	75.5	52	68	61.5	52	42	52	46	56	42.5	64.5	34.5	65	41	83	57	98	74.5
19	91.5	73	89.5	73	89.5	72	75	50	68	61	61	38	47	40	55	50	59.5	49.5	76.5	42	83	61.5	97	72.5
20	90.5	72	92	75	85	71	79	50	61	51	61	41.5	51	44	53	43	78	54	78	55	85	65.5	34.5	73.5
21	90	73	94	76	84	57.5	80	57.5	59	43	54.5	35	61	47	59	34.5	56.5	45.5	72	60.5	87	64.5	86	71.5
22	95	74	93	75	86	64	77	59.5	77	56	62	49	64.5	51.5	67.5	40.5	56.5	37	64	53	88	64	93	70
23	91.5	77	93	74	84.5	66	75	62.5	73.5	54	57	38	61.5	51.5	75	53.5	64	42	61.5	47.5	89.5	69	94	73.5
24	93	74.5	89	72.5	86.5	67.5	77	62	62	42.5	54	43	64	50	78.5	68	69	47.5	73.5	45	92	70.5	94.5	74
25	93	74	92.5	71	84	73	69	60	53.5	38.5	53	40	57	38.5	72	47.5	68	48	73	51	91.5	70.5	93.5	73.5
26	93	75.5	88.5	69.5	83.5	72.5	77	55	56.5	31	59.5	47.5	59	41.5	61	39	77	54	74	57.5	96	70.5	88.5	74
27	92	73	79.5	69.5	77.5	68.5	79	54.5	63	43.5	76	57	69	47.5	70	52	72	63	70	58	92	69	88	72.5
28	91.5	77	89	71	77	58	79	54	69	46.5	75	64.5	74.5	60	68.5	43	78	61.5	75.5	55	88.5	68	90.5	72
29	87	72	91	75	76	55	80	57	52	37	71	62	70	49	.....	.....	73.5	61.5	82.5	54.5	87	71	89	73
30	91	70	92	75	84	53	68.5	52	60	35	62	50	51	42	.....	.....	64	56	83	61	90	67.5	93.5	73.5
31	92	70	90	70.5	.....	.....	57	42	.....	.....	51	45	47	35	.....	.....	69	54	.....	.....	98	70	.....	.....
Range	29°		33°.5		37°		48°		49°.5		44°		56°		56°.5		43°.5		47°		45°		36°.	
Monthly means	79°.9		82°.6		76°.2		65°.1		58°.2		51°.7		47°.2		49°.6		57°.4		62°.6		74°.5		80°.	

Maximum, minimum, and mean temperatures—Continued.

STATION, MONTREAL, CANADA.

Date of month.	1874.												1875.									
	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	77.3	57.3	72	61	76.4	57.7	49.7	40.6	39.6	27.2	24	— 1.6	15.8	— 3.6	18	12.2	5	—10.3	44.8	33.2	50	33.9	73.3	51
2	68.6	54.6	65	54.2	77.2	60.2	54.5	46.5	40.5	34.5	34.5	22.4	16.3	10.4	28.2	15.2	19.5	5	46	33.6	42	33.1	76.6	57.3
3	64.1	58.7	62	53.5	70.2	51	48.0	41.6	50.1	33.3	43.5	23	17.2	4.9	39	19.6	18	9	39	32	41	29.9	74	57.7
4	72	59.5	73.4	54.1	68.2	48.5	50.0	37.5	49.6	37.0	23.8	8.2	19.4	12.8	27.8	— 6.1	19.5	12.6	43.2	30.5	50.3	33	74	55.1
5	72.8	59.5	75.8	56.2	71	51.7	56.4	38.4	51.5	40.2	18.5	7.1	14.8	8.2	9	— 6.5	24	3.3	47	29.5	56.5	38.8	77.7	59.3
6	76	59.9	74	57.5	71.4	62.5	55.0	40.4	53.6	43.0	26.8	18.1	14	5.8	9.8	—12.4	29	21.7	33	22.9	53	31.5	67	57.6
7	84.4	65.6	72.3	59	70	57.8	58.4	47.7	48.2	38.8	42.0	26.4	15	5.8	— 9.1	—21.4	30	20.5	38	19.5	58.7	40.5	57.7	52.7
8	81.1	66.5	76.3	63.4	73.5	57.4	63.4	48.5	52.5	38.5	31.8	4.5	17.1	8.1	— 3.3	—24	30	16.4	39.5	27.5	49.8	45	69.5	51
9	76.7	62.4	79.8	64	75.8	53.5	57.3	50.6	51.8	43.8	32.3	4.3	25.5	0	— 3.3	—14.3	27.1	11.3	40.5	23.5	66.2	44.7	74.7	51.5
10	73.9	61.5	84	64	84.2	63.3	58.0	50.0	44.0	35.8	29.8	8.2	5.0	— 6.1	2.6	—11.3	31	17.5	51	34.9	61.5	50.2	69	53.7
11	76	59.8	83.9	64.1	67.5	57.5	56.2	47.7	38.2	27.0	29.7	6.4	14.7	2	30.5	9	34.8	25.2	44.5	31	63.9	46.7	80.7	55.2
12	67.4	53.5	84	67.5	64.9	49.1	48.2	35.5	33.8	24.4	8.8	1.4	12	2	14	—11.1	37.9	27.4	43.8	24.1	58.5	42.1	76.4	56.2
13	76.6	61.5	72.3	60.7	73.5	47.2	40.7	33.0	27.6	24.0	9.2	5.2	28.3	8	3.1	—12	29.7	14.6	41	34.5	54.7	37.7	64	52
14	81.2	59.6	70.5	54.3	77.6	60	51.2	37.0	29.8	20.8	8.8	— 8.5	29.5	1	0.5	— 9.5	29.4	13.2	47.5	30.7	56	45	64.1	45.7
15	85.8	67.2	78.8	55.7	77	61	54.3	37.5	33.5	21.0	— 5.8	—14.3	1.6	—12.2	0.7	— 8.1	38	27	53	35.1	46.7	36.1	66.7	46.1
16	74	63.5	78.4	57.9	66.3	52.6	60.8	42.7	39.8	31.7	12.8	— 7.6	— 4.8	—10.7	10.2	— 5.5	41	31.6	45.8	29	47.8	33.9	69.1	48.1
17	73.9	59.6	80.8	58.9	59.5	50.7	64.8	43.3	41.1	27.0	23.8	8.1	— 1.0	—12.2	16.5	5.6	31.7	14.2	36	23	62.3	41	66.7	49.4
18	76.8	60.9	77	63.6	59.7	55.2	53.0	38.2	42.2	19.0	18.8	1.5	— 4	—12.2	6.4	— 6.5	14.8	3.1	34.2	22.1	62.5	42.5	65	50
19	87	63.1	72.5	56.5	69.8	55.5	43.2	34.9	27.0	14.2	22.6	12.5	4	—13.4	18.5	— 0.5	17	1.1	34.4	20	52	42.8	72.5	51.7
20	74.1	61.5	79.7	59.7	64.1	52.7	57.0	33.9	31.8	24.5	17.4	0	4.2	— 3.6	25.5	12.2	11.4	3.7	38.5	13.2	57.5	43.3	76.1	55.8
21	75	58.1	68	58.1	56.8	46.3	47.8	33.8	31.0	16.2	2.0	— 4.4	— 0.8	—10.6	23.8	7.3	22.2	2.8	32.8	11.4	70	47.3	79.3	58
22	75.3	60.1	68.1	50.5	62.0	42.5	56.6	34.4	18.0	10.1	28.5	— 2.1	+14.4	— 0.8	25.8	3.3	20.9	2.3	39	23.1	82	57.1	84	59.9
23	80.3	59	66.5	48.5	66.8	53.2	53.8	34.0	30.5	13.2	35.5	24.4	14.2	3.6	28.5	19.2	25	4.7	49.1	30.1	70.2	52	82.5	61.3
24	82.8	63.5	68.7	51.4	68.3	50.2	60	35.4	32.2	21.4	35.2	26.7	25.2	— 5.2	43.4	23.4	27.8	8	45.5	31.4	82.2	56	77.4	65.4
25	82.2	66.2	70.5	50.9	76.5	58.5	61.5	37.9	26.5	19.0	29.5	9.5	28.5	5.2	40.5	17.1	34	23.1	51.6	36	78.2	62.6	74.5	62.3
26	81.7	67.3	75.3	56	78.4	60.1	65.9	46.4	19.8	13.2	12.9	4.9	9.2	— 5.1	25	9	36.5	17.2	48.8	32.9	70.2	55.2	76.8	56.9
27	73.7	61	76	57	74.8	58.7	65.5	51.5	38.1	16.3	27.8	12.9	10.2	— 2	13	2.2	39.5	31.3	51.5	30.4	67.8	50	84.4	65.4
28	64	58.4	79.7	57	70.5	57.2	51.8	40.5	40.0	28.0	38	21	22.8	— 7.2	8.4	— 6	33.5	21.2	50.8	30.9	72	51	76.2	56.8
29	68.7	58.3	79.2	63	63.8	56.0	58.9	40	28.8	20	36.5	0.2	14	4	.....	.....	39	20.1	61.3	29.7	74.8	52.1	73	52.7
30	78.4	63	77.7	62.6	57.4	44.2	56.	40.5	19.8	1.4	5.7	—14.2	12.2	3.5	.....	.....	39.8	19.2	51	38.3	69.7	51.2	75.8	62.6
31	69	61.6	75	59	.....	.....	43.4	34.4	.....	.....	—2.5	—17.1	19	9.4	.....	.....	39.9	25.3	.....	.....	69.8	52.1	.....	.....
Range	33°.5		35°.5		41°.7		32°.9		52°.2		60°.6		42°.7		57°.7		51°.3		49°.9		50°.7		38°.7	
Monthly means	.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....	

Maximum, minimum, and mean temperatures—Continued.

STATION, MORGANTOWN, W. VA.

Date of month.	1874.												1875.											
	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	58	76	68	80	51	60	39	41	33	47	13	38	16	30	14	58	23	77	57	73	45	84	60
2	87	66	75	62	83	52	65	45	53	29	59	41	45	29	52	21	57	28	57	37	52	40	79	65
3	80	58	72	53	84	56	67	39	58	27	56	44	40	22	55	25	39	26	52	36	58	33	80	62
4	94	58	74	55	77	63	56	41	62	27	44	30	34	23	17	12	34	21	66	33	52	39	87	58
5	77	66	76	51	85	64	59	35	68	35	50	26	26	13	25	8	48	26	58	37	64	36	79	59
6	85	56	77	62	84	66	64	45	66	41	48	40	40	6	28	9.5	50	34	76	33	60	48	76	64
7	94.5	62	77	61	84	59	65	50	69	31	45	33	36	28	15	4	37	30	77	51	70	39	68	52
8	97	70	75	62	89	61	63	49	73	37	34	27	29	20	21	12	38	27	79	47	91	62	70	54
9	94	66	80	58	79	60	62	50	65	46	45	32	27	— 4	9	— 3	52	22	70	51	87	67	77	50
10	84	71	80	59	81	53	68	49	67	35	42	31	11	— 6	38	—10	41	32	64	39	78	52	82	56
11	76	54	87	59	84	55	63	46	61	38	38	30	26	1	42	17	57	31	70	47	74	51	87	61
12	80	66	92	69	89	59	52	38	44	33	39	30	38	13	24	14	57	42	66	49	65	53	80	59
13	82	63	85	66.5	90	62	47	39	43	28	52	28	51	33	35	18	59	37	50	37	67	40	66	49
14	88	61	76	63	87	61	53	34	49	23	49	23	33	19	28	12	68	32	56	40	79	46	73	54
15	89	65	76	56	75	67	62	29	50	39	34	20	21	8	18	5	68	48	58	46	67	43	69	52
16	80	64	80	52	69	67	65	29	53	36	48	19	31	16	24	5	48	36	51	25	58	38	76	59
17	75	56	82	58	74	65	69	44	59	46	48	35	25	17	39	11	39	18	30	20	61	33	81	58
18	88	57	87	58	80	59	58	41	56	43	40	28	26	18	25	6	36	21	27	18	65	41	72	55
19	89	65	89.5	64	83	64	57	30.5	46	37	46	33	24	10	44	16	33	23	54	25	66	38	74	46
20	88	66	90	65	70	56	65	33	47	32	39	33	26	0	39	28	49	29	41	30	80	58	82	52
21	73	64	91	63	64	45	70	37	38	29	41	31	48	20	43	28	29	21	42	23	80	60	85	56
22	80	59	80	68	70	43	72	37	55	27	51	33	47	36	58	25	28	12	44	22	85	62	85	64
23	86	58	69	64	75	45	72	41	64	38	45	32	41	20	62	38	45	16	53	28	87	63	87	67
24	87	66	70	62	77	52	73	42	40	28	36	32	50	34	67	49	51	33	41	32	90	64	92	66
25	86	71	74	59	80	53	71	42	34	26	40	22	35	25	55	31	42	26	56	34	85	64	91	72
26	86	72	74	60	79	50.5	71	42	44	26	50	23	36	14	48	28	62	31	64	37	82	62	88	72
27	78	67	73	58	71	60	69	47	56	29	56	40	45	23	41	21	57	32	60	46	87	55	85	72
28	75	64	72	47	65	54	74	45	56	32	62	55	55	38	26	9	54	28	65	46	90	58	87	72
29	73	59	73	46	63	51	75	55	53	26	55	26	38	29	.....	.....	57	41	74	41	78	53	85	70
30	77	53	78	50	56	49	61	43	27	15	29	21	33	27	.....	.....	66	44	65	44	73	46	83	67
31	82	58	77	53	.....	.....	43	36	.....	.....	23	16	39	19	.....	.....	79	40	.....	.....	85	45	.....	.....
Range	40°.5		46°		41°		46°		58°		49°		61°		77°		67°		61°		57°		46°	
Monthly means	74°.1		69°.5		66°.9		52°.4		42°.9		37°.6		27°.7		27°.2		40°		47°.9		63°.7		70°.6	

Maximum, minimum, and mean temperatures—Continued.

STATION, MOUNT WASHINGTON, N. H.

Date of month.	1874.												1875.											
	July.		August.		September.		October.		November.		e ber.		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.	in.
1	.....	31	.....	41	42	31	28	19	25	17	5	—18	6	—19	11	— 6	9	—19	43	23	32	12	43	36
2	.....	40	.....	36	47	34	37	25	24	14	27	5	18	0	17	— 8	32	— 1	41	35	32	11	52	36
3	.....	39	.....	28	54	29	33	17	28	16	32	17	1	—12	31	17	13	— 2	36	27	16	8	56	39
4	.....	38	.....	30	46	25	25	15	35	27	18	2	5	— 2	31	—18	5	— 7	34	23	27	14	50	40
5	.....	38	.....	36	53	41	32	20	39	32	24	11	3	— 9	— 8	—28	9	0	23	10	27	16	56	39
6	.....	40	.....	37	56	40	36	26	35	22	24	7	6	—12	— 7	—29	22	6	14	7	34	21	48	34
7	.....	43	.....	38	43	36	38	28	34	16	26	17	29	— 2	— 4	—34	21	7	21	9	32	23	38	33
8	.....	46	.....	45	42	34	43	34	40	33	17	4	13	— 6	3	—15	14	4	23	14	30	26	43	31
9	.....	43	.....	45	56	38	38	34	39	25	17	8	16	—26	—15	—29	12	2	32	14	49	27	45	37
10	.....	46	.....	43	54	40	38	30	30	17	13	— 5	—17	—32	2	—32	21	6	21	12	49	28	54	36
11	.....	47	.....	49	49	35	36	37	32	9	9	— 1	— 7	—20	11	— 3	12	4	23	0	34	25	58	37
12	.....	47	.....	49	47	33	31	17	9	0	— 1	—12	12	—15	11	—23	19	7	29	13	36	27	56	46
13	.....	49	.....	47	53	36	25	18	6	— 2	15	—10	23	8	—16	—28	16	3	24	8	27	17	47	19
14	.....	38	.....	46	61	48	24	16	12	— 2	18	—26	22	—20	—18	—32	23	9	23	7	37	21	32	22
15	.....	49	.....	40	59	48	27	16	19	10	— 4	—32	—14	—35	—17	—35	35	19	30	13	34	23	35	27
16	.....	44	.....	38	54	48	34	21	22	13	25	— 4	1	—18	— 7	—19	36	16	29	20	28	16	40	29
17	.....	38	.....	43	52	39	39	29	30	20	25	8	—19	—28	1	—14	16	—10	27	1	25	15	39	27
18	.....	40	.....	40	42	36	34	18	31	— 1	8	—19	— 3	—24	— 3	—23	—10	—27	9	— 2	31	20	37	29
19	.....	47	.....	35	50	41	18	12	2	—10	10	0	—12	—23	6	— 6	— 3	—23	3	— 8	32	22	34	28
20	.....	46	.....	40	51	46	33	10	23	0	16	5	—18	—22	25	6	10	— 3	— 4	—14	32	24	43	30
21	.....	40	.....	38	46	24	33	11	23	4	16	1	10	—22	25	—10	— 3	—14	14	—15	43	24	51	41
22	.....	39	.....	29	39	23	30	9	14	— 8	20	12	20	8	19	—10	0	—13	23	14	49	39	60	49
23	.....	40	.....	28	39	31	38	29	31	6	20	13	9	—11	32	19	7	— 8	25	18	52	36	58	49
24	.....	44	.....	28	44	33	42	31	24	7	21	5	19	8	37	30	9	0	33	22	59	45	60	49
25	.....	46	.....	33	47	39	45	36	22	5	9	— 6	12	—15	37	18	6	2	25	17	50	42	52	39
26	.....	47	.....	35	55	42	44	38	13	2	18	2	—15	—23	18	—10	20	— 5	17	9	42	34	54	40
27	.....	50	.....	36	51	42	41	36	31	13	20	13	10	—46	7	—13	20	9	18	4	54	29	58	51
28	.....	49	.....	39	54	40	37	32	31	20	34	12	16	8	—12	—30	5	0	33	15	49	39	56	37
29	.....	42	53	43	50	43	45	30	35	4	29	—14	16	10	.....	.....	17	3	36	20	51	41	50	35
30	.....	40	49	43	44	23	42	27	4	—17	—14	—35	—14	— 1	.....	.....	23	13	25	15	44	30	52	45
31	.....	40	50	39	.....	.....	33	22	.....	.....	—16	—30	11	— 2	.....	.....	33	22	.....	.....	45	29	.....	.....
Range	.....		.....		38°		36°		57°		69°		75°		72°		63°		58°		51°		41°	
Monthly means	48°. 5		43°. 9		43°. 4		29°. 7		17°. 2		7°. 8		— 2°. 0		— 2°. 5		8°. 8		19°		31°. 5		43°	

Maximum, minimum, and mean temperatures—Continued.

STATION, NASHVILLE, TENN.

Date of month.	1874.												1875.											
	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	93	74	84	67	74	46	51	27	63	36	45	33	44	17	68	52	66	43	77	48.5	82	72
2	94	74	88	72	87	70	80	57	59	31	64	44	45	33	53	35	56	29	54	38	58	41.5	89	72
3	94	70	90	69	86	67	76	53	66	32	70	45	40	30	53	24	40	29	64	35	67	43	85	70
4	97	70	89	68	83	65	71	49	67	32	53	36	35	23	27	14	43	24	73	43.5	57.5	47	90	61
5	98	77	87	67	83	72	72	48	73	50	63	33	27	16	30	12	61	37	77	48	65	40	81	68
6	100	78	81	72	86	67	77	55	74	53	58	38	39	20	42	22	55	37	80	55	75	49.5	83	68
7	101	73	91	72	86	70	71	57	77	50	44	36	35	25	36	20	40	32	78	55	85	56	75	58
8	101	78	92	76	88	67	65	53	68	59	47	29	38	20	29	17	51	29	78	62	87	71	74	53
9	95	75	91	69	90	67	68	44	71	61	56	41	32	0	25	9	60	32	73	55	88	58	81	54
10	92	73	102	76	91	68	77	49	77	59	43	33	21	— 2	43	20	58	32	65	49	75	51	87	62
11	82	70	104	79	86	67	70	47	59	48	54	27	37	11	44	25	64	34	65	49	77	53	90	67
12	86	68	102	73	88	64	57	46	56	45	55	30	45	33	54	25	62	44	60	44.5	72	59	90	72
13	92	71	106	78	87	67	56	37	52	36	59	47	46	28	62	35	70	48	51	40	74	48	84	60
14	93	74	96	77	88	71	63	34	60	36	46	33	29	19	55	29	74	58	61	37	83	51	87	60
15	93	75	91	72	86	70	68	45	63	45	46	28	36	13	33	16	69	43	69	42	76	54.5	89	68
16	90	75	87	70	76	67	67	54	67	47	52	38	39	29	40	24	52	36	65	33	68	50	89	68
17	90	70	90	68	80	69	66	54	77	55	46	37	43	18	42	28	49	31	45	25.5	73	48	87	66
18	91	72	92	67	87	67	68	48	63	45	44	33	37	27	41	20	60	31	57	28.5	74	49	82	67
19	93	71	94	69	78	65	68	42	49	42	52	26	35	22	54	38	60	50	74	36.5	78.5	49	73	64
20	94	75	95	75	72	53	73	44	49	37	46	36	48	25	43	31	57	34	67	55	79.5	62	83	66
21	95	73	87	78	75	50	76	49	49	31	52	36	55	41	57	35	58	30	58	42	81	64	87	67.5
22	88	74	92	75	78	57	63	53	72	44	51	38	53	35	64	36	45	30	53	38	79	65	81.5	69.5
23	84	74	92	73	74	62	65	57	59	45	51	30	52	30	66	47	59	32	61	37	81	65	91	70
24	96	77	87	73	80	64	75	57	52	35	47	34	50	37	75	61	59	44	66	40	80	66	92	73
25	96	77	87	67	85	65	75	53	40	24	52	30	45	30	63	37	60	35	65	40	87	66	92	72
26	97	79	81	66	76	66	77	53	52	25	53	43	55	35	57	34	66	52	66	48.5	89	66	90	72.5
27	88	76	75	69	74	58	78	55	63	38	65	51	56	43	51	34	58	41	63	53	88	67	88.5	70.5
28	82	70	76	68	65	52	79	56	56	33	75	55	60	49	61	31	54	43	73	52	86	68	82	68.5
29	84	65	87	67	71	49	78	57	46	30	56	34	54	36	.....	.....	65	49	76	53	76	63	82	64
30	86	62	80	68	74	52	78	43	46	26	36	28	44	33	.....	.....	74	52	66	53	81	55	84	63
31	92	64	84	66	.....	.....	45	35	.....	.....	42	27	38	19	.....	.....	73	56	.....	.....	87.5	57	.....	.....
Range	39°		40°		42°		46°		53°		49°		62°		66°		50°		54°.5		49°		39°	
Monthly means	83°.4		81°.5		73°.4		59°.8		49°.8		44°		33°.7		38°.2		49°.1		56°.3		68°.3		77°	

Maximum, minimum, and mean temperatures—Continued.

STATION, NEW HAVEN, CONN.

Date of month.	1874.												1875.											
	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	58	82	64	76	61	63	45	52	37	40	15	29	8	30	23	17	6	58	37	58	39	67	50
2	77	62	79	62	81	60	65	51	51	36	44	32	38	24	34	16	39	14	63	44	62	41	65	46
3	78	63	70	56	84	60	61	43	55	30	52	36	36	25	48	25	28	16	56	40	57	38	68	44
4	76	57	71	57	67	52	58	45	57	31	48	27	38	28	45	18	29	20	44	36	50	38	74	56
5	68	61	75	(*)	70	52	56	37	56	34	40	20	35	23	23	12	32	18	53	39	62	40	76	55
6	72	59	77	.....	76	66	61	38	66	48	47	36	31	15	33	12	42	26	53	37	50	46	72	63
7	75	59	80	.....	75	60	64	57	57	43	44	35	35	24	12	3	39	27	44	32	61	43	74	58
8	83	66	76	65	78	56	60	54	59	35	39	24	35	26	20	1	40	29	47	31	51	44	72	55
9	84	70	70	63	73	58	68	49	62	48	47	21	37	13	11	— 2	40	21	47	36	63	46	63	55
10	82	67	82	63	80	58	66	49	62	41	43	34	16	2	24	1	43	28	61	39	74	48	72	53.5
11	83	70	81	64	85	64	64	52	63	41	43	34	28	6	45	15	44	27	62	40	68	48	76	55
12	81	71	79	69	74	62	59	44	43	32	37	25	25	11	37	16	54	34	45	36	66	51	71	60
13	82	70	81	70	69	59	47	37	40	26	37	23	31	18	28	8	37	28	36	29	64	47	64	50
14	85	63	72	62	72	56	47	38	37	20	46	13	34	24	28	8	45	22	47	27	64	42	68	43
15	88	68	76	61	74	66	57	34	46	21	14	3	24	11	18	4	44	36	52	32	64	46	72	53
16	88	66	76	56	74	64	63	37	52	34	34	11	27	16	23	9	45	35	52	32	57	43	76	51
17	78	61	73	58	68	62	64	42	55	36	44	36	21	11	38	10	44	26	40	26	62	41	73	55
18	88	61	83	52	65	58	60	42	57	37	41	23	20	7	23	10	27	18	36	25	63	39.5	69	58
19	81	69	78	59	66	57	50	39	39	31	47	34	22	3	32	9	32	18	39	21	60	45	73	55
20	82	68	87	61	68	56	61	36	37	29	38	31	21	6	39	27	29	17	39	26.5	72	50	76	54
21	78	67	85	73	65	53	62	46	42	34	33	19	27	10	36	27	30	17	39	24	77	54	80	53
22	79	61	76	60	63	45	66	39	43	29	42	12	40	19	40	17	26	12	47	26	75	59	78	59
23	81	59	69	50	68	46	62	42	55	34	46	34	33	20	51	33	33	11	57	33	83	60	77	66
24	81	65	71	54	71	50	58	46	53	33	45	34	34	11	49	40	38	12	57	36	74	56	82	68
25	78	59	70	56	74	57	58	46	38	27	36	25	35	23	49	38	37	27	53	38	72	60	88	71
26	79	63	69	50	76	56	57	44	39	26	44	22	29	18	49	32	45	25	56	36	82	61	81	68
27	80	70	71	49	65	55	66	47	48	24	48	36	28	15	34	18	52	36	59	38	74	56	87	69
28	80	62	72	52	67	49	64	51	52	38	48	39	32	15	19	13	42	31	56	40	73	54	89	72
29	78	68	72	51	65	60	68	49	54	34	49	31	36	24	.....	.....	45	30	56	36	73	55	77	63
30	80	62	73	51	64	51	63	50	34	22	31	22	37	23	.....	.....	53	32	53	42	74	53	83	63
31	80	58	77	54	.....	.....	56	43	.....	.....	25	2	33	21	.....	.....	52	32	.....	.....	73	53.5	.....	.....
Range	31°		.....		40°		34°		46°		56°		38°		51°		48°		42°		40°		46°	
Monthly means	72°.2		67°.9		64°.8		52°.8		41°.9		33°.9		24°.2		24°.5		32°.4		43°		58°.2		67°.9	

* Minimum thermometer broken.

Maximum, minimum, and mean temperatures—Continued.

STATION, NEW LONDON, CONN.

Date of month.	1874.												1875.											
	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	60	80	66	76.5	62	61	46	49	35	38	18	27	8	30	22	30	8	47	36	54	37	60	48
2	70	61	78	64	80	57	66	52	54	36	44	33	38	21	33	17	38	26	58	40	59	42	61	48
3	76	61	72	58	82	61	61	46	55	33	52	38	34	25	45	25	30	20	50	45	53	37	61	46
4	68	58	72	54	70	55	60	47	57	33.5	47	37	39	27	44	15	30	19	45	38	47	39	73	52
5	67	60	77	56	64	49	60	40.5	57	34	39	22	34	22	22	10	35	22	54	39	59	38	72	56
6	71	56	77	60	70	61	59	39	66	50	47	36	30	16	29	11	43	30	54	37	48	43	72	58
7	71	55	79	62	75	58	61	53	57	42	46	38	37	26	14	6	41	29	41	34	58	42	71	58
8	77	63	70	65	79	56	64	53	57	37	45	24	34	28	22	8	40	29.5	40	31	48	40	68	56
9	83	67	77	65	74	57	65	51	60	47	46	21	36	10	10	1	37	19	42	35	56	43	60	55
10	76	64	81.5	62	78	58	64	55	60.5	41	48	31.5	13	3	24	0	39	32	60	37	70	44	70	54
11	81	68	79	64	86	63	65	54	62	40	42	33	28	6	42	18	41	26	62	38	66	50	77	54
12	76	67	76	67	72	62	62	47	44	31	35	25	28	14	35	13	52	33	42	34	58	48	66	55
13	78	66	79	69	65	56	56	39	39	25	43	24	36	24	25	12	37	31	35	32	62	47	64	51
14	82	63	70	60	68	52	52	39	38	21	47	16	32	21	25	5	42	30	47	29	60	45	64	44
15	87	67	76	60	70	55	56	36.5	43	20	18	6	19	12	15.5	2	43	36	52	33	58	43	70	51
16	85	70	76	59	70	64	64	41	52	31	35	10	23	12	23	8	45	36	46	35	56	45	75	54
17	80	63	72	58	68	62	63	42	53	35	40	33	22	11	34	11	43	22	42	29	61	40	69	54
18	82	61	79	57	63	57	59	45	59	39	34	24.5	16	8	23	10	24.5	16	39	28	62	40	64	55
19	80	66	78	61	67	58	52	39	38	31	44	33	21	4	33	10	30	17	38	22	54	43	74	53
20	79	66	83	66	67	58	60	37	40.5	28	37	30	22	7	40	32	31	21	40	28	63	48	75	53
21	79	67	85	72	68	54	61	45.5	40	32	36	22	26	9	35	25	33	19	42	24	68	53	79	56
22	80.5	60	74	62	64	47	64	41	42	26.5	43	15	35	22	39	19	30	12	51	27	69	57	77	59
23	79	61	67	52	69.5	45.5	61	42	58	30	46	33	32	19	51.5	36	33	14	54	35	84	56	75	61
24	80	64	71	56	71	51	58	42	48	31	44	32	41	12	50	40	38	16	57	37	63	52	78	63
25	74	60	69	52.5	75	57	58	47	39	25	35	26	36	22	48	35	36	26	57	40	64	55	86	66
26	75	65	70	51	76	56	61	49	38.5	25.5	43	23	26	17	38	31	41	22	57	37	83	56	75	61
27	75	66	72	48	66.5	54.5	62	48	48	25	50	36	26	14	33	16	49	34	59	39	74	56	83	62
28	74	62	73	51	67	50	66	50	52	38	48	41	40	12	16	10	42	33	54	40	73	52	88	67
29	75	67	73	51	67	60	62	47	54	32	48.5	29	40	30	.....	.....	42	31	53	36	69	53	74	60
30	80	64	74	52.5	66	53	63	51	33.5	22	31	22	36	24	.....	.....	48	32	59	41	74	52	79	59
31	78	60	74	55	.....	.....	54	44	.....	.....	23	5	35	17	.....	.....	50	33	.....	.....	73	52	.....	.....
Range	32°		34°		40°.5		31°		46°		47°		38°		51°.5		44°		40°		47°		44°	
Monthly means	70°.9		67°.7		64°.5		53°.3		41°.7		33°.8		24°.3		23°.7		32°.4		41°.8		54°.5		64°.1	

Maximum, minimum, and mean temperatures—Continued.

STATION, NEW ORLEANS, LA.

Date of month.	1874.												1875.											
	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	78	90	78	87	77.5	82	66	55	42	66	47	71	58	54.5	36	74.5	67	73	.....	82	.....	87.5	73.5
2	87	78	91	78	85	75	85	69	60	44	69	52	67	55	69	47	75	68	58	.....	79	.....	88.5	74
3	81	74	93	79	85	77	84	70	65	43.5	72	56	55	51.5	68	48	68.5	(*)	64	.....	79	.....	88.5	69
4	76	73	93	80	80	75	85	71	72	49	70	56	53	44	48	38.5	57	.....	69	.....	75	.....	85	71
5	83	73	94	80	86	76	83	69	76	59	66	57	44	37	48	32.5	62.5	.....	73	.....	77.5	.....	84	73
6	86	75	93	81	86	76	83	70	77.5	60	61	57.5	49	37.5	55	36	71	.....	76	.....	83	.....	81	72
7	89	78	92	80	85	79	79	71	77	60	61	52	56	47.5	54	42	52	.....	76.5	.....	84	.....	82	71.5
8	89	78	91	79.5	87	78	78	69	76	67.5	57	43.5	55.5	46	60	38	62.5	.....	77	.....	85	.....	81.5	68
9	81	74	94	80	83	78	74	65	76	64	64	42.5	54	36	57	42	68	.....	78.5	.....	86	.....	84	69
10	85	74	96	80	87	76	78	64.5	79	66	65	45	36	28.5	69.5	50	65	.....	78.5	.....	84.5	.....	86	71
11	79	72	94	82	88	70	82	70.5	81	67	65	48	48	34	67	53	64	.....	73	.....	85	.....	87	71
12	87	73	93	82	85	75	78	67	82	63	65	49	65	45	65	44	75	.....	69	.....	78	.....	88.5	73
13	85	76	96	81	84	75	68	53	61	56	71	56	66	51	72	52	78.5	.....	64	.....	80	.....	91	75
14	85	73	95	81	82	73	67	52	69	56	69	58.5	51	43	74	60	77.5	.....	70	.....	82	.....	92	76.5
15	85	75	96	81	85	74	73	58	71	62	58	48	55.5	38	65	43	73	.....	75	.....	85	.....	91.5	77.5
16	85	74	91.5	75	85	75	78	67	74	64	70	56	69	47	50	43.5	63	.....	73.5	.....	86.5	.....	90	77
17	86	75	85	76	87	75	71	63	75	68	67	57	58	52	52	45	59	.....	67	.....	82	.....	88	77
18	85	76	82	76	88	78	73	58	72	64	57	51	59	52	57	47	65	.....	76	.....	79.5	.....	91	78
19	86	76	82	76	86	77	75	60	67	62	68.5	48	54	47	55	48	76	.....	78	.....	79.5	.....	91	78
20	88	76	85	76	86	77	77	57.5	68	58	53	43	56	44	62	48.5	74.5	.....	75	.....	82	.....	89	78
21	88	77	86	78	84	72	79	65.5	72	52	61	41	73	50	61	41	65	.....	72	.....	81.5	.....	86	78
22	88	76	84	77	86	74	79	66	77	67	60	51	66	57.5	62	39.5	62.5	.....	69	.....	82	.....	86	77
23	86	78	86	77	85	76.5	77	65	73	64	58	48	69.5	53	76	61	67	.....	67	.....	85	.....	83	76
24	87	78	86	77	86	75	78	67	74	54	55	47	69.5	54	77	70	71	.....	71	.....	86.5	.....	87	73
25	90	78	89	78	83	76	79	67	58	48	57	45	59	48	72.5	57	72	.....	74	.....	87.5	.....	86	75
26	90	77	91.5	78	83	75.5	76	64	59	40.5	72	55	68	51	65	48	77	.....	74	.....	87.5	.....	84	75
27	91	77	90	78	85	73.5	77	64	69	52	74	62	74	57	72	54	77.5	.....	71	.....	85	74	84	74.5
28	93	80	88	77	85	68	79	59	72	48	76	63	75	65	71	55.5	77.5	.....	74	.....	86	71	84	73
29	91	78	89	78	74	63	80	64	55	41	75.5	63	71	54	.....	.....	79	.....	79	.....	88.5	75	85.5	73.5
30	91	79	83	72	79	66	73	62	61	44	70	61	56	45	.....	.....	74	.....	79.5	.....	86	73	86	74
31	91	79	88	75	.....	.....	64	52	.....	.....	63	56	54	47	.....	.....	77	.....	.....	.....	88.5	72	.....	.....
Range	21°		24°		25°		33°		41°.5		35°		46°.5		41°		.....		.....		.....		24°	
Monthly means	81°.4		83°.9		78°.9		70°.4		63°.3		58°.8		54°.2		55°.9		63°.5		65°.3		76°.2		90°.1	

* Minimum thermometer broken.

Maximum, minimum, and mean temperatures—Continued.

STATION, NEW YORK, N. Y.

Date of month.	1874.												1875.									
	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	85	67	82	64	61	46	48	35	35	22	23	7	30	16	29	8	62	37	58	33	67	56
2	76	66	80	65	85	64	70	52	55	36	45	29	38	18	39	16	47	23	64	48	54	40	67	54
3	79	63	75	58	86	64	66	48	53	39	50	36	35	23	49	27	30	17	52	41	55	37	63	53
4	78	63	75	56	68	57	60	50	59	43	49	26	41	27	41	10	34	20	47	36	49	38	77	56
5	71	63	77	60	72	61	58	43	57	38	41	24	37	20	20	6	30	20	59	38	60	41	78	60
6	74	61	80	62	76	61	60	49	68	49	43	32	33	22	33	7	45	26	63	37	53	45	75	63
7	78	61	78	64	82	64	66	58	62	47	45	35	35	27	14	3	36	29	45	33	57	41	78	58
8	87	66	73	65	80	62	66	56	60	43	39	33	36	27	22	2	39	28	50	34	52	44	72	55
9	85	72	75	64	77	64	67	54	58	49	45	32	35	4	15	— 1	35	25	45	36	70	45	62	55
10	88	69	84	66	87	60	69	57	62	44	46	33	10	— 6	24	— 1	43	30	63	36	74	48	76	56
11	85	69	83	70	88	68	66	56	63	43	42	30	24	3	43	14	43	25	66	44	69	50	78	62
12	82	68	81.5	68	74	62	62	47	48	35	40	26	27	14	27	7	52	34	52	35	70	52	73	58
13	81	68	84	68	70	60	49	41	41	29	(*)	26	34	19	28	14	40	29	36	31	63	48	67	53
14	86	68	72	66	72	64	49	38	41	23	45	14	31	19	28	10	36	28	54	30	63	47	69	49
15	90	68	78	63	75	64	58	37	43	29	24	6	26	11	18	2	45	32	51	37	71	49	75	55
16	88	69	78	65	71	68	65	42	57	34	33	13	25	14	23	4	48	34	49	34	61	43	78	61
17	91	64	77	64	68	65	61	45	55	42	30	30	28	16	27	8	44	18	35	24	65	44	77	62
18	84	65	87	61	69	62	58	44	60	(*)	39	32	34	2	25	8	31	11	35	25	62	46	71	60
19	82	68	80	65	68	60	57	41	45	.....	43	30	21	— 3	31	14	32	20	42	21	63	46	76	67
20	86	66	90	65	67	61	62	41	44	.....	30	29	29	— 6	43	27	31	19	43	30	77	52	78	57
21	77	71	90	74	68	54	67	49	40.5	.....	36	21	35	15	34	33	32	15	45	26	83	59	80	60
22	81	65	79	62	85	64	(*)	47	43	.....	45	32	40	25	45	22	31	13	54	28	80	65	78	61
23	81.5	65	69	53	86	64	60	51	58.5	38.5	47	32	39	18	53	35	35	12	57	34	84	65	75	64
24	80	63	71	63	73	57	65	52	47	28	43	27	35	18	53	41	35	23	58	33	76	57	88	67
25	78	64	70	61	75	59	60	51	42	23	37	22	36	16	56	37	36	26	52	32	68	60	95	71
26	77	67	70	58	79	61	68	47	42	25	43	21	32	14	41	28	40	25	62	37	82	62	82	69
27	79	68	70	57	70	61	69	47	50	30	47	32	29	11	34	15	49	35	58	46	72	61	90	66
28	79	68	73	59	67	55	66	53	52	30	49	39	40	22	24	9	46	33	47	41	78	58	89	72
29	73	69	73	58	63	55	72	51	(†)	.....	48	26	38	20	.....	.....	50	34	54	41	82	57	78	64
30	82	63	75	57	63	50	67	44	36	23	31	19	38	19	.....	.....	56	34	63	40	78	57	83	63
31	82	63	77	61	.....	.....	54	37	.....	.....	23	7	33	23	.....	.....	53	42	.....	.....	78	59	.....	.....
Range	30°		37°		38°		.....		.....		.....		47°		50°		48°		45°		51°		41°	
Monthly means	73°.9		70°.8		67°.2		55°.5		43°.6		34°.5		25°.2		24°.9		32°.5		42°.9		58°.5		68°	

* Maximum thermometer out of order. † No observation taken. ‡ Minimum thermometer broken.

Maximum, minimum, and mean temperatures—Continued.

STATION, NORFOLK, VA.

Date of month.	1874.												1875.									
	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	92.5	67.5	79	60	68	49.5	52	34	48	29	41	24	39	28.5	64	30	73	53.5	80.5	55	75	59
2	84	69	84	73	81	64	78	54	54	39	61	38	49	35	35	30	70	44.5	75.5	55.5	70	54	77.5	57
3	83	72	79.5	67	88	63	69	59	62	40	67	43	47	33	63	45	47	36	65.5	41.5	61	47	81	62
4	91	69	79	66	83	66	69	56	65	42	58	38.5	47	39	59	38	38.5	31.5	58.5	41	61.5	48	80.5	65
5	78	72	75	65	82	61	59.5	51	70	49	48	36	41	33	32	20	41	33.5	60	48.5	64.5	45	90	66
6	72	63.5	79	65	82	66	68.5	48	66.5	54	50	32	39	28.5	44.5	23.5	45	36	60	44.5	74	54	90	71
7	83	63	84.5	65	82	66	76.5	55	61	49	45	42	42	34	33	16.5	49	39.5	62.5	45	63.5	52	90	61.5
8	92	68	81	66	76	66	75.5	60	68	44.5	45	35	41	34	28	14	44.5	36	62.5	45	81	50	67	59
9	93	67	84	66	76	66	74.5	60	68	53	53	31	47	24	25	11	54.5	35	80	52.5	95	68	65	58
10	94.5	69	90	66	73.5	66	80	62	74	57	46	39	24	14	25.5	9	54	41	60.5	44.5	88	56	77	61
11	93	74	82	70.5	82	62	80	56.5	73	54	50	40	31	20	55	25.5	58	37	60.5	49	84	54	81.5	62
12	91	72	86	70	88	66	64	54	61	45	45	34	36	20.5	45	25	66	40.5	57	48	84.5	62	85	62
13	87.5	72	85	73	81.5	68	55	46	45	40	55.5	31	43	32	58	38	69	43.5	59	46.5	66	53	70.5	61
14	90	71	79	70	78	68.5	53	41	41	36	58.5	31	45	34	48	33	64	40	58	41	69.5	52	78	61
15	96	72	77	68	82	71	59	41	55	36	35	24.5	34	24	33.5	22	74	57	66.5	41	86	56	87	61
16	95	65	76	66	81	71.5	68	43	55	36	45	26	42	23	27.5	19	65	47.5	71.5	41	59.5	51	73	63
17	80	70	76	67	78	68.5	73	52	65	43	59	38	32.5	23	50	24	49	37	46.5	34	58.5	47	80.5	60
18	83	67	84	66	80	68	66	54	70	53	45	37.5	34	27	34	19	50	32	46	28	60.5	47.5	84.5	61
19	84	65.5	91.5	67	81	69	58.5	47	57.5	41	54	34	29	23.5	36	26	64	37	60	27	71.5	46.5	78	58.5
20	92	67	94	73	80.5	64	69	43	52	44.5	60	35.5	27	22	44	34	64.5	43	55.5	43	82	46	84.5	64
21	93	72	96.5	74	69	61.5	73	49	50.5	38	42	35	39	25	48	35	44	34.5	51	39	87.5	62	83	65
22	78	67	89	73	70	58	73	51	52	36	51	34	54	38	57.5	33.5	37	28	51	37	90	64	86.5	68
23	79	62	79	71	71.5	57	71	89	68.5	52	52	39	40	34	63.5	42	37	26	57.5	37.5	90.5	66	89	71
24	79	64	73	66	73	58	74	57	57	46	50	39.5	52	32	71	66.5	48	32	69	41	77.5	66	97	73
25	86	65	73	65	77	59	65	61	49	37	50	34	47	33.5	76	59	47	37	61	39.5	78.5	66	96	75
26	91	69	73	63	77.5	58	65	56	42	34	57	33	35.5	29	56	38	62.5	34	71	44	76.5	64	98	77
27	88	71	69	61	80	60.5	70	53	57	36	56	47	50.5	26.5	61	40	59.5	47	61	54	72.5	58.5	97	77
28	82	69	70	60	75	61	74	53	67	35	73	52	35.5	41.5	41.5	30	54	42	62	46	75	57	98.5	78
29	85	69	72	60	69	60	79	55	61	35	68	45	53.5	39.5	.....	.....	45	40.5	70.5	44	86	56.5	95.5	76
30	86	67	73	58.5	69	54	69	54	41	31	45	34	45.5	34.5	.....	.....	51	40	75	55	72	62	95.5	76
31	86	64	68	58	.....	.....	56	42	.....	.....	34	25	48	37	.....	.....	.....	.....	.....	.....	79.5	66	.....	.....
Range	34°		38°.5		34°		39°		43°		48°.5		39°		67°		.....		48°		50°		40°.5	
Monthly means	76°.9		73°.2		70°.4		59°.8		50°.5		43°.9		36°.2		37°.9		46°.7		52°.2		65°.2		74°.9	

Maximum, minimum, and mean temperatures—Continued.

STATION, NORTH PLATTE, NEBR.

Date of month.	1874.												1875.									
	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	43	60	20	65	28	19	2	27	7	34	19	46	15	49	30	68	53
2	.....	.....	.....	.....	.....	.....	75	40	62	23	60	38	38	3	7	9	32	15	67	25	60	35	70	45
3	.....	.....	.....	.....	.....	.....	78	47	61	27	56	22	4	3	4	17	36	15	63	29	57	36	78	45
4	.....	.....	.....	.....	.....	.....	82	58	65	38	49	27	1	8	18	17	34	23	72	31	72	40	76	54
5	.....	.....	.....	.....	.....	.....	66	53	67	35	53	20	6	12	37	3	32	18	34	20	80	43	64	49
6	.....	.....	.....	.....	.....	.....	66	48	71	41	56	24	5	24	10	1	41	18	25	18	90	54	60	44
7	.....	.....	.....	.....	.....	.....	68	47	62	33	54	23	25	22	42	0	47	25	33	16	72	53	69	39
8	.....	.....	.....	.....	.....	.....	74	47	60	27	58	25	25	21	36	22	46	28	35	12	63	42	70	54
9	.....	.....	.....	.....	.....	.....	80	43	58	38	38	26	7	25	26	12	48	26	44	22	65	44	77	47
10	.....	.....	.....	.....	.....	.....	82	42	54	30	50	18	15	16	21	12	52	25	43	25	73	38	83	66
11	.....	.....	.....	.....	.....	.....	60	38	42	32	33	18	15	6	32	5	48	25	30	29	60	40	72	48
12	.....	.....	.....	.....	.....	.....	60	32	36	29	52	18	14	18	46	21	53	29	44	26	77	40	79	48
13	.....	.....	.....	.....	.....	.....	65	37	56	28	47	22	−12	−26	41	22	52	30	50	34	76	44	92	63
14	.....	.....	.....	.....	.....	.....	70	40	50	32	55	16	− 4	−20	34	24	35	12	67	30	84	51	95	60
15	.....	.....	.....	.....	.....	.....	69	33	50	29	43	28	2	−15	32	20	25	8	50	38	62	52	90	50
16	.....	.....	.....	.....	.....	.....	77	35	44	18	35	22	4	−15	39	17	23	4	52	32	61	46	89	58
17	.....	.....	.....	.....	.....	.....	79	38	21	10	30	12	7	2	23	4	43	13	70	30	65	54	91	67
18	.....	.....	.....	.....	.....	.....	75	39	15	8	32	2	12	−12	41	15	25	0	78	40	72	45	79	63
19	.....	.....	.....	.....	.....	.....	75	45	26	8	37	6	14	− 4	33	18	26	0	76	43	76	54	79	60
20	.....	.....	.....	.....	.....	.....	62	42	52	15	32	5	42	5	45	25	41	10	57	40	77	55	87	52
21	.....	.....	.....	.....	.....	.....	65	42	58	22	36	7	38	16	44	18	43	22	60	43	77	53	95	62
22	.....	.....	.....	.....	.....	.....	73	34	41	20	40	7	34	8	42	13	65	26	68	40	79	58	81	66
23	.....	.....	.....	.....	.....	.....	75	42	22	11	35	12	35	11	25	9	50	33	71	48	78	53	93	63
24	.....	.....	.....	.....	.....	.....	73	48	30	12	34	9	36	4	21	0	58	22	58	28	81	53	92	52
25	.....	.....	.....	.....	.....	.....	71	40	64	17	41	11	31	7	45	0	83	37	40	27	78	59	80	68
26	.....	.....	.....	.....	.....	.....	53	38	50	23	28	12	35	9	41	12	55	23	47	28	78	58	85	58
27	.....	.....	.....	.....	.....	.....	50	41	32	19	30	12	23	9	40	20	64	32	63	36	68	53	68	51
28	.....	.....	.....	.....	.....	.....	50	35	44	10	24	3	23	− 6	43	20	63	33	53	40	65	44	68	49
29	.....	.....	.....	.....	.....	.....	49	30	39	23	35	1	29	10	.....	.....	75	40	64	35	77	49	78	58
30	.....	.....	.....	.....	.....	.....	35	24	34	22	12	2	22	2	.....	.....	40	29	56	33	80	55	86	63
31	.....	.....	.....	.....	.....	.....	47	14	.....	.....	20	7	41	− 7	.....	.....	35	25	.....	.....	84	53	.....	.....
Range							68°		63°		64°		68°		63°		83°		66°		54°		56°	
Monthly means							52°. 4		35°. 7		28°. 3		7°. 4		21°. 3		33°. 2		42°. 2		61°. 3		69°. 9	

Maximum, minimum, and mean temperatures—Continued.

STATION, OMAHA, NEBR. .

Date of month.	1874.												1875.											
	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	65	81	62	90	65	73	51	53	28	54	27	26	5	28	14	23	11	41	27	45	33	75	59
2	92	66	81	60	64	56	68	40	59	32	58	36	20	0	16	2	20	5	54	26	49	28	72	55
3	94	68	90	64	58	49	72	47	61	32	44	32	21	— 1	— 2	40	28	— 1	52	38	46	39	74	48
4	96	72	79	65	63	52	78	54	65	53	40	33	4	— 3	8	—16	30	19	64	39	61	34	75	66
5	97	69	95	75	84	52	75	50	63	46	49	32	13	—10	32	7	37	13	59	33	61	48	70	54
6	92	69	82	70	91	56	63	46	74	44	51	32	15	— 3	8	— 3	30	13	44	30	90	51	64	53
7	99	76	86	68	92	68	60	40	73	46	38	27	20	— 1	20	— 7	12	12	70	44	89	58	71	(*)
8	102	74	86	68	84	66	71	42	60	36	52	31	19	—17	13	2	40	26	59	33	71	50	71	.....
9	92	72	94	70	78	71	73	42	68	38	37	24	9	—19	20	— 5	42	22	51	30	61	51	74	.....
10	84	66	105	74	78	70	61	46	47	34	40	26	19	— 2	17	— 4	42	25	53	35	71	49	78	.....
11	84	61	93	75	85	66	52	36	41	32	32	20	16	— 1	9	— 2	40	26	40	30	64	50	73	.....
12	84	67	88	69	68	55	53	37	40	33	43	30	10	—10	24	8	49	30	44	35	72	48	75	.....
13	92	69	89	69	69	52	61	33	51	37	38	20	—10	—19	29	11	52	37	49	34	77	56	92	.....
14	100	77	80	71	65	45	68	45	52	35	36	16	— 4	—17	20	6	39	25	59	36	81	53	94	.....
15	85	67	78	69	62	36	53	39	53	28	45	31	12	—10	15	4	25	9	53	30	67	52	82	.....
16	85	57	92	70	67	45	63	45	45	31	39	17	8	— 8	35	— 2	50	6	36	21	72	44	94	.....
17	92	70	84	69	68	56	71	40	31	17	17	3	11	3	21	— 6	30	0	50	23	72	55	88	.....
18	97	69	91	66	62	48	73	45	22	14	36	9	12	— 4	32	—12	22	8	72	33	71	56	78	.....
19	85	75	97	75	62	44	74	50	21	15	35	15	20	9	32	18	21	1	81	55	80	55	81	.....
20	80	62	92	71	60	41	72	57	36	10	32	8	35	17	33	21	32	7	55	39	76	59	90	60
21	79	65	94	73	68	52	63	57	35	18	34	21	34	18	33	14	32	10	56	34	82	58	85	63
22	89	69	70	65	72	51	65	54	38	24	35	15	40	14	34	21	40	19	61	35	84	56	93	73
23	96	71	80	64	75	53	66	46	24	13	36	27	37	16	23	17	48	35	72	44	86	60	94	74
24	103	77	80	64	75	55	75	55	22	7	41	18	30	10	23	6	46	24	50	38	79	64	86	65
25	105	77	84	64	74	62	76	61	34	14	42	27	34	9	38	— 1	71	38	55	40	78	63	94	71
26	80	62	84	65	68	56	68	52	39	22	28	16	43	34	19	2	51	33	56	42	87	64	82	63
27	73	57	86	73	65	47	58	45	28	19	34	24	39	13	24	1	61	35	70	35	78	63	67	58
28	87	58	87	72	74	42	61	37	37	18	32	— 1	27	11	40	8	68	43	57	42	67	53	76	57
29	95	66	84	67	76	50	44	33	37	15	14	— 2	26	13	.....	.....	75	47	59	40	75	47	84	60
30	97	73	81	57	71	44	33	25	31	19	14	8	22	— 2	.....	.....	70	35	58	38	81	57	82	67
31	100	73	83	55	.....	.....	41	18	.....	.....	23	5	26	— 5	.....	.....	35	28	.....	.....	85	58	.....	.....
Range	48°		50°		56°		60°		67°		60°		62°		56°		76°		51°		62°		.....	
Monthly means	80°		77°. 3		63°		54°		36°		28°. 4		11°. 1		13°. 8		30°. 5		45°. 4		63°. 2		71°. 1	

* Minimum thermometer broken.

Maximum, minimum, and mean temperatures—Continued.

STATION, OSWEGO, N. Y.

Date of month.	1874.												1875.											
	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	74	65	73	55.[illegible]	56	47	40	35	31.6	11.2	24	9.7	30	16.5	21.4	7	62.5	43	51	33.1	87	51
2	72	59	69	61	78	62	57	47	46	36	45	29	34	20.5	37	14.5	24	9.5	48.5	34	50	33.3	86	60.5
3	76	57	67	52	77	52	53	44	59	36.1	51	25.5	32.5	22.1	47	20	28	6.5	50	31.5	51	33	81	67.5
4	67	59	70	51	65	46.9	51	43.5	52	36.4	28	17.2	29	22	22	7	26	8	55	33.1	52	35	78	52.5
5	72	58	77	52	79	54	55	45	60	42	(*)	(*)	25	17	19	[illegible].5	32	5.5	50	34	61.4	37	80	60
6	86	60	78	54	75	61.5	54.5	45.5	57.5	47	41.5	35	24	15	22	0	42	26.5	38	27	50.5	38	65	46.5
7	89	68	79	64.5	75	61.5	59	49	55	38.7	43	25	30	20	6	7.5	36	26	53	32.5	55	31.5	62	45.5
8	80	67.5	75	65	76	57	62	54	61	45	27	17	25	19	15	9.3	31	20	55	37.7	69	49.5	77	48
9	77	62	79.5	63.5	79	55	60	53	55	45	39	22	32	2	5	10	40	12	53	40	78.5	51.5	74	56
10	77	65.5	77	62	78	57.7	63	49	56	41	36.5	25.[illegible]	15	0.5	16	0.5	37	27	58	35.[illegible]	63	41	76	56.7
11	73	64	85.5	63	80	65.3	57.5	46.[illegible]	53	33.5	35	20	21	1	35	9	42	25.[illegible]	47	34.5	67.5	40	93	58.8
12	68.5	60	93	71.5	73	64.6	51	41	35	30	28	17.5	29	15.7	11	0	43	29	48.5	36	65	38	79	43
13	75	58	72	65.5	81	62	42	35	33	26	31	21.2	39.5	19.6	15	2.3	41	26.5	42	32	65	38.7	55	40.5
14	86	60	76	61.5	86	64	45	35	35	25	32	5.5	31	11	11	2	47	26	46	32	69	45.5	64	42
15	89	70	73.5	58	83	66.5	55	32.2	47	30	16	0.5	17	9.5	12	2	48	38.9	59.5	36	51	37	74	48.5
16	79	60	77	56.5	67	58.3	60	39	46	38	42	6.7	18	8	17	6	47	31	49	24.5	48	37	76.5	50.5
17	74	56	85	62	70	59	66	42	50.7	39	40	19.5	17	8	27	3	33	9	29	21.6	60	37.1	57	47
18	84	59	75	68	71	59.4	54	41.3	50	30	36	14.2	18	0	21	2	18.5	3.1	28	18.7	62	40.5	64	47.5
19	88	65	76	60.5	75	59.4	54	38.5	36	28.1	39	34	20	0.5	28	5	18	7	40	21	58	42	57	46
20	79	61.5	78	67.[illegible]	67	56	66	39.5	39	28.9	39	16	25	11	36	[illegible]	17.5	6.4	37	18.9	72	47	79	47.5
21	71	59	74	60.5	61	49.5	55	36	36	31	26.5	12.6	29	11	26	16	20	5.9	34	18.6	70	49.5	85	51
22	82	55	67	50	68	45	52	32.9	36	22	40.5	20	34	22.7	44.5	42.5	21	2.6	35	24.9	74	56.5	85.3	61.5
23	88	57	67	50.7	67	52	65	36.3	46	30	40	31	27	9.[illegible]	45	33	32.5	2.5	46	30	79	45.5	94	66
24	86	67.5	73	53	72	55	68	47.5	38	28	38	27	37	9	60	34.2	38.5	18.5	39	31	76	55	98	61
25	90	69.5	72	51	77.5	55	65	44.6	32	26	32	23	35	20	42	24	32	18.9	49	32.7	77	55	80.3	56.5
26	85	70.5	74	54	79	56	75	47.9	40.1	27.8	41	23.5	22.5	15	30	15	43	22	52	34	64	46	84	64.8
27	78	62.5	73	54.6	80	61	61	51.5	45	33	41	26	25	11.5	18.7	9.1	43	29	50	32.6	69	47	88	70
28	65	58.5	76	56	69	59	53	47	42	29	48	38	36	15	12	2	35	19	58	33.7	83.5	54.3	78	54
29	71	58.5	72	57.[illegible]	60	56	72.5	48	35	22	42	17	24	15	.....	.....	50	21.1	69.5	36.5	80	44	75	52.5
30	76	61	75	58.5	58	45.5	50	42	26	16	28	— 0.[illegible]	32	13.5	.....	.....	58	32.[illegible]	51	34.5	61.5	42.1	80	53
31	75	61.5	75.5	58	.....	.....	45	37	.....	.....	18	— 1	32	17	.....	.....	59	38	.....	.....	71	46	.....	.....
Range	37°		43°		41°		42°.1		45°		.....		38°.5		70°		61°.5		50°.9		52°		56°	
Monthly means	69°.8		67°.5		65°.4		50°.9		39°.1		29°.1		21°.1		16°.9		28°.3		38°.9		53°		63°.2	

* No observation taken.

Maximum, minimum, and mean temperatures—Continued.

STATION, OTTAWA, CANADA.

Date of month.	1874.												1875.											
	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	84.7	55.6	77.7	61	81.7	53	61.7	40.8	41.7	26.1	18	0	16.6	− 7.9	18.6	5.7	9.6	15.9	53.7	33.1	52.7	30.7	79.5	47
2	80.7	58	69.9	55	85.7	53.4	52.7	43.6	41.7	33.1	37	16	18.6	8.5	30.7	10.9	23.7	6.7	44.7	32.9	40.9	30.5	84.7	54
3	72.7	58	67.7	48.6	69.7	46.8	49.7	35.7	52.7	30.7	44	16	19.6	3.5	37.9	22.2	20.7	0.5	44.7	31.2	40.7	30.5	72.7	60
4	78.7	53	79.5	50.6	68.7	41.4	52.7	35.7	52.7	34.7	23	0	18.8	7.7	15.6	10.9	29.1	9.9	48.7	22.4	53.3	31.7	76.9	53
5	84.7	61	83.7	49.8	75.1	45.6	54.7	33.9	53.7	38.7	20	1	21.7	2.5	10.6	14.9	21.7	4.1	45.1	30.9	61.9	30.7	83	52
6	79.7	59	82.7	52.6	74.9	62	49.9	38.1	54.3	42.8	27.9	7.9	14.6	0.7	9.6	13.9	34.1	18.5	40.1	25	48.9	43.8	71.7	57
7	91	58	81.7	57	76.9	57.4	57.7	45.8	55.5	53.7	36.7	14.7	19.4	2.5	6.5	28.9	36.7	19.0	41.1	20.2	59.5	43.6	68.7	53
8	85.7	62	84.7	60.8	80.7	53.2	62.7	54	57.9	33.7	23.9	4.3	18.4	7.1	1.5	30.9	34.5	11.9	40.7	24.8	54.7	40.8	74.7	44
9	82.7	60.2	92.5	58	82.7	53	62.7	53.2	55.9	40.8	33.7	3.3	24.7	1.7	3.5	21.9	34.1	1.5	40.7	30.7	72.1	44.9	81.7	46.8
10	78.7	59	90.7	62	82.9	62	60.7	49.8	42.7	32.7	32.9	1.5	6.6	8.9	4.6	18.9	31.7	19.0	54.5	30.7	58.9	49.8	80.7	56
11	75.3	57.8	87.7	63	77.7	61.5	55	45	37.7	28.4	27.7	3.5	9.6	6.9	30.9	0.5	36.5	17.0	57.1	32.7	68.5	47	87.7	53
12	74.3	53	97.7	65	69.9	54.5	55	34	31.9	22.2	28.7	1.9	11.6	12.9	3.5	17.9	37.7	23.2	54.9	27.6	64.7	37.3	80.7	48.8
13	74.7	57.8	78.9	61.2	79	48.8	41	32	27.7	22.2	27.5	2.3	21.7	2.5	0.5	30.9	29.7	10.9	43.7	33.7	57.7	34.7	61.7	36.7
14	89.7	56	80.7	58.8	87.5	59	50	36	27.7	15.6	24.7	10.9	21.7	2.7	2.5	19.9	34.7	4.7	51.7	34.3	56.3	36.7	70.7	45.8
15	93.2	57	81.7	52.4	83.7	58.8	57	34	31.7	18.6	3.5	19.9	20	15.7	1.5	12.9	36.7	27.4	59.3	33.7	45.3	37.9	71.7	42.3
16	74.7	59.7	84.7	54	66.7	51.8	63	36	42.7	28.8	13.4	9.9	1.5	16.9	14.6	4.7	40.7	20.0	39.7	26	58.1	35.7	73.7	44.8
17	79.7	61	88.7	54.4	66.7	49.6	63	44	34.7	28.2	25.7	9.9	1.8	18.2	14.6	2.5	28.7	9.9	34.7	18.6	64.7	36.9	74.7	45.3
18	81.7	56	86.7	61.4	66.9	55	46.7	36.1	32.5	17	26.7	0	1.6	21.9	16.6	2.9	14.6	0.1	33.7	17	64.9	35.7	81.7	43.8
19	94	58.4	78.7	50.4	72.7	56	44.7	34.7	30.7	15	26.7	13.9	7.6	13.9	21.1	0.5	14.6	2.7	34.3	21.2	56.7	43.2	75.7	53.6
20	78.5	58	81.9	59.6	67.1	53.2	53.7	31.7	30.7	22.2	21.7	2.7	5.6	15.9	26.7	9.5	17.6	0.5	33.7	15	61.7	38.7	83.7	49.8
21	80.7	48.8	67.7	55.8	66.7	42.8	47.9	30	33.7	16	21.7	10.9	2.6	9.9	14.6	2.7	21.7	0.5	32.1	9.9	75.7	41.8	80.7	51
22	83.7	56.2	67.7	51.4	68.5	34.5	55.5	29.2	20	6.5	17.5	1.5	14.6	3.5	24.1	12.9	22.9	0.5	44.7	21.2	73.7	53	88.3	54
23	85.7	53	69.3	45.8	68.7	51	55.3	32.3	29.7	9.9	34.7	24.2	14.6	6.9	35.5	15.0	26.7	0.5	43.9	28.2	77.7	54.6	86.7	64
24	89.7	59	74.7	45.2	71.9	49	59.7	36.7	32.7	23.2	37.7	27.4	13.6	8.9	39.9	25.4	23.9	2.5	41.9	27.2	83.7	52	88.7	61
25	91.7	64	74.9	51	80.1	51	57.7	43.8	29.7	9.1	26.7	3.5	20.7	5.7	30.7	16.0	32.9	12.9	50.9	32.7	82.7	61	80.7	55
26	85.9	69.4	81.7	54.8	78.7	51.2	66.7	47.8	29.6	6.7	24.7	3	9.6	10.9	18.4	4.7	32.7	5.7	56.7	33.7	72.7	53.8	85.7	56
27	78.7	62	83.7	53	79.5	55	63.2	45.8	42.7	20.2	26.7	9.9	9.6	9.1	13.6	9.1	43.7	18	54.9	25.4	75.7	48	89.7	68
28	73.7	55.2	85.7	52.8	69.7	51	46.7	37.7	41.7	24.2	36.7	27.4	12.6	12.1	5.6	10.9	31.7	17.4	59.7	29.4	83.9	49	73.7	62.9
29	80.7	57.2	81.9	53	64.7	52	51.7	37.7	34	14	32.9	3.8	13.6	11.9	.....	.....	41.9	14.5	64.7	32.7	79.7	56	78.1	47.8
30	85.7	57.8	86.9	50.6	51.7	43.8	52.5	37.7	16	8	4.5	13.9	14.6	7.9	.....	.....	47.7	20.4	50.9	35.0	69.7	48.6	81.7	57
31	76.7	60.2	77.9	58.4	.....	.....	48.7	29.8	.....	.....	1.5	20.9	17.6	6.9	.....	.....	44.7	32.7	.....	.....	77	46.1	.....	.....
Range	45°.2		52°.5		54°.4		37°.5		65°.9		58°.6		46°.6		70°.8		50°.4		49°.7		53°.4		53°	
Monthly means																								

Maximum, minimum, and mean temperatures—Continued.

STATION, PECK'S BEACH, N. J.

Date of month.	1874.												1875.											
	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.	Min.	Max.	Max.	Min.
1	75	63	74	66	75	59	62	45	60	33	39	16	25	8	32	20	44	17	53	42	51	44	67	54
2	78	65	77	63	81	54	72	55	52	34	48	35	35	22	38	26	52	35	49	44	58	43	67	55
3	78	63	78	55	81	63	66	44	54	31	61	42	37	23	45	34	37	28	45	41	55	34	66	59
4	86	63	72	53	74	65	61	46	57	35	45	28	37	31	29	19	35	25	57	39	47	42	70	60
5	79	59	75	53	73	66	57	43	60	32	43	22	32	20	27	12	35	25	61	40	58	38	70	57
6	67	60	77	58	76	63	62	40	69	49	46	27	35	15	34	18	45	25	49	33	60	46	72	59
7	70	58	76	65	85	63	68	51	54	38	46	38	38	33	18	— 7	36	29	43	38	60	42	71	58
8	72	64	72	67	88	62	66	62	59	31	40	26	35	27	21	— 5	41	30	47	37	51	45	67	53
9	78	66	79	66	77	62	69	58	61	47	46	23	36	7	12	0	37	22	45	41	61	48	59	57
10	78	61	83	63	76	52	71	57	58	35	42	27	13	— 3	25	— 4	47	34	61	42	67	50	69	57
11	75	66	78	63	81	60	69	55	58	46	44	30	22	6	42	25	40	27	53	42	71	47	71	57
12	70	68	79	66	78	66	59	46	48	33	37	25	34	15	32	17	61	37	47	38	63	51	65	59
13	84	61	78	68	70	68	50	40	42	25	47	23	38	33	31	21	42	31	41	33	57	43	69	53
14	79	60	75	67	72	68	48	34	35	20	51	21	34	24	35	14	42	31	54	33	56	41	65	49
15	77	61	74	63	78	68	57	29	49	22	24	12	24	14	18	5	48	38	47	40	71	50	69	58
16	89	62	77	57	71	68	59	43	51	30	36	11	30	16	20	— 4	52	38	54	36	63	43	73	61
17	74	62	74	57	70	66	66	45	56	36	45	35	27	11	41	— 7	41	21	37	27	60	36	75	56
18	79	60	84	55	76	68	61	39	61	39	45	29	30	9	24	— 7	32	18	35	24	56	38	76	58
19	81	63	78	63	70	67	55	35	45	31	47	28	22	— 2	31	— 9	34	23	45	20	64	48	80	57
20	76	65	86	70	72	62	62	37	52	41	44	27	21	2	40	30	38	29	47	34	63	52	72	51
21	75	64	87	72	68	53	62	44	41	29	36	26	32	6	38	25	29	23	47	27	76	54	75	58
22	74	62	82	65	64	50	63	41	48	26	44	27	40	32	39	30	30	12	52	26	86	57	72	61
23	78	56	72	66	68	48	60	46	58	44	45	33	34	21	43	33	31	12	56	30	71	58	74	63
24	77	61	71	60	71	54	62	57	45	32	45	33	41	23	57	37	38	28	47	34	66	56	77	63
25	79	64	70	66	73	59	61	46	40	25	45	24	35	22	48	38	37	29	57	35	63	57	90	64
26	79	69	68	52	71	63	62	40	40	20	44	24	27	15	45	31	40	27	56	36	72	57	80	63
27	79	69	68	51	73	59	64	46	50	25	48	37	35	15	47	25	56	39	50	43	66	54	89	64
28	80	66	70	58	67	65	67	50	52	36	54	42	38	32	25	16	49	30	47	40	70	45	90	63
29	78	67	74	50	72	58	66	59	54	31	52	33	36	31	.....	.....	41	35	48	34	72	54	77	62
30	81	59	72	54	64	50	61	43	38	22	32	23	40	25	.....	.....	44	31	66	44	74	57	83	65
31	81	60	78	57	.....	.....	50	37	.....	.....	26	11	38	32	.....	.....	47	41	.....	.....	70	47	.....	.....
Range	33°		37°		40°		43°		49°		50°		44°		66°		49°		46°		52°		41°	
Monthly means	70°.2		69°.2		67°.5		54°.6		43°.2		35°.9		28°.9		29°.2		35°.3		42°.9		55°.7		60°.9	

Maximum, minimum, and mean temperatures—Continued.

STATION, PEMBINA, DAK.

Date of month.	1874.												1875.											
	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	47	71	.....	69	54	65	34	37	27	23	2	8	−10	(*)	(*)	(*)	(*)	38	10	39	11	66	49
2	77	51	80	.....	63	44	55	21	41	19	26	2	−10	−23	.....	.....	.....	.....	41	23	47	17	51	36
3	83	63	83	.....	75	36	60	28	37	20	19	−17	10	−20	.....	.....	.....	.....	35	22	57	20	45	32
4	83	56	78	.....	74	44	68	48	45	17	36	9	11	−19	.....	.....	.....	.....	33	20	51	30	56	31
5	82	64	81	.....	72	44	59	39	42	27	33	6	−10	−26	.....	.....	.....	.....	37	20	58	21	53	37
6	87	55	79	.....	80	53	62	29	49	19	28	−21	10	−24	.....	.....	.....	.....	34	15	46	41	70	33
7	84	54	82	.....	85	54	71	34	42	30	26	20	−6	−24	.....	.....	.....	.....	38	26	53	37	73	44
8	85	62	86	.....	87	56	65	48	35	27	28	14	−15	−35	.....	.....	.....	.....	42	30	49	41	71	40
9	80	56	89	.....	83	69	65	38	31	20	14	2	10	−38	.....	.....	.....	.....	34	26	57	39	78	39
10	72	51	84	.....	71	59	46	32	31	23	15	−13	−15	−28	.....	.....	.....	.....	35	23	57	34	61	47
11	81	47	70	.....	63	43	36	24	25	17	−3	−19	−32	−34	.....	.....	.....	.....	43	20	55	39	55	40
12	82	65	70	.....	65	40	46	9	27	21	8	−12	−30	−36	.....	.....	.....	.....	46	27	59	30	62	30
13	80	60	68	.....	63	45	57	32	33	11	3	−19	17	31	.....	.....	.....	.....	53	25	51	42	70	50
14	81	59	77	.....	52	34	59	26	32	15	16	25	14	30	.....	.....	.....	.....	53	25	62	40	76	59
15	80	50	85	.....	61	24	63	35	33	3	25	16	9	−27	.....	.....	.....	.....	25	7	65	34	77	59
16	84	63	73	.....	53	50	73	37	18	11	24	5	(*)	(*)	.....	.....	.....	.....	17	3	70	43	77	58
17	85	51	70	46	57	49	61	36	26	21	24	15	(*)	(*)	.....	.....	.....	.....	44	10	71	52	77	57
18	89	(*)	72	46	54	47	70	31	3	20	32	24	9	−32	.....	.....	.....	.....	48	23	75	53	79	52
19	70.5	.....	75	57	53	40	57	37	22	9	18	5	(*)	(*)	.....	.....	.....	.....	36	25	85	40	80	53
20	85	.....	71	54	54	40	52	17	20	3	21	8	(*)	(*)	.....	.....	.....	.....	45	17	77	54	80	60
21	87	.....	78	56	65	40	59	16	20	4	23	2	(*)	(*)	.....	.....	.....	.....	45	35	82	42	78	65
22	87.5	.....	76	45	69	36	70	29	26	7	17	8	4	(*)	.....	.....	.....	.....	46	32	89	47	77	41
23	79	.....	69	60	69	44	64	45	9	3	21	5	7	5	.....	.....	.....	.....	42	21	78	51	66	50
24	91	.....	77	50	82	39	66	46	0	14	2	18	8	21	.....	.....	.....	.....	50	20	75	51	85	55
25	63	.....	82	54	81	53	59	39	0	10	8	7	7	32	.....	.....	.....	.....	50	33	63	36	76	57
26	69	.....	68	62	58	45	39	33	7	7	18	4	12	11	.....	.....	.....	.....	60	29	67	53	72	47
27	78	.....	70	56	68	38	44	33	2	13	9	7	(*)	(*)	.....	.....	.....	.....	57	40	59	56	66	44
28	75	.....	71	65	67	34	38	23	4	19	7	25	.....	30	(*)	(*)	.....	.....	51	27	57	41	80	46
29	75	.....	74	59	63	30	31	23	7	28	15	32	0	16	.....	.....	.....	.....	35	16	66	28	72	53
30	85	.....	76	47	80	33	26	14	10	40	16	32	(*)	(*)	.....	.....	.....	1	30	18	77	45	79	44
31	70	.....	75	61	.....	.....	42	10	.....	.....	8	28	(*)	(*)	.....	.....	35	7	.....	.....	74	48	.....	.....
Range	.....		.....		63°		64°		89°		68°		.....		.....		.....		63°		78°		50°	
Monthly means	69°.9		67°		56°.2		42°.2		14°.4		.....		.....		.....		.....		32°.9		53°.3		59°.2	

*No observation taken.

Maximum, minimum, and mean temperatures—Continued.

STATION, PHILADELPHIA, PA.

Date of month.	1874.												1875.											
	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	65	87	67	81	66	62	47	48	32	37	22	22	11	32	18	31	12	71	43	54	43	76	53
2	81	68	81	66	83	62	72	52	53	36	53	24.5	37	21	43	19	43	28	72	56	56	42	66	51
3	81	66	75	60	88	62.5	69	51	57	37	56	28.5	37	25	54	31	34	23	57	42	56	40	69	57
4	86	71	76	59	70	59	62	49	59	37	49	30	41	30	42	16	32	24	58	40	52	43	81	58
5	76	66	78	59	74	63	59	42	57	42	42	24	37	24	20	10	30	21	60	45	63	42	80	62
6	75	61	81	64	76.5	63	63	49	68	49	46	32	34	17	32	13	41	29	60	39	60	47	78	66
7	80	60	77	65	84	(*)	70	55	59	45	45	37	35	27	14	5	36	31	42	37	58	42	77	59
8	88	66	72	64	86	.....	65	59	62	39	38	27	37	29	19	3	38	24	55	36	56	45	71	56
9	91	78	82	65	77	.....	68	57	60	46	41	25	35	3	14	2	37	24	47	37	82	47	63	57
10	91	71.5	86	66	85	.....	70	58	60	41	46	29	12	— 5	20	— 1	44	31	62	40	75	57	78	56
11	87	68	85	64	90	.....	70	55	62	43	41	31	31	7	47	14	47	30	64	46	73	54	83	59
12	86	69	87	68	87	.....	59	49	46	35	37.5	28	27	17	27	12	58	39	52	36	76	56	77	58
13	84	69	84	68	72	.....	49	41	42	29	43	31	36	23	33	18	43	32	36	33	68	50	67	52
14	89	71	75	66	70	.....	47	38	39	23	50	19	35	23	29	10	40	29	50	32	69	49	70	52
15	90	72	80	65	78	.....	58	38	43	27	23	11	24	13	18	5	57	34	59	41	73	50	75	57
16	88	72	82	65	70	.....	62	41	53	32	35	14	27	16	18	4	51	43	52	34	60	44	80	61
17	80	65	80	60	69	.....	67	45.5	57	37	42	32	26	19	39	10	43	20	34	28	64	44	81	62
18	86	62	87	63	75	.....	59	35	56	41	41	27	23	12	23	1	31	15	34	25	62	45	69	62
19	89	71	84	66	69	.....	56	40	41	33	45	30	20	6	32	15	33	24	43	20	64	46	76	59
20	89	62	93	67	71	.....	62	42.5	43	35	41	30	21	6	37	27	31	23	47	33	79	53	79	58
21	80	70	95	72	68	.....	65	47.5	41	32	37	25	29	10	37	25	29	20	46	27	85	57	82	60
22	81	64	79	65	69	.....	68	48.5	42	30.5	45	26	44.5	26	50	30	30	13	50	30	86	66	83	62
23	83	66	70	60	74	.....	65	48	62	34	47	36	37	22	54	37	35	14	56	36	89	68	86	68
24	83	64	72	60	74	.....	62	53	45	29.5	45	33	37	18	53	44	35	24	53	37	83	67	93	70
25	82	62	71	62	77	.....	63	51	38	26.5	39	27	36	20	57	39	37	26	54	35	70	64	95	73
26	85	67	71	57	83	.....	71	48.5	40	28	46	26	25	15	47	30	41	28	62	40	82	64	93	75
27	83	70	72	55	80	.....	71	49	49	30	49	36	35	17	39	22	57	40	58	45	77	62	93	74
28	85	68	74	55.5	69	.....	66	54	52	34	57	40	42	28	22	12	47	39	47	43	79	57	91	72
29	75	68	75	56	55	.....	70	50.5	58	32	53	30	38	28	.....	.....	51	35	61	42	83	56	80	67
30	81	62.5	80	57.5	64.5	.....	66	44	33	24	32	22	37	25	.....	.....	60	35	68	43	78	57	84	67
31	84	65	80	61	.....	.....	50	35	.....	.....	25	14	38	28	.....	.....	61	44	.....	.....	76	58	.....	.....
Range	37°		40°		.....		37°		45°		46°		49°.5		55°		49°		52°		49°		44°	
Monthly means	74°.7		71°.1		68°		55°.0		43°.1		35°.7		26°.1		26°.1		34°.9		45°.5		61°.4		70°.5	

* Minimum thermometer broken.

Maximum, minimum, and mean temperatures—Continued.

STATION, PIKE'S PEAK, COLO.

Date of month.	1874.												1875.									
	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	47	31	56	33.8	52.1	32.2	37	27	20	7	29	19	6	0	15	−9	5	−13	4	−20	21	9	24	13
2	52	32	51	33.2	37	28	37	23	24	13	19	14	11	0	−1	−27	1	−16	19	(*)	19	11	31	4
3	52	34	50.3	32.8	30	21	32	24	28	10	22	12	4	−5	−4	−37	8	−16	23	.....	21	5	35	21
4	57	36	48.4	32.2	37	20.3	34	23	13	2	15	0	−5	10	5	−8	−1	−14	21	11	29	14	41	24
5	52	38	51.8	33.8	47	23	27	21	21	9	15	7	0	−9	15	−5	−5	−17	15	5	37	21	36	23
6	52	35	48	33.9	50	27.6	27	21	25	15	21	8	−7	−16	9	0	15	−16	16	2	37	25	34	19
7	52	37	54	33.5	50	31.3	29	19	19	−3	23	14	4	−17	19	2	16	−5	8	−11	32	11	36	23
8	49	38	53	34	41.2	32	27	17	19	1	23	15	0	6	23	13	4	−12	−1	−15	13	−5	40	27
9	54	38	51.5	35	49.3	31	30	22	24	11	20	10	0	21	13	7	6	−15	8	−21	18	−8	40	28
10	55	36	51	30	44	28	35	25	23	10	20	10	4	−12	7	−14	12	−10	1	−11	30	14	35	17
11	56	37	48	30	47	27.3	34	21	18	11	23	13	5	−7	9	−13	6	−12	0	−9	28	8	39	24
12	54	39	54	31	39	21	37	21	22	10	19	10	5	12	14	3	8	−12	9	−13	35	16	41.5	28
13	54	37	50	33	29.7	20	32	22	24	12	15	5	−2	−17	15	2	13	−7	12	−3	36	19	45	28
14	50	35	54.5	32.2	35.6	20	25	13	17	−4	18	8	10	−3	8	−5	6	−24	23	6	38	21	44	27
15	42	34	49	35.9	44	24	34	19	18	6	13	0	12	5	3	−13	−15	−29	27	10	41	23	47	28
16	48	35	47.5	35.8	37.9	22	32	23	16	3	5	−3	19	8	3	−15	−2	−21	27	11	31	22	51	28
17	50	36	42.3	33.7	36.2	19	33	20	14	1	0	−9	18	9	13	−7	7	−7	30	13	32	14	45	30
18	49	35	53	32.8	27.2	15.5	31	18	13	6	11	−1	16	10	5	−9	7	−12	24	14	34	16	38	16
19	45	36	54.9	35	36.2	13	29	19	8	3	12	−3	19	10	−2	−23	1	−9	23	13	36	23	48	24
20	48	34	54	34	40	15.2	18	15	10	−1	11	−3	19	6	−3	−26	−4	−12	23	14	37	23	51	32
21	53	35	50.5	33	38.2	21.7	24	12	15	4	1	−11	6	−10	−1	−11	8	−13	23	11	36	22	55	33
22	46.5	34.4	46.7	34	28.8	22	34	23	3	−5	6	−2	0	−7	−1	−15	15	−8	32	12	37	20	47	35
23	42	36	47	23	25	17	37	21	13	−7	1	−15	−2	−9	8	−4	14	−8	23	21	35	20	45	29
24	54.9	35	44	31	29	17	22	8	15	9	10	−2	5	−10	11	−9	18	7	20	−7	29	22	53	27
25	57.2	36	39	31	34	19	22	8	23	10	3	−4	5	−3	−2	−21	22	12	15	−9	33	21	57	36
26	40.5	32.5	45.5	32.8	32	21	27	16	22	13	1	−4	13	2	6	−5	22	9	22	2	38	23	50	35
27	38.6	32	48	31.3	38	26	24	8	1	−5	0	−10	12	0	18	2	17	8	30	15	32	21	49	27
28	48.2	30.9	53.2	28.3	37.2	27.1	8	0	14	−8	−3	−11	3	−4	11	5	19	7	24	15	32	19	55	34
29	53.3	33.7	40.5	30	45.5	27.2	15	0	21	11	12	−9	1	−9	.....	.....	22	6	29	12	38	19	55	37
30	59	38.8	49.3	33	40.2	21.2	10	−6	25	14	10	−1	−6	−11	.....	.....	10	−8	25	15	31	20	51	34
31	55	36.3	52.4	31.7	.....	.....	10	−2	.....	.....	9	−2	12	−9	.....	.....	−8	−22	.....	.....	32	18	.....	.....
Range	28°.1		33°		25°.1		43°		36°		44°		40°		60°		51°		.....		46°		53°	
Monthly means	42°		39°.5		29°.6		21°.5		11°.8		6°.7		0°.5		0°.5		−0°.9		11°.5		23°.4		34°.5	

* Minimum thermometer out of order.

Maximum, minimum, and mean temperatures—Continued.

STATION, PITTSBURGH, PA.

Date of month.	1874.												1875.											
	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	.....	*55	.....	65	85	54	64	44	45	32	43	13	37	12	25	11	49	18	75	53	65	41	81	59
2	.....	63	.....	59	89	56	64	49	53	21	58	42	40	24	46	15	44	24	54	35	51	38	83	65
3	.....	55	.....	51	89	61	67	45	59	21	61	40	37	17	50	19	35	20	53	32	57	34	81	62
4	.....	61	176	51	72	60	54	42	60	31	42	31	30	20	19	8	26	17	68	34	53	35	85	52
5	.....	65	76	53	78	61	60	39	67	35	50	28	22	12	20	- 1	44	21	61	36	65	40	77	60
6	.....	57	81	59	85	63	58	49	64	43	48	40	33	7	21	6	44	30	79	34.5	57	43	71	60
7	.....	65	85	62	87	59	59	49	73	34	42	33	33	24	13	3	33	26	77	48	66	41	69	50
8	.....	70	74	64	91	62	62	49	71	40	35	25	27	16	15	4	32	25	82	45	93	45	70	47
9	.....	70	87	58	83	62	63	51	63	44	41	28	26	10	7	- 8	41	26.5	73.5	51	89	62	80	49
10	.....	71	85	63	82	54	68	50	66	36	37	28	4	-12	30	6	41	30	66.5	41	79	49	86	55
11	.....	66	92	65	90	55	63	47	57	38	33	26	18	0	39	9	50	28	69	44	73	48	91	62
12	.....	65	97	(†)	93	60	50	40	41	33	32	26	34	12	13	5	49.5	36	62	45.5	69	52	81	52
13	.....	62	85	.....	97	62	45	37	38	26	48	30	46	28	22	13	58	34	51	35	69	41	66	43
14	.....	65	80	.....	90	67	52	39	43	27	46	32	30	11	17	2	68	32	56	36.5	80	48	73	45
15	.....	70	84	.....	81	69	64	30	53	38	29	19	16	4	10	-10	68.5	42	58	40	61	43	72	49
16	.....	62	76	.....	71	65	66	36	53	40	42	21	25	14	18	6	45	29	41.5	21	60	36	81	59
17	.....	54	89	.....	74	61	73	43	56	48	47	31	20	12	30	7	32	13	28	16.5	65	37	85	51
18	.....	59	88	62	82	59	57	42	53	40	36	24	20	12	20	2	28.5	12	25	14	66	40	71	54
19	.....	69	92	61	88	66	58	32	43	35	43	30	17	12	37	5	30.5	18	50	20	71	42	78	49
20	.....	74	95	69	70	54	68	37	43	29	39	32	20	8	38	26	37	22	41	28	82	58	84	49
21	.....	63	96	68	69	45	72	41	35	25	36	29	42	19	30	20	26	15	41	22	83	59	87	55
22	.....	52	75	64	74	45	68	40	45	29	41	31	43	23	56	25	27	11	43	22	84	64	82	68
23	.....	58	69	60	80	48	76	44	57	25	41	34	33	17	60	44	39	15	54	28	90	63	89	67
24	.....	65	74	62	83	53	75	48	36	23	38	28	45	27	70	45	49	27	45	22	92	64	95	70
25	.....	71	75	58	85	55	75	46	33	21	38	21	34	16	47	26	42	25	53	32	85	59	93	69
26	.....	70	78	57	83	55	75	44	38	25	50	27	27	12	43	25	54	32	64	39	86	60	93	73
27	.....	65	77	57	69	62	73	53	58	33	57	40	43	18	34	18	59	34	63	43	88	58	90	70
28	.....	63	78	51	62	54	57	46	44	34	61	46	51	33	20	7	49	28	70	47	92	59	86	72
29	.....	61	79	51	65	53	78	47	37	20	46	21	35	24	.....	.....	58.5	35	72	42	74	54	89	68
30	.....	55	82	50	54	49	47	41	23	12	27	17	34	21	.....	.....	66	40	61	41	78	41	86	66
31	.....	64	82	56	.....	.....	42	33	.....	.....	25	15	34	16	.....	.....	79	38	.....	.....	87	47	.....	.....
Range	.....	.....	.....	.....	52°		48°		55°		46°		63°		80°		68°		65°		79°		52°	
Monthly means	74°.7		70°.4		67°.6		52°.5		40°.9		35°.2		23°.3		21°.6		35°.6		46°.5				70°.2	

* Station supplied with minimum thermometer July 1, 1874. † Station supplied with maximum thermometer August 4, 1874. ‡ Minimum thermometer out of order.

Maximum, minimum, and mean temperatures—Continued.

STATION, PORT HURON, MICH.

Date of month.	1874.												1875.											
	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	.....	.....	.....	.....	.....	.....	59	38	38	30	25	13	33	12	24	1	16	6	65	38	40	33	81	58
2	.....	.....	.....	.....	.....	.....	59	46	49	36	47	25	30	15	36	20	16	5	38	35	36	30	78	62
3	.....	.....	.....	.....	.....	.....	53	43	58	43	49	29	22	12	39	3	17	— 8	51	31	54	29	62	56
4	.....	.....	.....	.....	.....	.....	51	41	59	42	25	20	16	7	3	— 6	20	12	48	23	50	36	75	53
5	.....	.....	.....	.....	.....	.....	54	39	57	51	36	28	14	1	15	— 4	31	18	39	33	50	39	73	48
6	.....	.....	.....	.....	.....	.....	56	49	63	44	35	33	14	— 1	15	— 4	28	23	64	36	51	33	65	46
7	.....	.....	.....	.....	.....	.....	55	52	66	42	35	19	20	6	8	—12	25	11	52	34	55	37	52	46
8	.....	.....	.....	.....	.....	.....	56	49	66	47	30	15	20	3	1	—13	26	6	74	38	83	55	71	45
9	.....	.....	.....	.....	.....	.....	61	45	60	40	38	29	17	—12	5	—20	36	12	56	45	69	40	69	52
10	.....	.....	.....	.....	.....	.....	58	45	63	40	33	22	5	—13	25	— 9	32	26	61	40	52	43	76	56
11	.....	.....	.....	.....	.....	.....	51	42	42	31	27	17	15	1	28	— 2	37	19	47	36	59	45	84	62
12	.....	.....	.....	.....	.....	.....	42	36	36	27	22	9	23	9	2	—12	38	29	45	37	57	42	77	46
13	.....	.....	.....	.....	.....	.....	45	35	32	22	31	21	32	20	12	—11	43	24	39	36	61	40	54	41
14	.....	.....	.....	.....	.....	.....	49	26	40	23	29	14	20	4	7	— 7	52	34	53	29	62	43	62	44
15	.....	.....	.....	.....	.....	.....	59	38	51	39	26	9	11	— 3	9	—11	50	35	46	24	44	40	69	46
16	.....	.....	.....	.....	.....	.....	64	43	48	29	38	21	18	8	11	—10	35	14	24	12	46	38	74	49
17	.....	.....	.....	.....	.....	.....	62	45	54	41	39	19	13	2	15	4	14	8	16	10	60	39	59	51
18	.....	.....	.....	.....	.....	.....	53	39	42	27	34	18	17	8	11	— 7	18	4	37	7	63	42	59	50
19	.....	.....	.....	.....	.....	.....	58	34	35	23	42	26	14	1	25	11	15	10	32	25	70	44	69	49
20	.....	.....	.....	.....	.....	.....	70	44	30	23	33	21	15	— 1	24	18	20	13	28	23	81	54	72	46
21	.....	.....	.....	.....	.....	.....	53	48	31	22	32	16	27	12	21	4	18	11	27	23	75	60	79	52
22	.....	.....	.....	.....	.....	.....	54	38	41	26	37	29	28	12	43	9	25	5	33	23	72	45	76	59
23	.....	.....	.....	.....	.....	.....	58	47	53	27	36	29	25	1	34	25	30	12	46	26	77	45	85	60
24	.....	.....	.....	.....	.....	.....	68	51	26	22	35	20	31	12	44	22	36	25	37	28	76	63	85	60
25	.....	.....	.....	.....	.....	.....	72	56	28	19	33	18	21	9	27	19	34	17	41	30	69	49	71	55
26	.....	.....	.....	.....	.....	.....	71	56	38	26	42	32	18	5	24	9	46	32	43	33	54	47	84	62
27	.....	.....	.....	.....	.....	.....	63	49	41	25	43	25	31	13	17	5	42	28	51	34	79	46	81	61
28	.....	.....	.....	.....	.....	.....	58	45	28	24	45	32	32	13	8	— 3	37	20	64	33	83	63	75	55
29	.....	.....	.....	.....	.....	.....	64	42	27	9	32	9	18	9	.....	.....	53	28	50	35	71	48	67	55
30	.....	.....	.....	.....	.....	.....	43	35	19	3	17	9	20	10	.....	.....	61	38	46	35	69	47	81	60
31	.....	.....	.....	.....	.....	.....	40	31	.....	.....	24	10	20	12	.....	.....	73	46	.....	.....	72	50	.....	.....
Range	.....	.....	.....	.....	.....	.....	46°		63°		40°		46°		64°		81°		67°		54°		44°	
Monthly means	.....	.....	.....	.....	.....	.....	49°.6		36°.8		27°.4		13°.6		9°.8		26°.5		37°.3		53°.2		62°.8	

Maximum, minimum, and mean temperatures—Continued.

STATION, PORTLAND, ME.

Date of month.	1874.												1875.											
	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	77	60	75	58	57	44	48	39	30	11	26	6	35	20	18	1	41	36	59	40	64	51
2	65	56	75	59	78	56	59	45	48	35	32	18	27	16	34	16	28	12	58	37	53	38	71	49
3	65	56	70	55	82	54	59	43	52	32	47	32	29	20	41	28	27	17	49	42	52	37	69	47
4	61	52	70	50	65	47	55	38	50	35	41	24	32	19	43	8	24	11	42	37	56	40	79	54
5	59	52	75	57	66	47	57	40	53.5	33	31	18	29	15	20	6	30	12	50	35	62	40	73	56
6	68	54	71	55	70	56	61	45	61	48	36	24	28	8	23	5	37	24	48	32	52	40	79	59
7	67	53	73	56	70	59	60	47	51	41	37	32	25	20	8	— 6	38	32	51	28	61	42	64	53
8	89	65	65	61	71	52	59	49	52	35	40	26	30	19	10	— 1	38	27	44	30	55	41	73	53
9	82	66	64	60	69	58	62	47	52	43	37	20	23	13	9	— 2	37	24	44	31	47	41	61	54
10	70	59	83	63	86	54	60	48	55	40	36	30	13	0	23	— 3	40	34	54	35	62	42	66	53
11	75	61	78	63	79	59	62	45	56.5	36	35	26	18	— 3	36	16	46	27	53	38	67	49	65	51
12	68	57	78	58	75	49	62	42	38	28	27	16	22	3	38	2	48	32	43	33	59	48	71	56
13	67	55	71	62	67	47	49	40	33.5	24	31	16	16	10	12	— 5	41	30	35	32	67	46	61	47
14	86	63	63	57	67	47	53	40	33	26	23	4	26	14	13	— 1	41	28	50	28	66	47	70	42
15	92	67	77	58	69	57	57	35	36	22	12	— 2	16	3	10	— 5	38	33	52	34	50	46	72	50
16	87	70	75	57	71	60	65	41	46	31	27	4	17	1	18	— 1	38	33	44	38	50	41	77	51
17	82	64	71	56	70	55	60	44	47	31	32	18	16	3	23	4	40	20	43	32	65	41	72	53
18	81	61	81	56	(†)	.....	56	43	55	32	33	17	11	2	21	8	24	13	37	27	50	39	60	49
19	75	60	74	61	.....	.....	49	37	32	23	36	23	16	0	32	3	31	16	37	23	61	43	59	49
20	77	62	81	60	61	50	59	36	35	21	35	23	15	0	37	32	20	17	32	22	58	46	80.5	55
21	80	63	78	63	66	50	56	41	36	30	26	13	13	— 3	36	21	36	14	39	20	73	50	85	56
22	77	60	71	57	63	45	57	36	38	20	40	10	18	5	34	14	37	9	50	28	75	51	83	60
23	76	57	65	48	64	43	51	38	42	18	44	33	25	15	49	33	33	12	57	37	75	59	77	60
24	79	60	72	52	63	47	55	38	39	32	38	32	(*)	(*)	44	37	34	15	58	39	66	51	88	61
25	76	62	67	52	62	52	58	39	36	26	36	21	35	22	44	37	38	30	57	38	81	60	85	66
26	73	60	71	48	61	49	60	41	34	19	36	18	18	10	37	21	38	23	51	40	77	60	70	60
27	73	59	71	51	59	50	63	48	41	18	41	25	24	4	27	16	50	34	59	37	76	55	74	58
28	76	61	75	50	65	48	64	49	44	32	44	34	34	10	20	4	42	30	55	37	77	55	91	60
29	68	59	70	59	63	58	55	47	49	31	43	20	35	23	.....	.....	42	23	56	35	70	55	77	58
30	80	62	72	57	65	49	63	47	31	17	20	2	30	20	.....	.....	47	28	58	42	60	50	81	58
31	76	61	76	56	.....	.....	56	42	.....	.....	15	— 1	30	17	.....	.....	40	32	.....	.....	71	55	.....	.....
Range	40°		.....		.....		30°		44°		49°		.....		55°		49°		39°		44°		49°	
Monthly means	67°.2		64°.6		60°.3		50°.6		37°.6		27°.1		17°.1		19°.5		29°.5		40°.2		54°.3		62°.8	

* Observation not taken.

† Observer sick

Maximum, minimum, and mean temperatures—Continued.

STATION, PORTLAND, OREG.

Date of month.	1874.												1875.											
	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	.....	72	58	77	44	71	48	55	31	55	44	52	43	42	33	49	38	59	51	61	50	61	43
2	71	.....	72	53	83.5	53	65	51	52	30	53	44	53	43	42	33	49	40	52	42	61	48	61	42
3	68	.....	76	48	88.5	53	64	50	56	47	52	42	46	37	40	28	48	37	47	38	60	50	62	45
4	75	.....	78	52	79	49	77	45	55	48	52	45	44	37	40	24	49	37	40	32	63	52	70	39
5	77	.....	75	56	73	49	69	49	54	44	56	45	39	32	42	29	46	39	48	29	63	52	79	47
6	76	.....	71	56	69	57	66	54	57	40	49	38	38	28	51	32	54	43	50	29	60	48	82	55
7	71	.....	70	53	67	54	70	44	54	45	54	38	48	35	43	35	52	40	50	28	61	45	75	54
8	79	.....	74	54	65	51	76	44	53	43	57	45	39	22	47	34	52	35	54	35	60	47	74	59
9	86.5	.....	72	58	66	50	76	49	46	35	46	42	30	19	46	33	53	34	62	36	59	41	63	54
10	88	.....	69	57	63	49	73	51	43	32	53	39	30	18.5	48	32	55	41	72	39	62	44	67	52
11	73	.....	69	54	68	47	68	57	44	40	47	41	33	24	47	30	54	42	73	45	62	44	75	50
12	75	.....	74	56	68	49	68	51	46	40	47	38	26	16	43	34	50	38	80	46	65	44	75	50
13	72	.....	68	58	69	49	76	51	56	43	45	33	16	4	46	35	45	34	83	48	75	46	73	51
14	81	.....	71	49	69	57	76	52	53	46	46	34	14	3	50	33	46	34	83	47	64	56	72	56
15	74	.....	71	49	70	53	65	52	56	45	46	38	20	10	51	34	52	39	82	47	60	51	76	59
16	79	.....	84	49	68	45	70	50	50	38	46	35	19	9	51	31	53	44	78	47	65	45	67	59
17	72	.....	83	59	68	54	67	48	43	35	45	31	23	11	51	31	53	41	74	49	64	51	68	55
18	80	.....	72	48	73	43	63	52	43	32	45	34	18	9	52	31	50	36	60	43	59	40	69	53
19	85	.....	78	48	72	49	60	38	45	29	44	41	40	13	52	30	51	40	69	52	67	42	63	52
20	84	.....	73	56	76	51	63	38	44	27	40	32	45	35	46	36	53	37	71	52	70	51	64	49
21	80	.....	72	57	82	49	71	42	48	34	53	37	42	38	50	40	50	43	75	53	63	44	60	45
22	82	.....	80	46	78	45	68	42	48	39	49	36	43	35	52	40	49	38	67	55	68	41	67	53
23	77	66	79	60	65	45	60	49	60	43	47	33	44	26	53	39	49	40	63	45	67	51	72	55
24	76	55	71	59	69	51	53	36	63	56	50	42	36	32	53	43	51	44	74	42	69	51	65	54
25	81	53	74	57	69	46	55	32	59	42	46	34	40	33	54	44	52	38	81	51	60	48	69	48
26	86	52	74	56	79	49	57	43	47	38	39	31	38	24	52	40	49	41	65	43	61	44	76	49
27	84	54	72	56	71	52	61	42	55	44	43	33	40	24	50	40	50	42	70	44	74	42	77	52
28	71	58	73	48	70	44	59	39	53	38	44	35	38	29	46	39	49	41	74	45	71	50	73	50
29	73	55	79	48	70	44	58	35	47	39	48	39	40	26	.....	.....	52	36	72	49	61	54	82	56
30	79	51	68	52	70	42	62	38	54	44	50	41	41	25	.....	.....	52	35	70	44	63	52	73	51
31	75	50	65	50	.....	.....	62	39	.....	.....	50	45	38	23	.....	.....	52	40	.....	.....	61	46	.....	.....
Range	.....	.....	38°		46°.5		45°		36°		26°		49°		30°		21°		55°		35°		43°	
Monthly means	68°.3		64°.7		61°.4		56°.1		45°.3		42°.6		30°.3		40°.5		44°.1		56°.2		56°.1		62°.2	

Maximum, minimum, and mean temperatures—Continued.

PORT STANLEY, CANADA.

Date of month.	1874.												1875.											
	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	44	82	61	77.5	67	67.5	39.7	40	33.2	33	16	32.4	11.4	25.2	3.4	22	5.9	47	35.2	48	33.2	73	52.8
2	73.8	53	74	52	79	50.2	64	41.7	52	26.2	45.8	25	32.2	17	34	15	20	— 3.3	41	32	38	31	73	58.4
3	76	51	74.5	46.2	75	49.2	59.2	39.2	56	52	47	26.7	25	13	39.5	6.9	19.8	— 7.3	45	28.8	48.8	31	71.2	56.6
4	87.5	61.5	75.4	46.4	70.5	41.2	55	33.7	56	48.2	28.2	17	21	11	8	— 3.8	33	15.5	51	34.2	53	32.2	71.6	52.8
5	82	50.5	73	47.7	76	60.1	60	37.2	55	51.4	37	27.4	15.4	2.1	20	— 3.3	33.5	18	52	30.5	48.2	32.2	70.2	56.2
6	82	52.8	75	52.7	76	55.2	61	49.2	59.8	39.7	38	32.2	16.6	4.3	20.5	— 8.3	34.5	10.5	41.8	34.2	48.5	34.2	69	50.2
7	84.5	63	82	61.6	78	55.2	59	48.2	57.5	32.2	38	21	20	9.9	16.5	—17	30.6	2.9	46.6	32.2	67	30	68.8	47.1
8	82.8	62	85	61.1	89	67.5	57.5	30.2	60	51.7	32.8	19	24	— 5.7	4	—12.5	35.8	9.9	51.5	33.2	57.2	48.2	68	34.4
9	82	61	81	58.7	80.8	58.7	62.4	47.2	55	39.2	39	30.2	24	9.7	0.4	—18.5	36	4.9	51	41.2	62	45.2	72	41.2
10	76	65.5	81	63.6	80	55.2	59.5	47.2	57	35.2	34	21	7	—10.5	21	—16.5	35.4	25.5	49.5	31	58	42.2	74	52.2
11	77	60	84.5	69.1	81.2	58.2	56	41	45	34.2	30	19	18	— 1.7	33	— 2.3	37	8.4	59	35.2	55	38.2	81	58.4
12	65	56	93	67.1	82.5	52.7	48.8	36.2	38	29	23.5	11.5	25	0.1	1.5	—12	40.5	28	48.8	37.2	55	38.7	71.2	42.4
13	75	56	77	60.1	82.2	57.2	45	30	34	21.5	38.5	23	34.8	21	12	—19.5	40	26.2	43	37.2	55	31	62.2	38.2
14	82	56	80	54.2	83	61.1	51.5	25	43	21	34	6.4	20.5	5.9	10.5	—16.5	51	30.2	45	35.2	56.5	41.2	68	38
15	79	66	85	51.2	78	51.7	58.5	32	53	29	30	4.9	15.5	— 0.7	9.8	—17	47	34.7	43	29	53.6	38.6	77.4	39.2
16	71	51	79	50.2	70	47.4	63	33.2	48.8	21	39.8	29	21.5	9.8	11	—20.5	35	16.5	30	17	59	32.6	76.5	40.2
17	74.8	46	82	59.2	68	59.2	63.2	36.2	55	42.2	40	21.7	18	2.9	18	0.9	18.5	8.9	27.8	9.9	58.8	32.2	65.8	47.2
18	81	56	82	56.7	76	65.1	54.5	32.2	44	25.2	33	18	18	6.9	11.5	2.1	20	5.3	29	1.7	60	32.8	76	49.2
19	83	58	83.4	50.2	81	59.2	57.8	25.5	23	25.2	38	28	17	— 1.2	26.8	4.9	23	10	38	26	62	45.2	79.2	48.2
20	74.8	56	85	69.9	64	46.7	61.8	46	33	23	35	22	18	— 8.3	29	19	23	10	33.2	1.9	73	49.2	72.2	40.2
21	79.8	51	80.5	62.1	68	39.2	55.5	42	32.5	23.5	33.8	21	31.5	12.5	23	3.2	27	5.5	31	21	72	50.2	77.4	39.8
22	80	50	77	57.6	67	41.7	60	35	43.5	16.5	37	32.2	29.5	12	43.5	— 3	30	4.9	43	22	71	52.2	76.5	61.9
23	80.5	50.5	78	56	74	44.2	63	43.7	62	28.4	36	30	22.5	— 4.2	42	32.2	30.8	1.9	43.5	24	72	50.2	77	62.3
24	83.5	57	74.8	50.2	77.4	49.4	65	45.2	30	23	35	21	35	16	48	28	42.4	25	40.5	30	72.5	58.2	79.2	63.1
25	80	70	77	51.2	75.2	49.2	63.8	46.7	29	23	33	18	25	10	32	22	36	17	48.6	30	82	54.2	77.2	61.1
26	75.5	69	76	48.2	78	56.2	66.2	45.2	40	26	41	27	22.5	10	26	11	45.8	26.6	49	27	74.2	49.2	77	65.6
27	71.5	61	78	51.2	70	53.7	64	44.2	46.8	32.2	40	22	30	12	20	4.9	46	29	53.2	27	75.4	42.6	77	64.1
28	74	61	77.8	60.1	64	50.2	56	39.2	32	25.6	43	33.7	34	11	15	— 4.3	36	19.5	55.5	28	76.2	55.6	77	57.1
29	79	55	77	53.7	69.5	40.7	65.8	45.2	28	12	35	11.5	23	2.4	.....	.....	47	20.5	50.5	31.5	77	50.8	70	54.1
30	78	50	77	48.2	53	43.2	46	32.7	20	5.9	18	9.9	26	3.4	.....	.....	52.6	34	50	34.2	67.6	39.4	73	58.1
31	87	67	80	49.6	.....	.....	41	31.2	.....	.....	28.8	13	27	4.9	.....	.....	57	42.2	.....	.....	73	40	.....	.....
Range	43°.5		46°.8		48°.3		42°.5		50°		42°.1		45°.5		68°.5		64°.3		57°.3		52°		43°	
Monthly means	.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....	

Maximum, minimum, and mean temperatures—Continued.

STATION, PUNTA RASSA, FLA

Date of month.	1874.												1875.											
	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	72	87	75	.....	75	82	66	71	60	75	56	70.2	63.1	66	48.5	79	67.5	82	62.5	80.2	66	87.5	70
2	83	72	86	81	.....	79	82	70	65	56	73	58	76.8	65.2	75	48	78	66.5	80	66	82.5	75	85	70
3	87	73	87	81	.....	77	84	69	74	61	74	61	77.1	65	79	48	80	73	75	61	84	74.5	86	72
4	89	75	90	82	.....	76	84	71	81	64	77	64	75.7	70.1	42	66	80.8	70	76	55.5	83.5	75	84	69
5	85	71	90	74	.....	76	85	70	82	66	79	62	79	66	58.5	47	79.5	71.5	78.5	56.5	82.2	72.5	85	69
6	88	72	88	74	.....	76	84	70	82	67	73	64	78.9	67.8	69	48	79.5	68	79	60	82.5	75	84.5	69
7	88	72	87	75	.....	73	84	68	82	70	73	62	77.6	66.3	65	56.5	78	67.	79.5	60	85.5	69.5	85	71.5
8	90	72	89	75	.....	72	83	70	82	70	62	51	77	69.3	57	51	66.5	60	80	61	85.5	76	82	74
9	87	78	89	77	.....	73	84	71	81	68	70	49	77	65.4	66	43	69	51	80.1	63	86	71	83	76.5
10	91	71	88	76	.....	72	84	72	82	67	72	56	74.3	63.3	73	51	66.5	56	79	65	85	73	85	73
11	88	70	91	76	.....	72	85	72	82	66	74	58	77	62.7	73.5	51	76.5	52	79.3	68	86	71	85	71.5
12	88	71	90	78	.....	72	82	72	80	67	74	57	77.1	65.7	75	56.5	78.5	63	81	73	86.5	71	84	70
13	88	74	89	72	.....	74	80	68	74	64	74	58	77.3	65.3	78.5	55	79	67	74	61.5	84.2	68	85	71.5
14	87	72	87	75	.....	75	80	65	77	62	71	58	75.8	65	77	63	80.2	68.5	66.5	58.5	83.5	67.5	86.1	79
15	85	71	89	76	.....	77	81	71	74	64	73	60	71	64.7	74.5	64	79	70	69.1	56.5	80	67	88	71.5
16	86	71	90	71	.....	76	80	69	76	68	74	61	74	51.5	74	67.7	79	63.2	73.5	60	84	68.5	88	75.5
17	86	73	88	72	.....	75	83	69	77	68	73	58	76	58	76	59	64	56	74	67	82	68	87	75.5
18	82	72	89	75	.....	76	75	64	75	72	73	57	75.9	60	75	65	76	50.5	69.5	61	81.5	62.5	86	76.5
19	86	73	88	76	87	75	82	64	75	71	74	57	76.5	60.5	76	68	79	62.5	73	57	81	62	87	70
20	82	71	81	72	85	76	74	68	75	69	72	64	76	61	77	56.5	79.9	70	77	56	81	65	87	73
21	85	74	90	74	85	75	82	69	76	67	65	52	72.8	55	71	57	80	65.5	79	63.5	79.5	66	89	73
22	85	76	88	74	87	73	82	68	77	60	69	56	76.8	67	76	57	72	55.5	73.5	58.5	80	69	87.5	75
23	85	79	87	75	86	74	81	66	79	70	71	54	78.1	62.2	77	66	74	50	73	67	82.5	73.5	87	73.5
24	83	73	88	78	87	75	82	65	78	69	76	59	77.2	65.3	78	68	75	55.5	65.5	63	80	74.5	86	72
25	82	72	86	79	84	74	82	66	75	63	78	59	80	65	80	67	78	59	75	54	80.6	75.5	87.5	74
26	87	76	(†)	72	82	74	77	65	74	58	77	64	77.2	62.2	79	68.5	80	61	80.5	63	81	74	88	74
27	86	75	.....	72	80	74	82	66	79	62	80	64	80	62.2	76	64.5	79	63	79.5	66	81.5	73	89	72
28	89	75	.....	73	81	76	81	65	79	66	78	66	76.3	61.8	81.5	64.5	79.2	65	72.5	67	81	72.5	85	73
29	88	79	.....	73	78	71	82	67	73	56	79	66	77.1	70.3	.....	.....	81	65.5	74.5	60	80	72	87.5	73.5
30	88	79	.....	73	77	67	80	66	71	50	79	66	76.9	66.8	.....	.....	83.5	59.5	77.5	63	83	72	85	72.6
31	87	82	.....	77	.....	.....	80	66	.....	.....	79	62	76	61	.....	.....	82	63.5	.....	.....	84.5	73	.....	.....
Range	21°		.....		.....		21°		32°		31°		28°.8		38°.5		33°.5		28°		24°.5		20°	
Monthly means	79°.7		83°.7		79°.2		74°.7		70°.8		66°.4		70°.3		62°.9		71°.2		70°.2		76°.7		79°.2	

† Maximum thermometer broken.

Maximum, minimum, and mean temperatures—Continued.

STATION, ROCHESTER, N. Y.

Date of month.	1874.												1875.											
	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	53	76	75	80	57	58	44	37	32	34	13	25	13	26	12	21	4	69	50	48	30	83	53
2	78	62	67	57	82	54	56	47	46	36	48	31	34	23	35	19	19	9	50	34	49	33	76	65
3	77	55	67	54	72	55	54	41	58	38	51	30	25	15	51	16	19	8	49	31	51	33	78	61
4	73	60	69	50	68	50	51	38	55	38	30	20	26	16	16	2	23	15	59	38	53	37	77	52
5	77	59	74	50	75	57	59	41	62	44	38	17	21	10	14	2	33	11	49	37	60	34	76	60
6	85	60	78	53	75	60	52	47	59	43	41	33	23	5	14	1	39	27	43	31	52	38	69	55
7	94	69	78	65	77	58	57	42	56	44	39	24	38	21	3	— 9	29	24	43	31	55	35	65	52
8	84	70	80	65	76	62	62	54	65	49	28	14	26	18	8	— 9	31	19	60	37	76	50	72	50
9	79	65	84	61	72	55	63	53	57	41	38	23	27	6	4	—12	34	9	64	35	73	63	75	52
10	74	67	75	64	78	59	60	48	59	39	33	24	7	9	21	0	33	28	69	38	64	49	74	59
11	73	63	88	62	89	67	55	43	51	35	32	22	16	0	30	3	40	27	53	37	66	45	88	60
12	64	59	96	72	75	64	45	39	56	30	26	17	23	6	3	— 5	44	29	50	35	63	43	78	50
13	73	59	72	62	90	62	40	36	33	25	29	19	39	22	11	— 9	35	25	44	32	63	39	60	42
14	87	59	74	58	90	67	43	34	33	24	30	10	27	12	8	1	53	27	46	34	63	46	67	41
15	89	72	78	52	83	65	57	33	45	35	14	7	16	8	6	— 1	52	40	57	39	52	39	75	47
16	75	64	81	56	65	58	65	39	45	31	36	10	18	9	12	— 1	45	22	48	22	55	38	74	50
17	75	53	86	62	70	58	65	43	53	38	40	20	17	12	20	3	23	12	27	19	63	38	61	48
18	85	60	82	64	74	59	52	38	46	31	35	15	13	0	14	5	17	0	25	15	62	42	71	48
19	91	69	79	53	77	62	48	33	37	28	39	31	16	2	26	7	20	9	36	21	62	43	71	54
20	80	64	83	72	69	53	66	39	35	27	38	19	17	8	32	22	15	9	31	23	72	52	75	48
21	75	57	79	61	61	46	56	40	32	25	27	17	30	9	22	10	19	9	32	20	81	57	80	53
22	78	55	66	60	68	46	58	33	34	25	44	22	32	19	48	3	23	2	39	26	77	62	83	63
23	84	59	69	50	73	52	62	40	53	32	37	33	26	11	47	29	27	— 1	44	29	78	60	85	66
24	90	62	70	56	75	58	70	54	35	27	35	27	36	10	63	30	39	22	39	21	79	64	94	69
25	90	70	73	49	80	56	67	52	29	25	29	22	31	15	44	24	31	18	48	34	82	65	77	68
26	79	72	75	50	83	56	73	51	34	25	42	22	20	14	27	15	43	22	52	34	72	58	83	68
27	74	62	76	55	80	63	63	51	49	33	44	28	24	12	20	10	44	30	52	32	75	53	84	70
28	65	59	75	53	66	55	52	47	40	27	49	37	38	22	12	4	35	21	55	35	84	57	76	64
29	74	61	78	54	63	50	73	47	29	16	38	16	22	17	.....	.....	54	26	65	40	78	53	74	55
30	79	57	80	55	55	46	48	37	32	10	19	8	28	16	.....	.....	60	37	45	35	68	45	79	62
31	81	73	80	58	.....	.....	42	37	.....	.....	15	3	34	15	.....	.....	69	38	.....	.....	69	46	.....	.....
Range	41°		46°		44°		40°		55°		46°		48°		75°		70°		54°		54°		53°	
Monthly means	70°.7		68°		65°.5		49°.6		37°.9		28°.5		18°.4		15°.0		27°.5		39°.1		56°.2		66°.3	

Maximum, minimum, and mean temperatures—Continued.

STATION, SAN DIEGO, CAL.

Date of month.	1874.												1875.									
	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	77	64	71	64	68	60	71	51	62	52	62	44	59	46	60	49	71	44	66	56	70	58
2	69	60	75	64	72	63	68	56	64	49	59	45	63	43	58	50	63	42	73	52	66	53	69	58
3	73	60	74	65	73	62	69	62	64	57	58	51	65	43	60	46	58	49	71	50	69	57	70	61
4	73	63	74	65	73	61	70	58	64	56	68	45	61	42	62	48	61	42	62	55	66	55	70	62
5	72	62	74	62	72	64	69	63	65	49	74	47	58	43	68	48	62	45	59	52	67	56	70	60
6	73	62	73	64	71	63	67	60	62	53	82	50	61	52	70	49	67	48	55	41	68	57	70	58
7	74	60	73	62	71	58	72	56	61	46	72	54	59	51	67	49	62	44	59	39	67	57	72	60
8	75	61	75	65	71	58	90	60	66	47	70	49	58	43	64	49	60	48	61	41	67	54	71	61
9	75	65	75	63	70	62	75	63	67	47	65	46	56	44	63	49	71	48	65	43	80	54	71	61
10	75	64	73	65	71	57	73	63	66	49	67	45	56	46	60	48	67	45	74	46	82	59	70	57
11	77	62	71	63	74	57	73	61	63	48	61	44	58	51	61	50	61	45	77	52	69	59	68	59
12	74	64	74	61	74	58	68	61	62	55	60	46	61	52	59	47	61	51	65	51	68	58	68	60
13	73	64	76	61	75	56	68	61	62	54	61	46	59	48	59	50	63	55	62	50	69	58	70	56
14	73	64	83	61	74	58	65	59	62	52	61	47	60	43	60	52	60	50	61	52	70	58	70	53
15	74	63	81	65	74	57	66	54	61	46	61	49	61	45	60	53	64	46	66	53	69	59	70	57
16	73	65	81	65	74	61	66	53	60	49	60	49	60	50	60	53	66	45	65	54	68	53	71	56
17	74	64	75	64	71	60	66	56	63	48	64	39	58	54	60	48	65	45	64	54	70	50	71	55
18	75	65	71	61	70	61	69	56	63	23	63	41	59	56	59	46	60	49	63	54	71	52	71	56
19	74	65	71	62	69	57	67	55	60	54	59	39	68	58	61	45	62	40	63	54	68	59	70	59
20	75	65	71	63	69	58	67	55	60	48	58	41	60	53	59	45	60	42	65	54	67	59	73	58
21	73	67	75	60	70	61	68	59	59	47	59	40	62	42	59	52	62	46	64	54	68	59	70	60
22	77	68	75	61	68	54	68	57	62	49	61	40	59	46	59	44	62	53	64	53	68	60	68	60
23	78	68	77	63	69	59	68	57	62	45	62	40	59	43	61	50	64	50	66	54	70	55	70	61
24	72	65	74	63	68	62	68	57	63	47	60	43	60	50	60	48	62	51	65	55	70	59	69	57
25	71	62	71	62	68	59	63	49	60	49	61	57	59	53	62	44	63	56	65	53	70	61	69	59
26	72	65	71	62	68	60	65	46	60	55	58	49	56	43	59	44	63	54	65	56	69	61	71	60
27	72	63	71	50	77	58	63	54	62	55	56	45	55	42	58	47	63	51	69	57	68	61	71	61
28	79	62	72	63	78	59	64	47	75	49	58	39	58	44	59	51	63	48	67	56	68	61	71	62
29	79	63	75	62	75	61	73	49	72	48	58	39	57	43	.....	.....	62	54	65	53	69	58	76	64
30	75	65	73	66	71	62	77	51	70	49	59	42	60	43	.....	.....	61	39	66	57	68	58	74	63
31	75	64	71	65	.....	.....	78	57	.....	.....	58	45	59	46	.....	.....	66	43	.....	.....	67	60	.....	.....
Range	20°		33°		24°		44°		52°		17°		26°		26°		31°		38°		32°		23°	
Monthly means	68°.7		68°.2		65°.3		62°.6		56°.2		52°.8		53°.1		54°.1		55°.0		58°.0		62°.9		64°.9	

Maximum, minimum and mean temperatures—Continued.

STATION, SANDY HOOK, N. J.

Date of month.	1874.												1875.											
	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	61	85	63	80	64	61	44	52	37	40	25	29	11	26	22	33	11	62	40	.....	42	65	55
2	79	63	85	63	84	61	70	52	51	38	48	32	35	24	38	22	39	26	66	50	.....	43	65	53
3	80	63	76	56	85	65	64	49	53	41	53	40	36	27	50	31	32	20	51	41	.....	40	65	52
4	82	62	75	57	68	54	60	48	54	43	47	30	38	32	39	15	33	23	48	37	55	39	80	57
5	72	61	77	67	71	60	57	44	59	41	41	27	36	25	20	10	32	23	54	37	60	42	80	61
6	74	58	87	67	76	63	63	48	62	50	46	36	32	19	29	13	42	30	57	38	54	45	77	62
7	79	57	82	63	80	62	67	55	56	47	43	39	35	31	13	7	35	30	46	35	56	43	80	60
8	91	63	73	63	77	63	63	54	60	46	41	28	35	29	19	7	38	31	48	36	52	42	71	56
9	84	64	75	63	75	61	66	52	62	50	51	26	38	8	13	3	37	27	43	35	61	45	60	55
10	90	66	83	64	84	59	68	53	60	43	44	37	13	— 2	22	2	39	32	57	38	70	48	76	56
11	86	67	82	66	86	65	65	54	59	45	42	34	24	9	44	18	45	29	64	43	69	48	79	61
12	84	64	82	67	76	62	59	46	45	35	35	30	29	18	26	11	50	37	52	36	69	53	74	58
13	83	67	85	69	70	62	50	*	38	30	44	32	36	25	32	18	37	31	37	32	62	47	66	54
14	89	66	71	64	75	62	47	.....	34	24	49	18	35	23	26	10	37	32	51	31	60	44	70	52
15	93	69	76	61	77	60	56	.....	46	32	21	10	23	14	16	5	48	34	55	39	70	48	73	57
16	84	68	80	62	72	63	62	.....	55	37	37	16	30	16	19	7	45	36	52	36	61	44	79	60
17	83	62	76	61	69	60	66	.....	55	44	41	35	25	19	40	12	43	22	36	29	65	45	70	62
18	85	62	83	60	70	61	62	.....	56	44	40	25	20	9	22	10	29	15	33	26	61	45	71	61
19	84	66	83	65	66	60	54	.....	42	34	41	34	23	2	34	18	33	22	41	23	63	46	74	59
20	89	65	89	65	70	58	62	.....	48	37	40	34	20	9	35	28	28	23	43	32	76	53	78	58
21	80	67	88	71	67	53	59	.....	41	34	37	26	33	17	32	27	30	19	44	28	79	59	82	60
22	83	63	79	65	65	52	63	.....	42	32	47	27	37	28	40	26	39	15	51	29	81	61	81	63
23	84	63	69	58	72	52	59	.....	59	42	46	36	32	23	48	38	32	14	55	36	88	60	75	61
24	82	62	75	61	74	56	60	25	47	31	44	33	37	23	52	41	36	25	54	36	84	55	92	68
25	81	61	72	60	76	57	60	51	37	27	34	29	35	22	54	40	35	29	52	33	65	55	92	72
26	82	62	71	55	77	61	64	50	41	28	43	27	27	17	41	32	43	29	55	40	79	57	74	66
27	81	66	72	56	70	58	68	51	50	35	45	36	29	16	32	22	49	34	†	43	73	57	91	66
28	82	64	74	59	64	54	62	54	52	41	51	41	41	27	22	14	44	35	.....	42	82	57	88	73
29	77	66	73	57	65	55	73	54	55	35	51	31	35	25	.....	.....	43	35	.....	40	79	60	73	65
30	82	61	76	58	64	47	64	47	35	24	30	23	34	23	.....	.....	54	35	.....	42	81	56	81	65
31	85	63	79	60	.....	.....	50	40	.....	.....	24	10	36	29	.....	.....	53	39	.....	.....	80	57	.....	.....
Range	36°		34°		39°		.....		38°		43°		43°		52°		43°		.....		.....		40°	
Monthly means	73°.1		70°.2		67°.2		55°.6		44°.4		35°.6		26°.1		26°.0		33°.9		42°.9		57°.5		67°.3	

* Minimum thermometer broken.

† Maximum thermometer broken.

Maximum, minimum, and mean temperatures—Continued.

STATION, SAN FRANCISCO, CAL.

Date of month.	1874.												1875.									
	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	66	52	65	52	83	52	65	55	60	54	61	53	53	42	53	46	54	45	63	47	59	49	67	52
2	66	52	65	52	87	56	64	56	62	54	56	51	56	42	53	45	53	46	60	50	65	49	66	51
3	66	51	65	52	65	55	65.5	55	61	54	56	49	57	43	55	43	54	43	55	47	61	52	68	49
4	65	52	63	52	68	55	71	55	64	57	57	47	57	44	56	45	56	49	53	41	64	50	79	53
5	65	51	66	51	67	58	62	53	61	53	62	50	56	42	61	48	58	45	48	41	66	51	72	56
6	65	51	65	54	65	56	61	56	56	57	62	51	53	44	63	48	57	46	51	40	60	51	69	56
7	65	52	71	53	66	57	78	55	61	50	60	49	51	45	60	50	58	46	54	40	61	49	65	56
8	73	54	68	52	65	54	78	62	62	55	59	49	49	43	63	48	64	45	56	44	58	53	64	52
9	68	54	67	52	67	53	71	59	62	54	60	51	51	43	63	49	66	48	65	47	62	49	64	54
10	63	52	63	53	69	53	69	57	63	56	57	49	51	44	55	47	67	49	75	50	67	53	62	52
11	62	51	63	53	72	54	66	56	64	58	52	44	55	44	54	48	64	50	77	52	69	52	64	51
12	63	51	66	55	73	53	60	56	61	56	51	47	51	45	56	48	60	48	81	54	65	53	59	50
13	64	53	68	56	80	57	67	57	60	52	50	44	52	44	60	49	52	45	68	50	65	51	62	53
14	62	52	64	54	89	61	63	56	59	50	50	45	58	46	55	50	53	42	58	49	68	53	65	51
15	64	51	67	55	75	57	64	55	59	49	52	46	46	41	57	48	56	44	62	48	59	50	64	55
16	61	51	61	53	73	55	64	55	59	49	57	47	46	39	57	47	59	45	56	48	60	49	68	56
17	62	52	62	54	74	56	67	55	59	50	54	43	49	42	56	48	59	46	55	48	65	49	67	53
18	61	52	64	54	62	52	61	55	53	48	51	42	60	43	55	46	61	46	55	47	63	49	64	52
19	60	50	60	53	60	52	63	55	54	44	54	43	62	52	55	47	59	46	67	50	60	50	67	52
20	60	49	61	54	63	53	65	55	56	47	57	47	55	46	54	47	55	44	68	50	61	49	71	54
21	60	50	70	52	64	53	67	58	57	46	53	43	55	45	60	48	55	44	60	49	60	50	67	54
22	60	51	65	53	64	53	61	55	56	52	53	43	57	48	56	46	59	48	62	52	66	49	67	53
23	63	52	66	54	62	52	62	56	59	54	51	41	54	51	56	47	59	46	71	53	68	51	64	52
24	63	52	65	55	62	51	57	52	63	57	54	47	55	49	59	46	61	48	70	54	71	54	64	55
25	66	54	71	54	78	50	54	50	62	55	51	43	60	50	54	45	54	45	72	52	67	52	63	53
26	66	56	66	55	64	52	60	52	59	53	49	40	59	43	63	45	57	43	60	51	68	51	67	52
27	66	54	65	56	62	54	62	52	64	48	52	43	52	42	56	45	59	49	60	51	63	50	66	54
28	63	53	64	54	62	53	61	52	62	57	52	40	53	44	54	45	57	49	60	53	62	49	64	54
29	65	54	62	52	67	52	65	52	63	52	54	42	53	43	.....	.....	54	42	60	52	62	49	63	53
30	65	53	61	53	67	52	67	53	58	52	55	42	54	43	.....	.....	54	44	56	51	66	52	63	53
31	64	53	64	52	.....	.....	68	54	.....	.....	52	43	51	42	.....	.....	61	45	.....	.....	70	51	.....	.....
Range	24°		49°		49°		28°		25°		22°		21°		20°		25°		41°		22°		30°	
Monthly means	57°.7		58°.7		60°.8		59°.6		56°.4		50°.7		49°.3		52°.0		51°.5		54°.5		57°.2		58°.5	

Maximum, minimum, and mean temperatures—Continued.

STATION, SANTA FÉ, N. MEX.

Date of month.	1874.												1875.											
	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	54	87.5	61	82	52	73	46	52	23.5	59	23	30	5	42.5	17	35	20	42	11	63.5	35	75	47
2	83	52	89	61	69.5	58	76	48	55.5	24	56.5	27.5	38	11	41	19	36	7.5	61	31	66.5	37	75	40
3	83	52	84.5	60	65	52	61	50	57	29	57	37.5	38	13	33	13	40	7.5	67	32	67	34	76	51
4	83	56	83.5	66	69.5	44	55	46	50	32	52	25.5	34	5	40	14	34	16	67	32	74	39.5	77	48
5	85	56	84	60	76.5	48	62	45	55	32.5	45	19	41	11	46	15	30	11	67	36	80.5	47.5	82	51
6	80	57	81	57	78	50	61.5	40	57	34	49	24	23	20	46	24	35	5	60	32	78.5	45	73	47.5
7	81	56	85	52.5	78	49	66	40	60	34	51	26	32	8.5	51	21	41.5	15	46	17.5	74	45	79	50
8	83	57	87	62	81	51	67	43	52	24	54.6	21.5	30	13.5	53	27	46	21.5	46	11	76	36	85.5	50
9	87	57	84.5	61	81	52	70	45	59	30	52	23.5	37	7	43	29.5	44	16	47	23	67	35	86	48
10	82	62	82.5	53	79.5	49	72	46	60	32	56	26.5	42	13	40	24	49.5	20	48	20	81	41.5	81	47
11	82	61	77.5	53	78.5	54	73	47.5	60	30	53	27.5	42	42	42	17	46	16	54	22	72.5	45	82	48.5
12	87	55	85	57.5	72	56	71.5	42	60	33.5	49	22	37	25	47	22	48.5	25	47.5	20	75	44	74.5	53
13	86	59	84	56.5	72	52	67.5	43	58	33	51	22	43	22	56	25	55	27	57	22.5	82	50	81	53
14	84	60	84.5	56	70	42.5	66.5	42	59.5	30	41	25	16	22	53.5	25	46	17	67	32	83	55	70	52
15	79	57	83	55	71	41	67.5	41.5	58	34	35	21	18	24	46	27	32	7	69	33	83	50	81	46
16	78	56	87.5	55	74	47	71.5	44	56	30	39	20	19	26	42	27.5	48	14	69	34	75	47.5	83	44.5
17	86	57	85	56	73	43	73	42.5	56	33.5	36	19	46	32	42.5	31	54	12	75	40	72	38	84	57
18	83	56	84.5	49	72	44	68	45	45	22	26	14	50	34	43.5	24.5	45	26.5	69	41	79	38	80	48.5
19	78	56	86	60	68	37	63	44	39.5	18	34	4	46	32	38.5	22.5	40	16	69	37	79	37	83	51
20	78	58	84	55	75	46	61.5	35	43.5	24	32	12	47	31	41	17	56	20	69	41	84	42.5	78	60.5
21	80	56	85	57	77.5	50	65	34	44	30	29	11	44	22	50.5	21	58	25	71	38	75	48	89	52.5
22	83	58	82.5	55	64.5	42	69	38	38.5	24.5	34	8	42	14	48	26.5	62.5	19	66	35	74	46	85	62
23	85	59.5	80.5	62	64	37	71	44	42	23	36	11	41	15	35	19	62	34	76	43	78	44	83	56
24	85	57.5	70.5	52	66	42	60	34	52	31	39.5	8.5	40.5	12.5	31.5	2	60	34	70	38	73	47	86	55
25	85	52.5	70	54	71.5	41	62.5	37	50.5	33	39	11	42	22.5	37	15	67	34	45	29	75	47	88	49
26	79.5	54	71	55	74.5	45	66	40	55	37	44	22	44	30	47	20	58	30	65	29	82	45	90	54
27	75	55	72.5	52	74	41	57	42	54	33	38	23	43	24	51	23	63	32	74	34	77.5	46	89	53
28	78	57.7	73.5	50	76	43	50	30.5	42	18	34	16	34	21	48	31	68	31	79	39	65	43	89	56
29	82.5	59.5	78.5	54	75	47	53	27	48	25.5	43	10	37	16	.....	.....	68	36	67	40	75	41	88.5	59
30	87.7	62.5	80.5	49	75	47	53	25	56	23	36	24	36	15	.....	.....	52	27	67	39	76	45	89	66
31	88	59.5	79.5	53	.....	.....	42	24	.....	.....	32	75	38	13	.....	.....	32	15	.....	.....	78.5	43	.....	.....
Range	36°		40°		45°		52°		42°		55°		45°		54°		63°		65°		49°		50°	
Monthly means	71°.1		69°.9		60°.6		52°.3		38°.7		29°.2		28°.1		31°.4		34°.4		47°.4		59°.2		67°.9	

Maximum, minimum, and mean temperatures—Continued.

STATION, SAUGEEN, CANADA.

Date of month.	1874.												1875.											
	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	47	70	54	73	44	59	41	60	31	32	13	25	9	23	8	8	— 2	65	33	39	22	84	54
2	63	49	63	54	82	53	60	45	46	31	50	31	25	19	29	15	12	3	37	30	36	27	81	60
3	71	44	64	35	77	41	52	40	59	36	52	18	24	17	23	— 1	18	—10	51	30	42	27	67	44
4	71	57	68	42	73	38	55	38	64	41	30	13	20	14.5	7	— 8	25.6	0	44	32.5	42	28	63	42
5	68	48	73	44	79	56	55	34	60	51	38	22	17	9	17	5	31	11	51	28.5	50	29	68	43.5
6	80	55	76	55	71	50	55	47	60	34	36	33	14	6	7	— 8	24	4	54	31	43	30	55	33
7	86	58	75	55	82	49	59	48	67	37	40	15	24	9	7	—12	33	— 5	47	31	60	30	49	38
8	76	56	74	49	75	55	62	42	68	47	29	11	22	8	8	—13	25	— 3	57	33.5	84	49	67	37
9	79	52	79	54	81	56	63	42	55	36	39	25	6	0	— 2	—21	33	2	57	34.5	65	38	71	51
10	76	58	80	59	82	60	62	48	59	35	35	25	13	1	17	—22	30	22.5	51	33	51	35.5	73	56
11	68	50	89	56	82	57	59	46	50	30	39	15	15	5	25	— 5	32.5	20.2	57	28	59	35	89	57
12	66	56	82	59	86	58	46	34	38	24	33	18	20	4	— 3	—14	35	16	51	37	50	33	76	39
13	72	55	71	50	86	60	41	30	28	22	26	18	33	19	5	—14	38	18	44	34.5	57	33	54	37.5
14	87	61	71	42	84	59	53	26	31	13	25	5	24	5	1	—23	48	35	44	29	49	40	61	34
15	84	57	71	44	80	54	59	34	49	31	21	5	16	9	5.5	—13	48	34	45	24	44	33	66	38
16	62	44	75	45	65	42	61	39	48	30	39	18	18	8	10.0	1	35	14	25	10.5	46	28	73	43
17	72	41	86	59	69	41	61	48	54	37	43	15	15	8	15	1	15	1	17	6	50	35	62	44.5
18	81	60	74	48	74	60	51	28	49	27	33	11	17	8	12	—11	12	0	22	15	57	33	61	38
19	89	59	83	50	84	58	53	24	32	24	38	31	15	4	24	6.5	13	— 7	29	17	64	34	64	41.5
20	65	41	79	60	65	47	63	45	37	24	38	14	15	4	21	14	23	6	25	16	60	40	69	38.5
21	68	39	68	57	61	40	53	29	35	23	30	12	23	9	15	— 3	18.0	0.5	28	14	65	46	77	50
22	75	47	72	49	65	47	57	29	38	23	36	28	29	20	33	3	19.5	— 8.0	35	24	61	43	77	57.8
23	79	53	70	48	73	47	64	42	37	31	36	31	24	13	31	16	37.0	— 3.0	38	26	73	41	71	56.1
24	81	62	68	43	76	53	56	46	35	23	40	23	29	17	36	14.5	36.0	12.5	35	25	74	56	86	55.3
25	84	67	72	45	75	54	68	53	30	20	29	20	21	16	22	12	27.0	10.0	40	29	63	45	68	48.4
26	80	54	74	45	78	59	69	53	38	24	38	22	20	9	17	— 8	46.0	26.5	42	26	67	36	83	59.3
27	68	54	76	52	71	52	61	45	42	30	37	21	24	10	11	—14	39.0	15.0	50	24.5	82	43	72	54
28	72	53	83	53	65	50	55	42	34	25	45	31	29	14.5	4	—10	35	4	63	29	80	58	65	45
29	67	47	80	52	66	46	58	46	32	15	38	11	20	— 5	.....	.....	41	17	45	32	66	40	68	48
30	80	45	78	50	61	43	52	34	17	6	20	6	21	0	.....	.....	53	32	37	28	62	34	69	50
31	73	58	67	49	.....	.....	40	32	.....	.....	20	5	17	9	.....	.....	59	40	.....	.....	71	45	.....	.....
Range	50°		54°		48°		35°		60°		47°		38°		59°		69°		59°		62°		56°	
Monthly means	.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....	

Maximum, minimum, and mean temperatures—Continued.

STATION, SAVANNAH, GA.

Date of month.	1874.												1875.											
	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	75	92	73	77	72	76	60	56	38	61	37	40	35	51	31	75	51	76	60	85	64	81	66
2	87	75	96	76	83	69	83	60	62	37	66	41	57	37	64	36	79	62	79	58	85	68	84	68
3	83	70	92	75	84	71	83	64	70	50	72	48	55	47	66	52	81	56	68	48	81	60	87	67
4	85	70	89	72	83	70	85	63	74	50	66	50	50	42	56	34	60	42	68	46	75	63	87	67
5	94	73	84	70	85	70	75	63	75	55	66	44	55	43	42	30	72	52	75	49	72	55	85	71
6	83	68	84	72	84	68	74	59	76	57	67	50	52	47	53	27	68	47	71	55	85	63	85	69
7	83	69	87	72	85	70	78	62	76	56	66	46	52	41	56	34	67	41	77	51	88	67	88	69
8	83	71	84	70	87	70	79	63	76	60	53	37	54	40	46	31	58	40	78	53	89	69	76	66
9	87	73	86	73	90	69	89	59	76	59	59	(*)	61	40	54	32	65	43	80	62	89	69	78	63
10	88	73	89	73	80	67	83	61	78	63	65	.....	44	33	47	34	61	50	83	64	90	71	82	63
11	87	73	95	72	77	66	79	66	81	64	64	.....	38	34	64	42	64	43	74	63	80	63	87	65
12	85	70	95	77	83	67	77	61	65	50	61	.....	47	36	59	36	64	57	78	63	88	66	96	69
13	85	71	88	70	82	72	66	48	61	45	66	.....	56	38	67	39	75	58	68	55	76	68	90	65
14	87	75	87	74	84	72	60	42	70	39	69	.....	53	45	64	54	72	58	65	45	78	65	88	72
15	87	73	85	70	88	73	76	42	65	44	58	.....	55	40	62	48	77	60	70	49	81	64	93	75
16	92	71	84	72	87	72	73	59	68	57	60	.....	66	39	62	47	67	54	80	54	76	63	99	75
17	92	74	83	69	90	70	73	59	70	59	69	.....	56	45	51	45	58	45	61	47	71	55	91	72
18	89	74	84	69	90	70	76	56	67	62	65	.....	66	43	54	43	61	41	61	40	71	54	95	74
19	81	73	87	76	87	73	70	54	68	62	59	.....	53	45	51	42	64	50	72	40	80	59	87	75
20	82	72	88	75	87	73	73	54	71	56	65	45	50	39	66	49	80	60	81	51	80	65	86	65
21	85	73	89	76	81	70	74	55	65	47	58	37	58	41	59	37	74	58	78	57	78	62	82	69
22	90	74	93	76	81	66	75	55	70	48	66	45	71	50	62	36	60	45	60	46	76	64	88	70
23	89	74	93	73	81	64	73	62	75	61	66	54	62	50	73	51	54	39	54	46	74	66	89	71
24	84	72	85	76	78	64	74	62	67	48	58	48	65	51	80	60	72	47	70	46	83	69	90	70
25	86	70	82	71	81	68	71	61	66	50	55	41	61	46	78	57	65	51	63	49	86	67	90	73
26	83	74	82	66	82	67	73	59	58	40	70	47	57	39	60	42	72	52	74	53	89	69	89	72
27	85	72	79	67	82	68	75	56	65	45	74	59	62	43	72	46	75	60	76	64	86	69	93	73
28	86	73	75	66	75	64	78	58	73	49	76	58	74	49	62	44	72	60	75	56	80	70	92	74
29	88	70	76	65	75	57	78	59	65	48	76	62	68	62	.....	.....	71	52	78	57	85	66	89	74
30	85	74	84	71	78	57	81	60	60	40	69	45	61	47	.....	.....	61	46	84	61	81	61	88	74
31	86	74	81	71	.....	.....	66	48	.....	.....	.....	.....	61	45	.....	.....	71	54	.....	.....	81	70	.....	.....
Range	26°		31°		33°		47°		44°		.....		41°		50°		42°		40°		36°		36°	
Monthly means	79°		79°		75°.3		66°.3		59°.6		54°.6		49°.7		50°.7		59°.2		62°.5		73°		79°.4	

* Minimum thermometer out of order.

Maximum, minimum, and mean temperatures—Continued.

STATION, SHREVEPORT, LA.

Date of month.	1874.												1875.											
	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	94	76	94	71	85	60	59	31	70	40	43	35	58	31	78	50	60	40	80	58	100	70
2	92	72	96	78	94	70	86	61	64	31	74	50	46	39	61	48	50	39	71	39	80	48	98	73
3	94	73	95	79	94	74	86	67	70	37	71	58	48	39	58	28	51	30	79	47	81	52	103	72.5
4	87	72	97	76	90	71	84	69	77	55	76	53	42	31	39	22	62	38	82	52	81	54	97	76
5	86	71	97	77	85	72	80	67	81	58	64	58	34	28	48	35	77	48	81.5	57	90	55	100	67
6	88	74	98	78	83	70	86	59	81	59	63	51	39	29	52	29	60	30	86	64	96	62	91	69
7	94	72	99	79	88	74	80	66	82.5	56	61	43	38	33	45	24	52	27	84	65	94	68	83	60
8	97	71	97	79	87	73	81	60	83.5	64	64	35	43	35	66	28	69	33.5	79	54	94	73	93	59
9	92	74	97	80	87	74	84	56	84	64	72	41	38	14	53	44	62.5	50	84	49	86	69	96	66
10	81	73	101	79	84	72	85	53	84	65	69	52	29	13	73	45	74	40	84	56	91	56	101	72
11	91	73	97	78	88	70	87	56	84	67	64	47	40.5	17	54	32	65	48	73	47	92	60	101	73
12	92	72	100	80	90	71	70	54	70	52	69	47	51	35	69	33	73	51	63	47	84	59	100	73
13	93	72	100	77	89	67	68	45	67	44	73	53	47	35	67	55	84	54	72	44	91	54	99	74
14	86	72	98	77	88	69	76	43	76	49	60	45	41	30	65	49	80	66.5	76	47	98	61	101	76
15	86	70	99	77	82	71	81	49	76	62	51	40	46	29	50	36	69	48	86	47	91	67	102	72
16	88	68	97	76	81	68	80	61	69	63	67.5	40	51	41	55	34	63	37	70	55.5	87	64	103	73
17	90	69	95	76	86	66	74	50	72	59	59	43	42	27	57	45	67	38	77	46	90	62	101	73
18	91	72	90	71	90	70	76	50	60	54.5	53	39	40	36	61	44	71	44	86	51	94	65	103	76
19	92	74	87	71	77	68	81	49	54.5	43	49	37	44	33	58	46	60	40.5	82	56	94	66	90	73.5
20	93	74	86	74	78	60	82	51	52	35	53	34	56	29	57	34	59	36	77	62	92	67	98	73
21	93	74	91	75	80	56	81	53	63	44	52	35	67	49	70	38	69	38	73	59	94	68	99	74
22	93	76	94	78	80	59	82	59.6	77	62	55	37	62	43	76	45	74	40	62	46	96	71	104	75
23	94	76	97	73	84	68	79	55	68	52	63	33	46	41	78	59	70	46	74	45	95	71	102	74
24	95	76	89	72	80	69	83	54.3	77	45	53	38	56	42	77	59	64	58	82	48	101	71	99	74
25	94	78	92	76	82	70	84	58	55	40	55	43	58	36	60	34	76	53.5	70	55	98	69	104	75
26	95	76	94	76	85	69	84	65.7	66	36	65	49	52	45	71.5	37	76	63	61	51	85	68	101	75
27	96	73	95	76	78	63	86	61	72	46	77	60	75	52	73	47	72	60	75	46	92	68	102	77
28	94	76	95	71	86	56	84	59	67	38	77	63	73	47	74	53	78	58	90	49	87.5	73	87	76
29	88	73	95	78	79	56	76	58	63	33	65	47	47	39	.....	.....	89	61	77	60	81	68	100	75
30	90	66	97	75	85	57	65	45.9	65	36	49	40	51	31	.....	.....	86	66	87	61	88	63.5	100	75
31	92	68	93	70	.....	.....	55	39.5	.....	.....	40	36	48	32	.....	.....	76	52	.....	.....	96	70	.....	.....
Range	31°		31°		38°		47°.5		53°		43°		62°		56°		62°		50°		53°		44°	
Monthly means	82°.5		86°		75°.4		65°.6		58°.7		52°.9		41°.4		49°.9		57°.2		63°.0		74°.7		83°.1	

Maximum, minimum, and mean temperatures—Continued.

STATION, SPRINGFIELD, MASS.

Date of month.	1874.												1875.											
	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	.....	.....	.....	.....	.....	.....	.....	.....	49	•36	32	12	28	6	26	14	17	5	55	37	.....	38	76.5	49.5
2	.....	.....	.....	.....	.....	.....	.....	.....	50	36	43	30	36	16	29	0	39	13	57	42.5	.....	38	73	47.5
3	.....	.....	.....	.....	.....	.....	.....	.....	51	28	50	34	34	26	44	11	26.5	15	50.5	41	.....	38.5	72.5	46
4	.....	.....	.....	.....	.....	.....	.....	.....	56	31	44	24	34	25	42	13	29	16	42	35	.....	39.5	80	54.5
5	.....	.....	.....	.....	.....	.....	.....	.....	57	35	35	16	32	19	22	9	32	14	51	38.5	65.5	38.5	82	55
6	.....	.....	.....	.....	.....	.....	.....	.....	61	48	43	32	28	10	24	7	39	25.5	48	34	54	44.5	(*)	64
7	.....	.....	.....	.....	.....	.....	.....	.....	56	39	40	34	30	20	8	1	39	26	46	33.5	59	39.5	67.5	64.5
8	.....	.....	.....	.....	.....	.....	.....	.....	56	32	37	20	31	23	17	0	38	24.5	42	29	50	39.5	73	54.5
9	.....	.....	.....	.....	.....	.....	.....	.....	63	49	42	20	29	8	10.5	3	40.5	8.5	52	33.5	68.5	42.5	65.5	55
10	.....	.....	.....	.....	.....	.....	.....	.....	62	38	40	32	29	1	20	2.5	40	17.5	58	36.5	73.5	50.5	74.5	53.5
11	.....	.....	.....	.....	.....	.....	.....	.....	56	41	41	31	22	— 3	41	9	42	19	59.5	36.5	70	46	81.5	56.5
12	.....	.....	.....	.....	.....	.....	.....	.....	47	33	34	21	23	3	23	7	51	31.5	43	34.5	69	52	73	59.5
13	.....	.....	.....	.....	.....	.....	.....	.....	36	23	31	19	29	17	24	6	40	25	37	29	65	46	63.5	50
14	.....	.....	.....	.....	.....	.....	.....	.....	34	21	43	9	32.5	19	17	2.5	42.5	29	47	27.5	68	41	68.5	42
15	.....	.....	.....	.....	.....	.....	.....	.....	42	17	13	0	19	9	13.5	1	39	36	51	34	67.5	46	73.5	48
16	.....	.....	.....	.....	.....	.....	.....	.....	50	27	30	4	20	10	21	2	42	35.5	50	31.5	54	43.5	77	49
17	.....	.....	.....	.....	.....	.....	.....	.....	50	34	43	28	21	9	32	4	40	20	38	28.5	62.5	36.5	73.5	50.5
18	.....	.....	.....	.....	.....	.....	.....	.....	54	38	31	18	14	2	21.5	7	27	13	36	26.5	62	39.5	60	50.5
19	.....	.....	.....	.....	.....	.....	.....	.....	37	29	44	29	17	— 6	25.5	2	30	15.5	36	22.5	61	45.5	72	50.5
20	.....	.....	.....	.....	.....	.....	.....	.....	35	23	35	27	19	— 5	36	24	25.5	13.5	35	25	71.5	47.5	75.5	49.5
21	.....	.....	.....	.....	.....	.....	.....	.....	40	34	31	14	18	2	32.5	21	30.5	16	37.5	23.5	79.5	48	82	49.5
22	.....	.....	.....	.....	.....	.....	.....	.....	40	30	35	7	28.5	15	39	15	27	3.5	46.5	27.5	79.5	61	(*)	49.5
23	.....	.....	.....	.....	.....	.....	.....	.....	39	26	44	25	30	11	47	33	31	8.5	55	34.5	86.5	58.5	76	65
24	.....	.....	.....	.....	.....	.....	.....	.....	42	32	41	32	24.5	2	52	39	34.5	1.5	50.5	35	76	57	89.5	68.5
25	.....	.....	.....	.....	.....	.....	.....	.....	37	24	36	24	32.5	15	43.5	37	34.5	25.5	52.5	40.5	(*)	61.5	86	69.5
26	.....	.....	.....	.....	.....	.....	.....	.....	36	25	38	16	25	17	35	23	38	25	52.5	39.5	81	61.5	83.5	64
27	.....	.....	.....	.....	.....	.....	.....	.....	46	19	45	26	25	11	24	14	53	31.5	60	34	78	52	88.5	67
28	.....	.....	.....	.....	.....	.....	.....	.....	43	28	45	35	26	0	15.5	6	42	30	(*)	34	78.5	51	90.5	69
29	.....	.....	.....	.....	.....	.....	.....	.....	53	30	44	23	32	22	.....	.....	44	26	.....	33	78.5	54	74.5	62.5
30	.....	.....	.....	.....	.....	.....	.....	.....	28	18	27	15	34	18	.....	.....	52	31	.....	39.5	73.5	53	83.5	60.5
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15	— 1	29	11	.....	.....	46	32.5	.....	.....	75	48.5	.....	.....
Range	.....	.....	.....	.....	.....	.....	.....	.....	40°		51°		42°		52°		50°.5		.....		.....		.....	
Monthly means	.....	.....	.....	.....	.....	.....	.....	.....	39°.5		30°.5		209.0		20°.7		29°.9		41°.9		58°.0		67°.2	

* Maximum thermometer out of order.

Maximum, minimum, and mean temperatures—Continued.

STATION SQUAN BEACH, N. J.

Date of month.	1874.												1875.									
	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	62	90	65	76	58	62	41	50	27	38	18	24	6	30	20	40	12	48	40	49	38	63	50
2	75	63	83	64	78	52	74	52	52	26	48	26	37	21	36	16	47	30	52	40	59	38	62	43
3	77	63	76	51	90	56	66	38	55	28	60	35	34	22	31	12	35	24	51	41	59	33	63	53
4	76	57	71	51	70	60	60	50	55	30	49	34	38	28	42	15	36	23	50	34	51	33	72	53
5	77	61	74	54	72	63	56	43	60	31	41	25	33	20	22	10	36	26	61	32	59	38	69	53
6	69	58	76	52	73	61	62	44	68	38	45	26	37	14	31	12	36	30	48	21	49	32	72	55
7	70	56	78	63	86	58	66	61	54	34	42	37	39	32	18	8	35	29	42	35	58	31	80	54
8	78	63	71	62	76	56	64	58	59	31	30	22	26	24	19	5	39	24	44	35	58	42	64	50
9	80	65	73	63	74	61	70	52	64	44	47	20	36	7	6	— 1	38	19	48	38	53	44	60	55
10	73	65	85	59	82	52	72	51	60	32	42	25	30	— 3	18	— 5	45	29	64	37	79	48	65	55
11	78	58	80	66	80	60	70	49	65	44	43	28	28	5	43	12	47	23	60	40	66	46	70	55
12	73	54	78	67	75	63	61	42	46	28	38	21	32	14	26	11	60	36	50	37	67	47	72	57
13	84	55	78	67	69	63	52	36	42	20	43	23	38	14	31	18	38	31	48	31	56	40	67	51
14	80	58	70	64	71	65	50	30	33	20	50	17	33	23	28	8	36	25	52	30	54	40	71	40
15	85	65	74	59	76	65	58	26	46	18	22	8	24	12	16	4	48	34	47	32	66	47	69	50
16	91	63	77	55	72	68	66	35	51	26	35	8	28	12	19	4	49	36	51	34	63	40	70	56
17	73	61	74	59	70	65	64	36	55	34	46	30	28	16	44	5	41	19	48	22	60	36	71	52
18	77	57	89	61	70	65	62	42	59	38	42	27	24	5	22	5	30	11	36	19	57	39	76	53
19	76	60	79	56	69	66	55	35	42	29	45	24	18	—10	31	8	34	20	43	19	67	44	78	51
20	81	62	94	65	69	60	66	31	51	38	51	25	18	— 2	40	29	34	25	47	29	80	50	78	47
21	78	60	84	69	69	52	66	41	41	25	33	23	31	2	35	24	32	17	46	28	88	56	76	50
22	75	58	78	60	65	46	61	37	45	21	43	21	40	28	38	22	29	9	52	25	83	53	68	50
23	80	54	70	67	70	45	58	41	58	43	47	30	33	14	44	32	29	11	53	27	75	56	67	55
24	78	56	72	61	74	49	60	54	46	28	45	31	45	11	57	34	34	19	48	34	62	53	82	53
25	77	54	68	65	79	53	58	45	39	21	35	22	36	20	48	34	35	26	55	31	60	50	95	61
26	77	65	66	61	73	54	61	38	40	19	46	19	28	13	45	30	41	22	63	32	73	52	80	62
27	74	63	69	62	71	51	65	41	48	19	45	36	29	13	36	20	58	36	59	31	64	54	95	65
28	77	63	70	56	65	60	66	46	51	33	56	40	38	26	22	14	45	27	44	37	79	49	95	69
29	74	64	70	51	66	55	65	55	54	29	55	34	40	25	.....	.....	39	30	45	34	82	52	74	64
30	82	58	71	48	66	49	62	40	31	20	31	19	38	22	.....	.....	45	30	67	39	73	53	85	63
31	82	56	73	53	.....	.....	50	31	.....	.....	24	11	31	22	.....	.....	46	39	.....	.....	68	52	.....	.....
Range	37°		42°		45°		48°		50°		52°		55°		62°		51°		48°		57°		55°	
Monthly means	69°.2		68°.8		66°.4		52°.8		40°.1		31°.2		24°.9		21°.1		33°.2		41°.3		54°.6		64°.4	

Maximum, minimum, and mean temperatures—Continued.

STATION, SALT LAKE CITY, UTAH.

Date of month.	1874.												1875.											
	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	64	81	63	72	60	82	56	52	29	61	35	41	25	42	22	38	22	51	28	67	47	59	37
2	98	66	90	61	66	52	69	53	56	32	53	34	46	29	42	20	40	23	50	42	63	49	72	40
3	98	74	91	63	69	51	65	47	53	37	45	34	43	26	38	17	40	28	56	33	70	45	79	56
4	85	68	90	66	76	48	68	48	49	41	42	28	40	24	38	21	37	20	45	28	75	45	67	49
5	91	64	88	69	84	50	67	42	57	45	43	27	42	18	38	21	33	21	44	26	85	53	75	46
6	88	66	91	71	90	58	71	47	58	32	45	27	30	8	37	21	40	18	39	27	77	42	83	53
7	95	67	88	69	89	62	71	50	41	25	45	27	40	20	39	22	39	28	31	22	54	41	87	59. 2
8	92	68	88	63	88	61	71	47	52	38	46	28	41	21	38	22	40	27	43	19	53	38	85	45
9	91	65	94	65	77	53	71	50	52	44	54	31	33	12	37	23	50	24	47	20	63	39	73	48
10	92	63	82	65	74	42	74	47	55	42	48	30	39	22	40	30	42	31	53	30	56	40	69	45
11	93	66	82	57	58	44	77	51	59	43	46	29	41	28	43	22	39	28	54	35	64	38	84	50
12	88	69	90	63	65	43	74	53	61	39	36	25	31	19	45	23	46	29	56	40	72	44	87	60
13	94	64	90	62	67	44	72	55	55	36	40	28	28	17	46	32	37	23	59	37	76	46	88	66
14	89	67	91	62	72	46	72	50	45	31	44	23	46	20	44	28	31	20	63	37	85	57	77	53
15	90	67	90	65	82	48	72	49	48	31	44	26	43	23	42	28	38	19	66	41	82	57	86	52
16	93	67	88	65	74	48	72	49	45	28	39	24	25	5	46	28	44	29	69	44	63	43	87	61
17	86	68	90	68	63	47	75	50	45	27	37	21	30	17	39	30	41	29	69	42	62	42	73	55
18	87	65	82	68	60	41	66	53	45	32	37	18	34	18	41	29	33	22	71	44	76	43	77	53
19	87	67	77	59	69	41	60	46	46	35	36	19	51	28	43	31	40	15	73	46	78	51	90	55
20	85	70	86	60	67	53	64	44	47	28	37	20	50	29	49	36	39	25	67	52	83	51	73	58
21	90	65	80	66	70	51	66	45	51	34	40	22	36	22	48	31	50	22	72	48	81	57	86	52
22	88	68	86	60	71	50	73	48	49	35	44	32	45	26	39	23	57	35	79	51	68	51	87	62
23	87	56	91	64	74	47	70	50	49	38	40	21	32	14	38	25	49	34	66	47	75	46	87	59
24	77	67	88	67	76	50	62	46	53	45	45	28	34	13	36	22	66	35	58	40	76	49	87	59
25	79	65	77	59	76	50	58	42	59	45	39	28	37	23	48	23	57	34	61	42	80	52	82	60
26	82	63	76	62	75	49	66	42	57	33	35	24	39	30	49	33	54	29	74	40	67	47	84	57
27	85	60	75	56	79	50	53	41	47	30	33	22	35	25	56	29	52	36	65	52	61	38	84	57
28	92	64	80	61	79	49	50	36	52	32	36	22	35	25	48	31	62	35	63	46	73	41	93	57
29	92	67	87	63	81	53	51	36	53	32	38	21	35	25	.....	.....	56	26	67	43	79	56	87	69
30	90	67	85	65	81	54	51	31	53	30	38	20	38	27	.....	.....	33	22	66	51	77	55	87	63
31	85	64	84	62	.....	.....	48	31	.....	.....	38	24	35	19	.....	.....	40	18	.....	.....	65	51	.....	.....
Range	42°		38°		49°		51°		34°		43°		46°		39°		51°		60°		56°		56°	
Monthly means	78°. 2		74°. 7		62°. 6		55°. 6		43°. 4		33°. 0		29°. 4		33°. 7		35°. 2		50°. 3		60°. 1		69°. 1	

Maximum, minimum, and mean temperatures—Continued.

STATION, SAINT LOUIS, MO.

Date of month.	1874.												1875.											
	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.	n.	Max.	Min.	Max.	Min.	Max.	Min.
1	89	72	82	70	83	61	83	52.5	58	29.5	56	23	32	27	48	16	51	21	50	35	61	41	81	64
2	90	71	82	66	83	66	72	55	66	40	65	43	32	14	48	36	28	17	61	35	51	32	86	66
3	93	73	83	65	77	64	71	52	65	44.5	62	38	30	18	41	5	28	15	70	46	52	44	75	60
4	97	75	85	65	76	60	69	52	68	52	50	33	20.6	− 5	15	− 2	31	12	72	47	57	42	70	59
5	98	78	78	65	76	62	73	51.5	73	52	50	40	12	− 1	42	9	48	27	78	55	70	48	75	62
6	100	79	88	68	87.5	64.5	67	55	74	52	51	34	22	7	40	9	33	27	78	58	68	47	70	56
7	100	79	85.5	73	87	69.5	62	53	76	58.5	46	32	29	16	15	− 2	35	18	78	61	88	59	68	51
8	90	75	85	71	86	70.5	63	54	60	53	48	27	32	− 6	18	7	46	20	74	46	83	71	73	54
9	82	72	89.5	70	86	71.5	69	52	65	45.5	48	32	5	−16	16	− 3	47	32	61	42	74	50	80	58
10	89	72	100	70	88	72	72	51	66	48	34	28	20	− 2	40	13	52	34	36	40	73	51	88	64
11	84	66.5	101	79	89	71	61	47	50	38	45	28	26	11	24	5	61	35	54	37	75	55	92	70
12	85	64	98	82	90	70	53	36	47	35	55	23	35	18	40	13	51	33	47	39	69	48	81	62
13	92	72	92	78	88	67	54	36	47	31	57	35	32	10	28	10	70	38.5	59	36	77	53	68	51
14	94.5	74.5	83	64	87	71	58	39.5	(*)	.....	37	22	12	− 3	19	9	79	58	57	46	82	60	84	56
15	91	70	85	68	68	52	60	48	55	39	42	26	22	− 1	17	2	61	32	63	40	65	49	84	69
16	83	68	89	65.5	71	51	56	49	63	40.5	52	26	20	10	43	14	35	26	42	25	65	39	85	61
17	91.5	68	90	68	78	62	68	47	60	34	30	26	23	8	34	7	40	18	42	22	69	47	85	66
18	88	69.5	92	73	85	63.5	66	49.5	38	31.5	42	17.5	20	15	29	6	40	28	57	30	73	51	80	63
19	93	74	94	74	77	56	69	46	35	30	47	27	26	12	38	25	32	18	76	45	76	57	75	65
20	93	75	93	77	67	51.5	73	49	32	23	38	26.5	46	18	44	18	30	18	64	43	82	59	79	62
21	86	71	93	78	66	54.5	73	56	51	28	45	25	48	34	37	26	36	22	53	35	75	63	86	62
22	84	67	93	73	74	54.5	64	57	60	42.5	48	31	47	24	64	32	43	30	53	31	74	60	90	71
23	93	76	78	69	79	57	64	55.5	60	34	45	31	47	27	57	39	53	33	63	40	83	61	92	75
24	97	81	81	64	69	64.5	68	51	34	22	48	29	39	25	57	30	48	35	58	35	86	66	91	76
25	99	80.5	84	65	75	66	74	53	33	16	50	29.5	46	25	42	25	58	33	52	38	90	68	85	71
26	97	81	82	67	79.5	63.5	70	61	50	25.5	52	37	54	37	58	30	59	46	52	46	88	66	85	71
27	82	72	81	67	68.5	53.5	77	60	46	24	50	41	50	42	34	18	61	37	62	45	85	69	84	69
28	79	62	80	70	68	49.5	80	66	30	21	57	32	44	30	46	25	60	45	73	49	81	60	70	59
29	83	64.5	82	70	77	51	72	43	30	15	36	13	35	25	.....	.....	69	45	64	52	72	52	79	61
30	89	69	77	66	70	52.5	45	35	26	11	25	15	43	22	.....	.....	78	54	62	43	77	56	85	67
31	81	72	72	63	.....	.....	45	30	.....	.....	29	15	23	1	.....	.....	70	50	.....	.....	73	60	.....	.....
Range	38°		38°		40°.5		53°		.....		52°		70°		67°		67°		56°		58°		41°	
Monthly means	81°.5		78°.3		70°.2		58°.1		44°.3		37°.8		24°.1		26°.2		40°.0		52°.0		64°.9		73°.2	

* No observation taken.

Maximum, minimum, and mean temperatures—Continued.

STATION, SAINT MARK'S, FLA.

Date of month.	1874.												1875.											
	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	.....	.....	.....	.....	.....	.....	.....	...	.....	.....	65	35	59	46	53	31	73	60	78	61	77	63	88	69
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	73	35	64	47	65	40	71	64	72	51	83	68	90	69
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	44	65	55	68	52	75	55	66	42	79	65	89	67
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	72	43	64	50	52	33	55	45	75	41	73	64	86	63
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	69	49	57	46	43	30	71	54	80	47	78	60	86	67
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	66	54	57	45	52	28	67	59	78	53	80	62	85	68
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	62	44	69	54	61	32	64	46	74	52	82	65	83	62
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	53	34	58	48	50	30	59	36	75	53	83	68	83	67
9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	61	25	53	39	60	31	66	37	76	55	84	63	85	62
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65	29	47	34	61	47	64	44	77	63	83	66	88	66
11	.....	.....	.....	.....	.....	.....	.....	.....	*76	60	69	32	47	41	68	48	65	38	76	66	85	64	91	62
12	.....	.....	.....	.....	.....	.....	.....	.....	68	60	63	34	52	41	62	35	77	52	77	65	83	66	91	65
13	.....	.....	.....	.....	.....	.....	.....	.....	64	47	68	31	67	50	67	36	77	64	68	53	83	62	96	72
14	.....	.....	.....	.....	.....	.....	.....	.....	67	45	69	47	64	55	72	47	74	64	66	45	85	66	93	68
15	.....	.....	.....	.....	.....	.....	.....	.....	75	49	61	42	58	43	68	54	74	65	72	45	86	64	91	67
16	.....	.....	.....	.....	.....	.....	.....	.....	77	60	67	44	65	40	57	48	71	49	80	57	86	63	94	70
17	.....	.....	.....	.....	.....	.....	.....	.....	71	64	68	56	57	55	51	45	58	40	66	47	79	62	94	73
18	.....	.....	.....	.....	.....	.....	.....	.....	70	66	61	52	69	58	59	44	64	40	70	40	81	53	93	73
19	.....	.....	.....	.....	.....	.....	.....	.....	71	64	68	52	61	53	64	50	69	53	70	37	81	55	90	72
20	.....	.....	.....	.....	.....	.....	.....	.....	73	60	65	41	57	50	68	50	73	65	75	44	83	57	89	67
21	.....	.....	.....	.....	.....	.....	.....	.....	67	43	61	34	63	47	61	37	74	58	75	60	85	58	91	68
22	.....	.....	.....	.....	.....	.....	.....	.....	73	52	66	38	71	58	67	38	59	43	74	59	77	63	91	68
23	.....	.....	.....	.....	.....	.....	.....	.....	80	60	72	56	69	59	72	58	65	39	68	50	86	65	91	69
24	.....	.....	.....	.....	.....	.....	.....	.....	66	40	62	47	67	57	72	60	72	44	72	42	91	63	89	70
25	.....	.....	.....	.....	.....	.....	.....	.....	68	50	60	43	59	52	77	57	74	55	78	48	92	70	88	71
26	.....	.....	.....	.....	.....	.....	.....	.....	66	38	68	52	67	50	66	44	73	54	77	58	92	70	88	70
27	.....	.....	.....	.....	.....	.....	.....	.....	75	50	72	59	66	50	70	42	75	60	75	61	92	67	90	70
28	.....	.....	.....	.....	.....	.....	.....	.....	73	64	72	53	70	51	71	44	75	65	75	50	87	65	86	71
29	.....	.....	.....	.....	.....	.....	.....	.....	64	44	74	56	75	60	.....	.....	77	63	77	54	91	64	87	72
30	.....	.....	.....	.....	.....	.....	.....	.....	63	38	70	57	62	47	.....	.....	70	62	78	53	86	67	89	69
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	60	48	59	44	.....	.....	78	54	.....	.....	86	69	.....	.....
Range	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	50°		35°		49°		42°		39°		39°		36°	
Monthly means	.....	.....	.....	.....	.....	.....	.....	.....	62°.0		55°.2		55°.9		53°.1		61°.5		62°.6		73°.1		78°.6	

* Station opened November 11, 1874.

Maximum, minimum, and mean temperatures—Continued.

STATION, SAINT PAUL, MINN.

Date of month.	1874.												1875.									
	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	60	79	55	85	58	66	50	42	26	36	14	23	0	12	5	10	3	30	21	35	29	76	61
2	79	61	75	57	74	55	57	40	54	29	43	30	4	—11	9	2	15	0	45	11	53	24	67	45
3	94	66	74	56	67	44	59	36	50	27	34	27	2	—15	2	—20	18	—12	46	35	56	38	58	40
4	94	71	79	61	66	51	67	46	51	45	38	30	8	—18	— 6	—25	25	— 6	46	28	60	37	60	41
5	96	70	78	62	74	48	61	52	56	42	42	27	3	—20	3	—15	28	11	45	35	57	32	68	46
6	93	67	82	63	88	55	58	48	68	36	32	22	9	— 6	— 7	—24	30	2	40	32	50	40	60	46
7	90	68	80	62	92	64	61	36	72	51	26	12	12	— 8	5	—29	28	0	50	33	50	39	70	45
8	88	69	86	61	91	67	60	40	50	38	40	20	9	—30	— 5	—25	29	21	49	37	50	39	67	50
9	85	65	88	66	86	68	67	52	52	34	30	14	— 6	—30	4	—32	34	20	38	29	65	36	75	56
10	76	61	90	65	77	69	56	40	42	35	28	8	5	—17	15	— 8	35	21	46	28	64	37	77	55
11	80	57	91	71	85	64	46	34	36	27	15	0	— 6	—23	—11	—30	25	23	47	27	60	47	75	50
12	82	61	81	66	73	54	46	24	31	24	20	3	6	— 6	2	—30	33	13	50	31	65	39	65	40
13	89	64	77	55	72	45	55	27	33	20	20	9	2	—21	4	—18	38	31	48	35	55	47	66	49
14	91	70	76	60	64	45	47	42	37	26	25	2	—11	—25	2	—25	33	27	57	31	57	44	67	54
15	75	60	85	65	61	38	51	43	34	23	48	19	— 3	—22	4	—25	27	6	50	18	67	37	77	55
16	84	55	93	64	65	43	61	41	36	26	32	17	— 2	—20	18	—20	10	2	20	10	67	41	80	61
17	89	65	77	61	65	50	62	43	34	11	17	— 5	3	—20	4	—15	13	— 6	38	10	72	44	70	53
18	86	67	82	56	60	46	62	35	13	2	32	— 1	2	—15	21	—15	13	— 4	63	25	77	46	70	53
19	80	72	91	65	53	47	74	44	20	5	27	12	— 1	—25	20	10	18	—15	45	33	82	51	76	55
20	78	57	78	65	60	37	64	49	28	17	20	1	18	—10	18	8	25	— 8	47	27	83	56	76	59
21	85	53	70	62	62	46	61	43	35	24	29	12	21	1	18	—10	29	3	52	32	84	55	85	62
22	88	60	68	57	72	49	67	50	36	29	29	12	10	—10	22	8	33	1	57	37	88	57	83	64
23	86	68	77	51	76	45	70	47	33	8	29	16	25	5	24	—11	35	26	50	34	87	61	72	54
24	90	63	79	62	79	52	70	50	14	6	17	0	8	—10	13	4	31	9	50	24	88	62	82	59
25	93	67	83	58	68	55	71	56	17	7	25	15	2	—20	8	— 5	43	17	57	30	82	55	81	62
26	75	61	75	59	64	52	52	39	31	9	16	6	20	0	11	— 6	44	26	62	32	85	56	79	60
27	77	53	75	62	57	47	45	35	18	5	27	8	20	6	3	—12	35	14	62	38	82	66	70	55
28	88	59	75	66	71	42	56	40	17	6	20	—13	15	0	6	0	55	30	56	41	68	51	78	52
29	87	63	76	65	65	45	40	33	6	— 8	0	—18	10	— 5	.....	.....	54	37	54	25	74	46	79	60
30	88	62	75	54	67	37	34	26	16	— 2	0	—18	4	—10	.....	.....	60	35	50	25	78	57	80	56
31	86	65	81	54	.....	.....	36	21	.....	.....	10	—20	6	—20	.....	.....	35	25	.....	.....	70	58	.....	.....
Range	46°		42°		55°		49°		80°		68°		55°		56°		75°		53°		63°		45°	
Monthly means	74°. 7		70°. 5		60°. 9		49°. 4		28°. 7		18°. 8		— 2°. 3		— 1°. 8		22°. 0		39°. 7		56°. 8		63°. 6	

Maximum, minimum, and mean temperatures—Continued.

STATION, SIDNEY, CANADA.

Date of month.	1874.												1875.											
	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	48.6	42.8	66.4	50.5	74	55.3	65.7	47.8	51.7	32.1	33.3	18.4	16.5	11.4	26.7	15.6	21	— 3	35	1.5	36	32.3	57.7	29
2	60.6	44.7	76.4	59.3	60	57	60.5	44.7	48.6	29	37	21.7	24.2	14	23.3	10.6	19.3	— 2.3	37.6	28.8	50.5	26.3	67.2	31.5
3	64.1	43.7	72	56	66.5	56.4	66	50.2	47.9	30.1	42.2	31	32.8	24.2	26.9	5.4	14	5	52.6	33.5	50.3	32.5	71.9	31.7
4	54.2	43	70	50.2	62	44	60	36	52.3	31.5	48.1	30	24.3	10	4.5	20	16.6	—14	48.9	31.2	47.7	30	56.5	38
5	56.3	43.4	69	49.6	71	42.6	55	38	56.8	34	34	20.3	22.7	15.4	22.3	2	24.6	1.0	36.4	29.5	39	30	74.7	35.7
6	55.5	46.5	61	52	71	48	56	42	50	43.8	36.1	28.8	15.5	6.4	14.1	— 4.4	31.2	2.4	35.1	25	47.7	28.7	83.7	46
7	69.8	45.4	68	54	65	59	60	36	48.6	36.6	53.6	30.8	18.3	— 2.8	4.8	—19.8	31	23.6	26.3	15	42	26.3	69	46.5
8	69.2	49.4	75.5	52.8	63.7	49.5	64	43	39.6	33.3	53	39	28.6	15.3	18.4	—24	25.3	19.7	27.2	14.5	40	26	71.8	47
9	75.2	52.6	71	57.4	62	44.6	56	45	49.6	33	43.7	27.6	26.6	19	11.8	—21.5	20	—10	31	6.5	56.4	23.5	67.2	46
10	71.4	48.4	73	59	64.9	46	65	52	44	37	42.9	27	34	5	13	—21	22.9	—17	34.3	9.5	55.2	37.5	71.9	52.4
11	77.4	47.6	75.4	58.6	57	44.3	67.1	53.3	48	38.7	36.3	22	6.4	1.4	16.4	—16.7	28.2	— 6.5	33.8	26	59.7	42	79	53.8
12	73.7	50.1	82.8	59.9	53.6	47.3	62.2	45	42	32.6	38.2	17.2	12.6	6.4	38.8	8.4	34.4	— 1.5	30.2	17.6	67	36.5	77.2	56.5
13	73.3	51.4	80.7	57	59.8	34.4	56.7	36.1	36.8	28.4	17.2	11.2	12.1	— 2	11	— 2.5	34.7	23	33	— .2	58	38	75.3	56
14	79.8	54.4	62	56	69.6	31.9	51.7	46.4	35.1	29	46	15.6	31.5	0	4.7	—18.5	31.3	21	36.2	13.7	61	37	64	44
15	79	60.1	63.6	56.6	72	54.6	53	42.8	35.2	26.8	40.5	17	12	— 5	1.8	—22.6	33	21.5	37.4	19	66.2	31.5	69.2	38
16	87.9	61.6	66.5	47.2	70	52.4	55.9	43.8	38.6	31	28.2	20	20	— 4.4	5	—18	33.8	18.5	39.5	11.5	55.4	37.8	67.6	41.2
17	66.5	54.6	72.8	43	58.7	49.4	62.6	40.2	37.1	31.2	30.8	20.8	14	8	17	—11.7	15.5	27	40.6	26.7	53.6	38.1	62	35
18	73	45	74.8	55.4	53.3	46.5	64.4	48.2	44	31.2	33.8	22.3	19	6.6	24	— 9.6	33.2	18	42.6	32.8	50.4	31.7	73.4	36.1
19	78.8	41.8	69.9	48	55.5	47.4	62.5	43.4	40.8	20.5	30.6	17.7	14.5	3	20	—21.5	18	6.7	46	31.7	49	36	62	47.3
20	76.6	53.2	70.4	43	68.8	53.6	46.6	39.3	30.4	19.6	26.4	20.4	5.5	—18	34.2	17.6	20.5	9.5	37.5	30	64.4	42	60	46.4
21	71.7	56.2	68.6	56	71	57.4	50.5	36.1	38	25.6	26	19	— 0.4	—21	41.6	25.4	23	12	36	28.5	54.3	41	76.9	50.6
22	72.4	49.4	68.8	46.2	63	37.8	53.8	37	38.2	23.7	25.6	12.8	13.6	—12.4	26.6	2	23.9	10.5	45.8	30	65.6	40	71	50.5
23	71.6	42.6	64	42.4	57.3	35.4	47.3	31	32.5	24	37.9	18	28.3	13.6	37	3	15.4	1	48.9	33	57.4	38	80.8	51
24	78	43.2	67.7	42.2	59.3	33.2	52.7	27.2	50.3	32	37	29.4	27	5	36.8	30.6	26.2	—17.7	55.6	32	62	33.5	78	59
25	81	51.4	67	39.1	63	32.2	59.9	35.4	42.2	29.4	35	26	34	8.6	43.2	33.5	35	— 1.5	37.9	27	77.4	50.4	65.1	49.3
26	80.3	54.3	62	44	65.7	34.3	63.4	34	39.5	30.8	27	8.8	27.1	— 3.6	46	20.5	32.5	21	43.8	30.5	61.6	46	66.6	44.8
27	77	47.6	63.2	50	65.0	32.0	62.6	44	39.3	30	33.4	18	2.5	—13	21.6	12.5	42	21	37	23.4	48.3	40.8	77	50.7
28	81.8	65	66	45.4	60.2	33.1	57.7	43.4	46.6	29.3	31.8	22.6	23.9	— 4	21	10.5	46.3	13.5	38.9	20.3	43.4	36.4	77.3	54
29	75	64	69	55	65.4	56.3	50.8	40	53.7	27.3	37.8	23	28	— 5.6	.....	.....	33.8	21	47.7	20	46.7	34.4	67.4	44.4
30	73	61.5	72	61.3	69.0	55.6	57.7	34.3	56.6	30.2	23	0	31	27	.....	.....	34.3	6.5	54.4	23.5	53.8	33.4	68.6	43
31	76	53.6	76	57	.....	.....	56.4	40.8	.....	.....	16.4	— 1	32.9	14.4	.....	.....	30.3	15.4	.....	.....	53.6	37	.....	.....
Range	46°.1		43°.7		42°.1		36°.1		37°.2		54°.6		55°		68°.6		64°		57°.6		53°.9		54°.7	
Monthly means	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Maximum, minimum, and mean temperatures—Continued.

STATION, TOLEDO, OHIO.

Date of month.	1874.												1875.											
	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	61	80	67	77	55	69	40	41	29	.....	14	35	17	30	5	23	10	64	43	52	35	88	62
2	79	61	76	58	83	57	65	49	54	26	.....	34	33	14	42	24	27	10	53	36	45	32	80	64
3	78	59	72	57	71	57	60	42	62	44	.....	31	26	13	42	11	18	5	57	36	56	34	70	58
4	93	68	70	54	69	52	58	38	61	43	.....	27	22	12	11	0	27	10	58	41	57	41	80	57
5	77	60	72	54	74	63	59	39	60	53	.....	29	13	0	25	2	40	16	46	33	59	43	71	62
6	92	60	75	60	79	56	60	51	61	47	.....	36	16	2	13	7	41	29	67	38	59	36	66	56
7	97	74	79	63	88	64	58	48	66	44	.....	24	19	12	14	— 2	28	11	44	35	62	45	63	54
8	90	76	79	62	91	66	59	48	67	53	34	20	20	— 1	12	— 2	30	14	72	37	84	50	72	48
9	85	70	84	63	86	66	63	45	59	45	40	32	20	—12	6	—12	44	25	65	51	68	48	71	55
10	85	70	86	70	83	63	63	52	64	43	36	28	8	—12	32	— 1	37	29	64	45	65	48	74	62
11	75	60	93	69	86	60	58	44	48	37	35	25	18	1	33	5	47	27	57	42	65	49	87	67
12	76	58	92	77	88	61	46	.....	39	29	30	19	26	12	9	— 8	42	34	56	38	61	43	79	55
13	83	59	78	66	90	62	47	31	38	27	45	30	35	18	18	— 1	49	31	50	39	65	43	67	43
14	90	69	75	54	87	62	52	27	43	29	41	16	18	1	16	— 4	62	.....	56	34	71	46	70	54
15	89	71	77	55	77	57	63	38	52	41	34	16	15	— 4	14	— 5	63	34	53	34	56	42	67	56
16	75	59	79	57	65	47	63	48	52	34	42	26	23	11	20	0	36	17	34	20	54	39	74	57
17	78	57	87	57	70	58	68	47	57	45	43	24	19	10	24	9	19	12	28	14	64	41	77	58
18	83	63	78	65	78	63	57	40	47	34	37	23	20	10	21	— 1	25	11	34	12	62	46	70	52
19	91	63	91	64	80	59	60	35	35	28	41	29	21	9	33	16	21	14	50	30	73	55	78	53
20	79	67	93	71	67	51	68	44	34	24	33	23	21	1	32	21	22	14	37	25	80	60	79	58
21	74	64	92	66	66	43	57	47	35	24	36	18	40	19	25	10	26	12	39	22	78	64	79	61
22	76	56	72	62	73	47	58	51	46	29	40	33	37	18	51	18	50	6	47	22	79	63	80	67
23	85	60	72	62	75	49	62	51	52	28	43	31	32	8	47	33	39	16	58	33	79	64	85	68
24	87	70	72	58	78	49	69	56	(*)	21	34	22	35	20	57	34	42	29	47	28	77	66	91	67
25	78	69	72	53	81	57	73	55	.....	23	39	19	20	10	35	29	43	23	55	32	82	63	79	69
26	87	74	74	51	79	63	73	56	.....	29	45	33	21	8	28	14	52	41	54	33	69	59	83	71
27	75	60	74	59	70	58	67	55	.....	31	49	29	39	20	22	11	52	37	53	33	71	58	84	73
28	72	58	74	60	67	51	68	53	.....	24	48	36	38	21	16	4	41	25	66	34	85	64	77	63
29	76	54	73	58	69	45	68	43	...	16	36	14	22	15	.....	.....	47	.....	65	38	76	57	71	60
30	77	59	75	59	59	44	44	36	.....	13	23	15	26	19	.....	.....	65	38	55	38	69	53	81	63
31	87	67	74	57	.....	.....	42	31	.....	.....	23	16	28	13	.....	.....	75	55	.....	.....	70	54	.....	.....
Range	43°		42°		48°		.....		.....		.....		52°		69°		.....		60°		53°		48°	
Monthly means	74°. 7		72°		67°. 5		53°. 4		40°. 5		32°. 1		18°. 0		17°. 5		32°. 0		43°. 9		59°. 9		68°. 6	

* Maximum-thermometer broken.

Maximum, minimum, and mean temperatures—Continued.

STATION, TORONTO, CANADA.

Date of month.	1874.												1875.											
	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	76.2	44.4	79	60.2	77	55.5	56.6	38.4	38.8	32.9	30.2	11	29.4	10.2	20	3	19	1.8	49.8	36	39.2	27.2	69.8	51.4
2	73	50.8	67	50	81.8	55	56	42	49	29.5	41.6	27	32	19	33.5	15	18.2	3.4	40.8	34	40	34.7	69.8	53.2
3	79	52.5	69.8	48	68	47.8	52.4	38	52	29.6	44	20	25	16	39	8.2	20	— 1.5	49.2	32	50.2	31	74.5	53.8
4	70.8	57	72.8	50.8	64.2	46	54	40	52	31	28.5	12.2	22.4	15.5	6	0	29.4	12.6	52	32	52.4	36	68	42
5	78.2	56.4	75.2	53	72.8	54	56	34	51	36	35	23.2	17.8	5.5	15	— 2.6	29.8	18	50	33	54	29	70.2	49.6
6	80	57.5	73.5	55	78.5	56.2	52.2	46.8	61	34.8	35	31	14.2	1	15	—10.4	32	17	38.2	32.4	46	34.4	64.4	48.5
7	83.5	61	80	58.8	75	51	55	49	50.8	31.4	36.5	16.4	22.4	12.2	7	—15	29.8	16.2	40	30	50.4	32.2	65	49.5
8	82.4	65	82.4	58.2	76.5	58	60.5	52	57.6	36.5	32	13.8	24.4	5	4.5	—12	33.2	14	44	35	64	42.5	68	44
9	75.8	65.5	83.8	57.8	80.2	52.5	61.4	49.8	57.8	39.8	38	25	25	— 6.2	— 0.2	—14.8	28.6	4.2	53.8	36.8	67	49.4	69.6	44
10	74.8	63	81	61.4	88.6	60.5	58	48	48	35	33.2	23	8.2	— 8.8	21.2	—15	33.8	24.8	62.2	32.6	62	41	71	49.5
11	75	59.8	80	60.5	85.8	64	56.2	43	43.2	29	30	21	14.8	1	30.5	— 0.4	35	21	51	27.8	63	40	74	52
12	66	56.5	95	64.5	73.2	59.2	45.2	34.8	37	25.6	24.4	14.5	27	3	0.8	—10.3	36.9	24.8	42.5	34.4	51.5	38.2	74.2	42
13	76	55	74.5	59	76	58	39	33.8	31.2	19.3	27.2	20.5	39	21.4	9.2	—16	33.6	24.2	39	33.2	62.2	33	62	38
14	82.6	56.5	75	56.5	84.8	60	46.5	34	33	17	23	— 3.5	22	3.5	4	—10	38.2	26.8	49	32.5	52.8	41	71	37.4
15	83	66.5	80	51	79	60	55	29.2	48	30.2	26	— 7.5	16	3	6	—12.4	39.8	34	48.5	32	54	39.2	72.2	43
16	69.5	53.5	80	54.2	66.6	54.6	58.8	34.8	44	26.4	37.8	21	13	6.8	15	— 3	38	18.5	34	17	56.2	37	73.8	48.4
17	72.2	45.5	84	57	66.2	55	62.2	39	54.2	38	38	16.2	17.4	4	17	— 0.8	20	6.8	26.2	14.9	63	39.8	56.5	49.2
18	81	59.5	78.8	56.4	74.2	59.8	48	30.5	38	25.8	32.6	12	13.5	5.5	12.2	— 9	15	2	28.8	10	59	40	75.2	47
19	83.2	58.4	76.2	49	78	63	55.4	24.8	35.5	23.8	36.5	25	20.4	2	22.5	0.5	16	3.7	38.8	21	61.6	37	71.6	52
20	75	55.3	86	65.5	63	48	60.4	39	35	25.2	33.2	12.8	16.8	2.5	28.5	16	21.8	11.2	30	21.5	76.6	45	74.2	45
21	76	47.8	73	60	63.4	41.4	51.8	33.2	34	25.5	32	11.5	28.2	15	19	2.4	20.2	2.5	30	20.3	72.2	49.4	80.8	46
22	76.2	50	71.5	51.8	66	42.8	49.4	30	34.8	24.8	37.5	29	33.5	17.2	42	—4	22.2	4.7	42.2	27	75	54	71.4	55
23	79.4	52.5	68.4	54	69.2	46.8	55.5	40	50	30	36	31	24	13	39	27.8	27	3	46	30	72	54.5	86.8	52.8
24	80	53.5	73	52.8	73	49.2	50.2	43	32	24.6	31.8	24	31.5	19	47.6	21	36	20.5	37	31.4	73.2	49	82	60
25	83.2	63	74.8	51	77	52	61.6	47	32.5	19.5	29.8	20	31.4	14.2	32	19	34.5	16.2	48.4	32.5	72.2	53	76	58
26	79	67.2	75	55	73.2	55.8	65	44	36	27	40	26.1	20	12	26	4.5	41.4	28	54	29.4	70	51	77.5	54.6
27	71.2	62	77.2	55.4	69	61	61	49.2	46	34.8	38	20	29.2	8.4	15.5	3	39	22.7	50.8	28.2	68.2	49	81.2	59
28	67.5	59	76	54	62.8	55	52	46	36	25.5	41.8	33	30	7	9	— 3	32	14.7	53.5	32	67	47.4	71	57
29	78	54.2	77.8	57	67.5	48.8	67	47	32.2	11	35	14.3	18	— 1.5	.....	.....	37.5	21.8	50	32	68.8	51	65	54
30	79.2	53.3	77.8	55.8	56.2	39.5	48.2	35	20.2	3.5	21	— 0.2	26.5	10	.....	.....	45.8	26.8	43.5	32	65.5	42.8	81.4	54
31	82	63	81	61.4	.....	.....	46	32.8	.....	.....	14.9	— 7	27.2	6	.....	.....	51.5	35	.....	.....	68.8	42.5	.....	.....
Range	39°.1		47°		47°.2		42°.2		57°.5		51°.5		47°.8		63°.6		53°.0		52°.5		49°.4		48°.8	
Monthly means	.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....		.....	

Maximum, minimum, and mean temperatures—Continued.

STATION, TYBEE ISLAND.

Date of month.	1874.												1875.											
	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	.....	76	78	73	(*)	60	.....	42	59	44	40	37	47	32	69	54	74	60	80	64	79	70
2	.....	75.5	.....	74	81	71	.....	70	.....	48	63	44	53	38	54	38	73	60	74	58	82	68	84	68
3	.....	70	.....	75	81	75	.....	64	.....	51	69	51	52	46	63	50	73	58	59	50	77	60	87	68
4	.....	70	.....	71	81	71	.....	64	.....	56	60	53	50	43	53	34	54	44	64	48	71	63	84	67
5	.....	73	.....	72	81	73	.....	64	.....	58	56	50	52	44	39	30	67	51	75	50	68	58	83	70
6	.....	68	.....	75	82	72	.....	66	.....	60	66	53	51	46	45	34	56	48	66	53	85	62	84	69
7	.....	75	.....	74	83	75	.....	69	.....	62	61	46	50	41	55	36	65	42	78	51	85	65	87	70
8	.....	74	.....	69	86	71	.....	66	.....	64	50	35	51	44	45	32	57	40	77	56	85	69	76	68
9	.....	75	.....	71	89	69	.....	70	.....	62	58	35	58	39	47	34	66	43	77	61	85	69	74	64
10	.....	76	.....	71	80	70	.....	66	.....	63	62	45	57	35	51	39	59	47	72	63	84	69	80	63
11	.....	67	.....	71	78	69	.....	65	.....	62	61	43	38	34	59	43	64	43	72	62	79	66	86	64
12	.....	69	.....	74	81	75	.....	63	.....	51	61	41	46	38	52	36	59	56	77	62	84	68	91	65
13	.....	71	84	71	80	72	.....	52	.....	46	65	49	49	39	67	36	70	56	67	55	75	65	88	66
14	.....	75.5	85	75	82	72	.....	52	.....	44	71	43	50	44	65	53	65	56	63	48	75	67	86	75
15	.....	75	84	71	89	73	.....	54	.....	49	48	40	49	41	59	49	72	57	70	51	78	67	86	75
16	.....	72	82	76	85	70	.....	65	.....	58	67	47	60	41	49	47	64	47	82	56	70	65	96	74
17	.....	76.5	80	73	87	73	.....	59	.....	58	68	53	52	44	48	45	55	43	60	49	67	64	85	74
18	.....	72	84	73	87	74	.....	56	.....	61	59	49	60	44	50	44	57	43	60	49	70	60	92	72
19	.....	72	88.7	77	88	75	.....	58	.....	60	57	46	51	42	50	43	65	54	63	40	80	65	86	73
20	.....	74	88	74	86	74	.....	63	.....	55	65	44	44	41	67	50	71	58	81	50	80	67	82	67
21	.....	71	86	75	78	72	.....	62	.....	47	53	40	55	43	54	39	71	57	77	55	80	64	82	71
22	.....	74	90	74	78	70	.....	65	.....	48	65	49	65	42	54	42	57	45	58	47	75	69	84	73
23	.....	71	89	73	78	69	.....	64	.....	60	62	51	59	48	68	51	51	42	56	48	76	69	88	71
24	.....	71	88	75	78	71	.....	64	.....	50	57	48	64	48	73	56	70	50	65	46	80	69	88	71
25	.....	75	80	73	80.5	69	.....	63	.....	47	53	48	58	48	70	55	61	51	61	48	84	67	90	73
26	.....	77	80	70	82	74	.....	61	.....	44	65	50	50	44	57	44	69	56	70	56	85	70	89	73
27	.....	74	77	71	81	73	.....	60	.....	52	67	56	54	46	70	45	76	60	71	62	84	70	89	72
28	.....	71	75	69	(*)	65	.....	58	.....	57	71	56	67	49	58	47	70	60	72	54	87	70	89	76
29	.....	72	77	66	.....	52	.....	59	.....	48	76	59	65	55	.....	.....	70	52	74	55	84	69	89	76
30	.....	72	84	71	.....	60	.....	61	.....	41	63	47	59	46	.....	.....	59	46	83	60	83	67	88	73
31	.....	76	80	72	.....	.....	.....	50	.....	.....	47	45	53	45	.....	.....	70	55	.....	.....	80	72	.....	.....
Range	.....		.....		.....		.....		.....		41°		33°		43°		36°		43°		29°		33°	
Monthly means	78°.5		79°		75°.8		67°.8		59°.9		54°.2		47°.8		49°.2		57°.6		61°.4		71°.64		77°.17	

* Maximum-thermometer broken.

Maximum, minimum, and mean temperatures—Continued.

STATION, VICKSBURGH, MISS.

Date of month.	1874.												1875.											
	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	76	91.5	72	93	73	84	63.5	53	30	67	43	53	40	52	28	73	62	65	43	82.5	68.5	90	72.5
2	95	68	95	74	93	74	86	63	63	30	72	51	54	39	69	46	62	46	60.5	43	70.5	53	91	71
3	89	68	94	80.5	92	73	86	64	66	31	72	57	44	38	62	33	51.5	38	67.5	43.5	75	54.5	94	72.5
4	82	68	96	77	91	71	85	64	73	40	72	56	40	32	35	25	52	38	76	48.5	71	53.5	90	67.5
5	75	69	95	72	85	71.5	79	51	78	58	64	52	35	28	42	21	62	48	76	52	78	51	92	69
6	89	68	94.5	72	88	72	78	51	81	59	59	51	36	29	51	27	56	41	80.5	57.5	83.5	61	80	67
7	94	66	94	75	90	73	72	62	81	59	56	42	40	33.5	47	32	50	33	78	58.5	86	68	77.5	63
8	94	70	95	78	87	74	72	54	81	62.5	58	37	45	34	54.5	28	60	34	77.5	57	87	70	83	60
9	81	70	95	78	83	71	72	52	80	61.5	67	41	41	16	48	36	61	44	66	55	87	69	86	63
10	81	69	97	79	90	72	76	52	78	62	68	47	24	10	60	44	67	43	74	59	80	65	89.5	67.5
11	86	71	96.5	80	90	71	81.5	57	80	67	59	44	41	23	59	40	56	47	67	52	85.5	63	92	70
12	86	70	96	73	90	68	67	50	71	51	62	45	56	38	66	35	69	55	62	52	75	62	94	70
13	90	72	99	80	90	70	61.5	40	63	44	72	53	57	41	65	32.5	77	65	64	48	80	58	98	74
14	87	68	98	76	87	68.5	68	42	71	48	62	42	44	33	63.3	48	78	66.5	67	46	85	60	96	73
15	86	67	95.5	77	86	68	74	40	73	51.5	51.5	33	44	24	50.5	35	72	50	75	46.5	88	65	92	74.5
16	88	66	96	75.5	84	71	77	58	68	57	64	48	47	41	52	35	61	42	67.5	57	80	64	91.5	72.5
17	82	73	90	69	88	67	69	50	67	61	58	47	42	36	52	42	57	40	66	48.5	86	63.5	91	74
18	92	72	86	71	90	71	73	50	62	50	53	39	41	37	57	39	67.5	42	71.5	49	73	63	93	73.5
19	92	73	91	72	84	70	74	51	60	45	56	39	39	33	52	46	70	54	78	54	81	61	90	72
20	93	74	91.5	72	80	66	78	51	62	41	52	39	48	29	54	42	70	49	78	60	84	63.5	85	70
21	94	73	92	73	80	56	79	51	62.5	38	53	35	67	48	66	39	57	41	68	57	82	65	87.5	71
22	92	74	94	70.5	84	57	80	61	80	61	57	44	55	49	68	42	62	39	61.5	53	86.5	66	91	73
23	94	76	91	79	89	65	76	61.5	72	54	61	38	53	44	72	56	69	43.5	67	46	90	66.5	90	72
24	96	75	87	72	85.5	70	76	58	65	44.5	52	38	55	44	76	66	64.5	56	74.5	48	92	70	88.5	69.5
25	94	77	93	75	85.5	70	82	60	51	35	49	42	56	38	57	45	76	52	68	54	94	71	91	72
26	92	76	94.5	76	84	69	79	60	59	37	60	49	53	45	65	39	75	62	74	58	92	71	93	72.5
27	96.5	77	92	77	76	63	79	57	70.5	42	76	60	71	52	69	52	70	64	67	50	82	68.5	91	73
28	93	74	91	74	71	53	82	56.5	62	39	78	67	75	60	68	48	76	62	75	51	84.5	66.5	92.5	70
29	87	71	92	70	75	54	79	62.5	55	33	69	46	62	52	.....	.....	78	60	80	50	78	68	86	71
30	90	66	94	78	83	57	68	49.5	61	39	58	41	50	38	.....	.....	78	63.5	83	68	85	62	91	71
31	92	70	91	72	.....	.....	54	39	.....	.....	49	40	46	35	.....	.....	77.5	63	.....	.....	89	65	.....	.....
Range	36°.5		29°		40°		47°		51°		45°.		65°		55°		45°		40°		41°		36°	
Monthly means	81°.1		84°.6		77°		64°.7		58°.6		53°.3		42°.9		50°.0		58°.4		61°.8		74°.6		80°.5	

Maximum, minimum, and mean temperatures—Continued.

STATION, VIRGINIA CITY, MONT.

Date of month.	1874.												1875.											
	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	52	69	50	48	39	73	45	36	10	48	32	31	11	32	4	28	15	44	18	57	32	49	32
2	88	60	75	43	57	34	60	48	42	19	39	25	34	24	4	—15	32	11	42	32	51	37	63	34
3	90	55	84	47	72	47	55	45	39	27	37	22	26	— 7	20	—13	28	16	38	15	56	32	60	42
4	81	62	83	50	74	44	62	37	37	29	37	17	8	—14	30	12	26	9	15	— 4	61	43	57	29
5	80	50	80	55	79	46	61	40	44	24	39	23	2	—13	34	16	25	6	4	— 7	57	45	54	36
6	83	51	79	49	80	43	65	48	44	24	37	24	10	—13	36	23	34	10	4	— 5	50	34	69	38
7	84	52	79	52	81	52	63	41	29	8	46	25	30	—22	37	20	32	21	19	— 3	43	31	70	47
8	80	54	74	47	81	50	66	39	35	20	42	34	—20	—30	36	20	33	15	32	6	42	27	72	44
9	81	51	83	48	45	36	71	42	28	16	38	26	4	—30	30	23	37	22	35	22	45	27	60	43
10	83	53	62	49	51	33	71	46	24	8	36	22	16	— 2	19	3	32	20	37	19	45	29	53	40
11	81	61	56	44	50	34	69	43	23	13	41	25	11	—20	38	10	33	23	42	33	55	27	73	40
12	84	53	79	45	61	33	61	44	40	18	34	20	—26	—38	35	19	30	21	49	31	58	40	78	50
13	86	53	84	49	59	35	64	41	36	25	34	14	—34	—44	36	24	33	12	59	33	69	38	78	56
14	77	46	85	49	64	36	66	41	35	25	40	21	—20	—42	33	21	22	4	64	35	74	42	64	49
15	85	50	80	50	53	43	67	40	34	15	32	22	—18	—36	29	9	23	10	61	39	78	46	78	43
16	86	54	71	50	53	38	68	41	24	11	24	9	— 2	—28	26	11	32	10	66	37	57	42	76	51
17	87	57	81	49	44	35	67	40	10	3	27	10	10	—20	30	11	29	6	66	38	52	34	67	46
18	83	53	76	53	50	30	67	41	3	— 6	30	14	5	—17	31	17	17	0	64	40	55	36	72	46
19	75	55	72	50	48	38	55	42	15	— 9	27	14	41	4	37	26	28	6	60	40	64	40	80	39
20	83	54	72	49	52	38	58	34	29	9	33	10	36	6	38	26	27	16	55	38	74	42	66	42
21	87	57	67	43	58	33	60	38	34	21	32	14	20	— 3	35	20	36	17	62	37	68	46	73	33
22	87	60	75	43	68	37	61	42	24	6	25	10	24	8	27	8	36	24	72	44	63	41	72	43
23	85	58	83	48	72	41	57	38	36	1	25	9	5	— 2	18	9	29	12	50	37	70	41	72	41
24	83	53	82	59	72	44	45	30	44	38	30	15	22	— 1	26	5	48	15	45	35	76	43	78	45
25	64	53	75	56	60	44	29	23	47	27	22	16	30	12	38	19	43	18	62	31	66	45	70	42
26	80	46	77	50	66	34	30	20	21	15	18	10	15	3	37	25	37	13	65	37	45	29	60	44
27	82	50	69	50	76	43	29	24	32	19	19	8	17	— 2	42	23	40	25	52	31	50	28	80	36
28	79	53	70	49	78	46	33	23	42	31	21	— 2	24	5	28	19	44	29	52	32	65	32	74	47
29	83	54	80	47	78	48	31	23	47	30	34	21	19	1	.....	.....	38	15	60	37	67	43	84	48
30	85	50	81	52	77	49	27	7	48	35	25	11	20	3	.....	.....	27	5	51	40	60	42	79	56
31	83	54	71	49	.....	.....	31	12	.....	.....	30	11	37	6	.....	.....	30	7	.....	.....	50	34	.....	.....
Range	44°		45°		51°		66°		57°		50°		85°		57°		48°		79°		51°		55°	
Monthly means	67°. 7		61°. 8		50°. 2		45°. 8		25°. 7		24°. 9		1°. 7		22°. 8		22°. 8		37°. 2		47°. 1		56°. 2	

Maximum, minimum, and mean temperatures—Continued.

STATION, WASHINGTON, D. C.

Date of month.	1874.												1875.											
	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	66	88	71.5	83.5	61	66	46	51.5	33	39	18	34.5	13	39	19	34.5	20.5	74	47	58	47	79	57
2	89	73	83.5	68	86	58	77	54.5	53	30	62	33.5	42	29.5	51	24	50	30	70	47	56	44	72	61
3	88	68	81	60.5	90	62.5	71	44	58	30	68	40	73.5	29	61.5	40	37.5	24.5	50	39.5	64	41	77.5	63
4	92.5	64.5	80	60.5	77	66	63	47	61.5	32	54	34	44	29	40	17	34.5	25	66	40.5	53	44	85	59
5	78	68	81	57	85	65	59	42	63	43	45.5	25	32.5	23	26	12	31.5	26	63	46	65.5	40.5	88.5	63.5
6	82.5	61	84	62.5	87	66	63	40	71	50.5	48	29	29	17?	37	19.5	42	31	64.5	39.5	66	51	84	66
7	88	68	74	68.5	87	66	72.5	56	65.5	40	50	38	34.5	27	23	7.5	34	31.5	54	41.5	66	47	78.5	57
8	94	69	81.5	70	87	67	71	60	63.5	37.5	39	30	35.5	26.5	26	6	40	31.5	58	50	67	49.5	73.5	55
9	98.5	75.5	87	66	80	64	69	55.5	66	50	49.5	28	36.5	5	14	3.5	42.5	29	54	44	86.5	52	70	58
10	95	75	87	67	82	58	73	59	66	39	45	30.5	15.5	−3	21	−1.5	47	31	64	46	76	57	83	55
11	87	74.5	91	63	90	58	72.5	55	64.5	48	45	32	32.5	8	36	17	53	30	64	50.5	77	52	87	62.5
12	82	74.5	92	66	94	68	59	45.5	49	35	40	28	28	21	32	16.5	65	42	57	39.5	78	57	72	67.5
13	89.5	72	90	70.5	79	68	51	39	43	32.5	54	27.5	36.5	26	36	22	52	35.5	45	33	70.5	46.5	70	54.5
14	94.5	72	82	65	77	69	49.5	34.5	40	25	57	26	36.5	26.5	41	19	52	34	55.5	33.5	76	47.5	74.5	55.5
15	98	74	83	64	81	67	62	32.5	49	26.5	27	16.5	27.5	12	24	9	68	44.5	65	40	74.5	52	78.5	58.5
16	88	74.5	85	59	72	66.5	63	37	56	33	46	19	33.5	18	25	7.5	59	42	55	32	64	43	79	61
17	83	64	85.5	59	69	65	71.5	41	59.5	36	49	38	26.5	19	50	12.5	42	23	36	26.5	66	40	82	60
18	90	62	92.5	59	81.5	62.5	62	48	63	46	46	30	31	22	25	8	38.5	23	33	25	64.5	42.5	73	58.5
19	91	67	93	71	80.5	60.5	60	39.5	47	38	52	30.5	24.5	16	30	17	40.5	29	55	22.5	68	46	80	56.5
20	94	71	100.5	70	77	59.5	68	38.5	51.5	35	38	33.5	27.5	95	33.5	27.5	35	30	50.5	37	85	53	86	58.5
21	82	67.5	99.5	71	68	51.5	74.5	40.5	41.5	32	40	31	39	22	42	25	32.5	27	49	31	86	57.5	85	58
22	81.5	63	85	66	71.5	51	73	43.5	51	27	52.5	30.5	51.5	32	54	27	32.5	20	32	29.5	88	65.5	85.5	64
23	86	62	71	61.5	74.5	50	74	45	65.5	48.5	54	35	42.5	27.5	56	37	39.5	19.5	59	34.5	92.5	64	91	70
24	86	70	66	59	76	57	66	53.5	48.5	35.5	46	31.5	35	25.5	56	43.5	47	30	60	37	83	68.5	97	73
25	89	71	70.5	62	78.5	60	62	50	37.5	27.5	43	30	36.5	28.5	57	37.5	42	30	61	36.5	82	66	97	74.5
26	84	73	74.5	55	80.5	57	71	43	42.5	25	52	29	30.5	20	53.5	31	60	29	66.5	38	85	65.5	95	76
27	75.5	71	72.5	54	80.5	59	75	44	52.5	30	53	36.5	41.5	17	49	29	63	48	58	49	79	60.5	97	75.5
28	81.5	71	74	50	74	61.5	73	55.5	61	31	70	46.5	46	32.5	29	19	57.5	36	49	43.5	82	52	92.5	73
29	75.5	67	78	50	61.5	57	79	53	60	33	64	33	39.5	33	.....	.....	51	36	64	36	87	57.5	94	71.5
30	82	61	80	51	62	52	71	42	35	22	33	24	42.5	30	.....	.....	61	39	72	52	78	53.5	88	70
31	88.5	61	77.5	63	.....	.....	50.5	36	.....	.....	28	19	37	32	.....	.....	65.5	49.5	.....	.....	82	51	.....	.....
Range	37°.5		50°.5		44°		46°.5		49°		52°		76°.5		63°		46°		51°.5		52°.5		43°.5	
Monthly means	78°.4		73°.2		70°.4		56°.1		44°.8		39°.7		29°.7		29°.1		39° 5		4s°.1		63°.7		73°.0	

Maximum, minimum, and mean temperatures—Continued.

STATION, WILMINGTON, N. C.

Date of month.	1874.												1875.											
	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	76	91	69	81	62	72	54	55	35	56	28	36	27	48	34	67	49	72	53	78	64	79	58
2	88	76	92	72	85	62	81	58	61	36	72	36	59	32	58	30	69	62	72	61	82	63	79	58
3	86	69	91	72	86	65	82	64	69	46	71	44	46	37	65	55	72	59	64	44	73	51	81	63
4	89	70	84	68	89	65	77	62	74	54	63	45	50	42	58	34	60	40	65	41	77	60	84	69
5	91	72	83	63	85	67	69	52	77	54	60	32	52	42	38	24	53	37	76	49	66	48	82	71
6	85	70	86	67	87	66	72	49	77	54	64	40	40	35	50	22	46	40	68	46	83	60	82	69
7	85	64	87	70	90	66	76	57	71	54	50	42	46	35	48	27	68	43	84	51	74	60	81	65
8	90	71	83	73	90	71	80	63	76	50	40	35	46	39	37	17	59	37	71	47	79	62	68	60
9	89	75	90	69	85	67	79	62	75	50	59	33	52	40	39	22	62	42	84	58	90	69	68	58
10	88	77	92	67	74	63	80	67	77	62	60	32	35	21	42	15	58	46	71	58	83	65	80	58
11	88	75	94	73	89	67	80	62	76	63	59	37	34	25	61	39	61	40	74	58	80	58	85	65
12	75	73	92	74	84	68	75	56	60	49	53	33	39	33	50	31	70	40	68	60	84	63	71	63
13	82	70	92	72	85	71	61	46	52	40	63	34	48	34	67	41	64	55	70	51	72	63	80	66
14	91	73	90	67	78	73	59	40	55	34	63	43	53	39	58	51	71	52	68	44	68	56	78	64
15	91	70	86	67	81	71	69	44	62	36	46	30	45	35	51	37	71	63	70	49	80	59	84	66
16	91	73	90	67	87	73	71	54	64	45	48	26	53	29	44	30	63	52	74	54	69	55	91	66
17	92	72	84	63	85	71	67	61	66	48	60	39	47	29	54	29	57	44	60	37	69	46	82	67
18	87	70	91	68	85	70	73	58	68	58	47	35	36	30	45	32	57	35	46	32	68	43	87	70
19	81	71	90	71	86	70	65	47	61	46	59	28	40	31	45	29	64	44	65	28	73	51	81	64
20	89	69	92	73	85	70	70	55	58	43	65	46	42	25	64	46	75	59	79	54	75	63	77	70
21	90	73	93	75	78	60	79	50	56	43	53	38	42	30	55	36	67	44	56	42	81	63	82	70
22	88	74	92	71	77	56	73	51	67	40	63	38	62	37	64	36	45	34	55	41	84	59	84	68
23	84	69	92	71	77	59	75	55	68	60	61	43	54	41	66	49	50	28	52	45	75	67	90	70
24	88	65	90	72	80	61	66	60	65	48	55	41	70	41	78	60	64	38	70	44	76	68	86	74
25	88	68	79	67	81	64	70	60	56	42	50	34	54	38	74	51	57	43	67	39	74	67	86	75
26	89	69	79	59	82	62	72	60	54	33	64	42	49	30	61	40	65	39	70	45	81	65	87	75
27	83	70	79	58	81	62	74	50	65	37	74	58	57	29	67	42	70	59	71	62	78	65	91	75
28	80	70	79	56	81	62	77	55	68	49	76	58	68	46	61	38	62	51	68	55	80	65	87	76
29	84	69	73	62	71	59	77	61	66	52	77	60	66	59	.....	.....	53	43	70	48	82	62	87	74
30	84	69	73	62	72	55	79	63	60	35	60	43	62	48	.....	.....	64	44	89	62	77	65	86	74
31	89	68	79	65	.....	.....	67	44	.....	.....	42	29	49	41	.....	.....	72	53	.....	.....	78	59	.....	.....
Range	28°		38°		35°		42°		43°		52°		49°		63°		47°		61°		47°		33°	
Monthly means	79°.1		76°.7		74°.1		63°.8		56°.6		49°.4		43°.3		45°.9		54°.4		58°.5		68°.4		74°.2	

Maximum, minimum, and mean temperatures—Continued.

STATION, WOOD'S HOLE, MASS.

Date of month.	1874.												1875.											
	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	60	75	65	76	62	66	48	50	41	39	19.75	26	9	35	21	31	5	46	34.75	53	38.75	64	41.75
2	70	60	78	61	75	62	67	54	52	41	43	36	47	21.50	37	18.75	35	27.75	51	40.75	51	39	61	48
3	75	59	70	58	73	62	66	51	53	42	55	39.50	36	27	45	37	33	21.50	50	42	52	37.75	64	46.75
4	69	60	72	55	68	52	60	46	59	44	46	31	38	30.75	46	16	30	26.50	45	37	47	39.50	66	52.25
5	71	57	76	59	66	52	59	44	58	48	40	30.75	36	23	22	12	38	24.50	42	33.75	59	40.50	77	52.50
6	66	55	75	60	70	61	61	45	63	52	48	37	30	17.75	33	11	44	33.75	51	33.75	54	41.50	64	57
7	64	53	75	64	77	62	60	54	57	44	44	39.25	38	29.50	21	3	41	25.75	44	30.50	54	40	64	54
8	68	61	67	66	73	61	65	52	56	42	42	26	36	27	23	6.75	34	27	40	30.50	50	39	69	52.75
9	80	63	71	63	71	57	65	55	63	49.75	47	28.25	40	17	14	−5	38	23.50	45	33.50	53	43.50	58	53.50
10	70	65	78	63	74	60	67	56	61	47	43	34	17	5	20	−2	42	30.50	54	37.50	59	44.50	67	56
11	71	65	80	65	83	64	68	59	63	39.75	41	33.25	26	6	42	18.25	38	28	62	38	68	46.50	76	57.25
12	73	66	76	64	66	53	64	49	43	32.75	36	25	28	13.75	27	12.50	44	29	43	33	58	46.25	67	57.50
13	72	66	76	67	67	52	56	11	40	28	45	23	36	26.75	26	10.75	37	28.50	36	32	61	45	67	50
14	79	64	71	60	69	55	53	39	37	27	50	7	36	20	24	7	41	29.50	39	32	68	44.25	64	49.75
15	75	65	66	58	74	60	56	40	48	28.75	18	3	20	12.50	16	3.75	45	33.75	47	34.75	58	45	67	54.50
16	75	65	77	59	71	65	65	50	51	36.75	35	11	25	10.25	25	5	44	33.75	54	39.75	58	45	70	54.75
17	79	63	71	56	71	62	62	52	51	36	43	27.50	20	10	36	12.75	46	19	46	29	63	42	69	52
18	76	66	78	62	61	60	62	42	57	38	36	22	16	4.75	24	11	25	16.50	36	27.75	59	42.75	67	53
19	78	64	76	64	65	68	50	40	38	30	44	23	18	0.50	33	13.75	33	15	39	24.75	56	43.25	69	51.25
20	73	65	74	66	71	60	58	40	50	29.75	38	30	21	5.75	42	31.75	33	25.75	39	29.25	57	47	70	56.50
21	74	64	80	65	68	53	57	51	42	35.75	38	21.25	27	5.75	40	24	32	22	43	25	65	48.50	68	57.75
22	78	61	65	56	65	50	62	48	42	32	46	21.25	38	27	37	8.75	29	15	49	29.25	67	50.25	69	58.50
23	76	63	69	53	69	52	60	43	58	34.25	46	35.75	32	16	47	35.75	31	16.50	54	33.75	81	51.25	70	60.75
24	74	65	70	55	72	59	61	49	47	35	44	32	40	8	49	35	35	22.50	55	36	62	51.25	68	61
25	74	62	69	52	70	61	61	49	40	30	38	29.50	42	23	49	33.50	37	29	57	37.75	69	50.75	77	62.50
26	74	66	69	54	75	58	60	50	38	27.50	44	23.25	27	19	48	29.75	40	25.25	55	39.75	79	53	71	60.75
27	75	65	70	52	74	54	64	51	50	27.25	48	35	24	15.50	32	15	47	33.75	58	38	69	51.25	78	62.75
28	77	65	73	53	67	57	67	52	55	42	49	36	35	13	22	11	43	22.75	49	37.50	75	52.75	76	65.25
29	78	67	73	55	67	60	62	48	58	30	49	28	37	32.75	.....	.....	42	28.75	56	35.75	65	50	69	60
30	79	64	72	56	66	52	63	52	34	23	39	19.75	36	27	.....	.....	49	29.50	57	39.75	67	49.75	75	60
31	77	66	77	61	.....	.....	56	45	.....	.....	27	3	33	23.25	.....	.....	48	33.75	.....	.....	72	50	.....	.....
Range	27°		28°		33°		57°		40°		52°		46°.5		54°		44°		37°		43°.25		31°.75	
Monthly means	67°.8		66°.2		63°.8		54°.8		43°.6		34°.4		24°.8		24°.1		31°.8		40°.3		52°.1		61°.0	

Maximum, minimum, and mean temperatures—Continued.

STATION, WYTHEVILLE, VA.

Date of month.	1874.												1875.											
	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	77	60	79	54	66	40	42	22	47	24	35	22	37	10	54	39	64	55	72	52	80	51
2	83	64	77	61	80	47	71	44	54	25	54	36	45	30	50	23	60	45	59	35	57	37	69	60
3	85	58	78	54	79	48	71	43	58	21	52	34	40	23	53	27	45	28	53	32	66	31	78	57
4	91	55	74	56	82	48	66	39	61	25	50	30	40	30	27	9	49	24	65	30	56	36	82	50
5	84	62	79	48	80	48	64	40	64	31	52	25	37	23	25	3	37	30	72	36	65	30	78	55
6	85	53	81	56	81	51	65	46	68	42	45	29	32	21	39	15	56	30	74	35	64	45	81	60
7	89	55	75	61	82	57	59	54	63	32	42	30	40	30	30	15	45	34	74	48	80	38	67	50
8	91	59	79	60	83	53	64	48	65	31	43	23	42	28	17	6	36	26	78	45	86	55	76	46
9	86	59	79	55	82	58	66	40	60	47	45	18	35	5	15	2	52	23	67	52	85	56	77	47
10	80	61	79	55	77	47	64	45	60	49	49	24	27	0	25	2	47	30	57	38	72	48	80	49
11	80	64	85	61	85	45	65	46	60	45	39	30	39	11	42	23	53	21	59	50	79	42	86	54
12	76	64	92	63	83	47	49	35	47	33	47	24	33	25	42	17	53	38	63	45	67	47	81	60
13	83	58	89	64	82	50	45	32	39	22	51	24	42	29	51	35	65	41	49	34	74	35	74	57
14	87	57	83	58	71	57	56	23	42	21	46	26	42	24	45	28	64	34	57	38	80	43	73	52
15	85	61	81	57	70	63	59	26	55	25	41	19	37	17	30	17	61	51	57	34	74	46	73	54
16	80	62	80	52	81	60	56	34	59	32	42	23	35	20	35	19	52	34	51	24	63	34	81	63
17	81	61	81	48	69	64	57	49	60	41	48	32	40	19	46	23	36	26	34	17	66	31	80	62
18	81	58	86	48	79	64	59	43	60	48	41	24	35	25	38	14	46	23	26	12	61	32	74	54
19	86	54	89	50	77	65	62	33	53	41	51	26	35	20	36	23	57	30	62	26	68	34	74	43
20	87	56	90	50	66	50	69	28	52	32	41	31	40	16	38	25	56	47	58	45	77	36	62	58
21	80	61	86	59	70	41	71	37	41	29	45	26	46	20	43	24	52	27	58	36	80	50	77	57
22	83	66	86	58	70	47	70	37	52	30	50	36	45	31	54	23	29	22	53	27	82	52	77	56
23	75	62	78	66	72	41	67	37	56	37	48	29	47	19	47	31	49	18	63	26	86	48	85	62
24	84	61	73	63	72	47	65	43	46	33	37	30	45	33	62	46	52	36	52	30	79	59	90	58
25	74	65	74	59	72	48	66	44	35	23	43	19	35	25	60	30	46	26	61	31	82	57	85	62
26	72	64	74	59	73	50	70	38	47	18	53	31	44	24	51	25	66	29	57	35	88	59	86	63
27	77	64	63	56	64	57	69	43	55	29	58	45	51	23	45	31	55	40	52	46	83	52	84	65
28	75	66	64	54	57	52	72	46	59	37	68	46	54	42	49	25	60	28	58	44	85	43	83	66
29	70	55	61	56	59	50	70	43	55	(?)	64	33	56	38	.....	.....	45	38	73	36	78	44	80	60
30	79	49	60	55	63	47	62	36	(?)	24	37	28	38	29	.....	.....	64	39	67	47	83	44	82	59
31	82	51	77	54	.....	.....	39	28	.....	.....	35	25	37	22	.....	.....	64	43	.....	.....	81	41	.....	.....
Range	42°		44°		42°		48°		.....		49°		54°		60°		48°		66°		58°		47°	
Monthly means	69°.9		66°.5		61°.9		51°.1		42°.6		37°.4		32°.5		30°.7		42°.1		47°.6		61°.0		66°.9	

Maximum, minimum, and mean temperatures—Continued.

STATION, YANKTON, DAK.

Date of month.	1874.												1875.											
	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	57	84	52	89	64	72	46	50	26	53	23	19	— 3	24	— 2	10	6	45	27	41	28	71	56
2	95	70	78	57	66	54	71	32	52	21	56	38	22	— 7	2	— 8	21	3	62	31	41	24	66	50
3	90	73	87	61	62	48	74	40	56	23	42	24	5	— 7	— 8	—17	15	— 9	55	35	52	33	74	42
4	97	74	90	64	64	52	85	55	66	37	43	33	— 1	—10	4	—22	25	12	55	34	67	35	67	46
5	96	75	85	69	87	45	68	51	61	38	51	21	7	—19	10	— 1	22	8	44	26	66	45	74	50
6	95	72	85	66	94	51	59	36	71	44	49	27	6	—18	— 1	—20	19	5	34	23	88	47	63	47
7	97	73	87	66	95	69	70	33	70	37	38	18	13	17	10	—18	32	— 4	50	34	67	51	72	44
8	97	80	90	66	86	66	71	45	56	32	54	28	13	— 24	0	—20	29	22	36	24	66	49	67	56
9	95	70	93	67	78	68	80	38	60	32	28	17	6	—21	10	—22	36	13	45	30	72	42	71	52
10	87	65	94	67	78	65	58	41	36	27	31	16	10	—10	24	— 7	36	11	40	27	66	44	85	60
11	86	58	92	67	84	62	49	26	33	27	20	8	8	—10	— 6	—14	36	22	36	25	66	45	71	52
12	90	73	87	60	70	53	54	16	33	25	42	8	2	—16	9	— 8	40	24	40	31	74	38	72	44
13	91	65	90	60	74	41	65	35	45	31	25	18	—16	—24	11	— 3	37	27	47	32	77	51	92	60
14	89	74	82	69	64	41	61	42	42	28	41	9	— 7	—25	3	— 7	30	13	66	31	77	48	88	64
15	81	59	90	65	69	30	54	30	54	26	47	32	— 3	—10	3	— 8	13	4	51	24	70	48	82	62
16	87	58	101	72	71	46	70	29	29	20	32	6	— 4	—17	29	— 5	7	2	34	17	73	45	91	68
17	88	63	78	57	70	49	73	34	20	9	19	— 2	5	—13	5	—17	14	— 8	53	21	62	56	78	63
18	96	71	92	58	56	50	80	35	10	0	38	18	1	—17	24	4	12	— 2	73	29	77	55	70	66
19	88	66	95	78	62	43	81	54	20	10	31	9	14	—13	28	11	15	—12	82	45	84	52	71	57
20	67	57	93	68	57	37	63	47	35	16	31	6	27	11	27	12	25	— 3	58	37	81	56	80	60
21	74	60	86	66	71	51	55	47	53	18	31	11	24	10	30	— 8	24	9	63	27	82	54	82	58
22	87	67	75	62	77	50	68	51	37	17	33	8	32	3	31	— 2	41	13	69	38	87	47	80	67
23	88	73	88	53	82	45	75	48	17	8	33	21	28	7	12	— 4	42	26	60	39	89	58	85	63
24	93	67	87	58	79	54	78	53	15	1	33	7	18	— 3	10	—10	37	17	54	32	87	57	85	60
25	93	66	86	57	74	54	73	56	46	14	33	14	17	—10	8	—15	66	34	55	34	87	53	83	64
26	76	60	77	64	72	54	57	36	32	13	26	7	28	10	5	0	55	30	61	36	86	66	81	60
27	75	55	86	66	71	44	48	28	25	7	26	11	14	0	10	— 2	62	29	70	34	72	55	70	54
28	90	54	85	65	87	37	45	33	26	15	14	— 7	13	—11	15	0	62	32	59	42	67	49	78	46
29	90	61	82	59	76	41	40	26	23	9	22	—14	17	—10	.....	.....	72	46	53	36	76	50	80	61
30	92	70	83	50	80	37	32	18	35	17	7	— 9	17	—10	.....	.....	49	27	44	33	84	61	64	58
31	80	63	83	58	.....	.....	40	16	.....	.....	19	— 8	26	—20	.....	.....	33	26	.....	.....	88	61	.....	.....
Range	43°		51°		65°		69°		71°		68°		57°		53°		84°		65°		65°		50°	
Monthly means	78°. 2		74°. 2		61°. 7		49°. 4		30°. 4		23°. 0		0°. 6		2°. 5		23°. 7		40°. 4		61°. 2		66°. 1	

STATION STATISTICS.

PAPER 19.

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, 1875, compiled from the local observations taken at the several stations of observation at 7 a. m., 2 p. m., and 9 p. m., (local time.)

Station.	Wind.	July, 1874.	August.	September.	October.	November.	December.	January, '75.	February.	March.	April.	May.	June.	Spring.	Summer.	Autumn.	Winter.
Albany, N. Y.	N.	6	16	6	5	10	8	7	5	8	5	9	6	22	28	21	20
	N. W.	10	12	14	25	19	16	16	20	26	25	11	15	62	37	58	52
	W.	6	3	5	8	14	18	16	19	13	23	14	8	50	17	27	53
	S. W.	3	1	2	4	5	3	4	3	3	2	4	0	9	4	11	10
	S.	40	17	28	22	23	24	7	19	13	9	19	33	41	90	73	50
	S. E.	2	3	8	6	8	12	10	4	10	9	9	3	28	8	22	26
	E.	1	1	1	2	0	0	0	0	0	2	1	1	3	3	3	0
	N. E.	4	9	1	0	1	2	3	1	1	2	4	3	7	16	2	6
	Calm.	21	31	28	21	10	10	30	13	19	13	22	21	54	73	59	53
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alpena, Mich.	N.	6	9	3	4	1	4	0	2	2	8	6	7	16	22	8	6
	N. W.	18	23	20	29	19	22	20	23	14	29	21	10	64	51	68	65
	W.	12	7	14	14	24	18	27	20	15	8	8	14	31	33	52	65
	S. W.	11	5	8	11	15	21	17	10	5	5	4	7	14	23	34	48
	S.	7	3	4	6	11	16	6	7	3	1	2	8	6	18	21	29
	S. E.	22	24	31	12	11	5	8	6	19	15	32	21	66	67	54	19
	E.	8	8	3	1	2	0	0	2	13	7	6	9	26	25	6	2
	N. E.	5	6	1	4	0	0	0	5	10	7	6	4	23	15	5	5
	Calm.	4	8	6	12	7	7	15	9	12	10	8	10	30	22	25	31
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atlantic City, N. J.	N.	3	10	2	5	6	6	4	6	12	3	3	2	18	15	13	16
	N. W.	8	11	9	15	25	22	27	11	14	27	10	5	51	24	49	60
	W.	3	6	6	20	21	19	31	32	12	9	8	3	29	12	47	32
	S. W.	18	6	14	15	11	28	3	12	9	7	15	20	31	44	40	43
	S.	40	22	10	15	13	9	3	9	13	13	28	36	54	98	38	21
	S. E.	8	4	13	4	2	0	4	4	4	7	9	12	20	24	19	8
	E.	6	13	25	7	8	4	3	5	6	5	8	4	19	23	40	12
	N. E.	6	19	10	11	4	4	12	4	17	17	7	5	41	30	25	20
	Calm.	1	2	1	1	0	1	6	1	6	2	5	3	13	6	2	8
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Augusta, Ga.	N.	2	12	7	7	12	4	9	1	3	4	4	9	11	23	26	14
	N. W.	4	11	9	15	14	18	21	22	20	19	12	8	51	23	38	61
	W.	6	3	9	8	10	7	5	7	6	10	9	6	25	15	27	19
	S. W.	4	15	5	6	4	4	5	7	9	10	5	7	21	26	15	16
	S.	13	9	3	9	5	8	4	10	17	12	11	27	40	49	17	22
	S. E.	24	5	1	5	3	6	8	9	13	7	9	7	29	36	9	23
	E.	5	4	13	4	9	10	9	6	4	1	15	1	20	10	26	25
	N. E.	18	22	21	13	20	11	17	3	10	7	8	3	25	43	54	31
	Calm.	17	12	22	26	13	25	15	19	11	20	20	22	51	51	61	59
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baltimore, Md.	N.	10	24	14	8	9	14	13	9	11	11	13	3	35	37	31	36
	N. W.	7	13	10	20	23	19	18	17	15	28	14	16	57	36	53	54
	W.	10	3	7	14	17	11	17	16	8	7	10	11	25	24	38	44
	S. W.	23	10	8	13	11	14	1	9	3	2	12	12	17	45	32	44
	S.	22	15	11	7	7	17	6	2	5	6	12	17	24	54	25	25
	S. E.	9	4	14	11	6	6	9	7	8	13	21	22	42	35	31	22
	E.	6	11	8	1	3	0	5	3	8	1	4	2	13	19	12	8
	N. E.	3	9	15	14	7	7	14	8	13	12	6	4	31	16	36	29
	Calm.	3	4	3	5	7	5	10	13	22	10	1	3	33	10	15	28
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Barnegat, N. J.	N.	8	5	3	6	3	8	5	3	7	2	1	0	10	13	12	16
	N. W.	1	12	8	15	13	17	9	8	6	12	5	9	23	22	36	34
	W.	9	9	9	24	26	29	28	30	19	32	16	5	67	23	59	87
	S. W.	14	4	12	13	13	13	17	9	10	4	11	25	25	43	38	39
	S.	28	10	4	11	12	11	2	15	12	9	25	27	46	65	27	23
	S. E.	20	16	16	7	12	2	7	7	8	13	19	10	40	46	35	16
	E.	7	6	18	7	5	3	8	6	9	4	9	2	22	15	30	17
	N. E.	5	28	19	8	2	4	7	2	19	14	3	6	36	39	29	13
	Calm.	1	3	1	2	4	6	10	4	3	0	4	6	7	10	7	26
	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, 1874.	August.	September.	October.	November.	December.	January, '75.	February.	March.	April.	May.	June.	Spring.	Summer.	Autumn.	Winter.
Benton, Mont	N.	9	10	8	7	12	11	5	7	9	11	5	12	25	31	27	23
	N. W.	2	1	8	6	4	2	7	4	3	8	8	7	19	10	18	13
	W.	29	17	4	15	7	11	16	12	13	13	23	21	49	67	26	39
	S. W.	11	20	32	15	30	44	19	24	45	26	28	13	99	44	77	87
	S.	9	5	6	3	3	1	3	3	1	6	8	3	15	17	12	7
	S. E.	2	3	1	2	1	0	0	1	2	0	2	8	4	13	4	1
	E.	12	21	5	10	7	3	6	8	5	9	9	11	23	44	22	17
	N. E	7	6	2	6	7	7	3	12	8	5	2	4	15	17	15	22
	Calm.	12	10	24	29	19	14	34	13	7	12	8	11	27	33	72	61
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bismarck, Dak *	N.	...	3	11	25	36	29	43	32	20	25	16	11	61	....	72	104
	N. W.	..	15	5	13	8	15	12	11	19	21	17	21	57	....	26	38
	W.	....	25	12	4	4	4	5	0	1	3	10	4	14	....	20	9
	S. W.	..	14	8	6	5	7	5	3	5	6	4	3	15	....	19	15
	S.	..	7	5	12	14	6	5	8	17	9	21	13	47	....	31	19
	S. E.	..	9	10	4	6	5	6	9	12	7	6	6	25	....	20	20
	E.	..	10	20	15	8	14	5	5	5	9	9	23	23	....	43	24
	N. E.	..	10	13	11	7	9	8	11	11	9	9	9	29	...	31	28
	Calm.	..	0	6	3	2	4	4	5	3	1	1	0	5	...	11	13
	Blank.	..	0	0	0	0	0	0	0	0	0	0	0	0	....	0	0
Boston, Mass	N.	4	8	10	5	9	9	11	3	10	12	3	2	25	14	24	23
	N. W.	17	28	23	39	34	39	49	46	35	34	24	24	93	69	96	134
	W.	12	7	4	16	22	18	18	9	2	6	12	18	20	37	42	45
	S. W.	23	7	10	13	13	7	1	8	6	6	19	17	31	47	36	16
	S.	9	6	12	3	3	7	0	4	4	8	6	3	18	18	18	11
	S. E.	9	16	4	3	4	4	2	6	6	5	9	8	20	33	11	12
	E.	10	13	17	13	1	4	6	3	18	11	12	15	41	38	31	13
	N. E.	9	6	8	1	3	5	6	5	12	8	8	3	28	18	12	16
	Calm.	0	2	2	0	1	0	0	0	0	0	0	0	0	2	3	0
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Breckenridge, Minn.	N.	22	11	7	10	2	5	3	11	14	24	18	14	56	47	19	19
	N. W.	9	6	16	28	38	29	45	47	31	21	12	11	64	26	82	121
	W.	1	3	8	3	3	2	5	2	0	5	6	5	11	9	14	9
	S. W.	4	7	5	6	7	6	9	3	3	7	3	3	13	14	18	18
	S.	26	18	30	8	6	6	4	0	0	5	15	20	20	64	44	10
	S. E.	14	19	19	24	20	31	18	17	41	12	24	28	77	61	63	66
	E.	1	2	0	0	1	0	0	1	1	0	4	0	5	3	1	1
	N. E.	4	7	3	6	2	2	0	3	1	14	9	5	24	16	11	5
	Calm.	12	20	2	8	11	12	9	0	2	2	2	4	6	36	21	21
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Buffalo, N. Y	N.	5	11	4	4	4	6	3	1	4	5	6	3	15	19	12	10
	N. W.	11	6	4	12	12	5	3	4	3	12	8	6	23	23	28	12
	W.	17	13	16	27	25	30	33	34	23	12	14	11	49	41	68	97
	S. W.	29	22	22	15	23	23	23	24	19	31	41	41	91	92	60	70
	S.	12	5	11	7	10	13	5	4	8	5	8	9	21	26	28	22
	S. E.	1	1	8	2	2	0	3	4	4	1	1	4	6	6	12	7
	E.	1	16	8	9	8	7	16	9	14	12	9	7	35	24	25	32
	N. E.	9	8	6	5	4	6	5	1	15	10	3	5	28	22	15	12
	Calm.	8	11	11	12	2	3	2	3	3	2	3	4	8	23	25	8
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Burlington, Vt	N.	25	32	28	18	20	23	21	18	30	38	31	19	99	76	66	62
	N. W.	2	5	3	5	11	3	6	12	5	10	1	3	16	10	19	21
	W.	2	6	7	7	10	4	9	15	9	3	7	8	19	16	24	28
	S. W.	5	2	10	14	1	1	2	2	3	4	10	4	17	11	25	5
	S.	42	30	30	34	38	46	37	30	36	23	28	46	87	118	102	113
	S. E.	3	2	4	2	3	2	4	0	1	0	6	0	7	5	9	6
	E.	1	5	4	5	5	4	4	0	5	1	4	1	10	7	14	8
	N. E.	6	7	2	6	2	8	10	5	4	5	0	1	9	14	10	23
	Calm.	7	4	2	2	0	2	0	2	0	6	6	8	12	19	4	4
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cairo, Ill	N.	2	13	17	11	14	14	17	18	16	12	11	11	39	26	42	49
	N. W.	5	2	5	15	2	6	16	9	11	9	5	4	25	11	22	31
	W.	6	4	4	8	6	4	3	7	7	12	1	8	20	18	18	14
	S. W.	20	9	3	5	8	8	5	4	6	4	10	11	20	49	16	17
	S.	9	17	14	7	25	19	7	17	22	19	29	33	80	59	46	43
	S. E.	6	8	8	12	9	9	4	7	3	4	4	7	11	21	29	20
	E.	7	12	12	3	6	4	7	7	12	9	10	6	31	25	21	18
	N. E.	22	20	12	17	18	16	21	8	10	8	12	6	30	48	47	45
	Calm.	7	8	15	15	2	13	13	7	6	13	11	4	29	19	32	33
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

* July, 1874, incomplete.

Statement showing how many times the wind was observed blowing, &c.—Continued.

Station.	Wind.	July, 1874.	August.	September.	October.	November.	December.	January, '75.	February.	March.	April.	May.	June.	Spring.	Summer.	Autumn.	Winter.
Cape Henry, Va	N.	2	11	11	17	15	18	34	14	11	24	11	10	46	23	43	66
	N. W.	6	7	6	12	8	23	16	20	17	17	9	4	43	17	26	59
	W.	3	5	4	6	5	7	6	6	6	0	2	5	8	13	15	19
	S. W.	20	10	8	19	14	21	6	14	8	7	14	20	29	50	41	41
	S.	17	11	6	9	5	7	3	13	14	14	12	12	40	40	20	23
	S. E.	19	12	16	13	8	9	4	7	9	6	19	26	34	57	37	20
	E.	5	12	25	8	13	0	9	2	12	8	11	2	31	19	46	11
	N. E.	21	25	10	9	21	8	12	5	10	7	9	8	26	54	40	25
	Calm.	0	0	4	0	1	0	3	3	6	7	6	3	19	3	5	6
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cape Hatteras, N. C.*	N.	...	...	2	5	8	9	12	12	4	4	1	0	9	...	15	33
	N. W.	...	...	1	2	5	6	14	4	9	1	0	14	...	8	...	26
	W.	...	...	7	1	10	16	4	5	11	4	3	1	18	...	18	25
	S. W.	...	...	5	16	4	10	10	10	18	18	15	31	51	...	25	30
	S.	...	...	4	0	6	5	1	9	7	6	16	11	29	...	10	15
	S. E.	...	...	12	4	4	5	6	4	12	10	9	13	31	...	20	15
	E.	...	...	7	6	5	2	0	2	3	3	4	3	10	...	18	4
	N. E.	...	...	49	55	43	38	49	24	34	34	39	29	107	...	147	111
	Calm.	...	...	3	4	5	2	5	4	0	2	5	2	7	...	12	11
	Blank.	...	...	0	0	0	0	0	0	0	0	0	0	0	...	0	0
Cape May, N. J	N.	3	12	5	13	8	13	20	8	14	11	5	5	30	20	26	41
	N. W.	4	10	12	20	32	35	40	37	26	32	16	28	74	42	64	112
	W.	3	5	6	12	14	12	3	4	1	3	3	1	7	9	32	19
	S. W.	9	10	8	8	6	11	1	4	4	2	8	7	14	26	22	16
	S.	51	16	15	14	12	10	6	19	12	18	32	32	62	99	41	35
	S. E.	9	14	9	10	7	0	6	0	5	4	10	10	19	33	26	6
	E.	4	11	20	6	3	4	1	3	12	11	12	3	35	18	29	8
	N. E.	5	13	9	8	3	4	11	7	16	6	3	2	25	20	20	22
	Calm.	5	2	6	2	5	4	5	2	3	3	4	2	10	9	13	11
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Charleston, S. C	N.	3	5	6	26	21	11	33	18	13	5	12	4	30	12	53	62
	N. W.	2	1	4	0	1	8	9	7	5	9	3	6	17	9	5	24
	W.	7	6	5	8	10	11	12	12	13	14	4	9	31	22	23	35
	S. W.	27	21	7	12	7	17	12	18	26	29	14	10	69	58	26	47
	S.	19	5	3	5	4	7	3	5	4	12	14	39	30	63	12	15
	S. E.	6	16	16	5	2	4	0	3	10	4	1	5	15	27	23	7
	E.	14	12	22	9	10	10	9	7	11	4	23	10	38	36	41	26
	N. E.	12	23	21	20	29	19	14	13	8	9	20	6	37	41	70	46
	Calm.	3	4	6	8	6	6	1	1	3	4	2	1	9	8	20	8
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cheyenne, Wash	N.	10	9	14	12	4	6	13	8	8	17	8	9	33	28	30	27
	N. W.	10	11	13	26	8	23	12	19	28	34	24	16	86	37	47	54
	W.	17	30	26	19	40	35	29	25	26	23	21	27	70	74	85	89
	S. W.	2	13	11	4	13	11	17	8	15	3	7	6	25	21	28	36
	S.	25	18	16	15	11	8	10	11	7	2	15	18	24	61	42	29
	S. E.	6	4	6	5	6	0	2	0	3	4	7	6	14	16	17	2
	E.	5	5	1	5	3	1	2	3	0	3	5	3	8	13	9	6
	N. E.	6	0	2	1	0	0	2	2	3	1	5	4	9	10	3	4
	Calm.	12	3	1	6	5	9	6	8	3	3	1	1	7	16	12	23
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chicago, Ill	N.	12	16	7	10	5	12	10	8	12	20	11	16	43	44	22	30
	N. W.	4	4	8	14	21	14	18	8	6	10	8	4	24	12	43	40
	W.	7	3	12	12	20	24	24	12	7	4	3	3	14	13	44	60
	S. W.	20	9	30	16	18	26	19	41	18	20	18	17	56	46	54	86
	S.	16	8	18	15	17	10	7	3	12	5	8	8	25	32	50	20
	S. E.	5	14	12	5	5	4	9	8	8	4	18	14	30	33	22	21
	E.	10	14	8	5	2	1	0	4	11	12	13	11	36	35	15	5
	N. E.	18	25	5	13	1	2	3	0	17	12	12	16	41	59	19	5
	Calm.	1	0	0	3	1	0	3	0	2	3	2	1	7	2	4	3
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cincinnati, Ohio	N.	10	10	16	11	6	3	6	4	14	8	15	5	37	25	33	13
	N. W.	8	6	3	16	10	20	21	18	10	13	9	9	32	23	29	59
	W.	14	3	6	11	11	8	11	14	12	16	11	8	39	25	28	33
	S. W.	10	12	13	13	16	22	6	10	9	13	10	15	32	37	42	38
	S.	18	12	21	9	9	12	7	7	11	7	12	15	30	45	39	26
	S. E.	5	13	7	13	17	13	20	17	18	13	11	17	42	35	37	50
	E.	11	18	8	10	6	3	8	1	7	6	12	10	25	39	24	12
	N. E.	11	14	12	8	14	12	14	12	12	10	8	7	30	32	34	38
	Calm.	6	5	4	2	1	0	0	1	0	4	5	4	9	15	7	1
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

* Observations began September 1, 1874

Statement showing how many times the wind was observed blowing, &c.—Continued.

Station.	Wind.	July, 1874.	August.	September.	October.	November.	December.	January, '75.	February.	March.	April.	May.	June.	Spring.	Summer.	Autumn.	Winter.
Cleveland, Ohio	N.	24	19	13	5	6	5	0	4	9	17	15	19	41	62	24	9
	N. W.	12	5	9	12	14	15	13	9	10	15	9	5	34	22	35	37
	W.	5	8	6	19	15	23	29	29	18	11	17	9	46	22	40	81
	S. W.	8	15	6	10	19	16	19	14	9	6	7	10	22	33	35	49
	S.	15	4	14	13	13	19	7	17	13	12	17	18	42	37	40	43
	S. E.	17	19	29	20	17	7	12	4	18	9	14	14	41	50	66	23
	E.	3	5	3	4	0	0	0	5	2	3	9	2	14	10	7	5
	N. E.	9	16	10	8	4	5	10	1	13	13	5	13	31	38	22	16
	Calm.	0	2	0	2	2	3	2	0	1	3	0	0	4	2	4	5
	Blank.	0	0	0	0	0	0	1	1	0	1	0	0	1	0	0	2
Colorado Springs, Colo.	N.	0	0	31	35	17	44	25	23	16	36	27	24	79	24	83	92
	N. W.	34	35	13	10	10	8	8	6	18	12	11	13	41	82	33	22
	W.	7	5	3	6	11	6	8	5	14	9	8	9	31	21	20	19
	S. W.	7	18	2	2	2	3	8	8	5	3	8	3	16	28	6	19
	S.	19	31	4	1	5	5	8	1	6	9	19	11	34	61	10	14
	S. E.	12	0	33	29	35	19	20	23	15	10	15	18	40	30	97	62
	E.	5	0	0	6	1	3	3	1	6	7	1	4	14	9	7	7
	N. E.	5	0	1	4	6	4	3	10	9	2	2	4	13	9	11	17
	Calm.	4	4	3	0	3	1	10	7	4	2	2	4	8	12	6	18
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corsicana, Tex *	N.	....	....	....	25	13	24	41	16	17	20	11	5	48	....	....	81
	N. W.	..	....	....	9	10	12	10	5	9	9	4	1	22	....	....	27
	W.	....	....	....	2	2	4	1	5	5	6	1	1	12	....	....	10
	S. W.	....	....	..	2	4	4	1	1	8	5	4	6	17	....	....	6
	S.	....	....	....	26	45	34	13	35	34	28	42	64	104	....	....	82
	S. E.	....	....	....	14	6	8	5	10	6	13	15	9	34	....	....	23
	E.	....	....	....	6	7	5	14	5	10	3	12	2	24	....	....	24
	N. E.	....	....	....	7	1	2	7	7	4	2	4	2	10	....	....	16
	Calm.	....	....	....	2	2	0	1	0	0	5	0	0	5	....	....	1
	Blank.	..	....	..	0	0	0	0	0	0	0	0	0	0	....	....	0
Davenport, Iowa	N.	7	9	7	11	10	14	7	10	12	10	6	6	28	22	28	31
	N. W.	12	5	9	13	17	13	19	13	11	12	12	13	35	30	39	45
	W.	11	3	12	20	19	20	22	20	17	16	8	4	41	18	51	62
	S. W.	24	18	22	9	7	19	8	5	1	14	10	13	25	55	38	32
	S.	12	6	9	9	15	11	4	5	7	2	12	8	21	26	33	20
	S. E.	8	7	11	12	10	5	7	6	14	7	14	8	35	23	33	18
	E.	8	33	8	12	5	4	16	9	18	10	15	20	43	61	25	29
	N. E.	7	10	9	5	2	2	3	8	10	14	3	14	27	31	16	13
	Calm.	4	2	3	2	5	5	7	8	3	5	13	4	21	10	10	20
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Denver, Colo	N.	16	12	13	19	10	10	19	12	9	18	10	12	37	40	42	41
	N. W.	7	8	2	6	10	6	6	10	14	13	11	8	38	23	18	22
	W.	4	5	3	1	10	3	2	7	10	6	6	2	22	11	14	12
	S. W.	7	4	4	5	5	4	5	4	9	1	4	5	14	16	14	13
	S.	29	37	30	20	21	44	20	13	24	19	25	23	68	89	71	77
	S. E.	12	8	12	11	10	10	14	6	9	5	8	11	22	31	33	30
	E.	4	9	10	15	9	6	6	8	2	7	8	9	17	22	34	20
	N. E.	14	9	15	12	11	8	15	15	9	11	7	13	27	36	38	38
	Calm.	0	1	1	4	4	2	6	9	7	10	14	7	31	8	9	17
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Detroit, Mich	N.	9	14	6	9	7	11	7	2	7	8	8	6	23	29	22	20
	N. W.	4	2	12	18	13	13	7	8	9	11	14	8	34	14	43	28
	W.	9	4	11	11	26	19	40	28	14	17	11	8	42	21	48	87
	S. W.	28	6	20	24	18	30	15	23	13	10	25	25	48	59	62	68
	S.	15	10	19	10	17	15	6	8	7	8	3	9	18	34	46	29
	S. E.	4	10	6	1	5	4	4	5	12	2	5	12	19	26	12	13
	E.	8	27	6	12	1	1	9	5	13	16	19	13	48	48	19	15
	N. E.	15	19	7	6	3	0	5	5	18	15	8	9	41	43	16	10
	Calm.	1	1	3	2	0	0	0	0	0	3	0	0	3	2	5	0
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dodge City, Kans *	N.	....	....	....	7	14	21	38	22	30	37	24	12	91	....	....	81
	N. W.	....	....	....	25	15	10	4	16	16	8	8	2	32	....	....	30
	W.	....	....	....	7	5	5	12	10	5	0	5	7	10	....	....	27
	S. W.	....	....	....	7	8	17	5	11	7	13	9	9	29	....	....	33
	S.	....	....	....	18	11	24	17	8	13	11	21	43	45	....	....	49
	S. E.	....	....	....	13	16	6	9	6	15	11	13	6	39	....	....	21
	E.	....	....	....	7	1	2	2	4	2	3	4	1	9	....	....	8
	N. E.	....	....	....	7	20	8	6	6	5	7	9	10	21	....	....	20
	Calm.	....	....	....	2	0	0	0	1	0	0	0	0	0	....	....	1
	Blank.	....	....	....	0	0	0	0	0	0	0	0	0	0	..	....	0

* Station opened September 15, 1874.

Statement showing how many times the wind was observed blowing, &c.—Continued.

Station.	Wind.	July, 1874.	August.	September.	October.	November.	December.	January, '75.	February.	March.	April.	May.	June.	Spring.	Summer.	Autumn.	Winter.
Dubuque, Iowa	N.	4	10	3	4	2	6	6	7	15	11	7	4	33	18	9	19
	N. W.	7	9	12	17	22	17	16	9	14	19	13	14	46	30	51	42
	W.	7	3	5	17	14	20	22	15	6	10	9	12	25	22	36	57
	S. W.	8	4	7	6	7	10	18	12	11	4	9	5	24	17	20	40
	S.	14	9	18	13	10	12	7	8	11	5	10	5	26	28	41	27
	S. E.	6	9	9	20	18	9	8	11	16	10	28	21	54	36	47	28
	E.	5	9	6	4	3	2	4	6	6	5	4	14	15	28	13	12
	N. E.	4	12	0	0	0	0	3	9	8	17	6	7	31	23	0	12
	Calm.	38	28	30	12	14	17	9	7	6	9	7	8	22	74	56	33
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Duluth, Minn	N.	2	9	3	15	7	5	2	4	11	10	4	3	25	14	25	11
	N. W.	19	5	22	13	15	10	12	15	13	5	15	8	33	32	50	37
	W.	8	1	5	5	14	15	13	15	4	7	6	9	17	18	24	43
	S. W.	14	9	19	19	27	44	49	23	4	8	7	14	19	37	65	116
	S.	1	1	4	1	3	4	3	2	4	0	1	1	5	3	8	9
	S. E.	2	2	6	3	2	1	0	1	1	1	0	3	2	7	11	2
	E.	2	1	1	1	5	4	2	2	0	1	1	0	2	3	7	8
	N. E.	32	51	13	18	8	2	6	10	46	43	39	41	128	124	39	18
	Calm.	13	14	17	18	9	8	6	12	10	15	20	11	45	38	44	26
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eastport, Me	N.	6	14	18	12	23	30	33	15	21	28	14	5	63	25	53	78
	N. W.	2	1	5	7	18	17	24	21	15	10	5	7	30	10	30	62
	W.	3	4	0	14	9	11	7	15	9	2	8	3	19	10	23	33
	S. W.	5	9	12	15	11	8	1	7	6	3	13	14	22	28	38	16
	S.	43	26	21	28	17	10	4	9	8	20	27	47	55	116	66	23
	S. E.	1	0	0	0	2	5	4	0	2	2	2	1	6	2	2	9
	E.	10	5	12	1	3	2	2	3	12	6	10	3	28	18	16	7
	N. E.	5	14	8	4	6	5	12	6	19	13	8	7	40	26	18	23
	Calm.	18	20	14	12	1	5	6	8	1	6	6	3	13	41	27	19
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erie, Pa	N.	2	6	8	8	2	8	4	3	8	9	6	15	23	23	18	15
	N. W.	17	6	10	14	16	8	6	6	6	14	6	9	26	32	40	20
	W.	12	7	7	14	9	14	14	13	10	17	18	11	45	30	30	41
	S. W.	18	10	3	11	19	22	28	31	14	10	14	8	38	36	33	81
	S.	8	10	32	19	25	28	16	15	10	17	16	20	43	38	76	59
	S. E.	3	20	15	12	13	6	16	11	23	7	15	15	45	38	40	33
	E.	3	12	2	6	1	2	1	0	0	1	5	3	6	18	9	3
	N. E.	26	22	11	8	4	5	7	4	19	15	8	5	42	53	23	16
	Calm.	4	0	2	1	1	0	1	1	3	0	5	4	8	8	4	2
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Escanaba, Mich	N.	28	33	8	19	3	12	15	18	35	32	21	19	88	80	30	45
	N. W.	7	1	10	18	23	10	18	12	8	3	8	3	19	11	51	40
	W.	2	5	9	11	22	24	19	17	5	2	4	3	11	10	42	60
	S. W.	10	5	18	16	14	34	18	6	5	6	5	9	16	24	48	58
	S.	36	27	20	20	19	7	10	18	23	20	31	33	74	96	59	35
	S. E.	3	12	16	2	4	3	6	2	4	4	8	9	16	24	22	11
	E.	2	2	2	6	2	0	0	2	3	8	12	2	23	6	10	2
	N. E.	5	5	3	0	3	3	6	3	6	13	3	7	22	17	6	12
	Calm.	0	3	4	1	0	0	1	6	4	2	1	5	7	8	5	7
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fort Gibson, Ind. Ter	N.	7	6	11	13	15	20	26	23	18	12	11	7	41	20	39	69
	N. W.	2	1	7	8	10	12	11	14	20	22	4	7	46	10	25	37
	W.	3	2	2	6	3	4	2	4	2	6	1	0	9	5	11	10
	S. W.	6	13	4	3	3	4	3	4	2	1	9	7	12	26	10	11
	S.	23	20	11	12	11	8	5	13	13	9	19	32	41	75	34	26
	S. E.	28	17	24	16	26	22	15	17	20	19	30	31	69	76	66	54
	E.	12	25	19	13	5	11	4	4	5	16	16	3	37	40	37	19
	N. E.	5	3	2	3	11	6	1	3	11	3	1	0	15	8	16	10
	Calm.	7	6	10	19	6	6	26	2	2	2	2	3	6	16	35	34
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fort Sully, Dak	N.	19	11	6	13	7	2	8	10	18	21	12	19	51	49	26	20
	N. W.	13	10	20	22	30	38	35	27	20	15	15	9	50	32	72	100
	W.	3	7	5	7	5	6	7	2	5	12	4	3	21	13	17	15
	S. W.	4	1	12	3	0	0	0	0	0	0	0	2	0	7	15	0
	S.	10	5	12	2	5	2	2	2	5	2	9	2	16	17	16	9
	S. E.	28	36	20	24	18	20	19	16	23	20	19	25	62	89	62	55
	E.	11	12	4	9	4	2	4	14	11	5	8	19	24	42	17	20
	N. E.	3	11	3	2	10	1	1	7	3	4	4	4	11	18	15	9
	Calm.	2	0	8	11	14	19	17	6	8	11	22	7	41	9	33	42
	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, 1874.	August.	September.	October.	November.	December.	January, 75.	February.	March.	April.	May.	June.	Spring.	Summer.	Autumn.	Winter.
Galveston, Tex	N.	2	5	11	13	15	8	37	14	8	17	5	1	30	8	39	59
	N. W.	5	6	4	5	7	4	2	6	9	4	3	2	16	13	16	12
	W.	4	2	2	0	3	5	1	0	0	1	0	2	1	8	5	6
	S. W.	18	9	1	2	2	1	2	6	3	6	4	7	13	34	5	9
	S.	30	32	11	3	6	6	5	13	10	16	20	37	55	99	20	24
	S. E.	17	28	25	17	25	22	3	19	39	29	31	36	99	81	67	44
	E.	8	7	15	27	16	22	11	11	17	8	12	4	37	19	58	44
	N. E.	9	4	18	24	15	22	32	15	6	8	8	1	22	14	57	69
	Calm.	0	0	3	2	1	3	0	0	1	1	1	0	3	0	6	3
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Haven, Mich	N.	6	5	5	12	8	9	6	7	8	13	7	7	28	18	25	22
	N. W.	9	13	7	12	11	18	24	11	6	8	13	8	27	30	30	53
	W.	12	4	11	11	19	14	19	22	15	15	19	27	49	43	41	55
	S. W.	18	16	19	11	12	14	4	7	7	11	16	14	34	48	42	25
	S.	21	9	14	12	14	13	7	8	12	6	11	11	29	33	40	28
	S. E.	3	13	6	2	9	5	10	8	12	8	7	9	27	25	17	23
	E.	2	6	7	10	4	3	13	8	16	11	7	7	34	15	21	24
	N. E.	12	17	5	10	6	9	3	4	15	11	5	4	29	33	21	16
	Calm.	10	18	16	13	7	8	7	9	4	7	8	3	19	31	26	24
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Indianapolis, Ind	N.	11	10	4	11	14	7	12	11	9	8	11	3	28	24	29	30
	N. W.	4	7	13	16	10	18	19	13	10	16	8	10	34	21	39	50
	W.	9	6	9	14	10	16	17	23	17	17	12	15	46	30	33	56
	S. W.	17	13	9	10	17	15	6	7	5	12	9	15	26	45	36	28
	S.	17	11	17	10	19	21	9	13	15	15	17	14	47	42	46	43
	S. E.	8	16	5	11	11	7	13	8	16	5	15	13	36	37	27	28
	E.	2	8	3	4	4	4	5	5	6	11	10	10	27	20	11	14
	N. E.	11	16	8	2	2	2	10	4	11	3	6	6	29	33	12	16
	Calm.	14	6	22	15	3	3	2	0	4	1	5	4	10	24	40	5
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Indianola, Tex	N.	6	0	9	9	14	16	54	14	12	13	3	2	28	8	32	84
	N. W.	2	3	0	0	2	12	3	3	5	5	0	1	10	6	2	18
	W.	1	5	0	0	0	2	0	0	0	0	0	0	0	6	0	2
	S. W.	6	4	0	0	7	1	2	5	2	4	0	1	6	11	7	8
	S.	49	42	22	12	21	15	7	23	21	26	39	52	86	143	55	45
	S. E.	18	24	21	23	17	7	5	14	37	27	39	29	103	71	61	26
	E.	5	10	19	19	7	21	8	3	6	7	4	1	17	16	45	32
	N. E.	4	3	16	25	18	18	13	22	10	6	5	2	21	9	59	53
	Calm.	2	2	3	5	4	1	1	0	0	2	3	2	5	6	12	2
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Island of Saint Paul, Behring Sea.	N.	4	18	25	15	13	22	15	3	17	25	29	11	71	33	53	40
	N. W.	9	7	10	12	4	6	1	0	11	6	10	2	27	18	26	7
	W.	19	7	10	21	17	14	5	4	19	10	12	17	41	43	48	23
	S. W.	20	1	4	4	7	5	5	8	11	4	3	8	18	29	15	18
	S.	15	22	1	16	12	20	21	22	12	11	7	19	30	56	29	63
	S. E.	9	8	12	3	9	12	16	5	5	11	4	9	20	26	24	33
	E.	11	22	11	12	20	6	24	28	12	18	22	21	52	54	43	58
	N. E.	6	8	17	9	7	6	5	14	6	5	6	3	17	17	33	25
	Calm.	0	0	0	1	1	2	1	0	0	0	0	0	0	0	2	3
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jacksonville, Fla	N.	2	10	5	17	20	24	17	11	4	2	7	2	13	14	42	52
	N. W.	4	0	3	13	10	8	16	13	8	9	3	1	20	5	26	37
	W.	1	5	6	1	6	3	2	7	11	11	6	5	28	11	13	12
	S. W.	10	10	6	4	6	7	12	8	23	27	15	17	65	37	16	27
	S.	19	8	3	4	6	11	4	7	10	11	11	15	32	42	13	22
	S. E.	9	3	10	5	6	10	5	3	9	9	9	13	27	25	21	18
	E.	16	16	19	6	8	4	2	3	7	0	11	15	18	47	33	9
	N. E.	18	30	31	35	22	19	24	22	19	17	28	17	64	65	88	65
	Calm.	14	11	7	8	6	7	11	10	2	4	3	5	9	30	21	28
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Keokuk, Iowa	N.	8	14	6	11	14	10	17	14	13	5	7	7	25	29	31	41
	N. W.	2	2	11	15	12	20	20	18	13	19	15	5	47	9	38	58
	W.	11	3	5	9	8	10	8	7	12	16	4	15	32	27	22	25
	S. W.	15	12	13	9	13	19	10	10	4	7	8	9	19	36	35	39
	S.	16	6	22	9	19	12	9	2	9	10	18	15	37	37	50	23
	S. E.	8	17	14	15	9	7	9	12	17	5	21	16	43	41	38	28
	E.	8	17	6	8	4	4	14	5	6	8	11	8	25	33	18	23
	N. E.	17	12	5	10	9	6	3	8	12	16	5	5	33	31	24	17
	Calm.	8	10	8	7	2	5	3	8	7	4	4	12	15	30	17	16
	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, 1874.	August.	September.	October.	November.	December.	January, '75.	February.	March.	April.	May.	June.	Spring.	Summer.	Autumn.	Winter.
Key West, Fla	N.	8	8	6	8	17	2	2	13	12	10	10	3	32	19	31	17
	N. W.	9	11	1	2	5	2	1	1	4	15	12	5	31	25	8	4
	W.	3	10	5	0	4	0	0	1	1	9	3	0	13	13	9	1
	S. W.	7	6	3	0	4	2	3	3	5	1	4	4	10	17	7	8
	S.	9	6	1	0	2	2	8	8	6	5	7	5	18	20	3	18
	S. E.	13	10	11	1	10	7	16	18	31	22	15	20	68	43	22	41
	E.	30	25	51	18	25	35	35	14	27	17	22	38	66	93	94	84
	N. E.	12	11	12	64	42	43	28	24	7	10	20	14	37	37	98	95
	Calm.	2	6	0	0	1	0	0	2	0	1	0	1	1	9	1	2
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kittyhawk, N. C*	N.	..	..	..	..	..	..	..	13	4	11	9	3	24	....	..	....
	N. W.	....	....	....	....	....	....	....	10	11	7	1	1	19	....	..	....
	W.	....	....	....	....	....	....	....	12	9	9	11	16	29	....	..	....
	S. W.	..	..	..	..	..	..	..	8	20	14	16	18	50	....	..	....
	S.	..	....	....	....	....	....	....	10	4	8	8	7	20	....	..	....
	S. E.	..	....	....	....	....	....	....	8	4	6	14	18	24	....	..	....
	E.	..	....	....	....	....	....	....	5	8	5	4	13	17	....	..	....
	N. E.	..	....	....	....	....	....	....	10	32	30	29	11	91	....	..	....
	Calm.	..	....	....	....	....	....	....	8	1	0	1	3	2	....	..	....
	Blank.	..	....	....	....	....	....	....	0	0	0	0	0	0	....	..	....
Knoxville, Tenn	N.	12	15	6	9	14	14	25	14	16	15	17	5	48	32	29	53
	N. W.	5	2	8	9	5	8	8	8	4	7	4	4	15	11	22	24
	W.	11	1	3	10	7	6	5	10	9	10	8	4	27	16	20	21
	S. W.	21	20	9	21	16	24	13	18	27	22	27	38	76	79	46	55
	S.	6	4	7	1	6	4	0	2	6	3	6	5	15	15	14	6
	S. E.	5	4	3	2	2	1	1	0	0	2	2	2	4	11	7	2
	E.	15	10	13	9	11	9	7	9	8	5	3	4	16	29	33	25
	N. E.	8	21	22	8	13	14	18	13	21	14	17	12	52	41	43	45
	Calm.	10	16	19	24	16	13	16	10	2	12	9	16	23	42	59	39
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
La Crosse, Wis	N.	10	19	8	17	7	17	18	16	14	18	10	10	42	39	32	51
	N. W.	13	4	14	11	20	12	6	14	9	16	11	15	36	32	45	32
	W.	5	3	5	13	9	12	25	20	7	9	7	5	33	13	27	57
	S. W.	17	9	5	4	12	13	12	8	27	9	9	13	45	39	21	33
	S.	31	25	40	31	33	31	22	15	19	16	27	16	62	72	104	68
	S. E.	8	14	3	2	3	2	6	3	7	6	13	17	26	39	8	11
	E.	2	5	2	1	0	1	1	2	1	3	1	3	5	10	3	4
	N. E.	3	6	3	10	1	3	2	5	6	10	13	10	29	19	14	10
	Calm.	4	8	10	4	5	2	1	1	3	3	2	1	8	13	19	4
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leavenworth, Kans	N.	13	17	9	14	18	25	18	11	15	10	9	9	34	39	41	54
	N. W.	1	6	9	5	21	21	22	19	23	20	14	7	57	14	35	62
	W.	0	2	1	1	7	1	2	3	3	3	3	2	9	4	9	6
	S. W.	6	4	2	1	5	3	5	4	2	6	4	3	12	13	8	12
	S.	43	22	25	21	21	12	18	11	14	13	26	48	53	113	67	41
	S. E.	9	15	13	12	11	9	1	7	13	5	15	8	33	32	36	17
	E.	5	8	7	1	3	3	6	4	4	10	4	4	18	17	11	13
	N. E.	5	4	1	2	2	10	6	13	6	7	4	5	17	14	5	29
	Calm.	11	15	23	36	2	9	15	12	13	16	14	4	43	30	61	36
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lexington, Ky	N.	10	6	3	16	9	6	6	3	13	5	9	7	27	23	28	15
	N. W.	10	5	11	8	6	12	24	18	11	13	12	9	36	24	25	54
	W.	9	5	7	17	10	16	11	15	13	14	10	7	37	21	31	42
	S. W.	16	14	18	12	16	20	4	12	5	15	15	25	35	55	46	36
	S.	16	11	17	16	26	23	8	22	21	16	17	26	54	53	59	53
	S. E.	5	17	18	16	7	3	13	6	11	3	9	2	23	24	41	22
	E.	6	11	5	6	6	5	15	4	9	8	6	5	23	22	17	24
	N. E.	17	22	10	2	8	8	12	4	9	15	14	8	38	47	20	24
	Calm.	4	2	1	0	2	0	0	0	1	1	1	1	3	7	3	0
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Louisville, Ky	N.	4	8	7	0	3	4	9	5	12	8	15	5	35	17	10	18
	N. W.	16	19	5	16	16	8	12	11	6	8	4	5	18	40	37	31
	W.	7	3	13	9	5	17	22	17	11	9	9	5	29	15	27	56
	S. W.	7	2	3	13	8	10	7	12	12	14	3	8	29	17	24	29
	S.	8	9	8	8	4	16	4	4	4	16	10	21	30	38	20	24
	S. E.	14	11	23	17	24	20	8	19	22	8	19	22	49	47	64	47
	E.	2	6	1	3	4	4	3	2	2	4	4	2	10	10	8	9
	N. E.	5	9	1	5	3	6	10	6	7	4	8	9	19	23	9	22
	Calm.	30	26	29	22	23	8	18	8	17	19	21	13	57	69	74	34
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

* Station opened January 15, 1875.

Statement showing how many times the wind was observed blowing, &c.—Continued.

Station.	Wind.	July, 1874.	August.	September.	October.	November.	December.	January, '75.	February.	March.	April.	May.	June.	Spring.	Summer.	Autumn.	Winter.
Long Branch, N. J.	N.	4	12	2	8	2	5	2	2	11	2	5	6	18	22	12	9
	N. W.	13	18	13	28	30	35	50	34	30	39	22	14	91	45	71	119
	W.	1	2	7	8	18	16	13	6	5	2	1	3	8	6	33	35
	S. W.	37	22	16	23	20	25	8	21	12	11	31	23	54	82	59	54
	S.	24	6	10	5	5	1	2	5	12	13	16	25	41	55	20	8
	S. E.	9	14	21	12	9	3	5	5	6	6	7	8	19	31	42	13
	E.	1	12	14	3	2	1	3	1	4	5	3	4	12	17	19	5
	N. E.	3	7	6	6	2	5	8	8	11	12	7	5	30	15	14	21
	Calm.	1	0	1	0	2	2	2	2	2	0	1	2	3	3	3	6
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lynchburgh, Va.	N.	5	8	3	5	8	4	6	0	4	4	6	4	14	17	16	10
	N. W.	1	3	5	11	9	33	11	10	12	19	17	3	48	7	25	34
	W.	8	6	8	12	13	19	16	16	16	7	12	7	35	21	33	51
	S. W.	15	14	5	5	13	16	8	16	10	10	10	16	30	45	23	40
	S.	27	6	8	19	7	23	9	14	15	14	14	18	43	51	34	46
	S. E.	15	7	5	6	7	1	3	4	4	3	2	7	9	29	18	8
	E.	8	13	12	5	3	3	18	3	7	9	7	9	23	30	20	24
	N. E.	6	23	12	13	8	5	10	4	16	10	10	4	36	33	33	19
	Calm.	8	13	32	17	22	9	12	17	9	14	15	22	38	43	71	38
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marquette, Mich.	N.	6	9	3	8	1	3	3	4	6	6	8	5	20	20	12	10
	N. W.	14	13	14	18	9	11	4	19	24	32	26	12	82	39	41	34
	W.	12	7	14	18	24	25	43	28	16	8	6	12	30	31	56	96
	S. W.	18	5	17	13	21	24	16	9	3	4	7	8	14	31	51	49
	S.	9	15	17	13	15	17	8	2	7	11	4	11	22	35	45	27
	S. E.	11	9	11	10	14	7	8	4	13	8	13	7	34	27	35	19
	E.	9	8	6	2	4	0	3	6	9	8	14	17	31	34	12	9
	N. E.	3	10	2	4	2	1	0	4	9	4	4	1	17	14	8	5
	Calm.	11	17	6	7	0	5	8	8	6	9	11	17	26	45	13	21
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Memphis, Tenn.	N.	4	0	4	1	10	7	11	4	1	3	2	1	6	5	15	22
	N. W.	16	13	16	17	6	11	21	14	15	21	16	11	52	40	39	46
	W.	5	1	0	0	5	6	1	3	6	8	3	3	17	9	5	10
	S. W.	25	24	9	15	11	8	6	8	12	10	15	36	37	85	35	22
	S.	7	5	1	0	11	14	3	12	7	7	14	13	28	25	12	29
	S. E.	9	8	11	5	18	8	6	11	20	17	13	13	50	30	34	25
	E.	0	0	1	0	2	5	4	4	2	0	3	0	5	0	3	13
	N. E.	13	12	7	5	12	19	26	14	12	13	17	6	42	31	24	59
	Calm.	14	30	41	50	15	15	15	14	18	11	10	7	39	51	106	44
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Milwaukee, Wis.	N.	3	4	2	5	4	4	0	4	9	11	9	5	29	12	11	8
	N. W.	7	4	16	22	27	29	46	24	15	10	5	12	30	23	65	99
	W.	13	3	7	16	17	27	24	27	17	10	19	14	46	30	40	78
	S. W.	23	13	31	16	17	20	11	9	6	8	9	6	23	42	64	40
	S.	3	0	3	3	13	6	5	4	3	6	3	3	12	6	19	15
	S. E.	20	23	20	16	8	2	6	6	19	13	21	15	53	58	44	14
	E.	4	5	2	3	2	0	1	4	9	8	13	16	30	25	7	5
	N. E.	18	40	9	12	1	4	0	6	15	22	13	15	50	73	22	10
	Calm.	2	1	0	0	1	0	0	0	0	2	1	4	3	7	1	0
	Blank.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Mobile, Ala.	N.	11	6	18	36	31	31	53	32	15	22	12	5	49	22	85	116
	N. W.	7	5	6	3	7	6	4	7	6	14	6	7	26	19	16	17
	W.	7	11	5	5	2	1	1	0	0	1	9	10	10	28	12	2
	S. W.	22	18	5	6	2	3	4	6	14	6	9	24	29	64	13	13
	S.	16	26	16	20	20	23	12	18	34	28	34	33	96	75	56	53
	S. E.	11	6	14	3	11	5	5	10	9	7	4	2	20	19	28	20
	E.	11	7	18	7	8	8	1	1	4	1	3	2	8	20	33	10
	N. E.	5	14	8	13	9	16	13	10	10	4	14	5	28	24	30	39
	Calm.	3	0	0	0	0	0	0	0	1	7	2	2	10	5	0	0
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Montgomery, Ala.	N.	6	10	6	19	5	24	28	23	6	2	11	12	19	28	30	75
	N. W.	7	12	11	21	10	10	9	12	10	15	12	3	37	22	42	31
	W.	10	5	2	7	8	5	3	7	12	15	5	10	32	25	17	15
	S. W.	6	8	2	1	2	2	3	3	8	10	6	19	24	33	5	8
	S.	11	8	1	4	8	7	8	11	16	16	19	21	51	40	13	26
	S. E.	13	16	6	2	7	14	5	10	12	12	12	11	36	40	15	29
	E.	21	14	34	15	23	9	20	6	14	4	3	1	21	36	72	35
	N. E.	2	5	9	8	13	6	14	0	2	2	6	5	10	12	30	20
	Calm.	17	15	18	16	14	16	3	12	13	14	19	8	46	40	48	31
	Blank.	0	0	1	0	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, 1874.	August.	September.	October.	November.	December.	January, '75.	February.	March.	April.	May.	June.	Spring.	Summer.	Autumn.	Winter.
Morgantown, W. Va.	N.	12	8	12	6	11	3	12	9	9	16	17	9	42	29	29	24
	N. W.	12	7	9	9	8	8	8	9	13	6	13	6	32	25	26	25
	W.	6	4	5	14	7	11	14	17	12	15	8	7	35	17	26	42
	S. W.	9	12	10	27	21	30	21	23	18	14	18	21	50	42	58	74
	S.	17	13	12	13	23	23	12	13	12	13	14	17	39	47	48	48
	S. E.	8	9	8	2	3	0	1	2	6	3	3	6	12	23	13	3
	E.	1	8	0	1	2	6	2	2	4	3	5	1	12	10	3	4
	N. E.	4	9	7	4	4	3	11	4	8	8	3	3	19	16	15	18
	Calm.	24	23	27	17	11	15	12	5	11	12	12	20	35	67	55	32
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mount Washington, N. H.	N.	11	18	26	29	28	18	13	8	14	37	20	15	71	44	83	39
	N. W.	37	46	33	41	42	56	58	58	49	26	42	41	117	124	116	172
	W.	15	6	4	9	11	15	9	6	7	6	6	12	19	33	24	30
	S. W.	16	4	6	6	3	3	11	10	6	3	7	6	16	26	15	24
	S.	10	4	4	2	3	0	1	0	2	4	4	1	10	15	9	1
	S. E.	0	1	13	1	2	0	1	0	6	4	5	8	15	9	16	1
	E.	1	6	1	1	0	0	0	0	4	3	3	2	10	9	2	0
	N. E	2	5	0	1	0	1	0	1	1	3	4	3	8	10	1	2
	Calm.	1	3	3	3	1	0	0	1	4	4	2	2	10	6	7	1
	Blank.	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Nashville, Tenn.....	N.	4	5	5	4	8	14	22	8	9	8	9	8	26	17	17	44
	N. W.	5	9	7	18	9	17	22	18	10	21	11	9	42	23	34	57
	W.	4	7	1	7	7	8	7	8	14	11	11	15	36	26	15	23
	S. W.	12	6	0	4	2	6	2	4	3	1	4	10	8	28	6	12
	S.	6	2	3	4	14	14	5	11	15	11	17	21	43	29	21	30
	S. E.	7	7	6	15	23	9	3	19	14	8	10	7	32	21	44	31
	E.	6	12	10	3	5	7	15	5	3	2	5	2	10	20	18	27
	N. E.	8	4	3	2	9	6	13	4	9	11	12	5	32	17	14	23
	Calm.	41	41	55	36	13	12	4	7	16	17	14	13	47	95	104	23
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New Haven, Conn...	N.	11	19	7	18	15	25	17	11	24	29	17	8	70	38	40	53
	N. W.	7	10	10	20	25	20	22	18	9	16	4	11	29	28	55	60
	W.	5	6	7	11	9	13	21	20	11	7	8	5	26	16	27	54
	S. W.	18	14	11	15	21	18	3	8	7	4	13	13	24	45	47	29
	S.	35	15	12	9	6	5	3	9	7	13	24	33	44	83	27	17
	S. E.	2	4	6	4	0	1	0	6	5	4	11	5	20	11	10	7
	E.	0	3	8	3	1	0	1	0	2	5	4	5	11	8	12	1
	N. E.	7	18	22	8	6	4	23	9	23	11	8	7	42	32	36	36
	Calm.	8	4	7	5	7	7	3	3	5	1	4	3	10	15	19	13
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New London, Conn..	N.	6	14	13	12	14	15	21	12	25	14	11	8	50	28	39	48
	N. W.	10	18	17	23	33	27	37	29	21	30	10	9	61	37	73	93
	W.	3	3	7	10	17	21	17	18	7	7	9	9	23	15	34	56
	S. W.	20	18	9	21	15	18	3	11	11	6	22	27	39	65	45	32
	S.	16	9	6	3	5	0	0	5	6	8	10	16	34	41	14	5
	S. E.	25	8	10	4	3	2	3	4	9	12	14	7	35	40	17	9
	E.	2	6	5	4	1	0	2	2	2	5	7	6	14	14	10	4
	N. E.	2	14	14	2	1	6	9	2	9	7	4	6	20	22	17	17
	Calm.	9	3	9	14	1	4	1	1	3	1	6	2	10	14	24	6
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New Orleans, La	N.	4	2	12	22	13	14	22	8	13	15	14	12	42	18	47	44
	N. W.	12	13	6	5	12	8	14	11	11	17	6	8	34	33	23	33
	W.	19	13	6	5	2	0	6	6	2	5	3	4	10	36	13	12
	S. W.	10	13	5	3	6	6	5	9	17	5	15	15	37	38	14	20
	S.	2	7	3	3	2	6	2	5	10	15	13	18	38	27	8	13
	S. E.	20	18	12	8	15	17	11	15	26	19	21	23	66	61	35	43
	E.	15	11	27	15	20	19	16	16	8	7	3	4	18	30	62	51
	N. E.	10	8	18	30	18	19	16	13	6	1	7	3	14	21	66	48
	Calm.	1	8	1	2	2	4	1	1	0	6	11	3	17	12	5	6
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
New York, N. Y	N.	6	7	4	4	4	5	7	3	11	8	5	5	24	18	12	15
	N. W.	13	19	14	22	18	22	28	21	18	27	13	11	58	43	54	71
	W.	6	6	9	20	22	16	26	28	13	15	8	5	36	17	51	70
	S. W.	16	20	11	14	17	22	7	10	10	4	23	21	37	57	42	39
	S.	22	6	11	13	12	15	3	5	9	11	12	21	32	49	36	23
	S. E.	20	9	7	3	8	2	1	5	5	5	14	11	24	40	18	8
	E.	3	4	18	9	4	3	5	7	15	14	7	9	36	16	31	15
	N. E.	5	19	12	5	4	7	15	5	10	6	5	5	21	29	21	27
	Calm.	2	3	4	3	1	1	1	0	2	0	6	2	8	7	8	2
	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, 1874.	August.	September.	October.	November.	December.	January, '75.	February.	March.	April.	May.	June.	Spring.	Summer.	Autumn.	Winter.
Norfolk, Va	N.	6	6	9	17	12	16	15	9	11	15	0	7	26	19	38	40
	N. W.	0	10	3	6	8	11	10	9	12	13	6	5	31	15	17	30
	W.	1	4	6	4	4	5	5	9	7	5	3	1	15	6	14	19
	S. W.	38	16	3	16	15	24	8	14	13	12	24	33	49	87	34	46
	S.	11	6	13	8	9	9	5	16	13	12	8	13	33	30	30	30
	S. E.	15	13	18	15	5	9	9	6	9	10	21	16	40	44	38	24
	E.	8	7	11	5	7	1	5	3	9	6	9	4	24	19	23	9
	N. E	8	30	15	19	29	18	32	15	19	13	22	8	54	46	63	65
	Calm.	6	1	12	3	1	0	4	3	0	4	0	3	4	10	16	7
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North Platte, Nebr*.	N.	....	..	....	3	5	4	9	5	7	6	8	3	21	....	..	18
	N. W.	....	....	....	20	10	26	24	11	22	20	15	10	57	....	....	61
	W.	....	..	....	13	9	13	5	5	3	8	8	6	19	....	....	23
	S. W.	....	..	....	6	16	14	7	7	12	10	5	6	27	....	....	28
	S.	....	....	....	9	16	14	14	7	8	4	10	10	22	....	....	35
	S. E.	....	..	....	21	14	7	11	10	22	14	26	19	62	....	..	28
	E.	....	..	....	11	4	2	3	3	0	3	6	5	9	....	....	8
	N. E.	....	..	....	10	14	5	9	18	10	18	4	17	32	....	....	32
	Calm.	....	....	....	10	2	8	11	18	9	7	11	14	27	....	....	37
	Blank.	..	....	....	0	0	0	0	0	0	0	0	0	0	....	....	0
Omaha, Nebr	N.	13	16	20	20	25	12	17	29	21	20	7	8	48	37	65	58
	N. W.	1	3	9	12	7	24	22	21	23	18	12	12	53	16	28	67
	W.	0	1	2	5	5	6	5	2	5	5	1	5	11	6	12	13
	S. W.	27	7	9	2	10	6	6	4	4	9	8	11	21	45	21	16
	S.	27	19	25	22	30	28	19	9	11	10	19	16	40	62	77	56
	S. E.	8	15	11	6	3	6	7	7	15	7	22	17	44	40	20	20
	E.	4	2	1	3	3	2	4	4	6	6	6	3	18	9	7	10
	N. E	5	9	3	3	5	6	3	5	6	7	2	3	15	17	11	14
	Calm.	8	21	10	20	2	3	10	3	2	8	16	15	26	44	32	16
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oswego, N. Y	N.	3	8	12	10	9	16	10	9	8	17	19	9	44	20	31	35
	N. W.	18	20	11	3	13	7	13	17	6	5	4	8	15	46	37	37
	W.	12	5	4	24	16	18	17	26	23	31	39	35	93	52	44	61
	S. W.	11	11	4	4	8	7	7	1	2	1	1	4	4	26	16	15
	S.	20	22	29	31	31	38	31	25	35	19	20	26	74	68	91	94
	S. E.	10	8	18	6	6	3	7	2	4	5	1	1	10	19	30	13
	E.	3	2	2	0	3	1	5	0	4	5	1	1	10	6	5	6
	N. E.	13	13	7	2	1	3	1	3	5	2	1	1	8	27	10	7
	Calm.	3	4	3	3	3	0	2	1	6	5	6	5	17	12	9	3
	Blank.	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Pembina, Dak	N.	0	0	0	0	0	0	0	0	0	11	7	5	18	5	0	0
	N. W.	37	24	27	34	44	35	16	0	0	16	22	21	38	82	105	51
	W.	2	0	0	0	0	0	0	0	0	5	5	7	10	9	0	0
	S. W.	6	8	13	7	8	10	3	0	0	5	3	6	8	20	28	13
	S.	1	0	0	0	0	0	0	0	0	3	5	3	8	4	0	0
	S. E.	33	36	32	37	26	32	4	0	0	16	33	33	49	102	95	36
	E.	0	0	0	0	0	0	0	0	0	3	4	2	7	2	0	0
	N. E.	6	6	2	8	4	6	0	0	0	24	4	5	28	17	14	6
	Calm.	8	19	16	7	8	10	4	0	0	7	10	8	17	35	31	14
	Blank.	0	0	0	0	0	0	66	84	93	0	0	0	93	0	0	150
Philadelphia, Pa	N.	14	17	10	12	12	15	12	9	14	23	14	6	51	37	34	36
	N. W.	4	7	8	19	20	16	25	31	16	17	11	7	44	18	47	72
	W.	12	7	9	22	18	25	17	12	6	9	10	18	25	37	49	54
	S. W.	25	12	8	11	16	18	7	9	8	11	22	28	41	65	35	34
	S.	21	7	7	2	7	9	1	7	8	6	10	9	24	37	16	17
	S. E.	3	5	6	4	2	1	2	3	2	2	5	4	9	12	12	6
	E.	6	14	22	10	9	3	16	7	22	14	14	9	50	23	41	26
	N. E.	5	15	7	8	6	6	11	5	14	5	7	9	26	29	21	22
	Calm.	3	9	13	5	0	0	2	1	3	3	0	0	6	12	18	3
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pike's Peak, Colo	N.	7	3	18	35	17	17	4	9	6	15	8	2	29	12	70	30
	N. W.	5	8	13	13	10	15	9	16	30	31	14	17	75	36	36	40
	W.	7	17	17	6	32	25	47	52	33	10	29	26	72	50	55	124
	S. W.	23	31	20	18	25	17	26	5	22	23	36	34	84	76	63	48
	S.	17	20	4	15	5	12	5	1	0	0	3	5	3	42	24	18
	S. E.	6	4	3	0	0	1	0	0	0	0	0	0	0	10	3	1
	E.	8	6	4	4	0	1	0	0	0	0	0	0	0	14	8	1
	N. E.	19	3	11	2	0	1	0	0	1	11	3	5	15	27	13	1
	Calm.	1	1	0	0	1	4	2	1	0	0	0	1	0	3	1	7
	Blank.	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0

*Station opened September 15, 1874.

Statement showing how many times the wind was observed blowing, &c.—Continued.

Station.	Wind.	July, 1874.	August.	September.	October.	November.	December.	January, '75.	February.	March.	April.	May.	June.	Spring.	Summer.	Autumn.	Winter.
Peck's Beach, N. J.	N.	2	7	6	9	13	16	15	2	16	12	5	5	33	14	28	33
	N. W.	4	7	5	15	25	25	30	34	9	28	9	4	46	15	45	89
	W.	5	3	11	23	12	13	11	12	12	3	11	8	26	16	46	36
	S. W.	29	16	9	6	7	19	3	13	8	5	19	19	32	64	22	35
	S.	27	8	6	9	11	6	1	6	7	12	15	27	34	62	26	13
	S. E.	10	8	17	7	8	4	4	4	8	7	11	12	26	30	32	12
	E.	8	23	31	15	8	4	6	4	21	15	15	9	51	40	54	14
	N. E.	6	17	4	7	4	2	16	9	11	6	5	5	22	28	15	27
	Calm.	2	4	1	2	2	4	7	0	1	2	3	1	6	7	5	11
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pittsburgh, Pa.	N.	15	14	15	12	2	8	6	2	4	9	8	11	21	40	29	16
	N. W.	21	14	12	28	20	13	23	26	21	30	19	15	70	50	60	62
	W.	8	7	9	10	21	26	18	21	13	16	12	10	41	25	40	65
	S. W.	21	8	11	13	15	18	10	8	6	6	13	18	25	47	39	36
	S.	8	6	6	4	4	9	6	9	10	7	9	10	26	24	14	24
	S. E.	1	11	4	2	5	3	4	0	8	2	4	4	14	16	11	7
	E.	5	6	11	8	9	7	11	4	12	6	1	1	19	12	28	22
	N. E.	6	23	12	8	7	2	8	4	9	3	12	6	24	35	27	14
	Calm.	8	4	10	8	7	7	7	10	10	11	15	15	36	27	25	24
	Blank.	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Port Huron, Mich.*	N.	....	16	7	6	1	5	6	3	11	16	16	14	43	....	14	14
	N. W.	....	6	9	17	14	14	3	9	6	6	6	3	18	....	40	26
	W.	....	0	9	8	24	16	30	19	14	19	10	5	43	....	41	65
	S. W.	....	9	10	17	23	26	25	23	10	6	12	10	28	....	50	74
	S.	....	5	31	21	20	27	9	16	17	11	12	18	34	....	72	52
	S. E.	....	12	9	5	7	2	8	6	14	6	11	8	31	....	21	16
	E.	....	6	2	6	1	2	3	2	5	3	3	0	11	....	9	7
	N. E.	....	27	6	9	0	1	6	5	20	19	18	21	57	....	15	12
	Calm.	....	12	7	4	0	0	3	1	2	4	5	11	11	....	11	4
	Blank.	....	0	0	0	0	0	0	0	0	0	0	0	0	....	0	0
Portland, Me.	N.	2	5	9	10	12	16	24	5	14	14	4	4	32	11	31	45
	N. W.	6	16	12	24	21	15	17	21	15	18	11	7	44	29	57	53
	W.	8	6	4	11	12	22	26	31	12	7	12	11	31	25	27	79
	S. W.	26	24	18	23	12	9	6	14	8	7	15	19	30	66	53	29
	S.	18	7	13	6	6	2	1	3	5	11	23	19	39	44	25	6
	S. E.	8	9	8	8	2	0	0	1	7	9	9	6	25	23	18	1
	E.	5	3	7	1	1	1	1	2	8	3	7	8	18	16	9	4
	N. E.	10	9	5	2	1	1	3	3	18	11	7	5	36	24	8	7
	Calm.	10	17	14	8	23	27	13	4	6	10	5	11	21	38	45	44
	Blank.	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
Portland, Oreg.	N.	38	15	11	10	5	6	7	14	1	20	9	25	30	78	26	27
	N. W.	28	17	20	24	7	7	7	11	8	18	12	15	38	60	51	25
	W.	2	4	0	0	1	2	1	1	3	4	11	4	18	10	1	4
	S. W.	3	8	4	3	7	3	7	9	30	6	20	9	56	29	14	19
	S.	6	14	17	4	29	36	9	13	32	8	18	10	58	30	50	58
	S. E.	1	3	3	5	7	3	15	5	7	0	4	1	11	5	15	23
	E.	0	0	3	7	4	0	27	5	1	1	0	4	2	4	14	32
	N. E.	0	2	2	3	4	1	2	2	1	5	2	3	8	5	9	5
	Calm.	15	30	30	37	26	35	18	24	10	28	17	19	55	64	93	77
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Punta Rassa, Fla.	N.	1	9	1	14	17	14	5	13	7	4	9	4	20	14	32	32
	N. W.	9	5	7	3	7	3	8	8	10	19	7	7	36	21	17	19
	W.	6	16	4	2	5	4	3	6	6	8	14	12	28	34	11	13
	S. W.	16	15	8	3	9	1	6	2	9	12	17	8	38	39	20	9
	S.	9	3	3	2	7	7	25	14	22	15	10	4	47	16	12	46
	S. E.	11	3	7	0	2	6	5	12	19	7	3	4	29	18	9	23
	E.	18	11	38	14	18	24	18	9	12	9	10	21	31	50	70	51
	N. E.	20	24	20	53	23	33	19	19	7	13	21	28	41	72	96	71
	Calm.	3	7	2	2	2	1	4	1	1	3	2	2	6	12	6	6
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rochester, N. Y.	N.	9	11	8	3	2	2	0	3	5	7	5	5	17	25	13	5
	N. W.	12	11	9	14	9	11	2	4	7	16	5	12	28	35	32	17
	W.	20	11	11	30	28	33	44	44	32	32	45	25	109	56	69	121
	S. W.	28	24	20	21	27	18	18	12	7	9	11	16	27	68	68	48
	S.	4	3	15	5*	9	12	4	8	6	6	5	14	17	21	29	24
	S. E.	5	9	11	16	8	11	11	10	18	6	10	9	34	23	35	32
	E.	4	6	3	0	6	2	11	1	10	2	4	5	16	15	9	14
	N. E.	9	13	10	4	0	4	3	2	8	12	7	4	27	26	14	9
	Calm.	2	5	3	0	1	0	0	0	0	0	1	0	1	7	4	0
	Blank.	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0

*Station opened July 25, 1874.

Statement showing how many times the wind was observed blowing, &c.—Continued.

Station.	Wind.	July, 1874.	August.	September.	October.	November.	December.	January, '75.	February.	March.	April.	May.	June.	Spring.	Summer.	Autumn.	Winter.
Salt Lake City, Utah	N.	5	5	7	6	3	5	15	11	21	22	2	8	45	18	16	31
	N. W.	23	8	26	17	14	18	25	15	9	15	8	16	32	47	57	58
	W.	1	0	1	1	4	5	4	3	2	0	9	11	11	12	6	12
	S. W.	4	7	0	7	6	5	6	3	10	3	9	5	22	16	13	14
	S.	9	10	5	12	7	12	14	3	16	8	5	7	29	26	24	29
	S. E.	11	17	10	2	13	12	10	3	9	9	15	12	33	40	25	25
	E.	7	11	3	2	12	5	3	6	5	5	16	15	26	33	17	14
	N. E.	14	14	16	14	6	8	5	13	10	18	15	10	43	38	36	26
	Calm.	19	21	22	32	25	23	11	27	11	10	14	6	35	46	79	61
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sandy Hook, N. J.	N.	7	9	7	8	13	11	13	9	7	7	5	5	19	21	28	23
	N. W.	6	7	7	13	13	19	22	21	16	22	9	10	47	23	33	62
	W.	11	13	15	25	24	26	25	18	15	15	13	13	43	37	64	69
	S. W.	19	10	5	11	10	17	11	14	8	6	13	13	27	42	26	42
	S.	14	8	8	12	17	7	1	7	8	10	14	17	32	39	37	15
	S. E.	27	18	22	7	5	4	3	4	7	10	23	19	46	64	34	11
	E.	1	5	15	8	2	0	4	1	7	8	4	7	19	13	25	5
	N. E.	4	23	9	9	3	9	22	8	22	11	10	6	43	33	21	39
	Calm.	4	0	2	0	3	0	2	2	3	1	2	0	6	4	5	4
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Diego, Cal	N.	3	7	19	9	13	7	8	11	4	15	8	13	27	23	41	26
	N. W.	14	17	16	18	10	12	11	16	16	11	13	16	40	47	44	39
	W.	29	25	17	18	13	10	9	13	16	18	23	22	57	76	48	32
	S. W.	15	15	5	7	4	6	10	6	9	16	17	11	42	41	16	22
	S.	24	15	3	1	9	5	14	5	2	13	15	10	30	49	13	24
	S. E.	0	1	1	0	4	4	6	5	2	1	2	1	5	2	5	15
	E.	0	0	5	8	10	10	9	10	11	5	3	2	19	2	23	29
	N. E.	1	2	2	8	11	26	14	6	16	5	2	2	24	5	21	46
	Calm.	7	11	22	24	16	13	12	12	17	6	10	13	34	31	62	37
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Francisco, Cal.	N.	0	0	0	4	2	29	25	13	5	5	0	0	10	0	6	67
	N. W.	0	0	4	1	11	23	18	10	12	3	1	1	16	1	16	51
	W.	4	21	9	11	18	14	6	20	31	37	55	38	123	63	38	40
	S. W.	87	67	62	49	23	0	7	22	28	30	21	31	79	185	134	29
	S.	1	2	0	3	4	1	7	2	2	2	6	8	10	11	7	10
	S. E.	0	0	0	5	8	5	10	1	4	1	1	4	6	4	13	16
	E.	0	0	0	1	1	0	2	1	0	1	0	0	1	0	2	3
	N. E.	0	0	0	4	1	3	7	3	1	1	1	0	3	0	5	13
	Calm.	1	3	15	15	22	18	11	12	10	10	8	8	28	12	52	41
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Santa Fé, N. Mex.	N.	15	17	4	9	14	29	17	24	17	13	14	13	44	45	27	70
	N. W.	3	10	4	4	15	9	7	6	18	11	4	4	33	17	23	22
	W.	2	4	9	9	8	3	4	9	7	11	6	8	24	14	26	16
	S. W.	8	16	11	13	14	10	12	10	16	16	23	19	55	43	38	32
	S.	13	6	8	11	5	7	9	12	9	12	14	12	35	31	24	28
	S. E.	19	14	12	13	12	14	20	7	9	12	9	14	30	47	37	41
	E.	19	12	25	19	5	12	15	4	10	9	12	10	31	41	49	31
	N. E.	7	7	12	8	9	6	4	9	5	4	5	6	14	20	29	19
	Calm.	7	7	5	7	8	3	5	3	2	2	6	4	10	18	20	11
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Savannah, Ga.	N.	8	12	18	8	15	9	16	7	10	7	10	3	27	23	41	32
	N. W.	9	6	5	21	16	15	23	14	16	7	7	9	30	24	42	52
	W.	1	4	5	4	10	13	12	17	9	18	6	4	33	9	19	42
	S. W.	11	17	6	6	5	18	11	13	13	14	17	13	44	41	17	42
	S.	16	8	4	2	5	7	5	9	16	17	9	29	42	53	11	21
	S. E.	20	8	12	2	4	5	3	5	8	12	8	17	28	45	18	13
	E.	9	10	13	10	5	9	4	11	15	7	15	11	37	30	28	24
	N. E.	11	22	19	16	28	15	18	8	4	5	19	2	28	35	63	41
	Calm.	8	6	8	24	2	2	1	0	2	3	2	2	7	16	34	3
	Blank.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shreveport, La	N.	9	5	10	14	10	16	26	8	11	10	10	5	31	19	34	50
	N. W.	2	3	5	2	6	7	11	4	8	8	6	4	22	9	13	22
	W.	3	5	5	4	8	5	5	5	9	14	6	4	29	12	17	15
	S. W.	10	9	0	1	2	7	0	2	1	1	0	10	2	29	3	9
	S.	20	18	6	1	16	17	14	21	25	17	32	38	74	76	23	52
	S. E.	12	14	4	12	21	2	3	9	8	15	7	10	30	36	37	14
	E.	21	7	26	2	5	13	11	5	6	4	10	8	20	36	33	29
	N. E.	6	6	6	14	1	8	14	12	7	1	7	1	15	13	21	34
	Calm.	10	26	28	41	21	18	9	18	18	20	15	10	53	46	90	45
	Blank.	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2	0

Statement showing how many times the wind was observed blowing, &c.—Continued.

Station.	Wind.	July, 1874.	August.	September.	October.	November.	December.	January, '75.	February.	March.	April.	May.	June.	Spring.	Summer.	Autumn.	Winter.
Saint Louis, Mo	N.	21	16	12	18	19	20	13	19	19	7	8	8	34	45	49	52
	N. W.	4	7	6	12	5	10	16	10	5	18	10	8	33	19	23	36
	W.	8	5	4	6	6	5	6	7	13	11	9	11	33	24	16	18
	S. W.	13	4	3	7	12	15	4	9	3	13	14	18	30	35	22	28
	S.	26	19	27	23	20	22	15	14	14	11	19	21	44	66	79	51
	S. E	3	14	24	8	5	8	8	7	18	4	9	9	31	26	37	23
	E.	5	16	9	4	2	3	9	4	8	9	15	5	32	26	15	16
	N. E.	11	11	3	11	5	7	13	14	8	17	7	8	32	30	19	34
	Calm.	2	1	2	4	7	3	8	0	5	0	2	2	7	5	13	11
	Blank.	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Saint Mark's, Fla*	N.	...	...	...	...	..	14	21	24	10	5	10	3	25	...	...	58
	N. W.	...	...	...	...	...	7	9	9	7	20	6	4	33	...	...	25
	W.	...	...	...	...	...	2	1	5	6	8	10	5	24	...	...	8
	S. W.	..	..	...	...	...	3	5	7	9	9	12	15	30	...	...	15
	S.	...	...	...	...	...	16	15	15	32	26	24	27	81	...	...	46
	S. E.	...	...	...	...	...	6	8	6	8	3	6	8	17	..	...	20
	E.	..	...	...	...	...	9	6	9	9	6	13	10	28	..	...	24
	N. E.	...	..	...	...	...	13	22	8	6	2	8	4	16	..	...	43
	Calm.	...	...	...	...	...	23	6	2	6	11	5	14	22	..	...	31
	Blank.	...	...	...	...	...	0	0	0	0	0	0	0	0	...	...	0
Saint Paul, Minn	N.	7	12	7	10	3	1	2	11	12	16	6	10	31	29	20	14
	N. W.	19	9	16	26	20	22	10	21	19	18	17	11	54	39	62	55
	W.	6	3	5	6	13	15	22	17	10	12	6	12	28	21	24	54
	S. W.	9	6	13	5	17	14	20	18	5	11	7	7	23	22	35	52
	S.	12	5	17	6	7	15	8	2	6	7	8	9	21	26	30	25
	S. E.	22	31	21	21	22	15	12	4	21	5	30	20	56	73	64	31
	E.	6	15	4	10	4	6	6	5	10	10	3	12	23	33	18	17
	N. E.	3	7	2	4	2	0	3	1	3	3	6	2	12	12	8	4
	Calm.	9	5	5	5	2	5	10	3	6	8	10	7	24	21	12	18
	Blank	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
Springfield, Mass†	N.	...	..	...	...	10	11	25	12	19	20	8	6	47	...	...	48
	N. W.	...	...	...	...	19	18	18	20	13	20	10	9	43	...	...	56
	W.	...	...	...	...	6	13	15	21	11	9	9	7	29	...	...	49
	S. W.	...	...	...	...	11	8	6	9	7	5	10	8	22	..	...	23
	S.	...	...	...	...	7	15	6	9	15	17	19	31	51	...	...	30
	S. E.	...	...	...	...	10	2	2	0	1	1	8	4	10	...	...	4
	E.	...	...	...	...	0	4	0	0	1	3	0	2	4	...	...	4
	N. E.	...	...	...	...	8	2	5	1	11	5	11	5	27	..	..	8
	Calm.	...	...	...	...	19	20	16	12	15	10	18	18	43	...	...	48
	Blank	...	...	...	...	0	0	0	0	0	0	0	0	0	...	...	0
Squan Beach, N. J.	N.	3	12	7	5	2	4	6	5	8	4	5	3	17	18	14	15
	N. W.	11	13	4	15	26	26	36	26	20	27	15	12	62	36	45	88
	W.	6	7	9	21	23	15	22	21	17	12	10	8	39	21	53	58
	S. W.	17	5	7	14	12	27	4	9	2	10	16	9	28	31	33	40
	S.	33	14	7	7	15	11	2	4	8	10	18	28	36	75	29	17
	S. E.	14	2	21	9	4	1	5	8	10	6	10	15	26	31	34	14
	E.	3	7	12	2	3	3	4	4	6	3	3	4	12	14	17	11
	N. E.	4	26	19	14	4	4	11	5	17	17	15	10	49	40	37	20
	Calm.	2	7	4	6	1	2	3	2	5	1	1	1	7	10	11	7
	Blank	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Toledo, Ohio	N.	18	11	12	11	3	3	4	2	6	4	3	4	13	33	26	9
	N. W.	0	2	6	5	11	7	3	5	7	8	8	4	23	6	22	15
	W.	15	9	10	12	10	9	6	8	6	30	16	5	52	29	32	23
	S. W.	4	7	13	18	25	25	39	42	21	6	13	20	40	31	56	106
	S.	25	13	20	25	22	35	9	8	6	11	15	20	32	58	67	52
	S. E.	7	5	7	2	9	5	6	8	11	1	11	8	23	20	18	19
	E.	9	8	9	7	4	3	13	4	13	12	8	14	33	31	20	20
	N. E.	10	31	12	10	3	0	3	6	21	18	13	13	57	54	25	9
	Calm.	5	7	1	3	3	6	10	1	2	0	1	2	3	14	7	17
	Blank	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tybee Island, Ga.	N.	1	9	12	11	10	6	16	8	8	9	3	2	11	12	33	30
	N. W.	3	2	1	6	11	12	16	20	13	10	5	2	28	7	18	48
	W.	6	11	8	4	4	5	0	6	7	15	3	3	25	26	16	11
	S. W.	6	7	6	3	3	10	14	7	10	11	6	8	27	21	12	31
	S.	28	14	9	11	10	7	5	11	19	24	15	25	58	67	30	23
	S. E.	17	6	7	1	2	4	1	5	6	8	8	14	22	37	10	10
	E.	16	23	19	8	1	5	1	2	5	1	13	3	19	42	28	8
	N. E.	14	21	24	36	43	27	29	18	10	12	25	10	47	45	103	74
	Calm.	2	0	4	13	6	17	11	7	15	9	15	11	39	13	23	35
	Blank	0	0	0	0	0	0	0	0	0	0	0	12	0	12	0	0

* Station opened November 10, 1874.

† Station opened November 1, 1874.

Statement showing how many times the wind was observed blowing, &c.—Continued.

Station.	Wind.	July, 1874.	August.	September.	October.	November.	December.	January, '75.	February.	March.	April.	May.	June.	Spring.	Summer.	Autumn.	Winter.
Vicksburg, Miss.	N.	6	4	12	13	8	16	12	6	11	7	10	4	28	14	33	34
	N. W.	9	17	12	18	12	4	22	9	8	15	10	7	33	33	42	35
	W.	2	1	0	2	2	4	9	0	2	4	3	13	9	16	4	13
	S. W.	13	18	6	7	9	5	3	8	11	12	16	23	39	54	22	16
	S.	16	9	1	3	5	11	3	19	22	21	16	24	59	49	9	34
	S. E.	7	13	6	5	22	12	5	15	14	8	10	7	32	27	33	32
	E.	12	4	18	7	19	14	5	8	4	5	5	2	14	18	44	27
	N. E.	12	7	12	10	1	8	9	13	8	6	7	1	21	20	23	30
	Calm	16	20	23	28	12	17	25	6	13	11	16	9	40	45	63	50
	Blank	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Virginia City, Mont.	N.	0	5	0	2	2	0	0	1	1	3	4	0	8	5	4	1
	N. W.	6	4	6	7	3	1	0	5	1	7	11	8	19	18	16	6
	W.	11	7	14	9	5	7	3	6	13	14	18	13	45	31	28	16
	S. W.	14	9	9	1	31	16	10	23	37	9	20	11	66	34	41	49
	S.	12	15	4	3	1	2	1	1	4	1	1	7	6	34	8	4
	S. E.	11	15	11	24	4	10	13	12	11	14	13	18	38	44	39	35
	E.	5	6	6	7	3	1	6	2	4	8	0	3	12	14	18	9
	N. E.	5	5	3	1	2	0	4	2	2	16	7	8	25	18	6	6
	Calm	29	27	37	39	39	56	56	32	20	18	19	22	57	78	115	144
	Blank	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Washington, D. C.	N.	12	12	11	11	6	11	15	7	14	10	10	3	34	27	28	36
	N. W.	9	16	14	22	29	22	24	25	22	34	14	8	70	33	65	71
	W.	5	4	10	10	5	5	4	8	3	4	5	11	12	20	25	17
	S. W.	9	9	4	8	13	10	2	8	0	2	7	8	9	26	25	20
	S.	46	13	19	16	16	23	12	16	18	11	22	25	57	84	51	51
	S. E.	4	7	7	4	3	2	6	4	5	6	11	14	22	25	14	12
	E.	2	7	7	6	3	2	4	2	8	4	4	3	16	12	16	8
	N. E.	4	20	13	9	5	6	11	4	17	13	6	1	36	25	27	21
	Calm	2	5	5	7	10	9	15	10	6	6	8	17	20	24	32	34
	Blank	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wilmington, N. C.	N.	3	13	3	20	14	20	26	11	12	8	8	6	28	22	37	57
	N. W.	5	7	6	2	7	11	8	13	5	13	4	3	22	15	15	32
	W.	7	9	2	1	5	10	6	10	13	11	4	5	31	21	8	26
	S. W.	37	16	6	17	11	17	15	15	19	20	12	23	51	76	34	47
	S.	9	5	7	7	3	8	2	9	18	9	13	19	40	33	17	19
	S. E.	9	7	22	7	5	3	0	1	8	6	10	13	24	29	34	4
	E.	6	3	12	7	9	9	8	14	9	9	22	10	40	19	28	31
	N. E.	13	26	22	24	31	12	25	9	7	9	16	9	32	48	77	46
	Calm	4	7	10	8	5	3	3	2	2	2	4	2	8	13	23	8
	Blank	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wood's Hole, Mass.	N.	3	14	9	9	8	7	7	4	15	4	5	5	24	22	26	18
	N. W.	8	10	13	25	30	34	58	37	26	24	14	10	64	28	68	129
	W.	1	2	2	8	10	14	4	11	9	7	6	5	22	8	20	29
	S. W.	56	23	14	27	18	16	0	7	6	21	31	45	58	124	59	23
	S.	14	10	11	3	7	4	1	9	7	6	12	4	25	28	21	14
	S. E.	5	4	15	7	5	7	9	7	8	10	13	10	31	19	27	23
	E.	0	6	9	6	5	3	8	4	10	7	5	3	22	9	20	15
	N. E.	3	13	12	4	5	2	4	0	6	6	4	2	16	18	21	6
	Calm	3	11	5	4	2	6	2	5	6	5	3	6	14	20	11	13
	Blank	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wytheville, Va.	N.	1	9	3	8	14	4	3	4	3	8	7	9	18	19	25	11
	N. W.	6	3	10	11	2	15	17	15	13	24	16	13	53	22	23	47
	W.	22	20	8	28	20	41	22	33	26	23	21	29	70	71	56	96
	S. W.	7	3	0	3	6	5	4	6	8	7	5	4	20	14	9	15
	S.	5	0	5	1	2	2	2	6	7	3	10	4	20	9	8	10
	S. E.	7	10	9	10	7	6	6	2	5	3	8	4	16	21	26	14
	E.	9	12	13	7	10	4	17	6	14	11	13	6	38	27	30	27
	N. E.	0	2	2	4	4	4	6	3	5	3	2	3	10	5	10	13
	Calm	36	34	40	21	24	12	16	9	12	8	11	18	31	88	85	37
	Blank	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
Yankton, Dak.	N.	5	6	2	3	8	2	4	14	8	6	5	8	19	19	13	20
	N. W.	10	10	20	30	28	23	35	26	31	31	22	15	84	35	78	84
	W.	4	1	2	10	5	14	7	8	6	9	3	7	18	12	17	29
	S. W.	22	5	11	5	16	14	9	0	5	14	9	8	28	35	32	23
	S.	7	6	11	17	8	13	7	3	6	5	16	5	27	18	36	23
	S. E.	16	27	16	10	14	9	8	9	23	4	18	20	45	63	40	26
	E.	9	15	7	5	7	4	4	4	5	12	3	10	20	34	19	12
	N. E.	16	17	9	8	3	8	9	10	5	5	6	12	16	45	20	27
	Calm	4	6	12	5	1	6	10	10	4	4	11	5	19	15	18	20
	Blank	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PAPER 20.

MONTHLY WEATHER REVIEW, JULY, 1874.

INTRODUCTION.

A careful examination of the meteorological data accumulated in this office during the past month, from both the regular and volunteer observers, has rendered it necessary to consider facts referring to an unusual series of atmospheric phenomena.

The month has been particularly marked in the occurrence of severe local storms, which have, in some cases, proved greatly destructive to both life and property.

The accompanying charts show an intimate relation existing between the barometric pressure, temperature, prevailing direction of winds and moisture, in the several geographic districts, and illustrate in a forcible manner that each of the elements above named is an important but variable function of the weather, while a comparison with previous months and years would indicate that decided changes in atmospheric conditions depend more directly upon the supply of aqueous vapor.

Generally, the weather has been favorable for agricultual pursuits. This is especially so on the Pacific coast, where the yield of wheat is reported to be greater than in previous years, although there are sections in the northern portion of this region where excessive rains have been injurious, and the low temperature prevented the maturing and ripening of the grain.

It is now quite certain that the late frosts which occurred in Virginia, North Carolina, Mississippi, and Tennessee, will materially reduce the fruit crop in these regions, and that the drought in the Ohio Valley, Tennessee, and Arkansas, has caused an almost total failure of the tobacco crop. There has been a deficiency of rain in the regions north and west of the Ohio Valley, but the excess in previous months has produced excellent crops, except in limited localities, where drought or insects have completely destroyed vegetation. In some districts the agricultural interests have been improved by the occurrence of timely rains, while in others too much rain, or almost a total absence of it, has caused a total failure of particular corps.

BAROMETRIC PRESSURE.

The influence of the land upon atmospheric pressure has been unusually well marked. Upon chart No. II is represented the general distribution of this pressure for the month. A comparison of the months of June and May shows that the area of mean low barometer has moved slowly to the northeastward, and that it now extends over the center of the continent; in the mean time the barometric pressure has increased in the southern and southeastern portions of the country which is now within the limits of the increased area of high barometer extending over the Atlantic, between the twenty-fifth and fortieth degrees of latitude. During the past three months there has been a gradual increase of pressure in the region last named, the direction of increase being westward from the Atlantic, while, during the same time, there has been but little change in the mean barometric readings of the central depression. Compared with July, 1873, there has been but little change, both years showing an excess of the mean pressure previously calculated. On the Pacific coast there has been no marked variation from the monthly mean, the pressure being greatest at Portland, Oreg., and least at San Diego, Cal., thus indicating that the mean pressure on this coast increases with the latitude, within the limits of the United States, while the reverse obtains on the Atlantic coast. The barometric range is shown to be greatest in the northern districts near the forty-fifth parallel of latitude, and from this region southward it is gradually diminished, finally becoming least in Florida.

Areas of high barometer.—These areas are not traced on the charts, but their general direction of progression has been from the northwest to the southeast; they have moved with less rapidity after reaching the Atlantic, becoming more extended in longitude, conforming to the general contour of the coast, and in some cases extending to the westward, in the direction of the Gulf coast. They have also been uniformly attended by fair weather, falling temperature and less relative humidity, and followed by rain, especially in the Atlantic and Gulf States, after the winds had shifted to easterly.

No. I. The first area observed was central off the South Atlantic coast on the 4th, and gradually extended to the westward, apparently following and displacing the depression which existed in the Gulf during the 2d, 3d, and 4th.

No. II. Was central in Manitoba on the 10th, passed thence almost due east to the Atlantic by the afternoon of the 12th; after which the pressure increased in the Atlantic and Southern States, and on the 15th it was still traced in the southeastern portion of the country.

No. III. Observed in the Missouri Valley on the 15th, had passed from the Pacific coast southeastward to this position, after which it extended over the southern portion of the country and disappeared on the 26th.

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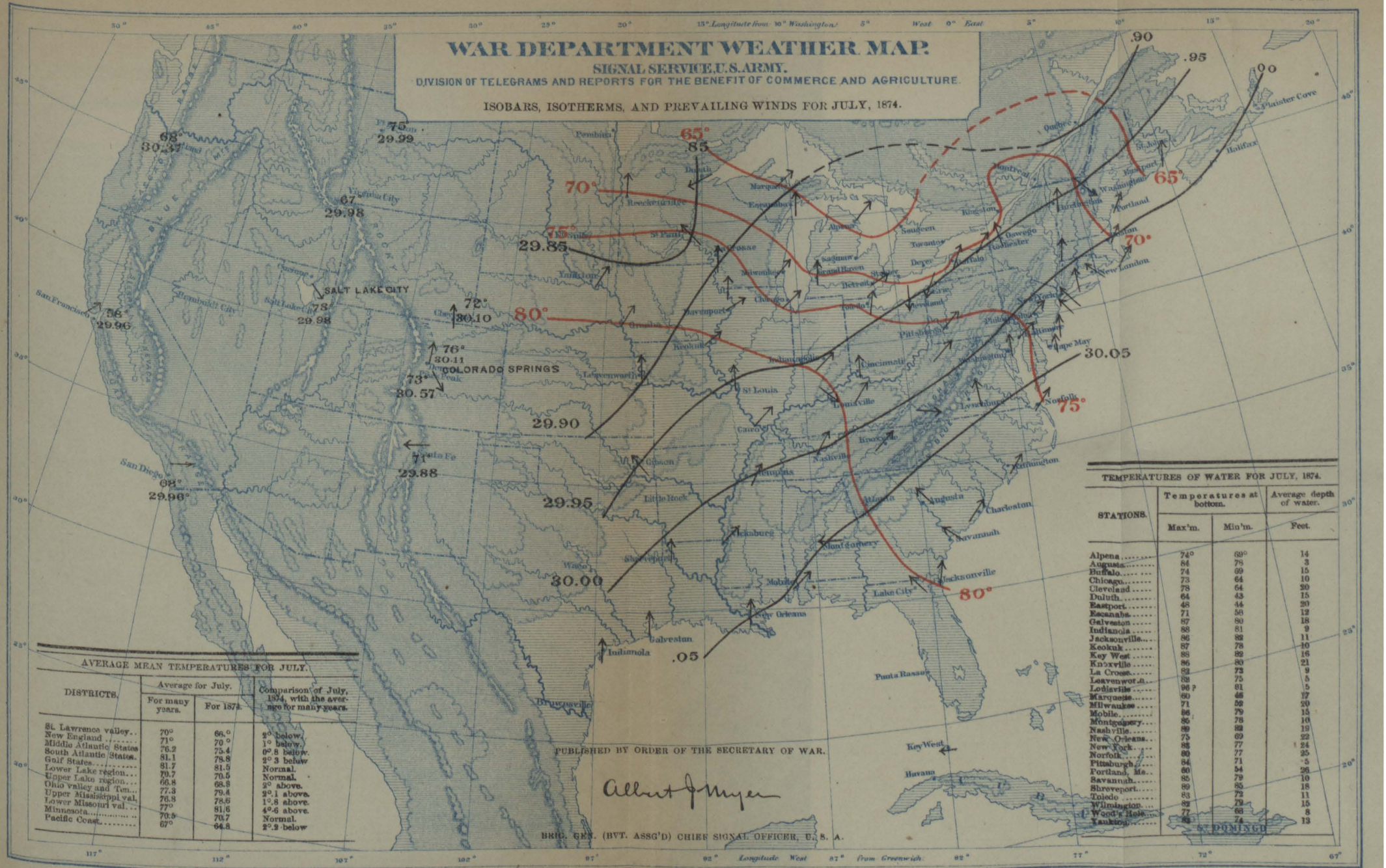
No. II.

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 JULY, 1874.



PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

AVERAGE MEAN TEMPERATURES FOR JULY.

DISTRICTS.	Average for July. For many years.	Average for July. For 1874.	Comparison of July, 1874, with the average for many years.
St. Lawrence valley	70°	68.°	2° below.
New England	71°	70.°	1° below.
Middle Atlantic States	76.2	75.4	0°.8 below.
South Atlantic States	81.1	78.8	2°.3 below
Gulf States	81.7	81.5	Normal.
Lower Lake region	70.7	70.5	Normal.
Upper Lake region	66.8	68.8	2° above.
Ohio valley and Ten.	77.3	79.4	2°.1 above.
Upper Missisippi val.	76.8	78.6	1°.8 above.
Lower Missouri val.	77°	81.6	4°.6 above.
Minnesota	70.5	70.7	Normal.
Pacific Coast	67°	64.8	2°.2 below

TEMPERATURES OF WATER FOR JULY, 1874.

STATIONS.	Temperatures at bottom. Max'm.	Min'm.	Average depth of water. Feet.
Alpena	74°	69°	14
Augusta	84	78	3
Buffalo	74	69	15
Chicago	73	64	10
Cleveland	78	64	20
Duluth	64	43	15
Eastport	48	44	20
Escanaba	71	56	12
Galveston	87	80	18
Indianola	88	81	9
Jacksonville	86	82	11
Keokuk	87	78	10
Key West	88	82	16
Knoxville	86	80	21
La Crosse	82	73	9
Leavenworth	88	75	5
Lodiaville	96 ?	81	5
Marquette	60	46	17
Milwaukee	71	59	20
Mobile	86	79	15
Montgomery	85	78	10
Nashville	89	82	19
New Orleans	75	69	22
New York	83	77	24
Norfolk	80	77	25
Pittsburgh	84	71	5
Portland, Me.	60	54	26
Savannah	85	79	10
Shreveport	89	85	18
Toledo	83	72	11
Wilmington	82	74	15
Wood's Hole	77	66	8
Yankton	83	74	13

ST DOMINGO

A.M. PHOTO-LITHOGRAPHIC Co. N.Y. (OSBORNE'S PROCESS)

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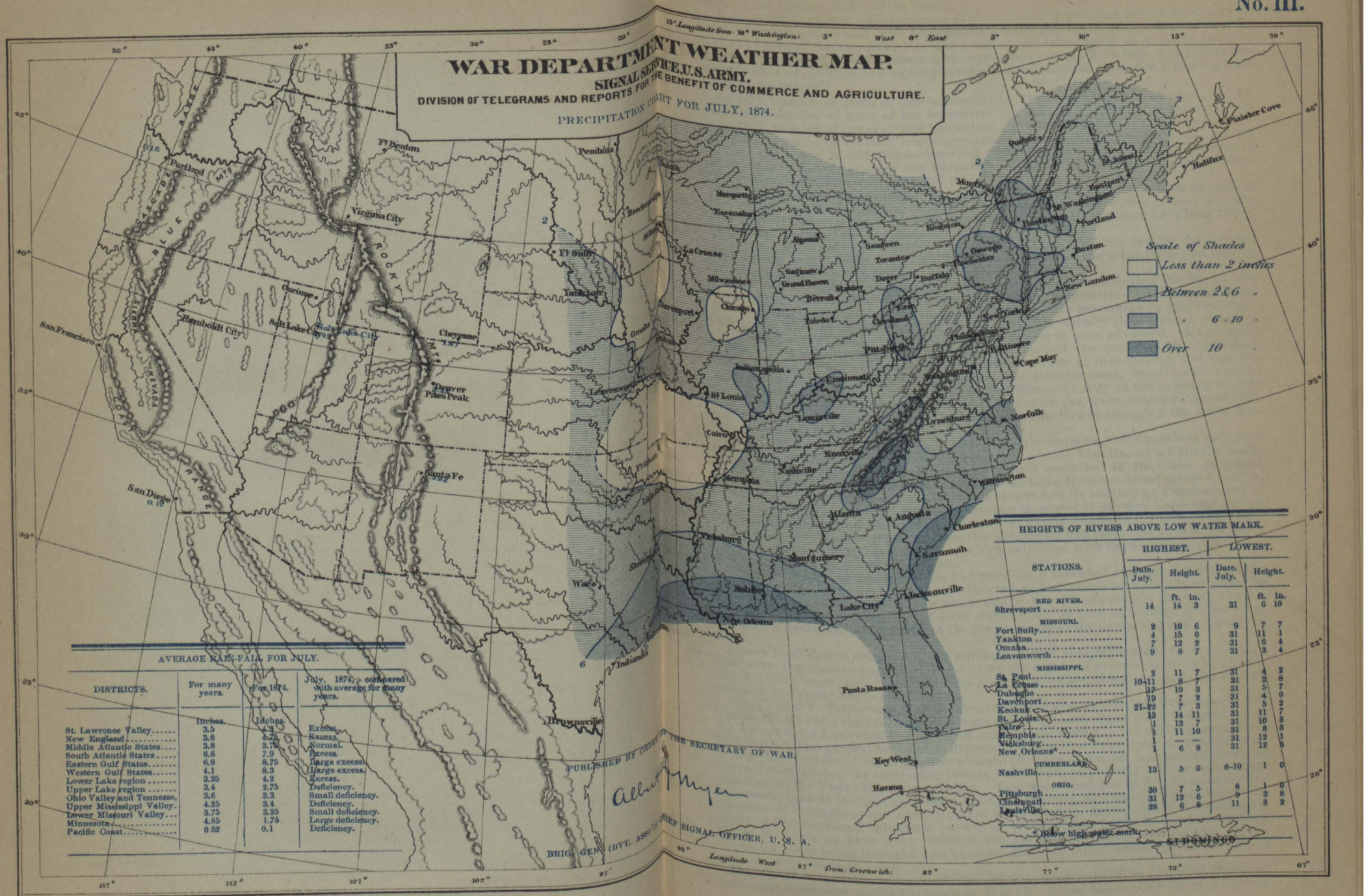
WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U.S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

PRECIPITATION CHART FOR JULY, 1874.



AVERAGE RAIN-FALL FOR JULY.

DISTRICTS.	For many years.	For 1874.	July, 1874, compared with average for many years.
	Inches.	Inches.	
St. Lawrence Valley	3.5	4.9	Excess.
New England	3.8	4.75	Excess.
Middle Atlantic States	3.8	3.75	Normal.
South Atlantic States	6.6	7.9	Excess.
Eastern Gulf States	6.9	8.75	Large excess.
Western Gulf States	4.1	8.3	Large excess.
Lower Lake region	3.25	4.2	Excess.
Upper Lake region	3.4	2.75	Deficiency.
Ohio Valley and Tennesse,	3.6	3.3	Small deficiency.
Upper Mississippi Valley	4.25	3.4	Deficiency.
Lower Missouri Valley	3.75	3.25	Small deficiency.
Minnesota	4.85	1.75	Large deficiency.
Pacific Coast	0 52	0.1	Deficiency.

HEIGHTS OF RIVERS ABOVE LOW WATER MARK.

STATIONS.	HIGHEST. Date. July.	HIGHEST. Height.	LOWEST. Date. July.	LOWEST. Height.
		ft. in.		ft. in.
RED RIVER.				
Shreveport	14	14 3	31	6 10
MISSOURI.				
Fort Sully	2	10 6	9	7 7
Yankton	4	15 0	31	11 4
Omaha	7	12 2	31	6 4
Leavenworth	9	8 7	31	3 4
MISSISSIPPI.				
St. Paul	2	11 7	31	4 2
La Crosse	10–11	8 7	31	2 8
Dubuque	17	10 3	31	5 7
Davenport	19	7 2	31	4 0
Keokuk	21–22	7 3	31	5 2
St. Louis	13	14 11	31	11 7
Cairo	11	13 7	31	10 3
Memphis	11	11 10	31	8 3
Vicksburg			31	12 1
New Orleans*	1	6 8	31	12 5
CUMBERLAND.				
Nashville	13	5 0	8–10	1 0
OHIO.				
Pittsburgh	30	7 5	8	1 0
Cincinnati	31	12 6	9	3 8
Louisville	28	6 8	11	3 2

* Below high water mark.

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Albert J. Myer

BRIG. GEN. (BVT. MAJ. GEN.) CHIEF SIGNAL OFFICER, U. S. A.

No. IV. During the 28th, 29th, 30th, and 31st, this area moved from the northwest to the South Atlantic coast, succeeding the depression which was attended by unusual rains in the Eastern and Middle States.

Areas of low barometer.—Eleven areas of atmospheric depression have been observed, some of which originated and disappeared within the limits of the United States; while the greater number passed to the north of the lake region on a mean latitude greater than that of similar depressions in previous years. This fact, which was noticeable in July, 1873, is now equally marked, as will appear from the following comparative statement:

July, 1871, number of areas of low barometer.... 15; mean latitude of same.... 45°
July, 1872, number of areas of low barometer.... 14; mean latitude of same.... 44°
July, 1873, number of areas of low barometer.... 13; mean latitude of same.... 47°
July, 1874, number of areas of low barometer.... 11; mean latitude of same.... 47°

From the above it will also be observed that there has been a gradual decrease in the number of defined areas of low barometer, a fact which is also noticeable in comparing records of June with 1874 and 1873.

The approximate geographical position of the center of each depression at each of the tri-daily reports during the time the depression remained within or near the stations of observation, is given on chart No. I, and through these points have been traced the general course of the depression.

No. I was apparent in Manitoba on June 30, and moved rapidly toward the Atlantic coast during July 1 and 2, following the general course of the great lakes and moving with less progressive velocity as it approached the coast.

No. II was attended by the unusual rains near the Gulf coast during the 2d, 3d, and 4th, and is interesting from the fact that it is the first barometric depression of the season which originated in the tropics, having a progressive movement to the westward. This storm has its parallel in July of last year, but usually they are not observed within the limits of the United States until the season is more advanced. Its westerly course, with a velocity of twelve miles per hour, carried the center of the depression slowly toward the dry and sandy plains of Texas, where it disappeared, and was followed by the succeeding high barometer from the Atlantic coast, which now moved to the westward and became central in the Lower Missouri Valley on the morning of July 6th. The same cause which produced the shifting of the mean tracks of barometric depressions in the temperate zone may be equally effective in changing the mean latitude of tropical storms.

No. III. The approach of this depression from the extreme Northwest was indicated by the reports from that region on the 2d July, while No. 1 continued within the limits of the eastern station and No. 2 in an undeveloped condition in the Gulf. It passed from its initial position to the eastward as far as Lake Huron without marked results, except that on the morning of the 3d it had almost lost its identity as a defined area of low barometer, the center of depression having increased thirty-five hundredths of an inch and the gradient diminished from 0.1 inch in eighty miles to 0.1 inch in two hundred miles. On the morning of the 4th, this depression had taken the form of a slightly eccentric ellipse, the transverse axis of which coincided with the 44° of north latitude, and was four hundred miles in length.

The area of high barometer which had previously extended over the districts on the Atlantic coast, and which by its southerly wind had accumulated a supply of vapor in these districts, now moved to the south and westward, apparently drawing the depression toward the coast in the most direct line. In this, as in other storms, there has been a deviation to the south of the direct course as the depression approached the coast.

Severe local storms occurred in the southern half of this depression, while its center was near the eastern portion of Lake Erie; the region of greatest severity being near the Atlantic coast, and including New Jersey, Delaware, Maryland, and the eastern portions of Pennsylvania and Virginia.

Nos. IV and V. No decided change occurred in the atmospheric condition within the United States until the 7th, although there seems to have been some disturbance in the Lower Saint Lawrence Valley which caused local storms in the northern portions of New York. The general barometric depression in the Northwest now contracted as an area of low barometer, central in the western portions of Kansas, and moved slowly to the eastward during the succeeding twenty-four hours, completely lost its cyclonic appearance in the Upper Mississippi Valley. This was succeeded by No. V, an extensive depression central in the Upper Ohio Valley, indicating an unstable condition of the atmosphere throughout the country east of the Mississippi River. After the barometric gradient had increased, this storm passed to the northeast to the Lower Lake region, where it seems to have been retarded, the easterly movement of its center during thirty-six hours being less than two hundred and fifty miles, while its movements in latitude were much greater.

No. VI. This disturbance was indicated by the appearance of an extended trough of barometic depression on the afternoon of July 11. It had taken the form of a circular

depression, central in the Upper Ohio Valley on the succeeding morning, when a small central area could be distinctly traced. A general rain prevailed at this time in the districts of the Atlantic coast and in the Lower Lake region, the course of the storm being directly to the east, with a mean velocity or twenty-five miles per hour, and a greatest barometric gradient of 0.1 inch in fifty miles.

No. VII. Observed in the Northwest on the morning of the 14th, while an area of decidedly high barometer extended over that portion of the United States south of the Lake region. These general conditions continued while this depression moved almost directly east toward the Lower Saint Lawrence Valley without producing any serious disturbance within the limits of the United States. Generally it has been observed that the relative positions of the areas of high and low barometer materially affect the course of the latter, and that the former seem to deflect the latter from their mean tracks.

Nos. VIII and IX, were only partially developed areas of low barometer, central in the Northwest near the boundary of the United States on the 18th and 22d. They produced no disturbance, but caused a rise of temperature in the Mississippi valley.

From the 21st until the 25th, the barometer continued low in the Western Territories with but slight changes of pressure within the States until the development of storm marked No. X, which can be traced to the west of the Rocky Mountains by a reference to the barometric readings taken at the stations in the far West. This storm moved with quite a uniform velocity of about forty miles per hour, producing heavy rains over a belt of country seven hundred miles in width, extending from the Upper Mississippi Valley to the Atlantic coast. The midnight reports of July 26 show that the depression divided, leaving a small elliptical area in the Ohio Valley to the southwest of Lake Erie, while the principal area was to the northeast of this position. Such a distribution of pressure would necessarily give a continuous supply of warm, moist air flowing from the southeast over Ohio and Pennsylvania, while a supply of cold currents flowing from the North and West in the rear of the more advanced depression would be forced over the same region. It was the sudden interference of these currents which produced the heavy rains which occurred in Western Pennsylvania on the night of the 26th. On the morning of the 27th the depressions had again united, forming an extended but narrow trough, nearly parallel to the coast, where southerly winds continued, while in the Lower Lake region and the Saint Lawrence Valley the winds had backed to north and west. This depression did not pass directly to the Atlantic, but apparently extended over the entire country south of the Lake region and continued until the 29th, when it was replaced by an equally extensive area of high barometer.

No. XI. The afternoon report of the 29th from the Northwest indicated the approach of this depression, but at no succeeding report could its center be more than approximately located; it passed to the north of the Lakes, and was only attended by light local rains in the regions north of the Ohio Valley.

Local storms.—These storms have been particularly marked for their severity during the past month. Their occurrence seems to depend upon the relative distribution of barometric pressure, considered in relation to the topography of the country. The region of greatest frequency has been in the vicinity of the Appalachian chain, where the vapor from the Gulf and the Atlantic was forced over the ascending plains by the prevailing southerly and southwesterly winds. Those producing the greatest destruction of life and property occurred on the 4th, 7th, 24th and 26th of the month. On the afternoon of July 4, the depression already referred to as No. 3, was central near the eastern portion of Lake Erie; at midnight this depression was located near the eastern boundary of New York, south of its previous position. The sudden veering of the winds in the south and west quadrants of this area was attended by violent storms during the afternoon and evening in the States of Maryland, Virginia, Delaware, New Jersey, and Pennsylvania. From an examination of a large number of reports referring to these storms, it is shown that the regions of severity were limited in area, and that the storms uniformly approached from the northwest. The storm of the 24th occurred at Eureka, Nev., and was very destructive; but no official report has been received concerning it.

The remarks referring to the area of low barometer, marked No. X, considered in connection with the peculiar arrangement of clouds at Erie, Pennsylvania, during the evening of the 26th, which was as follows: "Three distinct strata of clouds: first, black cumulo-stratus moving from the southwest; second, heavy cumulus well defined, moving from a little north of west; third, cirro-cumulus moving from the north," give the general atmospheric conditions which attended the unusually heavy rains occurring in Western Pennsylvania on that date. The official report from the observer at Pittsburgh, states that the total number of lives lost at or near that city is one hundred and thirty-four, and that property valued at five hundred thousand dollars was destroyed.

PRECIPITATION.

In the construction of Chart No. 3, which is a graphical representation of the distribution of rain in the United States, the regular and volunteer reports have been com-

bined with those furnished by Professor Kingston, of the Toronto Observatory. From the comparative tables accompanying the chart, it will be observed that the districts showing an excess over the normal are near the coast, and that the regions of excess of rain correspond with those in which the mean temperature has been below the normal. Within the large area representing less than two inches of rain, there are small districts where there has been a total absence of it. Special droughts have prevailed, proving injurious to crops, in Kentucky, Arkansas, Texas, Missouri, and Kansas.

Cloudy days.—The number of cloudy days reported from the Signal-Service stations average as follows: Six on the Gulf coast, eight on the South Atlantic coast, seven on the Middle Atlantic coast, twelve on the East Atlantic coast, three in the Lower Mississippi Valley, six in the Ohio Valley, seven in the Upper Mississippi Valley, four in the Lower Missouri Valley, and six in the Lake region.

Rainy days.—The number of days on which rain fell are as follows: Eleven in the Gulf States, fifteen in the South Atlantic States, eleven in New England, eleven in the Lower Lake region, nine in the Upper Lake region, eight in the Upper Mississippi Valley, seven in the Lower Mississippi Valley, and twelve over the Blue Ridge and Alleghanies.

Special rains.—Remarkably heavy rains occurred on the 3d at Wilmington, Charleston, and Savannah; on the 4th at New Orleans and Mobile; on the 12th at Hinsdale, Mass.; on the 24th at Eureka, Nev.; on the 26th at Pittsburgh and Allegheny City, Penn., and at Port Huron, Mich.; on the 27th at Rising Sun, Ind.

HUMIDITY.

During the month of July the relative humidity has averaged as follows in the different sections of the country:

On the Gulf and South and East Atlantic States, .75; on the New Jersey coast, .85; in the Lake region .68; in the Lower Mississippi Valley, .70; in Tennessee and the Ohio and Upper Mississippi Valley, .62; in the Lower Missouri Valley, .58; at the Rocky Mountain stations, .41.

ATMOSPHERIC TEMPERATURE.

The mean isothermal lines for the month are represented on Chart No. II, and the comparison of the mean temperature of the several districts with that of the mean temperature of July in previous years is given in the table. It will be seen that the temperature has been above the mean in the districts of the Mississippi Valley and below it in the districts near the coast; this has been particularly noticeable on the Middle Atlantic and New England coasts and at San Francisco. The range of temperature compared to that of 1873 has diminished slightly on the Gulf coast and increased in the northern sections of the country. The unusual high temperature of 100° prevailed over an extensive region, including Indian Territory, Missouri, Kansas, Nebraska, and portions of Iowa and Arkansas, on the 25th of the month. The mean temperature at the summit of Pike's Peak was 42°, that at the summit of Mount Washington, 48°.5.

Frosts were reported on the 10th in Colorado, and on the 27th in Minnesota.

TEMPERATURE OF WATER.

The table on Chart No. III gives the maximum and minimum temperature of water by observations made at the bottom at many of the Signal-Service stations on lakes, rivers, and coasts. The range of temperature of the water on the Atlantic seaboard has been about 5°, and on the Gulf coast 7°. In Lake Erie the range varies from 5° at Buffalo to 14° at Cleveland. In Lake Michigan from 9° at Chicago to 19° at Milwaukee, and in Lake Superior from 14° at Marquette to 21° at Duluth. The range averages about 14° in the Ohio, 9° in the Upper Mississippi, and 4° in the Lower Missouri.

The difference between the maximum air-temperature and maximum water-temperature has been greatest on the coast of Maine and near Lake Superior, where it has averaged 30°; this difference has been least in the Gulf and on the South Atlantic coast, where it has averaged 9°. At the stations on the western rivers the temperature of the air has risen from 12° to 25° above the highest water-temperature.

The minimum air-temperature has been lower than the minimum water-temperature at nearly all stations, the only exception being at Duluth, where the water-temperature was 5° lower than the air, and at Milwaukee and Eastport, where it has been 2° colder. The mean temperature of the water has been slightly above the mean temperature of the air on the Gulf and South Atlantic coasts, and in the Ohio, Cumberland, and Tennessee Rivers. In Lake Michigan the water has averaged colder than the air by 7°; in Lake Superior by 14°, and on the coast of Maine by 12°.

WINDS.

Southerly winds have prevailed throughout the United States east of the Rocky Mountains. Chart No. II shows the mean direction as obtained from each of the stations of the Signal-Service, and it will be observed that these directions are generally toward the area of mean low barometer. The total atmospheric movement, independ-

ent of the direction, has been as follows in the several districts: New England, five thousand two hundred and eighty miles; Middle Atlantic coast, six thousand four hundred and eighty miles; interior of the Middle Atlantic States, four thousand six hundred and ninety miles; South Atlantic coast, four thousand seven hundred and thirty miles; Gulf coast, five thousand six hundred and fifty miles; Ohio, Tennessee, and the interior of the Gulf States, three thousand three hundred and sixty miles; Lower Lake region, five thousand seven hundred and ten miles; Upper Lake region, six thousand three hundred and seventy miles; Upper Mississippi Valley, six thousand three hundred and ninety-five miles; Missouri Valley, three thousand five hundred and seventeen miles. Violent winds occurred at Washington, D. C., July 4, sixty miles; Mount Washington, New Hampshire, July 9, ninety-six miles; Milwaukee, Wis., July 9, sixty-three miles; Long Branch, July 26, fifty miles. Tornadoes were reported at Three-Mile Bay, New York, July 7; Bass Harbor, Maine, July 16; Lexington, Mich., July 24; South Bend, Ind., July 26.

Dove's law of gyration received four complete verifications at Signal-Service observatory in this city, with a single backing of the wind through an arc of 180°.

NAVIGATION.

From the table on Chart No. III, which gives the condition of the western rivers, it will be seen that the Mississippi and Missouri Rivers have declined slowly during the month, the lowest readings being those made on the 31st. The Ohio River experienced a sudden rise during the 25th, 27th, and 28th, which caused some damage near Cincinnati.

Comparative observations of the fluctuations of the barometer and the water in Lake Superior at Marquette, Mich., show that the mercury and the water acted together thirty-four times, and in an opposite direction fifty-nine times.

An unusual wave occurred at the east end of Lake Erie on the 25th, causing the water to rise 3 or 4 feet, the water returning to its normal condition as rapidly as it rose. A similar wave occurred at Northport, Mich., on the 31st.

ELECTRICAL PHENOMENA.

The local storms previously referred to, were, in many instances, accompanied by vivid displays of lightning. The most remarkable series of thunder-storms occurred at the summit of Pike's Peak from the 14th to the 25th, during which the electrical effect was so intense as to interrupt telegraphic communication with that station. The observer reports that sharp peculiar sounds were emitted from all pointed objects, and that painful sensations were experienced in the hands and face.

A brilliant display of ball-lightning was observed at Denver, July 21, the ball exploding in full view and the fragments re-exploding as they reached the earth; this phenomenon was also observed at Keokuk, Iowa, on the 16th.

Ground-currents interfered with the working of the telegraph-line at Sandy Hook on the 4th, 11th, and 16th.

Auroras.—The auroral display during the month has in some localities been unusually brilliant; the region of greatest frequency being near the forty-fifth parallel of latitude.

OPTICAL PHENOMENA.

The solar halos observed at more than one station on any particular date, were those reported from New York, Indiana, and Maine, on the 1st; New York, Ohio, Illinois, and Mississippi, on the 17th; Illinois, Iowa, and Vermont, on the 21st; Tennessee and Maine on the 31st. *Lunar halos* were observed in Georgia and Mississippi on the 8th; Indiana, New York, and Michigan, on the 19th; Tennessee, Georgia, and Iowa, on the 22d; Tennessee and Mississippi on the 25th; Rhode Island and Vermont on the 27th, and Vermont and Delaware on the 30th.

Fog bow.—This phenomenon was observed at Oxford, Me., on the 25th.

Mirage occurred at New London on the 18th.

MISCELLANEOUS.

Polar bands were observed at Key West on the 4th, and at Toledo on the 1st.

Brilliant meteors have appeared in large numbers during the month, the most noted being those observed in Indiana, Missouri, and New York, on the 3d; Kentucky, Missouri, and Tennessee, on the 7th; Nova Scotia, (near Halifax,) on the 9th; Pennsylvania and New York, on the 19th.

Earthquakes.—Light but perceptible shocks were experienced at Cairo, Ill., July 9th, at 4 p. m., and at Camp Russell, Nebr., July 23d.

VERIFICATION OF PROBABILITIES.

Probabilities.—The critical comparison between the separate items of the published tri-daily probabilities and the subsequent weather-reports, shows that on the average, during the month, 85.7 per cent. of the predictions have been well verified.

Published by order of the Secretary of War.

ALBERT J. MYER,
Brig. Gen., (Bvt. Assgd.,) Chief Signal-Officer, U. S. A.

MONTHLY WEATHER REVIEW, AUGUST, 1874.

INTRODUCTION.

In the preparation of this review, besides the regular reports from the Signal-Service stations, United States Army, and the Canadian stations, monthly meteorological registers, from many volunteer observers and from post surgeons, forwarded by the Surgeon General United States Army, and other data, have been examined. The accompanying charts illustrate, approximately, the courses of low barometers, the curves of mean atmospheric pressure and temperature, the prevailing direction of the wind and the distribution of rain.

The month has been characterized by an absence, comparatively, of destructive storms; by a deficiency of barometric pressure and continued high temperatures from Southern Dakota to the Ohio Valley and southward over the Gulf States; by extraordinary rain-falls over the Southern New England coast and Long Island; by cooler weather than usual over the Atlantic States, Lake region, and Saint Lawrence Valley; and by droughts in the Lower Lake region, Ohio Valley, Gulf States, and from Nebraska and Iowa southward, destroying crops in the two last sections.

BAROMETRIC PRESSURE.

Chart No. II shows the distribution of the pressure for the month, as represented by the curves in black. It is somewhat above the average over the Lake region. Over the remainder of the country it is below, especially from Kentucky and Tennessee to the southwest and the northwest. The latter is accounted for by the unusual number of low barometers which have moved down the Missouri Valley, while others, traced over the Lake region, left slight depressions in those sections, which gradually disappeared, some of which have been traced. An examination of Chart No. I will render this apparent.

Areas of low barometer, accompanying chart No. I, shows that the paths of the centers of eleven have, approximately, been traced. Their centers have been located for each synchronous observation, (three times daily,) and these connected. In case of doubt as to their positions, they were united by broken lines. Such are observed during every month, as many pass to the north of the Lower Lake region and the Saint Lawrence Valley on their way eastward. Frequently they leave minor depressions within the limit of the stations. In detail they are as follows:

No. I properly belongs to July, having moved from Dakota eastward over the Upper Lake region to the Saint Lawrence Valley on the 29th, 30th, and 31st ultimo. On the 1st and 2d instant it disappeared to the eastward, having been accompanied by generally light thunder-storms from the Lower Lakes, Ohio Valley, Tennessee and South Atlantic States eastward. A hurricane prevailed on Mount Washington on the 1st, and a tornado at Troy, N. Y., on the 2d.

No. II was first felt on the 3d at the Rocky Mountain stations by cloudy, threatening or rainy weather, and brisk southerly winds. Very heavy hail fell on the "divide," between Denver and Colorado Springs, Col. At the latter place a bank of water passed down the creek at 7 p. m., sweeping everything, and supposed to have been caused by the hail-storm. On the 4th the barometer fell quite rapidly from the Upper Mississippi Valley westward, with increasing east to south winds. At Saint Paul, violent high winds prevailed during the evening. The center passed within the limit of the stations on the 4th, and down the Missouri Valley on the 5th, with threatening or rainy weather from thence to the Upper Lakes. On the 6th it separated into two, one gradually disappearing over the Indian Territory, the other following the course shown on the chart. Cloudy or rainy weather accompanied it, except in the Gulf States. Remarkably heavy rains fell on the middle Atlantic and New England coasts, with brisk and high easterly winds. Violent thunder-storms are reported as having occurred in Ohio, Indiana, New York, Pennsylvania, and North Carolina.

No. III passed to the south and east of Nova Scotia on the 6th, producing rain and brisk east to north winds in that section. It was evidently a cyclone, and most severe at some distance off the coast. A sailing-vessel reported having experienced a hurricane for eight hours upon this date in that vicinity, the wind backing from east to north.

No. IV was first observed by the falling barometer and high temperature on the 8th and 9th at the stations in the Rocky Mountains and the Lower Missouri Valley. From Nebraska and Iowa southward to the Gulf States the temperature continued rising, and thermometer-readings varying from 100° to 106° were reported for several days. On the 10th the center moved within the limit of the stations; on the 11th, northeastward over Lake Superior into Canada; on the 12th, to the north of the Saint Lawrence Valley, leaving depressions in the Lower Missouri Valley and New England. Occasional rain fell during its progress over the Northwest and the Lake region, but became quite general, with severe thunder-storms, in New England and the Middle

States. A destructive tornado prevailed at Dixon, Ill., and a gale at Saint Paul during the night of the 10th; violent northwest winds at Davenport, Iowa, on the night of the 11th; hurricane on Mount Washington and severe thunder-storm at Berlin Heights, Ohio, on the night of the 12th.

No. V moved eastward from Dakota on the 15th, 16th, and 17th, over the Upper Lake region into Canada, accompanied by occasional rain, with high winds at Saint Paul on the evening of the 16th, and a hurricane on Mount Washington during the night of the 18th.

No. VI. During the day the barometer fell very rapidly over the northwest, with brisk south and east winds, and during the night of the 18th the central depression passed from Dakota to Minnesota, and thence, on the 19th, over Lake Superior into Canada. Rain fell in the Northwest and Lake region, and at places high winds prevailed.

No. VII advanced from Dakota on the 20th. The peculiarity of this consists in that it sent out in advance a secondary depression over the Middle Atlantic coast, producing at places severe thunder-storms. In the States east of the Rocky Mountains rainy weather accompanied them, with also severe thunder-storms in the Southern States.

No. VIII, appearing from Dakota, moved down the Missouri Valley and disappeared over the Southwest without producing any serious disturbance.

Nos. IX and X. The low barometric readings at the Rocky Mountain stations on the 26th and 27th indicated the presence of a serious disturbance. On the 27th the pressure rapidly diminished from the Upper Mississippi Valley westward, and on the 28th there appeared an extensive trough of low barometer, extending from Indian Territory northward over Minnesota and Manitoba, but being lowest over the latter and the Lower Missouri Valley. Previous to this time it is probable there was one low barometer, which gradually developed into the two. From the chart it will be seen that No. IX, after separating into three distinct areas, finally disappeared in the Southern States and Ohio Valley. In their movement across the country cloudy or rainy weather became quite general, except in the West Gulf States, Lower Lake region, Middle States, and New England, with very serious and destructive storms. Heavy rains and high winds are reported from Iowa, Tennessee, Georgia, Louisiana, and no doubt occurred in all the Southern States.

No. XI was of minor importance, producing rain in Maine and the eastern British Provinces. It apparently united with No. X over the mouth of the Saint Lawrence River.

Areas of high barometer.—Of the most marked, the *first* apparently extended itself southeastward, on the 2d and 3d, from Manitoba over the Lake region, and on the 4th and 5th over the Atlantic States. The *second*, following low barometer No. IV, first appeared over the Lake region, from Manitoba, on the 12th and 13th, where it remained nearly stationary until the 15th, and extended itself over the Middle States and to the East Atlantic coast on the 16th and 17th. On the 18th and 19th, the *third* gradually appeared over the Lower Lake region, Middle and South Atlantic States, which extended over the South Atlantic and East Gulf States on the 19th and 20th, and then slowly disappeared. The *fourth*, following low barometer No. VII, was felt over the Lake region on the 24th, moved over New England and the Middle States on the 25th, and disappeared on the 28th in advance of depressions Nos. IX, X, and XI. On the 31st the *fifth* moved southeastward over the Lake region, succeeding low barometers Nos. IX and X. The movement of these areas has been confined principally to the Lake region and the Atlantic States. They have been more prominent than heretofore for August, and have failed to reach the Southern and Western States, especially the Southwest and West, over which sections the barometer has continued low for longer periods than usual.

ATMOSPHERIC TEMPERATURE.

The curves in red, upon Chart No. II, are the mean isothermal lines for the month. The table upon the same gives the average mean temperatures of the different geographical districts for August of this year, as well as those for a number of years. Throughout the Atlantic States it has been the coolest August for many years, and is explained by the movement of the areas of high barometers, with north and east winds, over these districts. In the Gulf States and northward to Ohio, Indiana, Illinois, Iowa, and Nebraska, it has been an extremely hot month, especially between the 4th and 14th, the thermometer ranging from 100° as high as 114° for several days at a time. In that portion west of the Mississippi the extreme heat continued for several weeks, and the mean temperature ranged from 1° to 8° above the average. This hot weather is intimately connected with and accounted for by the deficiency in atmospheric pressure, producing southerly winds. On the Pacific coast the mean temperature is 2°.2 below the average.

Frosts occurred on the 3d, 4th, and 5th in New York and New Jersey; on the 7th in Massachusetts; on the 17th in New Hampshire; on the 23d, 24th, 25th, 26th, 27th, and 28th in Connecticut, New York, Vermont, New Hampshire, Massachusetts, and Maine.

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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.
TRACKS OF CENTRES OF LOW BAROMETER FOR AUGUST, 1874.
Longitude from Washington
Longitude West from Greenwich
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
BRIG. GEN. (RVT. ASS'G'D) CHIEF SIGNAL OFFICER, U. S. A.
NOTE.—The Roman letters show number and order of storms. 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 storm-centre on the day and report, written respectively above and below the line.
ST DOMINGO
AM PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

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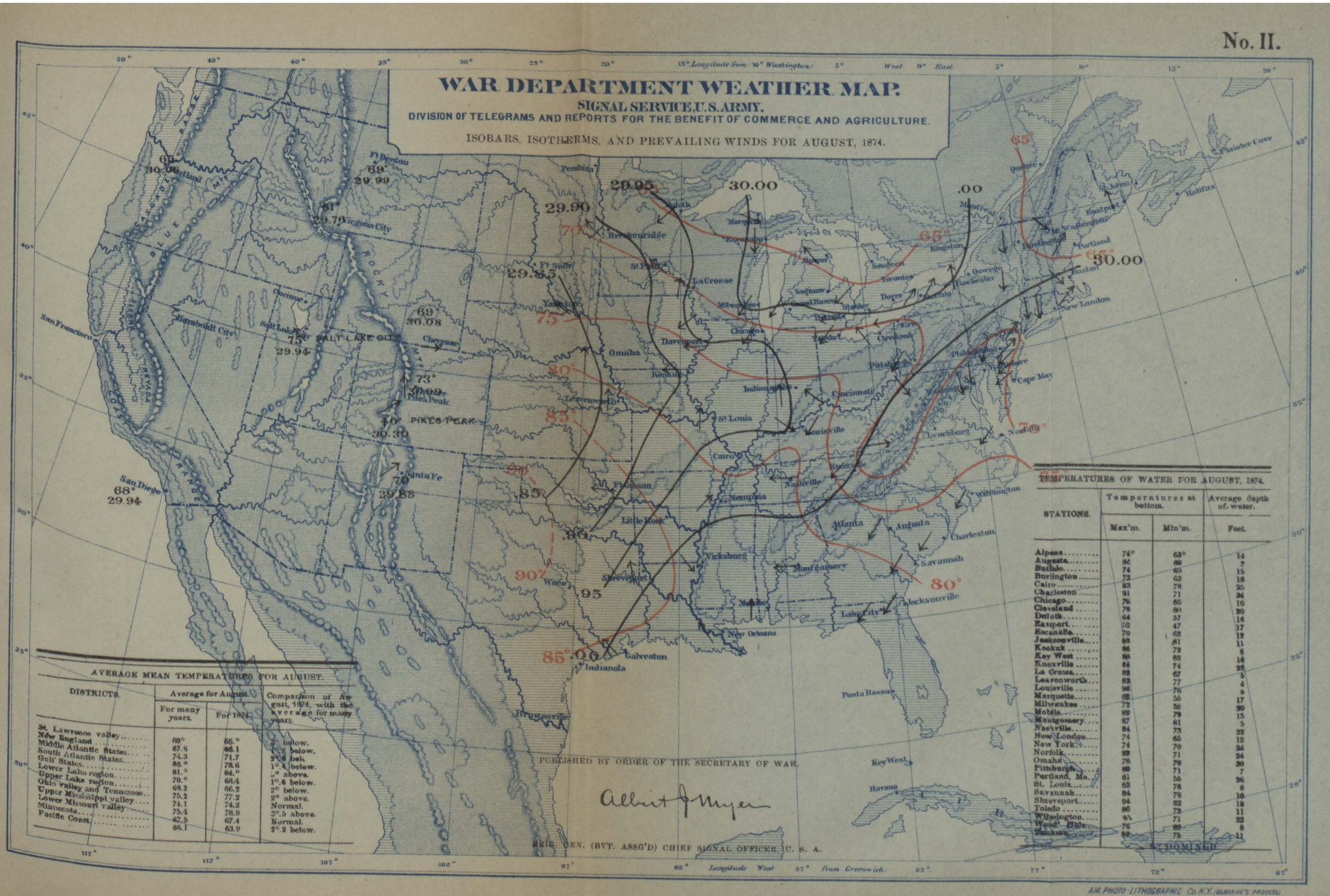
No. II.

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, 1874.



AVERAGE MEAN TEMPERATURES FOR AUGUST.

DISTRICTS.	Average for August. For many years.	Average for August. For 1874.	Comparison of August, 1874, with the average for many years.
St. Lawrence valley	69°	66.°	2° below.
New England	67.8	66.1	1°.7 below.
Middle Atlantic States	74.3	71.7	2°.6 below.
South Atlantic States	80.°	78.6	1°.4 below.
Gulf States	81.°	84.°	3° above.
Lower Lake region	70.°	68.4	1°.6 below.
Upper Lake region	68.2	66.2	2° below.
Ohio valley and Tennessee	75.2	77.2	2° above.
Upper Mississippi valley	74.1	74.2	Normal.
Lower Missouri valley	75.4	78.9	3°.5 above.
Minnesota	67.5	67.4	Normal.
Pacific Coast	66.1	63.9	2°.2 below.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

TEMPERATURES OF WATER FOR AUGUST, 1874.

STATIONS.	Temperatures at bottom. Max'm.	Temperatures at bottom. Min'm.	Average depth of water. Feet.
Alpena	74°	63°	14
Augusta	84	69	7
Buffalo	74	69	15
Burlington	73	63	18
Cairo	83	78	25
Charleston	91	71	34
Chicago	76	66	10
Cleveland	78	69	20
Duluth	64	57	16
Eastport	52	47	17
Escanaba	70	63	12
Jacksonville	88	81	11
Keokuk	86	78	6
Key West	88	83	18
Knoxville	84	74	22
La Crosse	82	67	5
Leavenworth	83	77	4
Louisville	86	76	8
Marquette	62	55	17
Milwaukee	72	52	20
Mobile	89	79	15
Montgomery	87	81	5
Nashville	84	73	22
New London	74	65	12
New York	74	70	24
Norfolk	83	71	24
Omaha	78	70	30
Pittsburgh	80	71	7
Portland, Me.	61	56	36
St. Louis	83	76	8
Savannah	84	78	10
Shreveport	94	83	18
Toledo	86	73	11
Wilmington	90	71	23
Wood's Hole	76	69	8
Yankton	83	75	11

RECOMMENDED

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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 AUGUST, 1874.

AVERAGE RAIN-FALL FOR AUGUST.

DISTRICTS.	For many years.	For 1874.	August, 1874, compared with average for many years.
	Inches.	Inches.	
St. Lawrence Valley	3.4	1.1	Large deficiency.
New England	3.8	6.4	Large excess.
Middle Atlantic States	4.6	3.4	Small deficiency.
South Atlantic States	7.6	5.3	Deficiency.
Eastern Gulf States	5.6	3.75	Deficiency.
Western Gulf States	5.4	2.0	Large deficiency.
Lower Lake region	3.1	1.25	Large deficiency.
Upper Lake region	2.75	2.25	Small deficiency.
Ohio Valley	3.0	2.2	Deficiency.
Tennesse	4.0	5.3	Excess.
Upper Mississippi Valley	3.1	3.4	Small excess.
Lower Missouri Valley	3.25	2.9	Small deficiency
Minnesota	2.75	4.25	Large excess.
Pacific Coast	0.25	0.27	Normal.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. BVT. ASS'T CHIEF SIGNAL OFFICER, U. S. A.

HEIGHTS OF RIVERS ABOVE LOW WATER MARK.

STATIONS.	HIGHEST. Date. Aug.	HIGHEST. Height.	LOWEST. Date. Aug.	LOWEST. Height.
		ft. in.		ft. in.
RED RIVER.				
Shreveport	1	6 6	31	1 9
MISSOURI.				
Fort Sully	1	7 9	31	5 8
Yankton	21	12 9	31	9 5
Omaha	25	7 7	20–23	4 6
Leavenworth	27	3 9	25	1 0
MISSISSIPPI.				
St. Paul	25–27	5 1	20–21	3 9
La Crosse	31	3 0	19–24	1 8
Dubuque	1	5 3	25–26	3 3
Davenport	1	3 9	26	1 8
Keokuk	1	4 11	26	2 1
St. Louis	1	11 4	29	6 6
Cairo	7	12 10	30	6 9
Memphis	10	9 8	29–31	4 3
Vicksburg	14–15	12 10	31	6 11
New Orleans*	14–22	12 6	31	13 3
CUMBERLAND.				
Nashville	31	18 3	22	1 2
OHIO.				
Pittsburgh	10	5 10	21–22	1 11
Cincinnati	2	15 0	28	5 0
Louisville	4–5	7 6	30	3 9

* Below high water mark.

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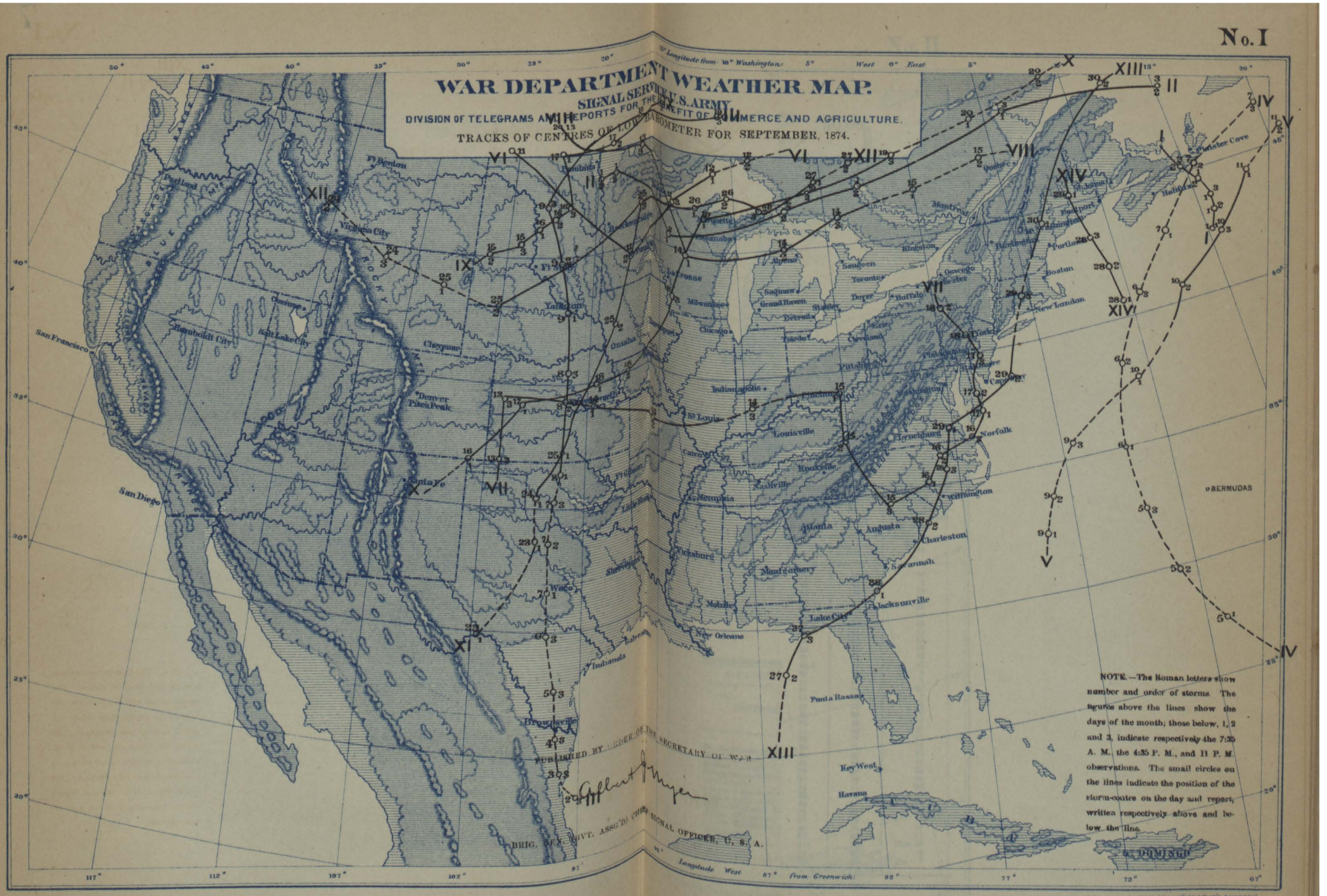

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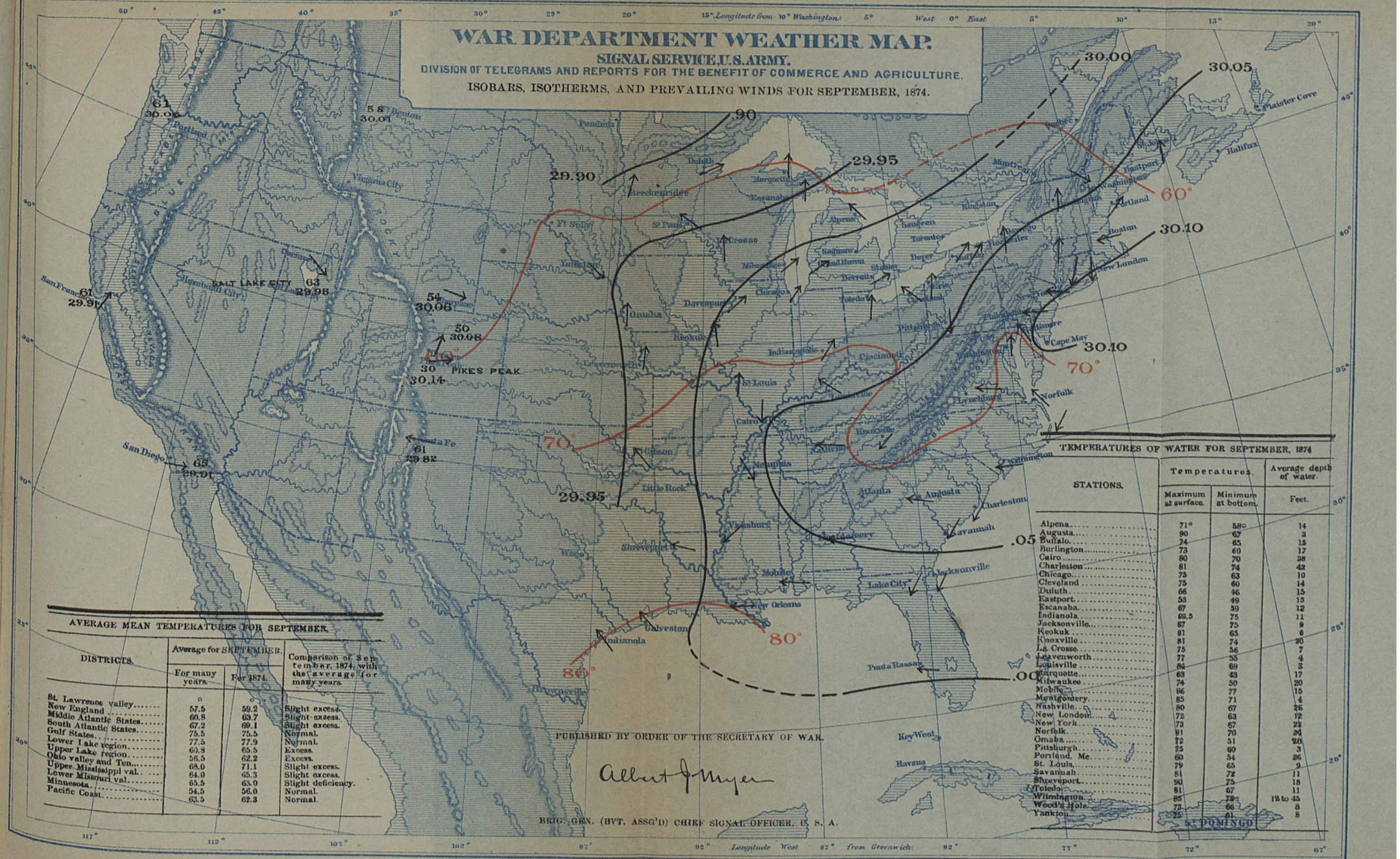
No. II.

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, 1874.



AVERAGE MEAN TEMPERATURES FOR SEPTEMBER.

DISTRICTS.	Average for SEPTEMBER. For many years.	Average for SEPTEMBER. For 1874.	Comparison of September, 1874, with the average for many years.
St. Lawrence valley	°	°	
New England	57.5	59.2	Slight excess.
Middle Atlantic States	60.8	63.7	Slight excess.
South Atlantic States	67.2	69.1	Slight excess.
Gulf States	75.5	75.5	Normal.
Lower Lake region	77.5	77.9	Normal.
Upper Lake region	60.8	65.5	Excess.
Ohio valley and Ten.	56.5	62.2	Excess.
Upper Mississippi val.	68.0	71.1	Slight excess.
Lower Missouri val.	64.0	65.3	Slight excess.
Minnesota	65.5	63.0	Slight deficiency.
Pacific Coast	54.5	56.0	Normal.
	63.5	62.3	Normal.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

TEMPERATURES OF WATER FOR SEPTEMBER, 1874

STATIONS.	Temperatures. Maximum at surface.	Temperatures. Minimum at bottom.	Average depth of water. Feet.
Alpena	71°	58°	14
Augusta	90	67	3
Buffalo	74	65	13
Burlington	73	60	17
Cairo	90	70	28
Charleston	81	74	42
Chicago	75	63	10
Cleveland	75	60	14
Duluth	66	46	15
Eastport	53	49	13
Escanaba	67	59	12
Indianola	88.5	75	11
Jacksonville	87	75	9
Keokuk	91	65	6
Knoxville	81	74	20
La Crosse	75	56	7
Leavenworth	77	55	4
Louisville	84	69	3
Marquette	63	43	17
Milwaukee	74	50	20
Mobile	86	77	15
Montgomery	85	71	4
Nashville	80	67	26
New London	72	63	12
New York	73	67	22
Norfolk	81	70	24
Omaha	72	51	28
Pittsburgh	75	60	3
Portland, Me.	60	54	26
St. Louis	79	65	9
Savannah	81	72	11
Shreveport	90	75	18
Toledo	81	67	11
Wilmington	85	73	12 to 35
Woods Hole	73	66	8
Yankton	75	61	8

ST. 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.

PRECIPITATION CHART FOR SEPTEMBER, 1874.

AVERAGE RAIN-FALL FOR SEPTEMBER.

DISTRICTS.	For many years.	For 1874.	Sept., 1874, compared with average for many years.
	Inches.	Inches.	
St. Lawrence Valley	2.9	1.85	Deficiency.
New England	3.35	3.14	Normal.
Middle Atlantic States	3.5	7.50	Large excess.
South Atlantic States	5.75	7.00	Excess.
Eastern Gulf States	4.5	3.55	Deficiency.
Western Gulf States	5.0	7.00	Excess.
Lower Lake region	3.4	2.40	Deficiency.
Upper Lake region	3.5	3.75	Normal.
Ohio Valley and Tennessee	3.1	2.50	Deficiency.
Upper Mississippi Valley	3.2	5.75	Large excess.
Lower Missouri Valley	2.5	4.00	Large excess.
Minnesota	4.1	3.50	Deficiency.
Pacific Coast	0.6	0.59	Normal.

HEIGHT OF RIVERS ABOVE LOW WATER MARK.

STATIONS.	HIGHEST. Date. Sept.	HIGHEST. Height.	LOWEST. Date. Sept.	LOWEST. Height.
		ft. in.		ft. in.
RED RIVER.				
Shreveport	30	6 9	6	1 2
MISSOURI.				
Fort Sully	1	5 10	26	4 4
Yankton	1	9 2	30	8 1
Omaha	1	4 8	30	3 5
Leavenworth	1	2 0	30	0 6
MISSISSIPPI.				
St. Paul	4	5 11	25	4 4
La Crosse	28-30	6 0	4	3 9
Dubuque	30	6 8	1	3 10
Davenport	29-30	4 1	1	1 10
Keokuk	27	4 7	1	2 4
St. Louis	29	11 11	12-18	6 6
Cairo	5	13 5	20-22	3 4
Memphis	8	10 0	23	3 2
Vicksburg	13-14	11 8	28-29	5 4
New Orleans*	4	12 2	3	15 0
CUMBERLAND.				
Nashville	1	16 0	25	1 7
OHIO.				
Pittsburgh	30	3 3	19	0 3
Cincinnati	4	7 6	23	2 3
Louisville	4	4 10	24	2 1

* Below high water mark.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. MAJ. GEN.) CHIEF SIGNAL OFFICER, U. S. A.

PRECIPITATION.

Chart No. III illustrates the distribution of the rain-fall for the month. The districts in which there has been an excess or a deficiency is apparent from an examination of the table upon the same. The decided excess for New England is principally due to the very heavy rains on the southern coast, produced by low barometer No. II. The deficiency in the Lower Lake region and the Ohio Valley gave rise to droughts during the latter part of the month. In the Gulf States the deficiency, with the heat, was sufficient in a great measure to injure the crops. From Northern Texas northward to Nebraska and Iowa the extreme dryness, excessive heat, and grasshoppers at many places destroyed all vegetation. On the Pacific coast the rain-fall has been about the average.

The number of days on which rain fell during the month averages, in New England, eight; in the Middle Atlantic States, nine; in the South Atlantic States, eleven; in the Gulf States, eight; in the Lower Lake region, five; in the Upper Lake region, nine; in the Ohio Valley and Tennessee, eight; in the Upper Mississippi Valley, eleven; in the Lower Missouri Valley, nine; in Minnesota, fifteen.

Hail fell at Troy, N. Y., on the 2d; on the "divide," between Denver and Colorado Springs, Colorado, as large as walnuts, on the 3d; at Jamestown, N. Y., on the 7th; at Indianapolis, Ind., on the 7th and 9th; at Spartanburg, S. C., Weldon, and Mount Pleasant, N. C., on the 8th; at Greensboro', N. C., Rochester, and Benton Centre, N. Y., on the 12th; at Lunenburg, Vt., on the 12th and 30th; at Mount Solon, Va., on the 21st; at Pomaria, S. C., on the 24th; at Castalian Springs, Tenn., on the 29th. On Pike's Peak, Colorado, rain, hail, sleet, and snow fell frequently, and often during the same storm, in succession.

HUMIDITY.

The percentages of relative humidity for the various sections average as follows: On the Gulf and South Atlantic coasts, .73; on the New England coasts, .74; on the New Jersey coast, .77; in the interior of the Middle States, .66; in the Lower Lake region, .65; in the Upper Lake region, 72; in the Ohio Valley, Tennessee, and the Mississippi Valley, from Dubuque to Vicksburg, .60; in the Lower Missouri Valley, .61; in Minnesota, .74; at the Rocky Mountain stations, (excepting Pike's Peak,) .38.

WINDS.

The arrows upon Chart No. II show the prevailing winds for the month. As usual, they are from the high towards the low barometer. It is most perceptible in the Mississippi Valley and westward, where the barometric gradient is the steepest, and no effect from land and seabreezes. On the Atlantic coast the prevailing winds have been from the north and east. As the high winds and gales have accompanied the movement of low barometers, they are spoken of under that heading.

The average total atmospheric movement, independent of direction, has been as follows in the several districts: New England, four thousand one hundred and eighty miles; Middle Atlantic coast, seven thousand three hundred and sixty; interior of the Middle Atlantic States, four thousand three hundred and six; South Atlantic coast, four thousand five hundred and eighty-seven; Gulf coast, five thousand one hundred and twenty; Ohio and Lower Misisippi Valleys, Tennessee, and the interior of the Gulf and South Atlantic States, three thousand three hundred and fifty-nine; Lower Lake region, four thousand nine hundred and sixty-three; Upper Lake region, five thousand six hundred and seventy-five; Upper Mississippi Valley, four thousand nine hundred and ninety-one; Missouri Valley, five thousand three hundred and eighty-six.

NAVIGATION.

On Chart No. III is given a table of the highest and lowest water-marks during the month. The Red River has continued falling during the entire month, and was remarkably low at its close, rendering navigation difficult. The Lower Missouri, Mississippi, and Ohio Rivers experienced slight changes, and were lower at the end of the month than at the beginning. The Cumberland, at Nashville, fell steadily until the 22d, when it was very low, but rose 16 feet during the last week. The only freshets reported were in Southern New England, resulting from the heavy rains of the 8th and 9th.

TEMPERATURE OF WATER.

Upon Chart No. III will be found a table giving the maximum and minimum temperatures, at the bottom, at stations on the coast, lakes, and rivers. The average range has been: in the Upper Lakes, 11°; in Lake Erie, 12°; in the Upper Mississippi, 14°; in the Lower Missouri, 7°; in the Ohio, 15°; on the South Atlantic coast, 11°; on the Middle Atlantic coast, 7°; on the New England coast, 7°.

For the purpose of comparing the temperatures of water and air, (observations made at 3 p. m. daily,) the following table of averages is added:

Average temperatures, August, 1874.

Localities.	Maximum of—		Minimum of—	
	Water.	Air.	Water.	Air.
	°	°	°	°
New England coast	62	81	55	48
Middle Atlantic coast	74	93	70	55
South Atlantic coast	85	95	74	61
Gulf coast	90	100	80	73
Lake Erie	79	90	67	49
Alpena, (Lake Huron)	73	83	64	45
Lake Michigan	72	91	60	50
Lake Superior	57	87	56	54
Ohio River	88	99	73	56
Cumberland, (Nashville)	84	104	73	66
Upper Mississippi	83	98	71	59
Lower Missouri	81	103	74	56
San Francisco	61	71	58	51

ELECTRICAL PHENOMENA.

In addition to thunder-storms spoken of under previous headings, there were strong ground-currents on the telegraph-line connecting Colorado Springs with the summit of Pike's Peak, Colorado, on the evening of the 1st. Frequent lightning was observed on the same line during the month. On the 3d heavy snow accompanied a heavy thunder-storm on Pike's Peak, from which station thunder-storms are reported as having occurred almost daily. Thunder or lightning or both were more frequent in the Southern and Western States, especially the latter, than in other sections.

Auroras were observed in the most northern States; that of the 14th at places in Vermont, New York, Michigan, and Wisconsin as an auroral arch.

OPTICAL PHENOMENA.

Solar halos.—Those reported most frequently are as follows: on the 4th, in Illinois; 6th and 7th, in Georgia and Maine; 9th, in New York and Ohio; 17th and 18th, in Georgia and Massachusetts; 19th and 20th, in Alabama, Georgia, Pennsylvania, New Hampshire, Massachusetts, and Maine; 22d, in Maine and New Hampshire; 23d, in Kansas, Nebraska, and New Hampshire; 25th, in Massachusetts, New Hampshire, New York, and Michigan; 26th, in Iowa, Illinois, Wisconsin, Ohio, Pennsylvania, and Newfoundland; 28th, in Maine and Massachusetts; 29th, in Maine, New York, Pennsylvania, and Michigan.

Lunar halos were seen at more than one station in Maine, New York, Indiana, and Iowa on the 25th; in Georgia, Ohio, and Indiana on the 26th; in Georgia, South Carolina, and Pennsylvania on the 27th.

MISCELLANEOUS.

Meteors have been reported as seen in large numbers during the first half of the month, and principally in the Northern States. The dates upon which they were most frequent are the 1st, 2d, 3d, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, and 13th, particularly the 10th, in Florida, Texas, Missouri, Wisconsin, Iowa, Michigan, Illinois, Indiana, Virginias, Pennsylvania, New York, New Jersey, and Maine.

Earthquakes were felt at Clifton, San Bernardino County, California, during the evening of the 3d, light shock from the east; at the following points in the West Indies about noon of the 8th, but without any damage: St. Kitts, very heavy shock; Antigua, sharp shock; and St. Thomas, smart shock with a long rumbling before and after; at El Monte, Los Angeles County, California, on the 20th, rumblings of distant earthquake heard; on the 24th, mutterings in the ground during the morning; on the 25th, mutterings at intervals during the morning.

The water in Lake Champlain, at West Charlotte, Vermont, has been two feet above the August average.

At Marquette, Michigan, out of ninety-three observations made upon the rise and fall of the surface of the water in the lake, it acted with the barometer forty-one times and contrary to it fifty-two times.

Published by order of the Secretary of War.

ALBERT J. MYER,
Brig. Gen., (Brt. Asstd.,) Chief Signal-Officer, U. S. A.

MONTHLY WEATHER REVIEW, SEPTEMBER, 1871.

INTRODUCTORY.

The Monthly Weather Review for September is based upon reports from 442 stations, classified principally as follows:

Canadian meteorological service	14
United States Army Signal-Service	92
United States Army surgeons	45
United States naval hospitals	5
Volunteer observers	286

together with numerous extracts from logs of vessels. Destructive storms have not been numerous. The single prominent exception was No. XIII, which was only destructive in its passage from Florida to North Carolina.

The weather in general, for the month, has been marked only by the not unusual features of droughts in some portions of the country, while other portions have experienced unusually heavy rains. These latter regions are well shown by the heavily-shaded spots on Map No. III, in Texas, the Missouri and Mississippi Valleys, and the Middle Atlantic States. Portions of Ohio, Indiana, and Illinois still continue to report a deficiency of rain-fall, thus prolonging the dry season in that region, to the great detriment of agriculture.

BAROMETRIC PRESSURE.

(1.) *In general.*—The general distribution of barometric pressure is seen from the isobars on Map No. II, where it appears that the highest average, 30.10, pertains to the Middle Atlantic, between Capes Hatteras and Cod, whence the pressure steadily diminished to 29.90 in Dakota. The mean 29.90 for the southern end of California seems low for that region.

(2.) *Areas of low barometer.*—The tracks pursued by the areas of low pressure are given on Map No. I. Further details are found in the following paragraphs. It will be seen that these have, as in previous years, been frequently pushed far to the west and north, but that the better-developed severe cyclones Nos. I, III, IV, V, and XIII have pursued tracks differing but little from their normal courses.

Storm No. I. This small but well-marked cyclonic depression became first apparent on the 1st, near Nova Scotia, but kept to the eastward of that province and passed beyond Cape Breton without being accompanied by high winds on the land as far as reported. In its earlier course, during the latter part of August, this storm may have passed near and to the northeast of the Bermudas.

No. II. This depression moved eastward over Lake Superior to the Gulf of Saint Lawrence, followed by an area of high barometer and generally accompanied by rain in the Lower Lake region and Saint Lawrence Valley. While this disturbance was central over the Gulf of Saint Lawrence on the 3d, a belt of notable contrasts of temperature extended from Iowa to New England, and severe gales were reported in Eastern Massachusetts, followed by rapidly-falling temperatures.

No. III. The brisk and high northeast winds that prevailed on the 3d on the western coast of Texas, appear to have been connected with the presence of a barometric depression in Northern Mexico and which may originally have entered that country from the Pacific coast, as the barometer was below the average in Southern California during the preceding day. If a definite central area of depression existed on the 2d and 3d in Mexico and Texas, its location must have been, approximately, as given on the chart. The cyclonic character of the disturbance on the 4th is not well shown by our observations, but may reasonably be inferred from the severity of the gale which raged on the 4th and 5th from Galveston southward, and which resulted in a large destruction of property along that coast. The barometric disturbance undoubtedly spent itself in great part in Central Texas, where, however, the depression continued during the 7th, and on the 8th the existence of a storm-center in the interior of Kansas became evident. This depression then continued its course northward to Manitoba, which it passed on the 10th.

No. IV. While the severe storm mentioned in the previous paragraph was moving northward into Texas, a similar and better-developed cyclone was pursuing an almost parallel course about fifteen hundred miles to the eastward. The published weather maps of the morning of the 7th show the existence of this storm a short distance southeast of Nova Scotia. Its previous history has been traced by means of the published logs of ocean-vessels, from which it appears that during the 5th the storm-center passed a short distance southwest of the Bermudas, where the gale was quite severe; and on the 6th recurved on its northward track, and that as early as the 2d instant its force was felt by a vessel in latitude 28° 10′ and longitude 55° 38′. The track given on Chart No. I may be regarded as a first approximate determination of its course, which, on the afternoon of the 7th, passed over Cape Breton Island. The lowest depression

observed at Cape Breton was 28.75, which corresponds with the figures reported from ocean-vessels, by many of which the hurricane wind was described as being one of the most severe ever experienced.

No. V. The cyclone No. IV was immediately followed by No. V, which passed nearly midway between Cape Hatteras and the Bermudas on the 9th, producing high winds on the North Carolina coast. The path of this depression remained persistently some distance east of the Atlantic coast, but its center must have passed quite near Cape Breton on the morning of the 11th.

No. VI. This depression was preceded by rain and low barometer, with southerly winds in Oregon on the 10th. It was itself first well defined on the afternoon of the 11th, when it was central in Minnesota. The cold, northwesterly winds that followed in its rear gave rise to numerous rain-areas from Missouri to the Upper Lake region, while the barometric depression moved rapidly northeastward over Lake Superior and beyond our stations.

No. VII. The origin of this depression during the 13th appears to have been similar to that of area No. III, the barometer having been reported quite low during the 11th in Southern California, and the existence of a depression in Northern Mexico and Western Texas on the 12th and 13th may be inferred from the prevailing winds. This depression was, however, but very feebly marked, as it moved eastward, and became more or less masked by the influence of depression No. VIII to the northward. On the afternoon of the 15th, however, No. VII became distinctly separated from No. VIII, and on the morning of the 16th was central in North Carolina, while northeast winds and heavy rains extended from that State northeastward to New England. The further history of this disturbance becomes very interesting, from the fact that an unexpectedly large area of high barometer moved into the Gulf of Saint Lawrence, whence a stream of air flowed steadily for over three days from the northeast along the middle and east Atlantic coasts, bringing cloud and rain to all that region, and causing the barometric depression to dwindle away and disappear as it moved northwestward into Central New York. The rains of the 15th, 16th, and 17th ended the drought which had prevailed for six weeks on the Middle and East Atlantic coasts.

No. VIII. This depression, of which but slight and uncertain traces are visible, previous to the afternoon of the 13th, moved eastward into Upper Canada, where it was lost sight of on the 15th.

No. IX. The low barometric pressure that prevailed on the 14th and 15th from California to Texas was probably the initiative of a disturbance that was central on that day in Montana, and on the 16th in Dakota, whence it slowly moved into Manitoba, and thence apparently eastward.

No. X. This depression developed slowly in Kansas and Northern Texas on the 16th and 17th, and was well defined on the 18th, as it passed eastward over the Lower Missouri Valley into Illinois. On this day occurred the lowest barometer during the month in Kansas, New Mexico, Colorado, &c. In the southeastern portion of Iowa and the adjacent portions of Illinois and Missouri, the wind and rain on the 18th were exceedingly severe, and much damage was reported. The course of this storm-center then turned northward over Upper Michigan into Canada, producing high southwest wind on Lakes Michigan, Erie, and Huron on the 19th.

No. XI. This disturbance was preceded by low barometer in Southern California, and probably southward over Mexico, but itself apparently had an origin on the border of Texas and Mexico, on the 22d, in a manner similar to that of No. X, since it would appear that during the previous two days dry, cold currents of air flowing southeastward from the extreme northwestern part of Texas under-ran and uplifted the warm air of the plains. On the 24th, this area of low barometer passed northward over Indian Territory, and on the 25th united with No. XII, which had rapidly developed in Montana.

No. XII. The trough of low pressure that stretched during the 25th from Kansas to Manitoba had, by midnight of that day, contracted to a small area in Minnesota, which moved slowly eastward into Canada, developing a quite low central pressure, and accompanied by southerly winds and rain over the Lower Lakes on the 26th and 27th.

No. XIII. While No. XII threatened, on the 26th, to give rise to a very severe storm on the Lakes, a notable cyclonic disturbance moved northeastward over the Gulf of Mexico, for whose early history no data have as yet been received. Its existence was first rendered evident by strong northeast winds on the Texas coast on the afternoon of the 25th, at which time the central depression must have been south of Louisiana and possibly near Yucatan or Mexico. During the nights of the 27th and 28th, the center passed northeastwardly over Upper Florida to the coast of Georgia, pursuing a track medial between those followed by storms Nos. VI and VII of September, 1873. As the present cyclone passed along the Carolina coast on the 28th, it developed a force that has been very generally compared to the hurricane of 1854. The center of this storm passed a short distance east of Charleston and west of Wilmington and Norfolk, crossing Chesapeake Bay on the morning of the 29th; here the violence of the winds sensibly diminished, while the barometric depression spread irregularly in various di-

rections. After passing east of the New Jersey coast, the storm seems to have turned northward through New England, and is lost sight of on the afternoon of the 30th at the mouth of the Saint Lawrence. The lowest reported barometric pressures at points near the track of the storm-center were as follows:

Lake City	29.40 at 4 a. m., 28th.	Cape May	29.39 at 4.35 p. m., 29th.
Jacksonville	29.42 at 7 a. m., 28th.	New York	29.37 at 11 p. m., 29th.
Savannah	29.40 at 9 a. m., 28th.	New Haven	29.29 at 11.16 p. m., 29th.
Charleston	29.06 at 1 p. m., 28th.	New London	29.24 at 11.35 p. m., 29th.
Augusta	29.57 at 4 p. m., 28th.	Wood's Hole	29.31 at 7 a. m., 30th.
Wilmington	29.15 at 6.15 p. m., 28th.	Boston	29.13 at 4 a. m., 30th.
Cape Henry	29.31? at 11 p. m., 28th.	Portland	29.05 at 7.35 a. m., 30th.
Norfolk	29.41? at 11 p. m., 28th.	Eastport	29.20 at 7 a. m., 30th.
Lynchburgh	29.47 at 11 p. m., 28th.	Father Point	28.94 at 4.35 p. m., 30th.

The highest winds were: At Savannah, northwest, thirty-six miles; at Tybee Island, east, sixty; at Charleston, east, fifty-one, and northwest, forty-eight; at Cape Hatteras, southeast, seventy-five; at Wilmington, southeast, forty-five, and southwest, fifty; at Cape Henry, sixty miles.

(3.) *Areas of high barometer.*—Of these areas, the most notable has been No. V, which obtained its greatest development on the 18th, when it was probably central on the Gulf of Saint Lawrence.

I. This passed from British America on the 1st southeastward over the Lakes, to the Carolina coast on the 3d, followed by storm No. II on its northeastern boundary, and by the still higher pressure of the next paragraph.

No. II is first reported in Oregon and British Columbia on the 2d. It moved southeastward over Dakota on the 3d, to South Carolina and Georgia on the 8th. Clear, dry weather accompanied it over the greater part of the country, except the Texas coast, during that period.

No. III began to press southward over the Saint Lawrence Valley on the 12th, and, after passing over New England, disappeared east of Cape Cod on the 15th.

No. IV was, apparently, a western division of the same area of cold, dry air, and moved southeastward on the 12th over Dakota, disappearing on the 14th over the Lake region.

No. V appears on the 14th as a continuation of No. IV, and extended, on the morning of that day, over the Upper Missouri Valley. It passed thence eastward to the Upper Lake region on the 16th, where it appears to have been re-enforced by further contributions from Hudson's Bay and Labrador, forming an unusually extensive area of high pressure, whose center was over the Gulf of Saint Lawrence on the 18th and 19th, where the barometric reading averaged 30.70 on the morning of the former day. The influence of this high barometer in producing continued easterly winds and rain on the New England and New Jersey coasts from the 15th to the 20th, has already been alluded to.

No. VI. The extensive area of low pressure prevailing over the Lake region on the 18th and 19th, seems not only to have drawn from the northward and eastward the air that produced the high barometer of the preceding section, but also induced a flow from the south and west that gave rise to No. VI, whose existence may be traced from the Ohio Valley on the morning of the 21st, backward to Indian Territory on the 19th, and forward over Maryland on the 22d to the Middle Atlantic coast, where traces of it still remained on the 26th.

No. VII. This area began, like the preceding one, in or near Texas, and, like it, its origin is attributable to the presence of an area of low pressure (No. XIII) which existed on the 27th in the Gulf of Mexico. Like it, also, the highest barometer at center moved eastward, and was not remarkably conspicuous.

ATMOSPHERIC TEMPERATURE.

The isothermal lines, as given on chart No. II, show the average distribution of temperature during the month, which are supplemented by the small table, which gives the mean temperatures for the different geographical divisions. The cool weather of August was gradually succeeded throughout the Middle Atlantic States and neighboring sections by hot weather, accompanying the drought, the influence of which is not fully seen in the average temperatures. The extremes of temperature reported from sections in Dakota, and adjoining sections, have been quite remarkable, very hot southerly winds being reported during the 2d and 9th, followed by frost on the 15th. Frosts were reported over extensive portions of the country on the 4th and 5th in New England; on the 15th and 16th from Michigan and Illinois to Dakota; on the 20th, 21st, and 22d, from Massachusetts and Pennsylvania to Wisconsin; on the 28th, 29th, and 30th, from Ohio to Kansas and Minnesota; besides these, frosts were reported in portions of one or two States on the 8th, 10th, 12th, 14th, 19th, 23d, 25th, 26th, and 27th.

PRECIPITATION.

Map No. III gives the details of the total amount of rain-fall for the month over the entire country, and the accompanying table shows the districts in which there has

been an excess or deficiency. Remarkable rain-falls occurred on the 3d, 4th, 5th, and 6th in Texas, accompanying storm No. III, and in Iowa, Missouri, and Illinois on the 18th, accompanying storm No. X. The heavy rain-fall of the Middle Atlantic States occurred principally on the 16th, 17th, and 18th, in connection with storm No. VII, and on the 29th in connection with No. XIII.

The drought in the Middle Atlantic and Southern New England States closed on the 15th, after lasting about six weeks; that in Central New York closed on September 3; that in Tennessee, Ohio, Indiana, and portions of Illinois and Iowa has been only in a slight degree abated by the light rains in those States.

The distribution of the number of rainy days exhibits, in some respects, a notable contrast to the distribution of the number of cloudy days. The greatest number of rainy days is reported from the Gulf coast, especially Florida and Texas, while the numbers reported from portions of Illinois, Iowa, Nebraska, and Michigan are but little lower. The minimum number of rainy days for the country east of the Rocky Mountains appears in the interior of New England and the basin of the Ohio. The number of cloudy days is decidedly greater on the Middle and East Atlantic coasts, reaching a maximum in Maine. The region of minimum cloudiness, averaging five or six days during the month, extends from Ohio and Illinois southward to the Gulf States.

RELATIVE HUMIDITY.

The relative humidity averages about 75 per cent. throughout the Gulf and Atlantic States, and diminishes as we proceed inward toward the Ohio Valley to 62 per cent. The averages for the Upper Lake region are 70 or 75, and for the Lower Lakes about 2 per cent. less.

PREVAILING WINDS.

The prevailing winds exhibit in general a complete accord with the law according to which they should blow outward from the regions of greatest pressure. The latter region being off the Middle Atlantic coast, we find northeast winds prevailing over the South Atlantic and Gulf States, but southerly winds over Maine, Vermont, and New York. The low barometer in the Northwest has evidently determined the southerly courses of the winds from Texas to the Upper Lake region, and has had an equal influence on the northerly direction of the winds prevailing in Western Dakota. The total movement of the atmosphere irrespective of the direction has been a minimum at Memphis, and less than usual, namely, from fifteen hundred to four thousand miles, over Kentucky and Tennessee and the greater portion of the States adjoining these on all sides. The greatest total movements, viz, from seven thousand to ninety-five hundred, are reported from the Texas and Middle Atlantic coasts. The maximum winds have already been mentioned in connection with the respective storms.

NAVIGATION.

On chart No. III is given a table of the highest and lowest stages of the rivers during the month. The fluctuations have in general been very slight, the greatest range being that at Cairo, 10 feet. On the whole, the Missouri River, the Ohio, and the Lower Mississippi, were lower during the latter part of the month than at the beginning. Destructive freshets have nowhere been reported, notwithstanding the heavy local rains reported in the Lower Missouri Valley and the Middle Atlantic coast.

TEMPERATURES OF WATER.

The observed water-temperatures have been as follows:

	Surface maximum.	Bottom minimum.
Lower Missouri River	72° to 79°	51° to 65°
Upper Mississippi River	75 to 81	65 to 66
The Red River	90	75
The Ohio River	75 to 80	60 to 70
The Gulf coast	88.5	75
South Atlantic coast	81 to 85	72 to 75
From Cape Hatteras to Cape Cod	72 to 81	63 to 70
Cape Cod to Eastport	53 to 75	49 to 66
Lake Erie	74 to 81	60 to 67
Lake Michigan	67 to 75	50 to 63
Lake Superior	63 to 66	43 to 46

In general it will be noticed that the ranges of temperature are greatest in the Upper Lakes and the Missouri River, and least on the coast of Maine.

ATMOSPHERIC ELECTRICITY.

(1.) *Thunder and lightning.*—The diminution in frequency of thunder and lightning storms during the latter part of the month has been very notable. The days of most

numerous local storms, covering the greatest extent of territory, appear to have been the 5th, 8th, 11th, 12th, 17th, 18th, and 26th. By far the greater number of these storms have occurred in the South Atlantic States, Mississippi Valley, and the Southwest, and a much smaller number in the Ohio Valley, Lower Lakes, Middle and Eastern States.

(2.) *Auroras.*—The auroral displays during September have generally been faint, although not less numerous than usual. They have been noted on the 3d, 4th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 15th, 17th, 21st, 23d, 26th, 27th, and 30th, and, as in previous months, the general relationship between auroras and thunder-storms has been well marked. The only auroras reported from more than one station were those of the 7th, seen in Maine, New York, Wisconsin, and Dakota. The 8th, seen in Dakota, Iowa, and Michigan. The 11th, seen in Maine, Wisconsin, Dakota, and Iowa. The 12th, seen in Maine, New Hampshire, Vermont, Massachusetts, New York, Michigan, Ohio, Indiana, Tennessee, and Dakota; and the 13th, seen in Massachusetts and Michigan.

OPTICAL PHENOMENA.

(1.) *Solar halos.*—Solar halos have been observed principally during the latter portion of the month. Those that are reported by more than one observer, are as follows: On the 6th, in New Hampshire, New York, and Pennsylvania. On the 21st, in Ohio and Vermont. On the 23d, in Kansas and North Carolina. On the 24th, in Massachusetts, New Jersey, Virginia, North Carolina, Tennessee, Ohio, Indiana, and Illinois.

(2.) *Lunar halos.*—Lunar halos have also been observed principally during the latter portion of the month, and, as usual, appear over nearly the same regions in which solar halos are observed; the former are, however, much more fully reported. The halos recorded by two or more observers are as follows: 11th, in Vermont and Indiana; 19th, in Indiana, Illinois, and Iowa; 21st, in Massachusetts, New York, New Jersey, and Ohio; 22d, in Louisiana, Indiana, and Pennsylvania; 23d, in Pennsylvania, Indiana, Illinois, Iowa, Kansas, North Carolina, and Texas; 24th, in Vermont, Pennsylvania, North Carolina, Alabama, Ohio, Illinois, Michigan, Iowa, Missouri, and Nebraska; 25th, in Vermont, Tennessee, Ohio, and Michigan; 26th, in New York, North Carolina, Georgia, and Illinois; 28th, in Vermont, New York, and Mississippi.

MISCELLANEOUS PHENOMENA.

(1.) *Forest and prairie fires.*—The general dryness of the country has materially contributed to the prevalence of forest-fires during the first half of the month. These have been reported as extensive in New Jersey from the 12th to the 15th, and in Upper Canada from the 10th to the 16th. The resulting wide-spread smoke and haze was noted on the following dates: On the 1st, 2d and 3d, in Maine, Massachusetts, New York, New Jersey, Virginia, and Ohio; from the 10th to 15th, inclusive, in Maine, Massachusetts, New York, New Jersey, Virginia, Pennsylvania, Ohio, and Illinois.

(2.) *Migration of birds.*—The northward flight of wild geese was observed on the 6th in Colorado; 12th and 22d in Iowa; 27th in Kansas. That of wild pigeons was observed on the 28th in Kentucky.

(3.) *Unusually light meteors* were observed on the 1st, 2d, 3d, 4th, 5th, 6th, 8th, 10th, 14th, 15th, 21st, 23d, 27th, 29th, and 30th. Of these, those of the 1st, 4th, 6th, 10th, 14th, and 27th were not reported from two or more stations.

Published by order of the Secretary of War.

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Brig. Gen., (Brt. Asstgd.,) Chief Signal-Officer, U. S. A.

MONTHLY WEATHER REVIEW, OCTOBER, 1874.

INTRODUCTORY.

The Monthly Weather Review for October expresses the mean meteorological conditions as determined by observations made at 448 stations. These stations are thus classified:

United States Army Signal-Service	91
Canadian meteorological service	9
United States Army surgeons	60
United States naval hospitals	1
Volunteer observers	287

Their collective observations have been supplemented by extracts from the press-reports and other memoranda.

Only one very dangerous storm has been recorded. The general aspects of the October weather have been dryness and calmness, the usual haziness and moderate baro-

metric contrasts; while frosts, abundant at the close of the month, and the first snows of winter fell over the Northwest and the Lake region. The forest-fires in the central States were encouraged by the prolonged rainless season. The thermometric range was considerable and several times sudden. The nocturnal radiation of the earth (large because of the dryness of the air) was manifested by high nocturnal humidity.

ATMOSPHERIC PRESSURE.

(1.) The general distribution of pressure is exhibited by the isobarometric lines (in black) on Map No. II. The high-pressure areas moving over the country appear less clearly defined than usual for October.

(2.) *Areas of low barometer.*—There have been nine distinguishable depressions moving across the country, or near its frontiers, whose disturbing effects have been felt. The tracks of each of these, chronologically numbered, appear in black lines on Map No. I, and the details of each storm are herewith appended. The most severe of these storms have passed over the Lake region. The progress of some has been obviously much retarded by the presence of very high pressures, lying athwart their normal paths. There have been but one or two of these storms of marked cyclonic violence, their character partaking generally more of that of summer disturbances than of equinoctial storms.

Storm No. I first came in sight in Minnesota on the 1st of October, and moved nearly due east toward Nova Scotia. It was attended in its passage over the Lakes by high but not very dangerous winds, its advance having been at the nearly uniform velocity of twenty-one miles an hour.

No. II is first recognizable on the weather-maps of the 3d of October, when it was slowly moving from Western Nebraska due north, toward the Upper Missouri River. Crossing the Missouri in Dakota, and relieved from the presence of an area of high pressure in its front, (by which it had been deflected and detained,) it curved quite sharply to the eastward, and, after passing Lake Superior, took a southeastward course to Lake Erie. This movement was performed very leisurely, taking from the morning of the 3d to the midnight of the 6th. On reaching Lake Erie it lay in a barometric trough, between two high-pressure areas; and the depression seems to have been then filled up, or to have disappeared from the map. If again distinguishable, it is only as an ill-defined area, lingering in the Upper Ohio Valley until it mingles with No. III, which, as will be seen from the map, was meanwhile working its way from the south toward the same valley. The precipitation of this feeble depression did not serve to allay the autumnal drought in Ohio, and its accompanying winds were not serious on the lakes.

No. III. This storm, originating in the Southwest, progressed in a nearly due northeastward direction along the Appalachian chain, toward the Lower Saint Lawrence Valley, with some rapidity, but with no very notable circumstances.

No. IV was traced from Minnesota (on the morning of the 8th) in a line running north of the lakes and nearly due eastward to the lower valley of the Saint Lawrence. Its effects were most decidedly felt on Lake Huron, but not in dangerous winds. The rains accompanying it, as those of its predecessors, were generally very light.

No. V. This storm's track was peculiar and quite meandering. It was first visible on the 13th in Northern Dakota, whence it moved in an eastward course to Western Minnesota; thence, on the 14th, directly south, trending slightly to southwest, on the 15th, until it arrived in Southeastern Kansas. It then moved in a northeastward direction, crossing the Mississippi River a little below Saint Louis, whence it struck off in a southeastward line across Kentucky and East Tennessee, and thence to the coast of South Carolina. From the vicinity of Charleston its path lies, so far as anemometric indications afford light, along the warm-water current of the Atlantic toward Newfoundland, evidencing its northward progress by the Atlantic coast winds and other signs, as it passed south of Halifax, N. S. It consumed four entire days from Dakota to South Carolina, moving with constantly varying velocity. Its velocity on the ocean cannot be accurately determined. The storm was accompanied, while in Tennessee, with heavy rains; but elsewhere with no remarkable rain-fall.

No. VI. This was also originally a northwest storm-center, and, commencing in Dakota on the 26th, moved in a nearly due east-northeast course to the mouth of the Saint Lawrence River, traversing this distance in forty-eight hours, with a nearly uniform speed of thirty-four miles an hour. Light winds and light precipitation attended its entire course.

No. VII was but a feeble and ill-defined depression, crossing only the northwestern angle of the Lake region. It entered the field of observation in Western Dakota on the night of the 18th, and passed beyond sight, north of Lake Huron, on the night of the 20th, thus moving slowly. But little rain-fall attended it, and no violent cyclonic phenomena.

No. VIII, like No. V, was erratic in its course and behavior. First seen moving eastwardly in Western Kansas on the 20th, its pathway was straight to Leavenworth, which it reached by very deliberate advances, averaging five miles an hour. At Leaven-

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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.

TRACKS OF CENTRES OF LOW BAROMETER FOR OCTOBER, 1874.

NOTE.—The Roman letters show number and order of storms. 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 storm-centre on the day and report, written respectively above and below the line.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN'L (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

A.M. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

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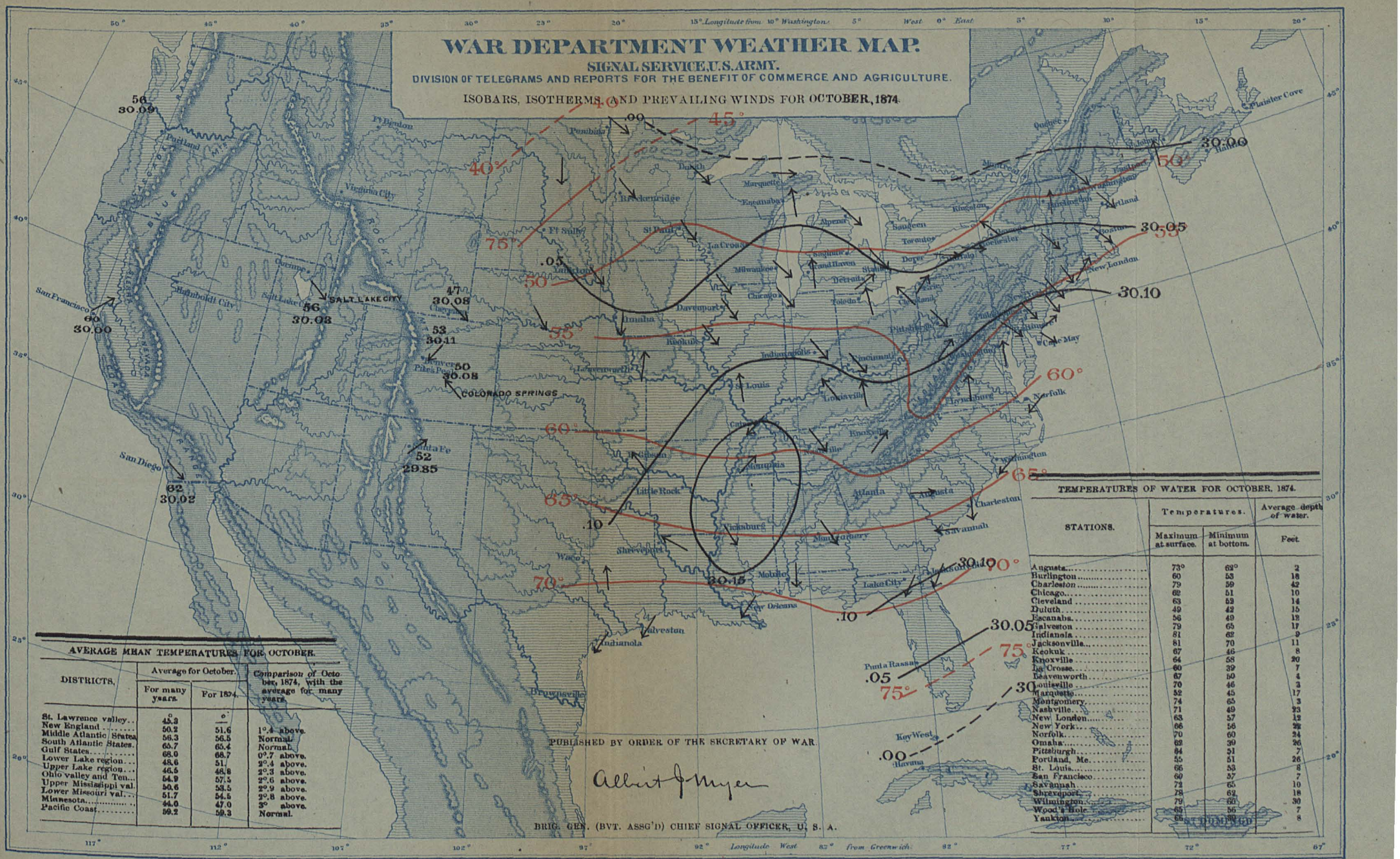
WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U.S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

ISOBARS, ISOTHERMS, AND PREVAILING WINDS FOR OCTOBER, 1874.



AVERAGE MEAN TEMPERATURES FOR OCTOBER.

DISTRICTS.	Average for October. For many years.	Average for October. For 1874.	Comparison of October, 1874, with the average for many years.
	°	°	
St. Lawrence valley	45.3	—	
New England	50.2	51.6	1°.4 above.
Middle Atlantic States	56.3	56.5	Normal.
South Atlantic States	65.7	65.4	Normal.
Gulf States	68.0	68.7	0°.7 above.
Lower Lake region	48.6	51.	2°.4 above.
Upper Lake region	46.5	48.8	2°.3 above.
Ohio valley and Ten.	54.9	57.5	2°.6 above.
Upper Mississippi val.	50.6	53.5	2°.9 above.
Lower Missouri val.	51.7	54.5	2°.8 above.
Minnesota	44.0	47.0	3° above.
Pacific Coast	59.2	59.3	Normal.

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Albert J. Myer

BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

TEMPERATURES OF WATER FOR OCTOBER, 1874.

STATIONS.	Temperatures. Maximum at surface.	Temperatures. Minimum at bottom.	Average depth of water. Feet.
Augusta	73°	62°	2
Burlington	60	53	18
Charleston	79	59	42
Chicago	62	51	10
Cleveland	63	53	14
Duluth	49	42	15
Escanaba	56	49	12
Galveston	79	65	17
Indianola	81	67	9
Jacksonville	81	70	11
Keokuk	67	46	8
Knoxville	64	58	20
La Crosse	60	39	7
Leavenworth	67	50	4
Louisville	70	46	3
Marquette	52	45	17
Montgomery	74	65	3
Nashville	71	49	23
New London	63	57	12
New York	66	56	22
Norfolk	70	60	24
Omaha	62	39	26
Pittsburgh	64	51	7
Portland, Me.	55	51	26
St. Louis	66	53	8
San Francisco	69	57	7
Savannah	72	65	10
Shreveport	78	62	18
Wilmington	79	60	30
Wood's Hole	65	56	7
Yankton	66	39	8

DUPLICATE

A.M. PHOTO-LITHOGRAPHIC Co. N.Y. (OSBORNE'S PROCESS)

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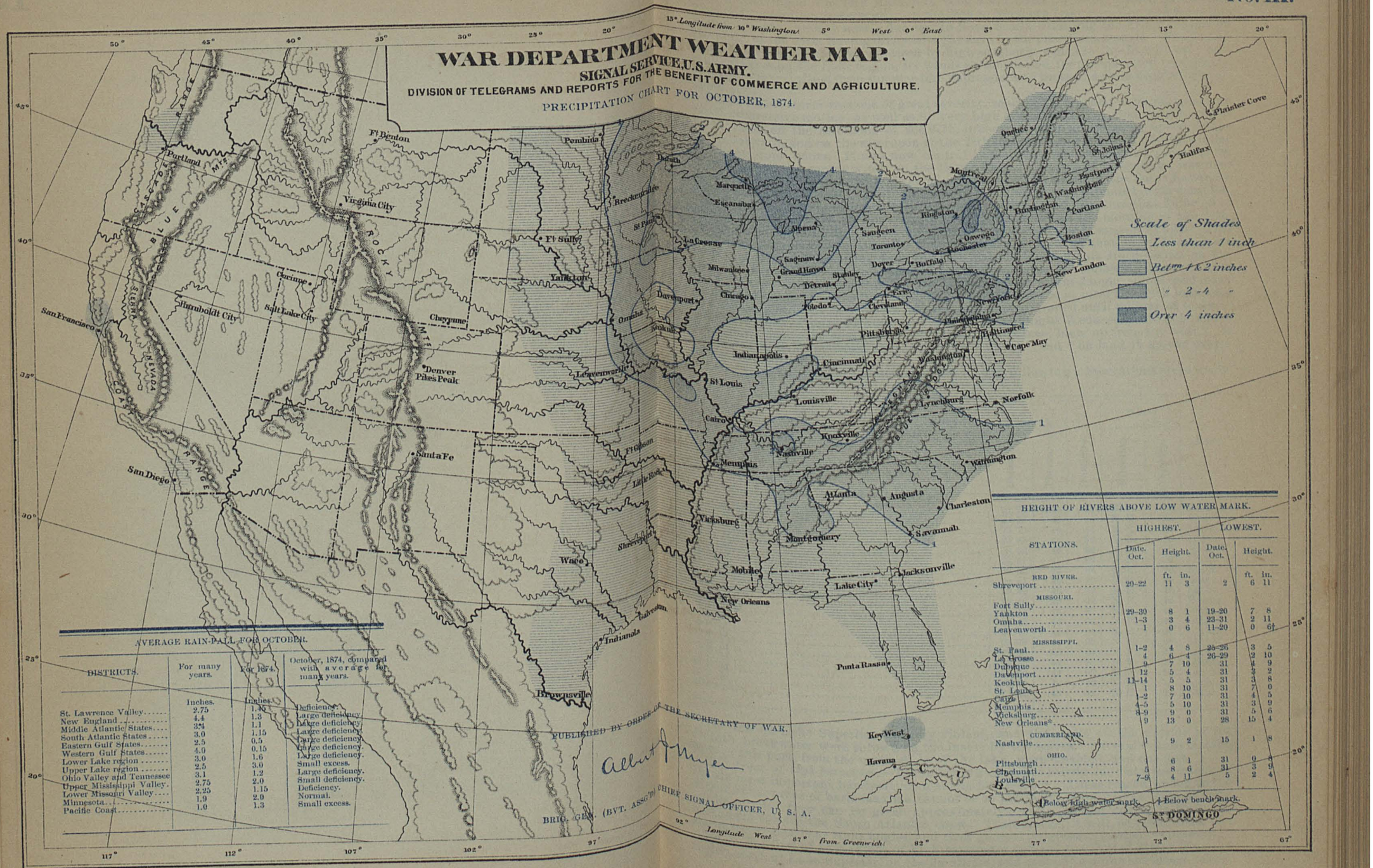
WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U.S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

PRECIPITATION CHART FOR OCTOBER, 1874.



AVERAGE RAIN-FALL FOR OCTOBER.

DISTRICTS.	For many years.	For 1874.	October, 1874, compared with average for many years.
	Inches.	Inches.	
St. Lawrence Valley	2.75	1.45	Deficiency.
New England	4.4	1.3	Large deficiency.
Middle Atlantic States	3.4	1.1	Large deficiency.
South Atlantic States	3.0	1.15	Large deficiency.
Eastern Gulf States	2.5	0.5	Large deficiency.
Western Gulf States	4.0	0.15	Large deficiency.
Lower Lake region	3.0	1.6	Large deficiency.
Upper Lake region	2.5	3.0	Small excess.
Ohio Valley and Tennessee	3.1	1.2	Large deficiency.
Upper Mississippi Valley	2.75	2.0	Small deficiency.
Lower Missouri Valley	2.25	1.15	Deficiency.
Minnesota	1.9	2.0	Normal.
Pacific Coast	1.0	1.3	Small excess.

HEIGHT OF RIVERS ABOVE LOW WATER MARK.

STATIONS.	HIGHEST. Date. Oct.	HIGHEST. Height.	LOWEST. Date. Oct.	LOWEST. Height.
		ft. in.		ft. in.
RED RIVER.				
Shreveport	20-22	11 3	2	6 11
MISSOURI.				
Fort Sully	29-30	8 1	19-20	7 8
Yankton	1-3	3 4	23-31	2 11
Omaha	1	0 6	11-20	0 6†
Leavenworth				
MISSISSIPPI.				
St. Paul	1-2	4 8	25-26	3 5
La Crosse	4	6 4	26-29	2 10
Dubuque	9	7 10	31	4 9
Davenport	12	5 4	31	3 2
Keokuk	13-14	5 5	31	3 8
St. Louis	1	8 10	31	4 0
Cairo	1-2	7 10	31	4 5
Memphis	4-5	5 10	31	3 9
Vicksburg	8-9	9 0	31	5 6
New Orleans*	9	13 0	28	15 4
CUMBERLAND.				
Nashville	1	9 2	15	1 8
OHIO.				
Pittsburgh		6 1	31	0 6
Cincinnati	8	8 6	31	3 9
Louisville	7-9	4 11	5	2 4

* Below high water mark. † Below bench mark.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. A. A. G.) CHIEF SIGNAL OFFICER, U. S. A.

worth it recurved sharply to the northwest, and pursued this unusual course, ascending the Missouri Valley to Northern Dakota. Then, on the 24th, it moved nearly due east, and, on arriving in Northern Minnesota, took a southeast direction toward Saint Paul. Thence it passed northeastwardly on the 26th to Northern Lake Superior, and from this region directed its way nearly due east to Nova Scotia, attaining the Atlantic coast on the night of the 28th, having occupied eight days in the circuitous transit. Feeble and obscure at first, it was characterized by high southerly winds in the Northwest; but, while traversing the Lake region, its winds subsided, and its precipitation was gentle. It marks the transition from summer-like depressions to those of a more decided winter-type.

No. IX. This storm was one of great severity, marked by a nearly straight track and rapid progressive motion, as well as by very high cyclonic winds. Coming into notice in Nebraska on the afternoon of the 27th, it coursed with accelerating speed to the northeastward, and on the afternoon of the 28th had made five hundred and fifty miles in twenty-four hours. It was now central in Southern Minnesota, and preceded by very high and dangerous winds on the Upper Lakes. Its line of progression was over Southeastern Lake Superior, and thence northeastwardly north of the Saint Lawrence Valley towards Labrador. In its passage of the lakes it was attended with considerable rain-fall, turning to snow, with the rapid decline of temperature that followed in its wake. The severity of this storm was first betokened on the morning of the 28th, by the remarkable northerly deflection of the isotherms in the Mississippi Valley. This deflection was more conspicuous in the afternoon and night of that day. There were numerous disasters resulting from the high gales attending this storm-center on the Upper Lakes. A Milwaukee paper of the 30th contains the following dispatch from Grand Haven: "As forewarned by the Signal-Service storm-danger signal yesterday forenoon, a heavy wind-storm from the south, accompanied at intervals with light rain and vivid lightning, reached here last evening and continued until midday of to-day." A Detroit paper of same date states: "Soon after midnight Wednesday the gale which the Signal Corps predicted a day and a half in advance, blew up from the west." It adds: "The gale increased in violence until noon;" and "on land it moved everything not fastened."

During the progress of the storm at Duluth the following observations were made

	Barometer.	Thermometer.	Humidity.	WIND.		Rain.
				Direction.	Velocity.	
6.35 A. M	29.77	45	84	N. E.	30	Heavy.
7 A. M	29.75	45	84	N. E.	32	Heavy.
8 A. M	29.75	46	84	N. E.	36	Light.
9 A. M	29.68	46	84	N. E.	36	Light.
10 A. M	29.63	46	92	N. E.	36	Heavy.
11 A. M	29.61	45	92	N. E.	36	Light.
12 A. M	29.53	46	84	N. E.	36	Light.
1 P. M	29.47	46	92	N. E.	40	Light.
2 P. M	29.42	46	92	N. E.	48	Light.
3 P. M	29.48	46	92	N. E.	40	Heavy.
3.35 P. M	29.43	46	92	N. E.	40	Light.
5 P. M	29.42	46	92	N. E.	40	Light.
6 P. M	29.40	45	84	N. E.	36	Light.
7 P. M	29.39	44	92	N. E.	28	Light.
8 P. M	29.35	45	84	N. E.	26	Light.
9 P. M	29.35	44	92	N. E.	24	Light.
10 P. M	29.34	43	92	N. E.	24	Light.
11 P. M	29.32	43	92	N. E.	28	Light.
Midnight	29.31	43	91	N. E.	27	Light.

The sea on Lake Superior was very violent, and the rocks on the outside of the Duluth breakwater were thrown on the inside by the waves. Several vessels coming toward this port, from the north shore of the lake, were disabled, and one lost.

(3.) *Areas of high barometer.*—The following sketches briefly indicate the tracks of the six most important barometrical maxima for October. These tracks, owing to the extent of the areas of baric maxima, cannot be so precisely delineated as those of baric minima. But they can be given approximately; their general course is from the northwest toward the South Atlantic coast. Their tracks, it will be seen, cross the storm-tracks nearly at right angles, and their general progressive motion is contrary.

No. I. The first of these areas of high barometer entered the United States from the region north of Lake Superior, on the 3d ultimo, and moved in a due southeast course

toward Pennsylvania and Virginia, passing off the Atlantic coast on the 5th. The highest barometers connected with it were about 30.50 inches.

No. II was an area of less decided character, introducing itself from the Red River Valley of the North and pursuing a path parallel with that of No. I, to the southern shore of Lake Michigan, where it became unimportant, and was partly absorbed by depression No. II, referred to under the head of *Areas of low barometer*.

No. III. This area of high pressure also originated in the Northwest or north of Dakota, on the 10th, and moved southeastwardly to Tennessee, whence its apparent track was a little to the north of east, while, on the 16th, it disappeared off the Virginia and Carolina coasts. It was quite well-defined and attended by but little precipitation. As this area of high pressure reached the South Atlantic seaboard, it produced high northeast winds along the coast. On the 13th the German bark Netherland, from Rotterdam, when approaching Tybee Island, ran on the shoals which make out from the northeastern extremity of the island, and though her crew and much of her cargo were saved, she subsequently went to pieces.

No. IV. This, like its predecessors, originated, also in the Northwest, crossing Lake Superior on the 20th, and advancing southwesterly, reached New Jersey on the 23d. Meanwhile another high pressure.

No. V was approaching the Middle States from the Province of Quebec. This latter area took a peculiar course; first, southeast, from Quebec to Nova Scotia; second, from Nova Scotia, in a nearly southwest direction, across the Middle Atlantic States and Tennessee to Mississippi, and Louisiana; thence a due eastward path toward Southern Georgia, making the entire tour at a nearly uniform rate of progress, in six days, (*i. e.* from 22d to 28.) The pressures were highest in Canada, and, as the area moved southward, they gradually decreased until they became imperceptible off the Florida coast on the 28th. The high pressure was felt on the Atlantic coast in long-continued northeasterly winds and in the heavy swell of the ocean.

No. VI followed; the severest of all the October storms, (that marked IX,) and ushered in the extensive rain-areas and snow-areas in the Northwest and Lake region, and also the low temperatures and heavy frosts, which finally extended to the Gulf of Mexico. The pressures were very high in this anti-cyclone, and the winds accompanying it were also high in the Lake region. Its line of progression was from the Northwest to the Lower Mississippi Valley. Its effects were felt after the month of October closed, although it was quickly succeeded in the Northwest by falling barometer. The frosts which followed it, however, extended over the whole country east of the Rocky Mountains and to the neighborhood of Mobile and Pensacola, Florida.

ATMOSPHERIC TEMPERATURE.

The thermal changes of October, with one or two exceptions, were neither severe nor sudden. The southward deflection of the low thermometer isotherms commenced in the Northwest and Upper Lake region and proceeded first down the Missouri and Mississippi Valleys, and thence eastwardly over the Appalachian Belt and the Atlantic States. The extreme ranges of temperature were at Bismarck, Dak., from 83° to 6°; at Breckenridge, from 76° to 10°; at Cheyenne, from 80° to 11°; at Colorado Springs, from 76° to 20; at Fort Gibson, Ind. T., from 87° to 24°; at Indianapolis, from 78° to 28°; at Knoxville, from 80° to 30°; at Leavenworth, from 89° to 21°; at Omaha, from 78° to 18°; at North Platte, from 82° to 14°; at Saint Louis, 83° to 30°.

The temperature was everywhere, except in the South Atlantic States, above the normal or usual height. (See Table, Map No. II.)

PRECIPITATION.

This item is graphically represented on Map No. III; the table printed thereon shows the areas of deficiency or excess, as compared with the normal precipitation, deduced from the observations of other years. The map shows a general deficiency over the entire country. The only excess, and that very small, is over the Upper Lakes.

RELATIVE HUMIDITY.

The connection between this condition and the precipitation will be seen by comparing the rain-chart data with the following means of humidity: New England, 72.6; Middle States, 68.1; South Atlantic States, 70.2; Eastern Gulf States, 71.0; Western Gulf States, 66.0; Lower Lakes, 69.00; Upper Lakes, 74.1; Ohio Valley and Tennessee, 64.1; Lower Missouri Valley, 63; Upper Mississippi Valley, 67; and Minnesota, 70.7.

PREVAILING WINDS.

As is generally the case, the prevailing winds are strictly conformed in direction to the "law of the winds." The arrows which represent their direction veer around the area of high pressure in the usual way, *i. e.*, with the hands of a clock. The extreme maximum movements of the wind have been at Breckenridge, seven thousand six hundred and fifty miles; at Cape Henry, nine thousand one hundred and forty-seven;

at Cape May, six thousand nine hundred and seven; at Cleveland, seven thousand two hundred and eighty-one; at Escanaba, seven thousand two hundred and seventeen; at Long Branch, nine thousand two hundred and forty-two; at Pike's Peak, fourteen thousand seven hundred and thirty-four; at Sandy Hook, ten thousand nine hundred and seventeen.

The extreme minimum movements have been at Memphis, one thousand seven hundred miles, and at Shreveport, one thousand eight hundred and eighty-six. The calm-area is, therefore, coterminous with that of high pressure.

NAVIGATION.

On the lower left side of Map No. III is given a table showing the varying stages of the rivers for the month. From this table, it is seen, the rivers have fluctuated but very little, and almost inappreciably; some, only a few inches; none, more than eight feet. With the exception of the Ohio, at Louisville, the Missouri, at Yankton, and the Red River, at Shreveport, all the rivers have been slowly falling during October, the greatest falls being reported toward the close of the month.

TEMPERATURE OF WATER.

The water temperatures, from observations taken at the bottom, have been as follows:

	Maximum.	Minimum.
Lower Missouri River	62° to 67°	53° to 39°
Upper Mississippi River	60 to 67	53 to 39
Red River	78	62
Ohio River	64 to 70	51 to 46
The Texas coast	79 to 81	65 to 62
The South Atlantic coast	72 to 81	70 to 59
From Portland, Maine, to Cape Cod	55 to 65	51 to 56
From Cape Cod to Cape Henry	63 to 70	56 to 60
Lake Erie	63	52
Lake Michigan	56 to 62	51 to 49
Lake Superior	49 to 52	45 to 42

ATMOSPHERIC ELECTRICITY.

(1.) *Thunder and lightning.*—There is not much change to note in the frequency of thunder and lightning since September. There were numerous electrical storms, even in the northern part of the country and on the lakes. Zigzag lightning was reported at Duluth on the 25th and Buffalo on the 10th; thunder and lightning at Pembina, Dak., on the 24th and 25th; at Fort Randall, Dak., on the 4th, 24th, and 28th; Rock Island Arsenal, Ill., on the 27th; Fort Wallace, Kans., on the 26th; at West Point, on the 27th; Fort Adams, R. I., on the 28th; Golden City, Colo., on the 24th; at Louisville, Ill., on the 28th. On the night of the 27th a thunder-storm passed over Hartford, and on the 30th, at 5 a. m., a smart thunder-shower passed over New York City.

(2.) *Auroras.*—October, at least the early part of the month, was marked for its auroral displays. Among the most conspicuous of these were the auroras of the 2d, 3d, 4th, 5th, 6th, 7th, 12th, 13th, 14th, 15th, 16th, and 17th. That of the 3d and 4th was extraordinary and extensive in its manifestations. It was seen at nearly all the northern stations, where the weather was favorable, *e. g.*, Buffalo, Portland, Me., Lexington, Ky., Port Huron, Mich., Peck's Beach and Long Branch, Norfolk, Boston, Atlanta, Wytheville, Va., Duluth, Minn., Eastport, Me., New Haven, Conn., Albany, Chicago, Davenport, Iowa, Detroit, Atlantic City, La Crosse, Wis., Keokuk, Iowa, and numerous other stations.

The aurora of the 12th was most distinct at Duluth and Pembina, Dak., Eastport, Me., and Cornish, Standish, and Mount Desert, Me., and Fall River, Mass.

At Hillsboro, Ohio, an aurora was seen on the 31st.

OPTICAL PHENOMENA.

(1.) *Solar halos* were observed at Milford, Del., on the 16th; at Atlanta, Ga., on the 9th and 21st; at Gainesville, Ga., on the 16th; at Hennepin, Ill., on the 1st and 4th; at Cresco, Iowa, on the 4th and 27th; at Cornish, Me., on the 6th, 17th, and 25th; at Florida, Mass., on the 18th; at Litchfield, Mich., on the 9th; at Trenton, N. J., on the 14th; at Waterbury, N. Y., on the 1st, 10th, and 24th; at Weldon, N. C., on the 13th; at Belmont Farm, Texas, on the 1st; and at Lewisville, Va., on the 6th and 25th.

(2.) *Lunar halos* have been more numerous than solar, and have prevailed in the latter part of the month. The two phenomena have occurred over nearly the same stations. These halos were observed at Southington, Conn., on the 22d; at Milford, Del., on the 25th; at Gainesville, Ga., on the 8th; at Vevay, Ind., on the 14th and 28th; at Rockford, Iowa, on the 19th; at Cresco, Iowa, on the 23d; at Pine Grove, Ky.,

on the 21st; at Cornish, Me., on the 22d; at West Waterville, Me., on the 24th; at Standish, Me., on the 23d; at Northampton, Mass., on the 24th; at Andover, Mass., same date; at North Adams, Mass., on the 24th; at Northport, Mich., on the 25th; at Brookhaven, Miss., on the 22d; at Fayette, Miss., on the 25th; at Atco, N. J., on the 20th; at Depauville, N. Y., on the 24th; and at Weldon, N. C., on the 22d.

CAUTIONARY SIGNALS.

The total number of cautionary signals ordered for and displayed at ports of the United States during the month of October was 86. The regulation requires a display of the storm-warning signals at a station whenever the officer, preparing the predictions, judges that at the station, or within a radius of one hundred miles, the wind will reach twenty-five miles an hour, or attain a velocity dangerous to shipping. According to this regulation, the whole number of ordered cautionary signals, which are justified by the result, was, for the entire month, sixty-five. This makes the percentage of justifications seventy-five.

MISCELLANEOUS PHENOMENA.

The most striking of these is the extensive and disastrous prevalence of prairie and forest fires, chiefly in Indiana, Ohio, and the surrounding districts, during the whole month of October. These are due to artificial causes, combined with the extreme dryness of the interior. The wide ravages of these forest-fires are indicated by the numerous reports of dense smoke, forwarded in the signal-service returns. These indications came from Breckenridge and Saint Paul, Minn.; Toledo, Ohio; Bismarck and Pembina, Dak., on the 2d and 18th, respectively; Omaha, Nebr.; La Crosse, Wis.; Long Branch, N. J.; Augusta, Ill.; Cumberland, Woodstock, and Falston, Md.; Andover, Mass.; Wet Glaze, Mo.; Plattsmouth, Nebr.; Atco, N. J.

(2.) *Migration of birds.*—The migration of wild geese, southward, was first noticed at Saint Paul, Minn., on the evening of the 27th, shortly before storm No. IX and the approach of the area of high pressure and low temperature. At Fort Randall, Dak., on the 2d, geese were seen going south; at Rockford and Afton, Iowa, on the 12th; at Fort Madison, Iowa, on the 26th; at Arkansas City, Kans., on the 12th and 18th; at Andover, Mass., on the 26th, the same phenomenon was registered. At Mount Desert, Maine, on the 21st, crows were seen going south, and geese, at Sugar Island, Mich., on the 31st, and at San Diego, California, on the 27th and 28th.

(3.) *Meteors.*—On the 20th, occurred at Saint Paul, Minn., the striking phenomenon of a meteoric ball of fire exploding with an intense white light, the fragments scattering in all directions as they fell towards the earth. Light meteors were also seen at Linden, Ill., on the 16th, 25th, and 28th; near Burlington, Ind., on the 24th; at Woodstock, Md., on the 9th, 14th, 15th, 17th, and 20th; at Fayette, Miss., on the 26th; at Corning, Mo., on the 14th; and at New York City on the 17th.

(4.) *First frosts, snows, and ice.*—The first destructive frost occurred at Memphis on the 13th, doing considerable injury to the top crop of unmatured cotton-bolls. The first frost at Pittsburgh was on the 15th; at Wytheville, Va., on the 13th; at Leavenworth, on the 11th; at Rochester, N. Y., on the 15th; at Fort Randall, Dak., on the 7th; Fort Wayne, Mich., on the 4th; at Plattsburgh, N. Y., on the 19th; at Moulton and Marion, Ala., on the 13th.

The first snows fell at Rochester on the 13th; at Port Huron, Mich., Cleveland, Ohio, and Germantown, Penn., on the 31st; at Fort Niagara and Fort Porter, N. Y., on the 31st; at Fort Ontario, N. Y., on the 13th; at Plattsburgh Barracks, N. Y., on the 31st; Jackson County, North Carolina, on the 13th; at Fort Fred. Steele, Wyo., on the 28th; and at Golden City, Colo., on the 29th.

The first ice formed at Toledo on the 13th; on the 31st at Mount Sterling, Ill.; at Fort Randall, Dak., on the 31st; on the 13th at Laconia, Ind.; on the 12th at Afton, Iowa.

At Boston, on the 2d, a beautiful mirage was observed in the eastern horizon, about 6 p. m., lasting several minutes. The distinct image of a ship at sea was depicted, the eastern sky assuming a dull, hazy, and orange tint. There was a "norther" upon the Texas coast on the 29th. Heavy snow fell in Dakota Territory, which obstructed the railroad trains, about the close of the month. Observations on Lake Superior show that the oscillations of the barometer and those of the lake-water were contrary twenty-nine times and acted together sixty-four times. A water-spout took place on Lake Erie, October 31, which had an apparent rotary motion and reached the shore about half a mile west of Buffalo, when it burst, scattering the sand in all directions.

Published by order of the Secretary of War.

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Brig. Gen., (Bvt. Assgd.,) Chief Signal-Officer, U. S. A.

MONTHLY WEATHER REVIEW, NOVEMBER, 1874.

INTRODUCTORY.

The current Weather Review is a summary of the meteorology of the United States for November, as determined by the instrumental and other observations from the following sources, representing 450 regular stations and other points from which observations have been taken:

United States Army Signal-Service	92
Canadian meteorological service	13
United States Army surgeons	50
United States naval hospitals	1
Regular volunteer observers	283
Miscellaneous sources	11

Among the latter, the press reports have been found useful.

The great meteorological event of the month of November was the inland cyclone which swept with devastating force across the northern portion of the country towards the close of the month, and of which the track is charted on Map No. I, and marked Storm VIII.

The prominent characteristics of the November weather have been rapid and severe thermal transitions, well-defined barometric areas and contrasts of pressure, with high winds and heavy snows in the north and considerable rain-fall, supplying, in a large degree, the deficiency of water, so unmistakably exhibited by the autumn river-reports, and so disastrously felt by the agricultural interests since last August.

ATMOSPHERIC PRESSURE.

(1.) This meteoric element is graphically delineated by the isobaric lines (in black) on Map No. II, from which the reader will discover the mean pressure of the atmosphere in all sections of the United States. Although the high pressure areas were not excessive for the month in review, they were as high as experience teaches the meteorologist generally to look for in the last month of the fall season.

(2.) *Areas of low pressure.*—These areas, otherwise registered as storm-centers, so far as they call for special notice, are ten in number, and are specially tracked on Map No. I, where they are classified chronologically. The details, of importance, of each such depression are herewith enumerated. The most disastrous (storm No. VIII) is highly instructive, and is a fine type of the terrific autumnal gales which ravage the Lake region. Unlike most of the October cyclones, which spent their fury in the region far north of the Lakes, the November gales pursued tracks upon lower latitudes, and their cyclonic winds were felt in the United States with most disastrous consequences.

Storm No. I, though of comparatively minor moment, was dangerously felt on the Lower Lakes. It appeared on the 1st of November, northeast of Lake Superior, moving in an east-southeast direction, and passed beyond Nova Scotia on the morning of the 2d.

No. II. This depression was originally noticed in Montana on the 3d of November, moving along the Upper Missouri Valley eastward. It passed over Minnesota and the height of land just north of the Lakes, and finally vanished beyond the Lower Saint Lawrence Valley on the morning of the 6th. It was attended by high winds on Lakes Huron and Michigan during the night of the 4th, but its later track lay on parallels too northerly to produce any violent commotion on the Lower Lakes. Rain and light snow, however, marked its passage to the eastward.

No. III also made its first appearance in the Northwest. On the morning of the 6th it was central in the northern part of Wyoming Territory, whence it moved first northeastwardly into Dakota, and thence, on the night of the 7th and morning of the 8th, slowly passed over Lake Superior, finding its way towards Hudson's Bay and Labrador, wholly disappearing in those high latitudes on the 9th.

The most severe winds connected with this storm were on Lake Superior and the northern part of Lake Michigan; after passing the latter, its northerly course insured the lower lakes against serious disturbance.

No. IV had its origin nearer to the Upper Mississippi Valley, in Northwestern Iowa, on the morning of the 9th, whence, advancing towards northern Lake Michigan and Lake Huron on the 10th, it progressed to the Lower Saint Lawrence Valley, apparently pausing off the coast of Cape Breton for forty-eight hours.

This was a feeble depression, attended by light winds and very light precipitation. It was followed, however, by a high-pressure area, the highest barometers of which read over 30.60 inches.

No. V. This storm enters the field of observation in Western Dakota on the 13th, and on the morning of the 14th it had reached Southern Minnesota, whence its course lay

northeastward to the northern shore of Lake Superior, and thence, with a slight southerly trend, almost due east to the Province of Quebec, which it visited on the 15th.

The depression of the 13th came in the rear of an area of high barometer, which had occupied three days in its transit of the country, during which low temperatures prevailed very generally. As the earth was thus chilled, the conditions favoring precipitation were present, and the snows and rains which preceded and followed the storm were considerable. The storm-vortex occasioned high and dangerous winds on the upper lakes, but no decided gales on Lakes Erie and Ontario.

No. VI began in Southwestern Kansas at midnight, of the 15th, whence its track lies nearly due northeastward over the Lake region and the Saint Lawrence Valley, the lower part of which it passed on the 18th.

Quite a considerable precipitation in the Upper Mississippi Valley preceded this disturbance, and the rain-fall over the whole Lake region was large, though not torrential. The storm subjected lake navigation to no danger or inconvenience until it approached Lake Ontario. After it, came, rapidly, an area of very high barometer and excessive cold in the Northwest. The barometer readings in the Upper Missouri Valley reached the very high figures of 30.97 inches—one of the highest (if not the highest) readings ever recorded by the Signal-Office observers. Attending this high pressure were low temperatures, as low as 15° Fahrenheit.

No. VII's track is traceable from the Lower Ohio Valley (on the 19th) to Lake Ontario (on the 20th,) and thence to Nova Scotia (on the 21st.)

This depression probably arose from the precipitation in the Lower Ohio Valley, but it was faint and unimportant, except that its course was marked by considerable rain-fall and snow-fall.

No. VIII. This extraordinarily violent and extensive cyclone also had a northwestern origin, and may, perhaps, be traced to the Pacific coast. It is first distinctly visible on the night of the 20th, in Western Wyoming, and pursued thence a course slightly east of northeast to Southwestern Dakota, over which it passed on the night of the 21st, moving very leisurely. On the morning of the 22d, after taking a southeast course, it was central in Northern Nebraska, and thence commenced advancing more rapidly to the Mississippi Valley, which it crossed near the southern boundary of Iowa on the evening of the same day. It now struck off in a different direction, nearly due northeast, to Lake Huron, sweeping over that inland sea on the 22d. Having on the afternoon of the 23d gained the vicinity of Georgian Bay, its center appears to have divided; one part, as an offshoot, going a little by the south of east, and, with the extraordinary progressive velocity of about four hundred and eighty miles in eight hours, (or sixty miles per hour,) reached Vermont and New Hampshire by midnight; the other part of the cyclone moved from Georgian Bay, a little by the north of east, and, with similar speed, reached the meridian of Quebec early on the morning of the 24th. Meantime, since the midnight of the 23d, the southern section, having crossed Vermont and New Hampshire, pushed rapidly northward and reunited with the northern section near Quebec, whither it had by this time come up. From this point, during the rest of the 24th, the combined depression, with high but diminishing velocity, swept away to the northeast, and at midnight was lost to view in the vicinity of Newfoundland. While this dangerous tempest was approaching the Lake region on the evening of the 22d, the atmospheric equilibrium in the Southern States was violently disturbed; and, in Alabama, a terrific wind-storm ravaged the town and vicinity of Tuscumbia, killing twelve persons, wounding thirty, destroying upwards of one hundred buildings, and inflicting disaster on many other structures. Nearly one-half of Tuscumbia was destroyed; and, almost simultaneously, the town of Montevallo, about sixty miles north of Selma, shared a similar fate. Although the Tuscumbia tornado is not perfectly shown by the weather-maps to have been an offshoot from the main storm-center—No. VIII—yet it is highly probable the former was almost directly caused by the latter, when the great storm-center crossed the Tuscumbia meridian. The tornado occurred just as the cyclonic winds shifted to the southwest and west from the indraught towards the center, and when the temperature of the air was suddenly and greatly lowered and the condensation of vapor became correspondingly great. The main storm was preceded and followed by large quantities of rain and snow, which rapidly filled the tributaries of the western rivers. The commotion of the lakes was very great, the water in some parts of the lower lakes being shoaled, so that vessels were grounded.

The winds were of the most dangerous velocities, and but for the timely forewarning and lateness of the season—many vessels having been laid up for the winter—the lake disasters, numerous as they were, must have been largely augmented. Among the high wind-velocities reported were the following: At Chicago, thirty-five miles an hour; Milwaukee, forty-six; Port Huron, forty-eight; Toledo, forty-eight; Grand Haven, fifty-two; Buffalo, fifty-two; Cleveland, fifty-two; Cape Hatteras, fifty-two; Knoxville, sixty.

The lowest barometers recorded were: At Buffalo, 28.93 inches—considerably below the lowest record of the past two years at this station; at Alpena, an uncorrected ba-

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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.

TRACKS OF CENTRES OF LOW BAROMETER FOR NOVEMBER, 1874.

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 storms. 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 storm-centre on the day and report, written respectively above and below the line.

A. M. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

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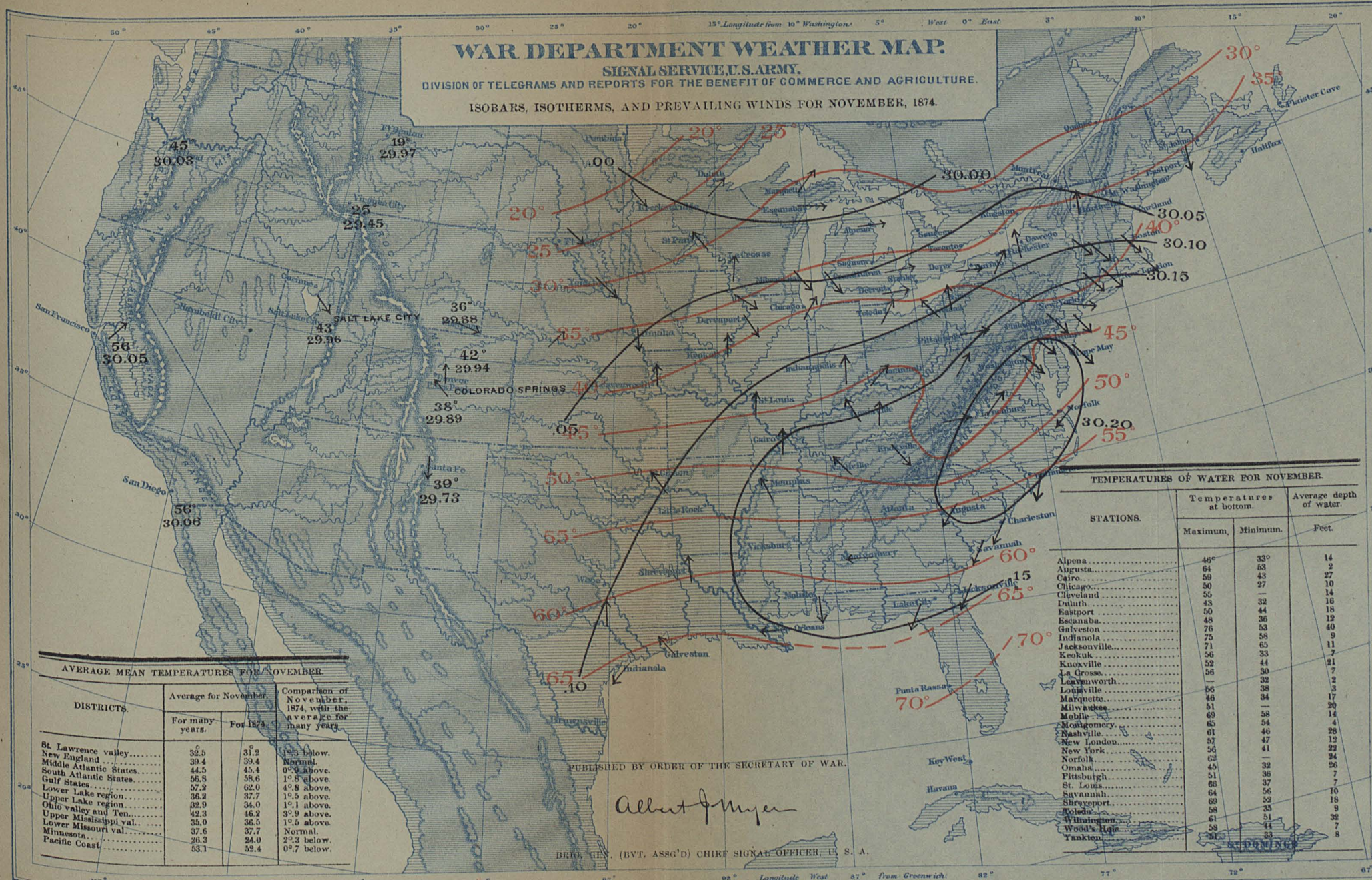
No. II.

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 NOVEMBER, 1874.



AVERAGE MEAN TEMPERATURES FOR NOVEMBER.

DISTRICTS.	Average for November.		Comparison of November, 1874, with the average for many years.
	For many years.	For 1874.	
	°	°	
St. Lawrence valley	32.5	31.2	1°.3 below.
New England	39.4	39.4	Normal.
Middle Atlantic States	44.5	45.4	0°.9 above.
South Atlantic States	56.8	58.6	1°.8 above.
Gulf States	57.2	62.0	4°.8 above.
Lower Lake region	36.2	37.7	1°.5 above.
Upper Lake region	32.9	34.0	1°.1 above.
Ohio valley and Ten.	42.3	46.2	3°.9 above.
Upper Mississippi val.	35.0	36.5	1°.5 above.
Lower Missouri val.	37.6	37.7	Normal.
Minnesota	26.3	24.0	2°.3 below.
Pacific Coast	53.1	52.4	0°.7 below.

TEMPERATURES OF WATER FOR NOVEMBER.

STATIONS.	Temperatures at bottom.		Average depth of water.
	Maximum.	Minimum.	Feet.
Alpena	46°	33°	14
Augusta	64	53	2
Cairo	59	43	27
Chicago	50	27	10
Cleveland	55	—	14
Duluth	43	32	16
Eastport	50	44	18
Escanaba	48	36	12
Galveston	76	53	40
Indianola	75	58	9
Jacksonville	71	65	11
Keokuk	56	33	7
Knoxville	52	44	21
La Crosse	56	30	7
Leavenworth	—	32	2
Louisville	56	38	3
Marquette	46	34	17
Milwaukee	51	—	20
Mobile	69	58	14
Montgomery	65	54	4
Nashville	61	46	28
New London	57	47	12
New York	56	41	22
Norfolk	63	—	24
Omaha	45	32	26
Pittsburgh	51	36	7
St. Louis	66	37	7
Savannah	64	56	10
Shreveport	69	52	18
Toledo	58	35	9
Wilmington	61	51	32
Wood's Hole	58	44	7
Yankton	51	33	8

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BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

A.M. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

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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, 1874.

AVERAGE RAIN-FALL FOR NOVEMBER.

DISTRICTS.	For many years.	For 1874.	November, 1874, compared with the average for many years.
	Inches.	Inches.	
St. Lawrence Valley	2.75	2.70	Normal.
New England	3.85	2.75	Deficiency.
Middle Atlantic States	3.50	2.50	Deficiency.
South Atlantic States	3.00	2.25	Small deficiency.
Eastern Gulf States	3.65	1.75	Large deficiency.
Western Gulf States	4.25	2.25	Large deficiency.
Lower Lake region	3.25	2.45	Deficiency.
Upper Lake region	2.40	2.65	Small excess.
Ohio Valley and Tennesse,	3.40	5.10	Large excess.
Upper Mississippi Valley.	1.80	2.65	Excess.
Lower-Missouri Valley	1.40	2.00	Excess.
Minnesota	1.85	1.10	Deficiency.
Pacific Coast	3.00	5.88	Large excess.

HEIGHTS OF RIVERS ABOVE LOW WATER MARK.

STATIONS.	HIGHEST. Date. Nov.	HIGHEST. Height.	LOWEST. Date. Nov.	LOWEST. Height.
		ft. in.		ft. in.
RED RIVER.				
Shreveport	1	9 6	19	4 7
MISSOURI.				
Fort Sully	8-12	4 1	—	—
Yankton	18	8 2	21-22	5 9
Omaha	1	2 11	24	2 6
Leavenworth	1	0 0	30	3 0†
MISSISSIPPI.				
St. Paul	13-15	5 0	28	3 0
La Crosse	14	4 3	28	2 8
Dubuque	11	6 3	30	3 6
Davenport	23	4 6	30	2 3
Keokuk	25	4 8	4-5	3 4
St. Louis	23	7 6	10	3 3
Cairo	30	12 1	10-13	3 0
Memphis	30	6 9	16	1 11
Vicksburg	30	6 1	16	3 0
New Orleans*	18-19	14 0	25-29	15 8
CUMBERLAND.				
Nashville	26-27	19 9	7-9	1 4
OHIO.				
Pittsburgh	25	9 0	5-8	0 3
Cincinnati	30	14 10	12-16	2 11
Louisville	30	7 6	3	2 3

* Below high water mark. † Below bench mark.

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rometer read 28.20—the lowest reading ever taken at this station; at Dubuque, 29.07—the lowest record of the station; at Milwaukee, 28.84 inches.

The following readings were made at Milwaukee during the rise and progress of this storm:

Date.	Hour.	Barometer.	Thermometer.	Humidity.	Wind.	Velocity.	Weather.
November 22	10 a. m	29.551	40	94	S. E.	8	Threatening.
	11 a. m	29.528	40	100	S. E.	8	Light rain.
	12 m	29.501	41	100	S. E.	12	Light rain.
	1 p. m	29.478	41	100	S. E.	12	Light rain.
	2 p. m	29.426	42	100	S. E.	16	Light rain.
	3 p. m	29.402	42	100	S. E.	16	Light rain.
	4 p. m	29.360	42	100	S. E.	16	Light rain.
	5 p. m	29.319	42	100	S. E.	18	Light rain.
	6 p. m	29.260	42	100	S. E.	16	Heavy rain.
	7 p. m	29.212	42	100	S. E.	17	Heavy rain.
	8 p. m	29.165	42	100	S. E.	22	Heavy rain.
	9 p. m	29.118	42	100	S. E.	20	Heavy rain.
	10 p. m	29.042	42	100	S. E.	24	Heavy rain.
	11 p. m	28.960	42	100	S. E.	20	Heavy rain.
November 23	12 m	28.913	42	100	S. E.	8	Heavy rain.
	1 a. m	28.841	42	100	S. E.	16	Heavy rain.
	7 a. m	29.102	35	100	W. N. W.	28	Light snow.
	8 a. m	29.143	34	100	W. N. W.	32	Light snow.
	9 a. m	29.174	32	89	W. N. W.	36	Light snow.
	10 a. m	29.262	30	89	W. N. W.	40	Light snow.
	11 a. m	29.338	28	88	W. N. W.	46	Light snow.
	12 m	29.381	28	84	W. N. W.	42	Cloudy.
	1 p. m	29.420	27	84	W. N. W.	40	Clearing.
	2 p. m	29.452	26	86	W. N. W.	36	Fair.

The electrical phenomena of this storm were very extensive and intense, although the cold season had so far advanced. The most terrific lightning and thunder were observed at Baltimore, (during the furious winds there which destroyed about $60,000 worth of property,) in Alabama, Georgia, Tennessee, Connecticut, Massachusetts, West Virginia, New York, and along the Atlantic sea-coast.

Thus, while heavy snow was falling on the northern edges of this immense cyclone, its southern quadrants were illuminated by brilliant lightning.

The effects of the storm were felt in powerful winds as far south as Cape Hatteras, where the storm-wind blew fifty-two miles an hour. The lakes were lashed into high and dangerous seas, and the cyclonic indraught exerted its force to the Northwest and far Southwest as well as over all the interior districts.

No. IX was mostly felt on the lakes, having apparently begun on the 26th in Dakota, and thence followed a course almost due east. Though by no means so severe as its memorable predecessor, it was attended with dangerous and disastrous winds on the lakes.

No. X was peculiarly a southern storm-center, approaching Texas from the valley of the Rio Grande on the 27th of November, and moving eastward to Mississippi, whence, on the 28th, it selected a nearly direct northeast path along the Appalachain chain to New Brunswick, which it reached on the 29th without unusual progressive velocity.

(3.) *Areas of high barometer.*—These areas were far more definite than those of October. Only six, however, were of note.

No. I appears November 1, in the Gulf States, where it slowly progresses eastwardly to the Carolina coast, where, by accretions of pressure from the Northwest, it apparently moved in an unusual (northeast) direction from the 2d to the 4th.

No. II began to enter the country from the Northwest on the 10th, moving very slowly, its pressure accumulating rapidly in the Northwest, whence it decended with low temperatures over the eastern part of the United States in an east-southeast direction. It reached the New England and Middle Atlantic coast on the night of the 14th, with pressure as high as 30.65 inches. It gradually worked its way down the Atlantic coast. It was speedily followed by

No. III, which overtook and re-inforced it before its final departure off the Atlantic coast.

No. IV. Another very high baric area from the Northwest entered the country on the 16th, and rapidly developed in the Northwest, till, on the morning of the 18th, the pressure had risen in Dakota to 31.00 inches—an almost unprecedented height. This pressure subsided as rapidly as it had formed, and, before it could cross the Mississippi River, it had lost its phenomenal features, sinking into comparative insignificance.

No. V also arose in the Northwest on the 27th and had a well-marked barometric character, moving southwardly without any peculiar consequences.

No. VI. The last notable area pursued the usual track from northwest to southeast, having barometer-readings in the Northwest as high as 30.60 inches.

ATMOSPHERIC TEMPERATURE.

This element is represented on map No. II, and needs no comment, except that November was abnormally warm in nearly all sections of the country. Some of the extreme ranges of temperature were, *e. g.*, at Breckenridge, Minn., from 61° to —18°; at Chicago, 72° to 0°; Davenport, 71° to 0°; Duluth, 65° to —12°; Saint Paul, 72° to —8°. (See table, map No. II.) The greatest daily range at Key West was 13°.

PRECIPITATION.

Map No. III graphically shows the month's rainfall and melted snow. The table in the left-hand corner exhibits the numerical deficiencies and excess.

RELATIVE HUMIDITY.

The relative humidity for the month averages as follows in the various districts: New England, .69; Middle Atlantic States, .67; South Atlantic States, .70; Gulf coast, .74; interior of Gulf States, Lower Mississippi and Ohio Valleys, .65; Missouri Valley, .61; Lake region, .69; and Minnesota, .77.

PREVAILING WINDS.

As will be seen from map No. II, the predominant winds were northwest and north, except west of the Lower Mississippi Valley, where they were southeast. Some of the maximum movements of wind for the month were as follows: At Alpena, seven thousand four hundred and fifty-three miles; Buffalo, eight thousand one hundred and thirty-six miles; Cheyenne, nine thousand two hundred and fifteen miles; Cleveland, eight thousand seven hundred and eighty-eight miles; Erie, ten thousand seven hundred and twenty miles; Indianola, nine thousand and ninety-seven miles; Sandy Hook, eleven thousand and fifty-eight miles. Some of the minimum movements were: At Augusta, two thousand nine hundred and nineteen miles; Lynchburg, two thousand two hundred and twenty-six miles; Baltimore, three thousand and fifteen miles.

NAVIGATION.

The river-stages are shown by the tabular statement on map No. III. The heavy rains which occurred from the 22d to the 24th, raised the Ohio and its tributaries from Pittsburgh to Cairo, and also raised the Cumberland and Tennessee, which subsequently affected the Mississippi.

TEMPERATURE OF WATER.

The temperature of water, from observations taken at the bottom, are exhibited in the table on map No. II.

ATMOSPHERIC ELECTRICITY.

(1.) *Thunder and lightning.*—There is a marked falling off in this element since October, although it was abundant during the great storm, No. VIII. (See p. 4.) Lightning and thunder occurred at Duluth on the 7th; at Fort Gibson, Ind. T., on the 6th; at Nashville on the 10th.

(2.) Scarcely any brilliant *auroral* displays were reported for November, which is in very marked contrast with the October record. One brilliant aurora was seen at Trenton, N. J., 27th.

OPTICAL PHENOMENA.

This element of the November meteorology is of special interest, especially if studied in connection with the great cyclone of the 21st to 23d.

(1.) *Solar halos* were reported at Cornish, Me., on the 1st and 8th; at West Charlotte, Vt., on the 3d; at Florida, Mass., on the 5th; at Toledo on the 15th and 19th; Plattsburg Barracks and Troy, N. Y., on the 16th; Troy on the 19th; at Havana, Ill., on the 10th, 13th and 18th; at Carthagena, Ohio, on the 14th and 30th; at Cresco, Iowa, on the 20th and 24th; at Atlanta and Gainesville, Ga., Hennepin, Ill., Rocky Run and Utica, Wis., and Dunbarton, N. H., on the 24th; and at Savannah on the 22d.

(2.) *Lunar halos* were observed at Afton and Mount Vernon, Iowa, on the 15th; at Wilsonville, Ala., Cornish and Standish, Me., North Adams, Mass., Wilmington, N. C., Falsington, Pa., West Charlotte, Vt., on the 16th; at Havana, Ill., Cresco, Iowa, Rocky Run and Utica, Wis., on the 18th; at West Point, Brook Haven and New York City, N. Y., Southington, Conn., Andover and Fall River, Mass., Atco and Freehold, N. J., Falsington, Ephrata, Williamsport, Reading, and Tioga, Pa., on the 19th; at Havana, Ill., Afton, Iowa, Freehold, N. J., and New York City on the 20th; at Atlanta, Ga., Hennepin and Havana, Ill., Standish, Me., Litchfordville and Hudson, Mich., Trenton, N. J., Wilmington, N. C., Carthagena and Mount Auburn, Ohio, on the 21st; at Dunbarton, N. H., and Lunenburg, Vt., on the 22d; at Auburn, N. H., on the 23d; at Litchfordville, Mich., on the 24th; at Gardiner, Me., and Woodstock, Vt., on the 27th; and again at Woodstock, Vt., on the 28th and 30th.

At Long Branch a *lunar halo* was visible from the 19th till 2 a. m. on the 20th; one was seen at Santa Fé on the 17th; at Erie, Penn., on the 27th; at Breckenridge, Minn., on the 24th; at Augusta, Ga., on the 24th; at Eastport, Me., on the 21st, one of great

diameter; one at Knoxville on the 24th, with a lunar cross; on the 21st one of exceeding brilliance at Lexington, Ky.; a large *halo* at Milwaukee, on the 20th; at Morgantown, W. Va., on the 16th, 19th, and 21st, (with a radius of 22°); at Rochester, on the 27th; at New York and New Haven on the 19th; and a *lunar corona* at Fort Gibson, Indian Ter., on the 22d.

The lunar halos, both on account of their number and intensity, are of special interest in connection with the cyclone of the 21st to 23d.

CAUTIONARY SIGNALS.

During the month of November there were displayed at the United States ports, maritime and inland, seventy-five storm-warnings, and, at Canadian ports, forty-two. The resulting weather shows that, of the seventy-five warnings displayed at United States ports, sixty were fully justified, and three were partly justified. This gives (as the percentage of perfect justification) *eighty per cent.* Most of these warning-signals were of great value to shipping, as shown by the journals and public press. A Milwaukee paper, speaking of the small number of disasters from the great gale of the 23d, says: "This is undoubtedly due to the cautionary signal which kept vessels in port." The signal was hoisted here nine hours before the storm began, and not a single vessel left port during the display, and several owners and captains afterwards stated that their cargoes and vessels were saved by obedience to the signal. The insurance companies refused to take risks on any vessel disobeying the signal. All along the lakes, the benefit of the warnings was largely and most favorably commented upon.

MISCELLANEOUS PHENOMENA.

(1.) *Forest fires, &c.*—There were not many forest or prairie fires, but the extensive conflagrations of October, owing to the lateness of the season and the arrival of the fall rains, were mostly extinguished early in November. About the 6th of the month, a few fires, in the Piedmont region of Virginia, were put out by rain. Fires were burning in the woods near Urbana, Ohio, on the 3d, and much smoke overspread Charleston, S. C., on the 2d, 3d, and 4th. Prairie fires were reported from Cave Spring, Missouri, on the 10th and 11th. Large prairie fires to the east of North Platte, Nebraska, were observed on the 1st of November. No other noteworthy conflagrations were registered.

(2.) *Migration of birds.*—On the 8th, at Memphis, birds were observed going southward; and on the 9th, wild geese and blackbirds. At Fort Randall, Dakota, wild geese were seen going south on the 9th; so, also, at Fort Madison, Iowa, on the 26th; on the 23d, 24th, and 25th they were seen going north and northwest; at Gardiner, Maine, going south on the 17th; at Warrensburg, Missouri, on the 8th, geese, ducks, and cranes were observed going south; at Plattsmouth, on the 4th, geese going south; at Centre Cookville, N. H., going south on the 14th, and Auburn, N. H., on the 23d; at New Germantown, N. J., going south on the 1st; geese going south at Carthagena, Ohio, on the 12th, 13th, and 14th.

(3.) *Meteors* were recorded at Vevay, Ind., on the 11th and 12th; at Afton, Iowa, on the 6th; at Woodstock, Md., (bright meteors,) on the 29th; at Somerset, Mass., on the 12th; at Fall River, Mass., on the 2d and 12th; at Freehold, N. J., on the 16th; at New York City, on the 14th; at Troy, N. Y., on the 11th and 14th; at North Volney, N. Y., on the 1st and 9th; at Mount Pleasant, N. C., brilliant meteors on the 11th; at Woodstock, Vt., on the 11th and 30th; near Lewisville, Va., on the 15th.

(4.) *First frosts, snows, &c.*—The first frost formed at Savannah, Galveston, and Shreveport, Texas, on 1st November; at Wilmington, N. C., on the 2d; at Norfolk, Fayette, Miss., on the 1st; at Montgomery, heavy frost on the 2d; at Augusta, Ga., on the 2d; and at Mobile, Ala., on the 1st, 2d, and 3d; at Lake City, Fla., on the 2d. The first snows fell at Memphis and Fort Gibson, Indian Ter., on the 28th; Nashville, on the 24th and 28th; West Point, N. Y., on the 20th; Humboldt, Tenn., on the 28th; Southington, Conn., on the 15th: Blandville, Ky., on the 24th; Hudson, Mich., on the 19th; and Shelburne, N. H., on the 21st. Ice formed at Nashville on the 26th. The first cold snap of the winter at St. Paul, Minn., occurred on the 17th. Ice formed at Cincinnati on the 21st.

(5.) *Close of navigation.*—On the 18th, Lake Superior was frozen over between Duluth and Superior, and the steam ferry-boat cut down and sunk in shoal water on Minnesota Point. The river froze at La Crosse, Wis., and St. Paul, Minn., on the 29th; at Omaha, on the 25th; at Yankton, on the 26th, and at Fort Sully, on the 18th. Navigation closed at Dubuque, Iowa, on the 21st, and at Keokuk was seriously impeded on the 30th.

During November, the utility of the signal-service temperature-predictions has been largely recognized by the pork-packing business in the West in deciding upon the weather favorable or unfavorable for slaughtering.

Published by order of the Secretary of War.

ALBERT J. MYER,
Brig. Gen. (Bvt. Assgd.) Chief Signal Officer, U. S. A.

MONTHLY WEATHER REPORT, DECEMBER, 1874.

INTRODUCTION.

The meteorological data collected in this Office during the month of December has been carefully examined, and a general summary of the several elements is given in the accompanying charts and tables. The stations of observation are so distributed as to give the meteorological condition of that portion of North America lying between the twenty-fifth and fiftieth degrees of latitude, and extending from the Atlantic to the Pacific. The following are the sources from which reports have been received: Canadian meteorological service, 12. United States Army surgeons, 36. United States naval hospitals, 2. United States Army Signal Service, 87. Regular volunteer observers, 264.

In addition to the above, marine reports have been received, which have proved of special value in the study of storms which have passed to the eastward off the Atlantic coast beyond the regions of permanent stations. By means of these reports the most severe storm of the month—that occurring on the 19th and 20th—is traced to the fifty-fifth meridian west of Greenwich, fifteen hundred miles east of the middle Atlantic coast. The increasing severity of this storm, and the desire to trace it through its entire course, led to a telegram being sent from this Office to the Director of the Meteorological Office, London, on the 23d instant, to the effect that the storm had left our coast on the fortieth parallel of latitude, moving to the eastward. A detailed description of this storm will be found in the text.

The most noticeable features of the weather of December are:

First. The mean temperature, which has been above the mean of previous years, and differs but slightly from that of 1873.

Second. A deficiency in precipitation in all the districts east of the Mississippi River and in the Northwest.

Third. An excessive precipitation in the southwest.

Fourth. The unusual low temperature and excessive precipitation in New Mexico.

BAROMETRIC PRESSURE.

A comparison of the mean isobarometric lines on chart No. II, with those of the preceding month, will show that the area of mean high barometer has increased both in extent and intensity. This area now extends over the southern portion of the United States, extending from the Lower Mississippi Valley eastward over the Atlantic, with its center near the coast. The area of low barometer continues central north of the Lake region, and a second depression has developed rapidly in the North Atlantic, immediately east of New Brunswick. Compared with December, 1873, there is no marked variation, both months showing an excess of pressure over the mean in the districts south of the Lakes. The pressure has increased rapidly on the Pacific coast, and its general distribution is directly opposite to that of the preceding month, and to the present distribution of pressure on the Atlantic coast.

In the following references to longitude, that of Washington is used in determining the location of storm-tracks, and that of Greenwich, in fixing the location of vessels furnishing marine observations.

Areas of low barometer.—The progressive movement of each of the barometric depressions marked on the tri-daily weather maps during the month, is shown on chart No. I, from which it will be seen that the region of greatest storm-frequency extends from the Upper Mississippi Valley eastward to the Atlantic coast, including the territory lying between the forty-fifth and fiftieth degrees of latitude. Although these depressions have occurred more frequently in the northern portion of the country, the most severe storms of the month are traced to the lower latitudes. Those marked as Nos. II and VIII, developing south of the thirtieth parallel, were probably tropical storms, which, in their progressive movement, had passed beyond the most westerly point of their curvilinear course near the northern limit of the torrid zone, and were on their return track when first observed.

An examination of the meteorological records of this Office for this and previous years, indicates that the most severe storms which occur within the United States in December, originate south of the mean track of areas of low barometer, and that the severity of these storms depends largely upon the latitude of their origin, and upon the magnitude of the angle which the general direction of the course makes with the parallels of latitude. As in December of 1873, twelve barometric depressions have been traced upon the chart, and a detailed description of each is given below in the order of occurrence.

No. I. First observed in latitude 45° north, longitude 27° west; last observed in latitude 51° north, longitude 10° east; time of transit, forty hours; mean velocity per hour, thirty-one miles. Twenty-four hours previous to the cyclonic movement of the winds produced by this depression, the barometer was decidedly above the mean

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No. I.

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No. II.

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 DECEMBER, 1874.

AVERAGE MEAN TEMPERATURES FOR DECEMBER.

DISTRICTS	Average for December. For many years.	Average for December. For 1874.	Comparison of December, 1874, with the average for many years.
	°	°	
St. Lawrence valley	18.2	13.2	5°.0 below.
New England	28.4	29.4	1° above.
Middle Atlantic States	35.7	38.8	3°.1 above.
South Atlantic States	49.3	52.4	3°.1 above.
Gulf States	52.4	55.2	3°.8 above.
Lower Lake region	28	29	1° above.
Upper Lake region	21.8	24.8	3° above.
Ohio valley and Ten	35.6	39.5	3°.9 above.
Upper Mississippi val	24.2	28.3	4°.1 above.
Lower Missouri val	25.2	30.4	5°.2 above.
Minnesota	11	14.3	3°.3 above.
Pacific Coast	46.5	48.4	1°.9 above

TEMPERATURES OF WATER FOR DECEMBER.

STATIONS.	Temperatures at bottom. Maximum.	Temperatures at bottom. Minimum.	Average depth of water. Feet.
	°	°	
Alpena	33°	—	11
Augusta	53	46	3
Cairo	45	37	28
Charleston	68	51	40
Chicago	33	28	10
Cleveland	38	31	14
Duluth	34	29	15
Eastport	44	36	20
Indianola	67	52	9
Jacksonville	64	59	11
Keokuk	36	33	4
Knoxville	44	39	20
Leavenworth	37	32	4
Louisville	43	38	7
Milwaukee	38	252	20
Mobile	61	51	14
Montgomery	59	47	7
Nashville	50	41	30
New London	46	39	12
Norfolk	47	41	24
Pittsburgh	38	32	35
Portland, Maine	41	33	26
Savannah	55	48	10
Shreveport	61	45	18
Toledo	38		10
Wilmington	54	45	34
Woods Holl	46		8

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A.M. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

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AVERAGE RAIN-FALL FOR DECEMBER.

DISTRICTS.	Mean for many years.	Average For 1874.	December, 1874, compared with the mean for many years.
	Inches.	Inches.	
St. Lawrence Valley	3.25	1.95	Large deficiency.
New England	3.05	2.15	Deficiency.
Middle Atlantic States	3.30	3.33	Normal.
South Atlantic States	3.45	2.75	Small deficiency.
Eastern Gulf States	3.30	3.00	Small deficiency
Western Gulf States	4.25	6.25	Large excess.
Lower Lake region	2.85	1.00	Large deficiency.
Upper Lake region	1.95	0.95	Large deficiency.
Ohio Valley and Tennessee,	3.95	3.25	Small deficiency.
Upper Mississippi Valley.	1.95	0.85	Large deficiency.
Lower Missouri Valley	1.15	0.96	Small deficiency.
Minnesota	0.88	0.85	Normal.
Pacific Coast	4.75	—	—

HEIGHTS OF RIVERS ABOVE LOW WATER MARK.

STATIONS.	HIGHEST.			LOWEST.		
	Date. Dec.	Height.		Date. Dec.	Height.	
		ft.	in.		ft.	in.
RED RIVER.						
Shreveport	31	12	4	1	7	8
MISSOURI.						
Fort Sully	—	—	—	—	—	—
Yankton	—	—	—	—	—	—
Omaha	—	—	—	—	—	—
Leavenworth	13	0	10†	24	3	3†
MISSISSIPPI.						
St. Paul	—	—	—	—	—	—
La Crosse	—	—	—	—	—	—
Dubuque	26-27	6	7	3	2	5
Davenport	18	3	3	3	0	7
Keokuk	1	3	2	31	1	4
St. Louis	1	7	8	31	3	4
Cairo	31	16	11	17-22	6	10
Memphis	31	9	11	21-24	4	11
Vicksburg	19	11	3	1	6	6
New Orleans*	19	13	6	1 and 24	15	5
CUMBERLAND.						
Nashville	31	21	11	19	3	10
OHIO.						
Pittsburgh	30	20	0	13	4	7
Cincinnati	31	25	1	19	9	5
Louisville	31	9	10	20	5	10

* Below high water mark. † Below bench mark.

in eastern and southern portions of the United States, and below the mean in the upper Mississippi and Missouri valleys. At 11 p. m. of the 1st instant, the center was near the western boundary of Dakota, from which point it advanced over the northern portion of the United States into Canada, producing brisk and high winds in the Lake region, which veered gradually from the east to the south and west, with increasing force. The area of rain, which includes only those stations south of the storm-center, extended from Lake Superior to Tennessee, and thence eastward to the Atlantic.

No. II. First observed in latitude 30° north, longitude 28° west; last observed in latitude 44° north, longitude 17° east; time of transit, sixty-four hours; mean velocity per hour, twenty-eight miles. This depression moved from Western Texas to the Lower Mississippi Valley during the 5th, accompanied by very heavy rain in the southwest. Until the morning of the 6th its course was approximately east, and its velocity per hour twenty-four miles. Its course changed from east to northeast, near the mouth of the Mississippi River, passing over the Gulf and South Atlantic States, off the middle Atlantic coast, with increasing velocity and rapidly falling barometer. Marine reports show heavy gales south of Cape Hatteras on the 5th, in latitude 37° north, longitude 73° west. This storm was followed on the 6th by a decided fall in the temperature, and a rapid rise in the barometer, accompanied by a "norther" on the coast of Texas.

No. III. First observed in latitude 51° north, longitude 15°; last observed in latitude 44°, longitude 17° east; time of transit, fifty-six hours; mean velocity per hour, twenty-four miles. This depression appeared immediately after the development of storm No. II, and both depressions moved toward the Atlantic coast on converging lines, which apparently united near the fortieth parallel on the afternoon of the 7th, after which there appears to have been but a single depression, which moved to the northeastward. The area of precipitation from the two preceding storms includes the entire country east of the Mississippi River. Southerly gales, reported from latitude 37°, longitude 73° west from Greenwich, would indicate that this depression passed off the immediate coast as a separate and severe storm.

No. IV. First observed in latitude 45°, longitude 28° west; last observed in latitude 49°, longitude 18° east; time of transit, sixty-four hours; mean velocity per hour, twenty-six miles. This depression moved to the Atlantic coast between the parallels of forty-five and fifty, moving to the northeast until it arrived near Lake Superior, and afterwards following the general course of the Great Lakes and the Saint Lawrence Valley. Light rain preceded, and snow followed this depression in the regions north and northeast of the Ohio valley, and the temperature fell below freezing at stations as far south as the thirty-fifth degree of latitude. The winds veered to the south and west, increasing to gales at a portion of the Lake stations.

No. V. First observed in latitude 50°, longitude 19° west; last observed in latitude 51°, longitude 10° east; time of transit, thirty-two hours; mean velocity per hour, twenty-three miles. This depression approached the Upper Lake region from British America, and was at no time wholly within the limits of the stations of observation. It produced no disturbance south of the Lake region, and its course seems to have changed abruptly from southeast to northeast at a point immediately north of Lake Huron. High winds occurred on the northern shores of Lakes Erie and Huron when the center of this depression had arrived at its most southerly point.

No. VI. First observed in latitude 44°, longitude 25° west; last observed in latitude 46°, longitude 15° east; time of transit, fifty-six hours; mean velocity per hour, twenty-six miles. This depression moved rapidly to the Mississippi Valley, and its center was a well-defined depression in Northern Illinois, on the morning of the 13th; from which point the course of progression was north of east, passing over the Lower Lakes and off the New England coast. After passing to the east of the Mississippi Valley, the central area appeared in the form of an elongated ellipse, with the major axis parallel to the equator. This form was continuous while it remained visible, the central figure growing larger and the depression diminishing as the storm moved to the eastward with increasing velocity. The storm became more severe as it approached the coast, and was accompanied by snow, sleet, and rain, in a greater portion of the country. High northerly winds prevailed in the Lake region, and several wrecks occurred on the Atlantic coast north of Cape Hatteras. An area of decidedly high barometer, accompanied by very cold and clear weather, followed immediately in rear of this storm from the northwest.

No. VII. First observed in latitude 46°, longitude 22° 30′ west; last observed in latitude 47°, longitude 18° east; time of transit, sixty-four hours; mean velocity, twenty-four miles per hour. Previous to the formation of this depression in the northwest, the barometer continued below the mean in this region and the adjoining districts. This depression moved to the eastward over the Lake region and the Saint Lawrence Valley, producing no unusual disturbance within the United States. It increased in severity after passing to the northeastward, and marine disasters are reported to have occurred in the Gulf of Saint Lawrence. When the center was near Sydney, the barometer at that station indicated 29.07 inches.

No. VIII. First observed in latitude 25°, longitude 18° west; last observed in latitude

38°, *longitude* 11° *east; time of transit*, sixty-four hours; mean velocity, twenty-five miles per hour. The north and east winds which prevailed on the Gulf coast during the afternoon of the 18th were *the first indication* of the approach of this depression from the south. The succeeding reports showed that northerly and easterly gales prevailed near the Texas coast, and on *the morning of the 19th* it was a well-defined tropical storm, central in the Lower Mississippi Nalley. As in most storms which originate in the lower latitudes, the progressive movement of the center was retarded or nearly uniform, until it had taken the northeasterly course, when the progressive velocity increased with each tri-daily report. This was decidedly the most severe storm of the *month*, and the region of dangerous winds extended from Lake Michigan to the Gulf and South Atlantic coast. The changes in temperature were marked and sudden on the *opposite sides of this depression*, which passed over the Atlantic coast south of the Middle States, producing northeast and northwest gales in the northeastern portion of the United States, and *southerly gales south of Cape Hatteras*. During its entire course, this depression was accompanied by heavy precipitation, rain, sleet, and snow falling at the stations north of the thirty-fifth *parallel*. *The following* reports from marine records will serve to determine the general direction and extent of this storm after it had passed beyond the stations above mentioned:

On *December* 20, latitude 37° 30′, longitude 74° 30′ west, revolving hurricane northeast veering to northwest.

On December 21, *latitude* 35° 20′, *longitude* 71° 30′ west, severe gales from south veering to north, terrific force from west-northwest; (23d, 3.30 a. m., furious gusts, barometer 29.42, temperature 72°.)

On December 20, latitude 32° 30′, longitude 74° 10′ west, a violent gale from northeast.

On December 26, latitude 41° 51′, longitude 63° 5′ west, schooner Maria seen with loss of deck-load and leaking.

On *December* 20 *and* 21, latitude 35° 29′, longitude 74° 40′ west, heavy southeast gale veering to northwest.

On *December* 20, *latitude* 35° 41′, *longitude* 74° west, severe gale from all points, twelve hours.

Vessel from Wilmington, N. C., *to Liverpool, arrived December* 26, had bulwarks stove and cabin damaged.

On December 24, latitude 40°, longitude 67° 30′ west, northwest gale with tremendous sea, twenty-four hours.

On December 25, latitude 45° 07′, longitude 53° 49′ west, west-southwest heavy gales.

No. IX. First observed latitude 47°, longitude 27° 30′ west; last observed latitude 48°, *longitude* 6° west; *time of transit, forty hours*; mean velocity per hour, eighteen and three-quarter miles. This depression appeared in the extreme northwest before the preceding storm had passed beyond *the East Atlantic coast*. An examination of the weather-maps shows that, for several days previous to the appearance of this depression, the barometer was decidedly high on the Pacific coast, and *furnishes* no trace of this depression west of the Rocky Mountains. It was irregular in form, and produced no marked disturbance within the limits of the United States, although the area of *precipitation extended* southward to the Ohio Valley.

No. X. First observed latitude 49°, longitude 25° west; last observed latitude 47° 30′, longitude 17° east; *time of transit, fifty-six hours*; *mean* velocity, twenty-six miles per hour. This appears to have been a secondary depression following immediately in the rear of the preceding, and *becoming defined as a storm-center on the afternoon* of the 22d in Manitoba, after which it developed into a storm which extended from the Mississippi Valley eastward to the Atlantic coast, producing *high winds in the Lake region*, and finally passing to the southeastward over the Middle and New England States to the Atlantic, where it curved again to the northeastward.

No. XI. First observed latitude 45°, longitude 22° west; last observed latitude 47°, longitude 2° west; time of transit, forty hours; mean velocity, twenty miles per hour. *Although the center of this depression could not be located* before the midnight report of the 24th, there were indications that it passed from the Pacific coast north of *Oregon*, crossing the Rocky Mountains near *Virginia City*. *It was but a slight* depression, and produced no marked disturbance.

No. XII. First observed latitude 45°, longitude 12° west; *last observed* latitude 50°, *longitude* 15° east; time of transit, thirty-two hours; mean velocity per hour, thirty miles. The stations in the Mississippi Valley, and those in the Territories east of the *Rocky Mountains*, indicated an extensive barometric depression, without a cyclonic movement of the winds, on the morning of the 27th. At the afternoon report, an extensive trough *of low barometer extended from Lake Superior* southwestward to Texas. The low barometric readings reported from Santa Fé, and the direction of winds at neighboring stations, taken in connection *with reports from San Diego*, would indicate that this storm passed from the regions of these stations.

Areas of high barometer.—The progressive movements of these areas have been traced

in a manner similar to that followed in tracing the tracts of the centers of low barometer. These tracts are given on chart No. II in red, from which it will be seen that the mean direction of these areas is from the northwest toward the South Atlantic coast. They have uniformly been accompanied by low temperature, and in the latter portion of the month by decidedly cold weather. The occurrence of increased barometric pressure in the northwest was followed by a "norther" on the coast of Texas, or in the southwest, on the 6th, 14th, 17th, 20th, 24th, 29th, and 31st, and in some instances warnings of the approach of these storms appeared in the daily weather-reports from this Office. The most interesting are those which immediately preceded and followed the storm of the 13th and 14th, each originating in the northwest beyond the limits of our stations, and extending over the entire country east of the Rocky Mountains, before disappearing off the South Atlantic coast.

No. VIII passed directly to the southward west of the Mississippi River, and thence to the eastward, following immediately in the rear of storm No. VIII. This deflection from the usual course, when considered in connection with the tropical storm which preceded it, is suggestive and interesting.

No. XII was decidedly the most extensive of the month, and was attended by a continuous flow of cold northerly winds toward the Gulf, producing a rapid change of temperature in all the districts, and continuous rains in the Southern States during the latter portion of the month.

ATMOSPHERIC TEMPERATURE.

The mean temperature of the month is shown by the isothermal lines on Chart No. II It differs but slightly from that of December, 1873, and has been from one to five degrees above the mean of the month, in the districts of the United States east of the Territories. The low temperature in the Saint Lawrence Valley is probably due to the relative distribution of atmospheric pressure, as the area of low barometer, which developed rapidly in the North Atlantic during the month, produced north and west currents, passing over this region from higher latitudes around the west side of this depression. Reports from New Mexico show that the temperature has been lower than for many years, and that this extreme cold has been accompanied by heavy snows in the valley of the Rio Grande as far south as the northern boundary of Mexico.

PRECIPITATION.

The distribution of rain and melted snow is shown by the isohyetal lines on chart No III, and the amount of precipitation during the month in the several districts, as compared with the mean deduced from several years, is given in the table. It will be seen that there has been a deficiency in precipitation in nearly all the districts east of the Mississippi River and in the Northwest, and a large excess in the Southwest. There has been an excess of cloudiness in the regions north of the Eastern Gulf States, and the number of days on which rain or snow has fallen is unusually large in comparison with the amount of precipitation.

WINDS.

The mean direction of the winds at the several stations of the signal-service is shown on chart No. II. The total atmospheric movement for the month, independent of direction, has been as follows, at the stations named below:

	Miles.		Miles.
Boston	6,393	Albany	7,618
Baltimore	4,657	New York	7,090
Buffalo	8,670	Pittsburgh	4,986
Cleveland	8,032	Detroit	6,282
Cincinnati	5,187	Chicago	7,341
Saint Louis	7,107	Memphis	3,500
New Orleans	5,506	Charleston	5,15

Among the maximum total movements the following are noted:

	Miles.		Miles.
Erie	12,260	Sandy Hook	11,993
Cape Hatteras	9,323	Grand Haven	9,280

The winds have been light at the following stations: Augusta, Ga., total movement, 2,494 miles; Lynchburg, 2,809 miles; Nashville, 3,406 miles.

A velocity of one hundred miles per hour occurred at Mount Washington on the 12th.

CAUTIONARY SIGNALS AND VERIFICATION OF PREDICTIONS.

During the month ninety-eight cautionary signals were displayed at the stations in the United States, and thirty-six storm-warnings were sent to the Canadian stations. Eighty-eight and seven-tenths per cent. of those ordered for the stations of the signal-

service were justified by the occurrence of dangerous winds within one hundred miles of the signal. The signals at Wilmington and New London were of special value, as they prevented vessels from going to sea immediately preceding the storm of the 20th.

Probabilities.—A critical comparison between the predictions published in the tri-daily probabilities and the subsequent weather reports, shows that on the average, during the month, 94.4 per cent. of the predictions have been well verified.

NAVIGATION.

The condition of the rivers during the month is given in the table on map No. III. from which it will be seen that the Red River rose slowly but steadily at Shreveport, during the greater portion of the month, and recent reports from points above Shreveport show a sufficient depth of water for navigation. The Missouri River was closed throughout the month at Fort Sully and Yankton, and after the 9th at Omaha. The heavy rains which attended the storm No. VIII in the Tennessee, Ohio and Cumberland Valleys caused a considerable rise in these rivers, beginning on the 20th. These freshets had partly subsided before they were reinforced by the still greater rise of the 28th and 29th. No important change occurred in the Mississippi River until the 23d, when the freshets from the Ohio and the Cumberland caused a rise of 10 feet at Cairo, the freshet-wave reaching Memphis on the 25th, and Vicksburg on the 29th. At Saint Paul and La Crosse the river remained closed during the entire month.

Navigation closed at a greater portion of the Lake ports between the 1st and the 10th of the month. The Erie Canal was closed on the 5th.

TEMPERATURE OF WATER.

The table on map No. II gives the maximum and minimum temperature of water at many of the signal stations on the lakes, rivers, Gulf and South Atlantic coasts. The range of water-temperature in the rivers and lakes located in the central and northern sections of the country is small, as the temperature of water was, comparatively, near the freezing-point at the beginning of the month. In the southern rivers, and on the Atlantic and Gulf coasts, the range has been larger, and a comparison of the mean temperature of water with the mean atmospheric temperature shows that the temperatures of the air and water have differed but little, the air being slightly cooler. The only instance where the water has been colder than the air is at Saint Louis, where the winds have been southerly during the greater portion of the month. In the lakes and on the coast of New England the mean temperature of the air has been much lower than that of the water, the greatest observed difference being 17° at Eastport, 10° at Portland, 9° at New London, 14° at Duluth, and 11° at Marquette.

ATMOSPHERIC ELECTRICITY.

Thunder and lightning.—The thunder-storms which have occurred during the month in the southern portion of the country were uniformly in the vicinity of areas of barometric depression. Those accompanied by the most vivid displays of lightning were as follows: At Montgomery, zig-zag lightning on the 3d; at Indianola and Fort Gibson on the 4th; at Charleston on the 7th; at Galveston on the 17th, 19th, and 25th; at Cape Hatteras on the 20th; at Corsicana, Texas, on the 28th.

Auroras.—The auroral displays, although not noticeably brilliant, have occurred more frequently during this than during the preceding month. The following are cited as the most interesting: Those of the 1st, 3d, 6th, and 15th, at New London; 6th, 15th, and 21st, at Keokuk; 3d, 13th, 20th, and 21st, at Wood's Hole; 3d at Alpena, Escanaba and Cornish, Me., very brilliant; an auroral arch was visible at Auburn, N. H., and Woodstock, Vt., on the 21st.

OPTICAL PHENOMENA.

Solar halos.—The only days on which solar halos have not been reported at some one of the regular stations, during the month, are the 3d, 4th, 7th, 8th, 14th, 21st, 28th, and 29th. Those most extensively observed were reported on the 5th at New London, Alto Vista, Va., Andover, Mass., Standish, Me., Florida, Mass., Auburn, N. H., Contoocookville, N. H., Cornish, Me. On the 10th at Ephata, Penn., Standish, Me., and Cornish, Me. On the 15th at Point Pleasant, La., and Newburyport, Mass. On the 18th at Tioga, Pa., Point Pleasant, La., and Milton, Mass., (parhelia,) and Wilsonville, Ala. On the 19th at Jacksonville, Tenn., Afton, Iowa, and Hennepin, Iowa.

Lunar halos.—These have been unusually numerous during the latter portion of the month; those occurring on the 16th, 17th, 18th, 19th, 20th, 22d, and 23d, were extensively observed, and are of especial interest when considered in connection with the storm of the 19th and 20th.

Mirage.—Observed on Lake Superior, near Duluth, on the 15th.

MISCELLANEOUS PHENOMENA.

Meteors were observed on the 5th at Andover, Mass., and Afton, Iowa. On the 8th at Williamsport, Penn., Fall River, Mass., Woodstock, Vt., Corning, Mo., and Council Bluffs, Iowa. On the 12th at Milford, Del., Fort Madison, Iowa, Fort Wayne, Ind., (brilliant,) and Woodstock, Vt. December 2 at Shreveport, La., (brilliant, exploding with blue and yellow light.)

Fires.—Prairie-fires were reported to the west of and near to North Platte station on the 3d and 8th, burning towards the north. Forest-fires on the 12th, east of Shreveport.

Earthquakes.—Distinct shocks occurred at 10.15 P. M. on the 10th on Long Island, in Westchester and Rockland Counties, along the Palisades and Hudson River, N. Y., and in New Jersey. Also on the 12th, between 10 and 11 P. M. a slight shock of earthquake was felt at Garrison's, New York; also at Guadeloupe, W. I., at 11.50 A. M., on the 8th.

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MONTHLY WEATHER REVIEW, JANUARY, 1875.

INTRODUCTION.

In the preparation of this Review, besides the regular reports from the signal-service stations, United States Army, and Canadian stations, there have been examined monthly meteorological records from many volunter observers and post surgeons, the latter forwarded by the Surgeon-General United States Army, and other records, from which valuable data have been extracted. Chart No. I, showing the movement of areas of low and high barometers, and chart No. II, giving the isothermal and isobaric curves and prevailing direction of the wind for the month, have been prepared from the observations taken at the signal-service and Canadian stations alone, for the reason that the barometers and thermometers of the volunteer observers have not been compared with the signal-service standards, and their instrumental errors are not known.

The most noticeable features of the month are the tracing, approximately, of the paths of several storm-centers from the Pacific coast to the Atlantic coast; the deficiency in the mean temperature in all the districts east of the Rocky Mountains, compared with the average of many years, as well as that of January, 1874; the excess of barometric pressure over that for the same month, 1874, in all the sections, except on the South Atlantic and Gulf coast; the large excess of precipitation in the South Atlantic and East Gulf States and Tennessee above the average; decidedly lower water in the Ohio River and Mississippi from Cairo down, but considerably higher in the Cumberland, than during January, 1874.

BAROMETRIC PRESSURE.

An examination of chart No. II shows the pressure to have been above the average in all the districts, except on the Gulf and Atlantic coasts, which is explained by the number of areas of unusually high barometers which have extended south and eastward from the Northwest over the entire country east of the Rocky Mountains. For January, 1874, the highest barometric pressure (30.20) covers the South Atlantic and Gulf States, and the lowest Lake Huron. For the present month the highest (30.25) extends south and eastward from the Northwest over Kansas, Missouri, Illinois and the western portion of Kentucky and Tennessee; the lowest over Maine and the eastern British Provinces.

Areas of low barometer.—From chart No. I it will be seen that twelve have been traced; of these four have crossed the United States from the Pacific to the Atlantic. A number of minor depressions, producing rain or snow and fresh to brisk winds, have been noticed, but only such as became dangerous are represented on the chart. The storm-centers have, approximately, been located for each synchronous observation, (three times daily,) as heretofore, the figures above the curves showing the dates of the mouth. In many cases, during the movement of storm-centers over the northern sections of the country, it is observed that minor depressions are developed on the Atlantic coast, which often become dangerous as they pass to the northeastward. Another interesting feature, in the majority of cases, is the constant diminution of the pressure; that is, the barometric readings become less, and frequently greatly so, as the depression reaches the Eastern States. In detail the storms are as follows:

No. 1 appeared from Manitoba as an elongated, diminished pressure. It passed from thence southeastward over the Lake region, and gradually developed into a severe snow-storm the night of the 1st and 2d. Westerly gales extended on the 2d from the Upper Lakes to the Lower Lakes, Middle States and New England, and high easterly

winds prevailed for a short time on the New England coast, during the passage of the depression from the Lower Lakes eastward over New England to Nova Scotia and New Brunswick. On the morning of the 3d, the barometer at Sydney, Cape Breton, read 28.89 inches. A minor disturbance existed on the Gulf coast at the same time, producing high northerly winds on the Texas coast. Rainy weather accompanied these two in the Southern States, and snow north and northeast of the latter. High barometer No. I followed them.

No. II was first felt in the Gulf and South Atlantic States on the 6th, by the rainy weather and northeasterly winds which preceded it. Thunder-storms prevailed at Savannah and Augusta, Ga. It was not until the 7th that its movement could be definitely traced. On its way northeastward along the coast it became quite a dangerous rain and snow storm. The lowest reading of the barometer, 29.40 inches, was reported from Halifax, Nova Scotia, on the morning of the 8th. During the night of the 7th, the easterly wind at Eastport, Me., reached the velocity of forty-eight miles per hour. Rain, sleet, or snow, principally the latter, fell from Tennessee, Kentucky, Indiana, and Lake Huron, eastward over the Lower Lake region, Middle States, New England, Saint Lawrence Valley, and the Eastern British Provinces.

No. III moved southeastward from the Pacific and north of Oregon during the night of the 6th and 7th, and passed within the limits of the stations so as to be accurately located on the night of the 7th and 8th. It was central near Saint Paul on the morning of the 7th where it appears on the Signal-Service charts as an elongated barometric depression running north and south, which form it preserved in crossing the States. The easterly winds in advance of it only became dangerous from Maine east and northeastward. It was closely followed by high barometer No. III; also by northwesterly gales from the Missouri Valley eastward over the Lake region, Middle States, New England, Saint Lawrence Valley, and Eastern British Provinces. A very severe "norther" extended over Texas during the night of the 8th and 9th, and continued on the 9th. The wind reached a velocity of fifty-two miles per hour at Indianola; at Alpena, forty; at Erie, forty-six; at Buffalo, forty-eight; at Sandy Hook, sixty-seven; at Cape May, forty-two; at Peck's Beach, thirty-eight; and at Eastport, forty-two. Snow accompanied it in the northern sections, and occasional light rain in the Southern States.

No. IV was of minor importance. It was accompanied by brisk winds, and, after reaching Lower Michigan and Lake Huron, by snow. On the 11th it disappeared northeastward into Canada, having been followed by high barometer No. IV.

No. V passed over Oregon from the Pacific on the 10th, and thence southeastward to Indian Territory, whence it took a northeastward course over the Lake region and north of the Saint Lawrence River. The tri-daily Signal-Service maps show the gradual development of a well-formed depression, No. VI, off the Atlantic coast on the 13th. The lowest barometric readings taken were at Montreal, on the night of the 13th, 29.62 inches; at Sydney, Cape Breton, afternoon of the 14th, 29.21 inches. North and west gales closely followed them. At Duluth, a velocity of thirty-six miles per hour was reached; at Erie, forty-eight; at Buffalo, thirty-eight; at Rochester, thirty-five; at Montreal, thirty-three; at Sandy Hook, thirty-five; at Kittyhawk, on North Carolina coast, forty-five; at Halifax, twenty-seven. On the 18th, a severe "norther" was felt in Texas, with a maximum velocity of thirty-eight miles at Indianola. Thunder-storms were reported from a number of the stations in the Southern States. Over the northern sections of the country snow, sleet, or rain, prevailed during their passage, and in the Southern States rainy weather. No. V was followed by high barometer No. V, which probably forced it to take a more southern course than it otherwise would have done, as it approached the Mississippi Valley from the Rocky Mountains.

No. VII probably crossed the Pacific States, as very brisk easterly winds prevailed at Portland, Oreg., with snow on the 13th, after which the telegraphic reports are missing. On the 15th, it reached the Lower Missouri Valley and southward. High winds and gales are reported to have accompanied it in Colorado and Kansas. Chart No. I shows it to have disappeared to the southeastward over the West Gulf States on the 16th, followed by a "norther" in Texas. It sent out to the eastward several minor depressions, producing light snow in the Upper Mississippi Valley and the Lake region. Cloudy and rainy weather prevailed in the Gulf States.

No. VIII also crossed the country from the Pacific coast. From the Northwest eastward it appeared as an elongated depression, and during a portion of the time, as two distinct areas. The lowest barometric readings were at Portland, Oreg., on the 19th, 29.22 inches; at Escanaba, Mich., 29.73 inches; Eastport, Me., 29.76 inches; at Sydney, Cape Breton, 29.54 inches. High easterly winds or gales preceded it over the Northwest and Lake Michigan, on the 20th; over Lake Erie, on the morning of the 21st; at Eastport, Me., and Quebec, Canada, on the 22d. High westerly winds followed it in the Lake region; also, a "norther" in Texas on the 22d. Cloudy and rainy weather accompanied it in the Southern States, generally light rain, sleet, or snow in the northern sections, and heavy snow at Portland, Oreg. It was followed by high barometer No VIII.

No. IX has also been traced from the Pacific. The high temperature, southerly winds,

and heavy rains at Portland, prove that the central depression passed north of that station. As shown on the chart, it developed into two well-defined centers by midnight of the 24th. The lowest barometric readings occurred at Buffalo, 29.63 inches; at Father Point, Canada, 29.41 inches; at Eastport, Me., 29.50 inches; at Cape Roziere, Canada, 29.28 inches. Easterly gales preceded it on Lake Erie, in the Saint Lawrence Valley, and from Maine northeastward. It was followed in the northern sections by high westerly winds or gales, and snow, sleet, or rain; in the Southern States by generally heavy rains and frequent thunder-storms. The maximum velocities of wind reported during the passage of this storm are, at Port Huron, twenty-eight miles per hour; Toledo, thirty-six; Erie, forty-four; Rochester, thirty-six; Sandy Hook, forty-five; Cape May, thirty-two; Wood's Hole, twenty-eight; Eastport, thirty-two. It was followed by high barometer No. IX.

No. X passed over California on the 25th. At San Francisco the northerly gale reached a velocity of forty-eight miles per hour on the 26th, with clear weather. The shipping in the harbor sustained considerable damage. After leaving the Rocky Mountains, it was forced to take a southerly course for a time, by a high barometer which had extended over the Northwest on the 26th and 27th. During the afternoon of the 28th it appeared on the Signal-Service maps as an extremely long depression, extending from Texas northeastward over Tennessee, Kentucky, West Virginia, Pennsylvania, New York, and into Canada. High winds occurred principally in the Southern States on the 27th, 28th, and 29th, accompanied with thunder-storms, which were reported from some places as violent. The highest wind-velocities were recorded at Montgomery on the 28th—thirty-three miles per hour; at Wilmington and Galveston on the 29th, twenty-eight miles.

No. XI could not be definitely traced, as it moved north of the Lake region. Cloudy weather, with generally light snow and brisk or high winds, prevailed in the Northwest, Upper Mississippi Valley, and Lake region. Toledo reported a southwest gale during the morning of the 30th.

No. XII moved down the Missouri Valley, as shown on the chart. It slowly developed into two distinct depressions. The one passing along the New England coast was felt as a severe snow-storm. The highest wind-velocities were reported from Eastport, Me., northeast, twenty-seven miles; Galveston, Tex., morning of 31st, north, forty miles, accompanying a "norther." Snow or sleet attended it in the sections north of Tennessee.

High barometers.—Of these, ten have been traced, as seen on Chart No. I, in red. The most remarkable one of the month was No. III, following storm No. III, on account of the unusually high barometric readings, highest 30.97 inches, at Leavenworth, Kans., morning of the 9th, extremely cold weather and high northwesterly winds, which accompanied it from the Rocky Mountain stations eastward over all the States, and in Texas the very severe "norther" of the 9th. The next of importance was No. V, the highest barometric reading, 30.86 inches, having been reported from Yankton, Dak. As these areas move eastward the barometric readings grow less, directly the opposite of the low barometers.

The "northers" of the Southwest are intimately connected with these high barometric areas, and in the majority of cases, especially the more severe ones, they have been predicted in the "probabilities" from eighteen to thirty-two hours in advance of their arrival.

Atmospheric temperature.—The curves in red on Chart No. II are the isothermal lines for the month. The table in left-hand lower corner of same chart gives the average of mean temperatures, by districts, for January of this year; also those for many years. From these it appears that the weather has been decidedly colder than usual, especially from the Missouri Valley to the Middle and Eastern States, except in the South Atlantic States only slightly so. For Portland, Oreg., the mean is over 10° below that of January, 1874. This, no doubt, due to the extensive areas of high barometer which, first appearing in the extreme Northwest, have swept south and eastward across the country east of the Rocky Mountains. Many observers mention it as the coldest month for many years. On Mount Washington the minimum temperature registered 46° below zero on the 27th; at Denver, Colo., on the 9th, 29° below, the lowest ever known. The accompanying table, giving the readings of the minimum thermometers at the different stations in the morning, is quite interesting, in that it shows the south and eastward progress of the areas of cold accompanying high barometers Nos. III and V.

Stations.	January 8.	January 9.	January 10.	January 11.	January 12.	January 13.	January 14.	January 15.
Pembina, Dak	.....	—38	—28	.....	.....	—28	—30	.....
Breckenridge	—31	—33	.....	.....	—14	—34	—31	.....
Cheyenne, Wyo	—23	—38	.....	1	—23	—26	—15	23
Saint Paul, Minn	3	—30	—17	—23	— 6	— 8	—25	—22
Escanaba, Mich	— 9	.....	—17	— 9	— 1	10	— 6	—10
Alpena, Mich	2	— 4	—12	— 1	— 5	17	6	— 5
Omaha, Nebr	—10	—19	— 2	1	7	—17	—17	—10
Chicago, Ill	8	—20	— 3	2	19	18	— 8	— 9
Saint Louis, Mo	21	—15	— 2	11	18	15	— 2	— 2
Fort Gibson, Ind. T	20	.....	2	15	32	6	2	8
Indianola, Tex	40	21	19	31	37	43	28	32
Montgomery, Ala	43	40	18	34	39	46	43	29
Louisville, Ky	15	— 6	— 5	6	20	34	13	5
Pittsburgh, Pa	16	22	—12	— 1	10	32	17	4
Augusta, Ga	38	44	26	28	33	34	40	35
Rochester, N. Y	18	19	— 9	.....	2	22	19	8
New York, N. Y	27	25	— 6	3	14	19	26	11
Washington, D. C	27	30	— 3	8	21	26	36	13
Albany, N. Y	16	16	— 6	—12	— 5	11	24	3
Boston, Mass	26	17	0	0	7	19	20	9
Eastport, Me	15	8	6	— 1	3	2	24	— 4

PRECIPITATION.

The distribution of rain and melted snow is illustrated on Chart No. III. In the left-hand lower corner of same is a table giving the averages, by districts, for January of this and of many years. Large excesses occurred in the South Atlantic States, East Gulf States, and Tennessee. In some sections, especially in portions of New England, the deficiency has given rise to droughts, probably assisted by the light rains and cold weather during the early winter. The number of days on which rain or snow fell during the month, averages as follows in the districts mentioned: New England and Middle Atlantic States, 14; South Atlantic and Eastern Gulf States and Tennessee, 17; Western Gulf States, 14; Lower Lake region, 19; Upper Lake region, 15; Ohio Valley, 13; Northwest, 10.

HUMIDITY.

The percentages of relative humidity for the different districts average as follows: New England, 73 per cent.; Middle Atlantic States, 74; South Atlantic States, 79; Gulf States, 82; Lower Lake region, 79; Upper Lake region, 70; Ohio Valley, Tennessee, and the Northwest, 73. As usual, the mean relative humidity has been lowest at the Rocky Mountain stations, amounting to 56 at Denver and 51 at Santa Fé.

WINDS.

An examination of Chart No. II will reveal the prevailing direction of the wind at the Signal-Service stations. Except where influenced by local causes, the arrows, which fly with the wind, point from the high toward the low barometer. The maximum velocities of the wind, in miles per hour, are given in the remarks upon storms. The average total atmospheric movement, independent of direction, is as follows for the various districts: Middle and East Atlantic coasts, seven thousand miles; interior of the Middle and Eastern States, four thousand three hundred and ten; South Atlantic and Eastern Gulf coasts, five thousand two hundred and eighty; Western Gulf coast, nine thousand five hundred and sixty-six; Ohio Valley and the interior of the Southern States, four thousand three hundred and thirty-four; Lake region, seven thousand one hundred and seven; Northwest, five thousand seven hundred and seventy-two. The largest total movements have occurred at Erie, Pa., ten thousand eight hundred and eighty-four miles; Galveston, Tex., eleven thousand and forty-three, and Indianola, Tex., eleven thousand eight hundred and thirty-five. Winds have been lightest at Augusta, Ga., and Lynchburg, Va., where the total movements have been two thousand seven hundred and thirty-five and two thousand five hundred and thirty-nine miles, respectively. The total movement on Mount Washington could not be obtained, but the highest velocity per hour recorded during the month, was one hundred and fourteen miles.

VERIFICATION OF PROBABILITIES.

A comparison of the predictions as to weather, wind, temperature, and barometer, prepared and issued to the public tri-daily, with the facts as shown by the following reports, has been made by an assistant other than the one making the predictions. It has been found that 90.25 per cent. have been verified.

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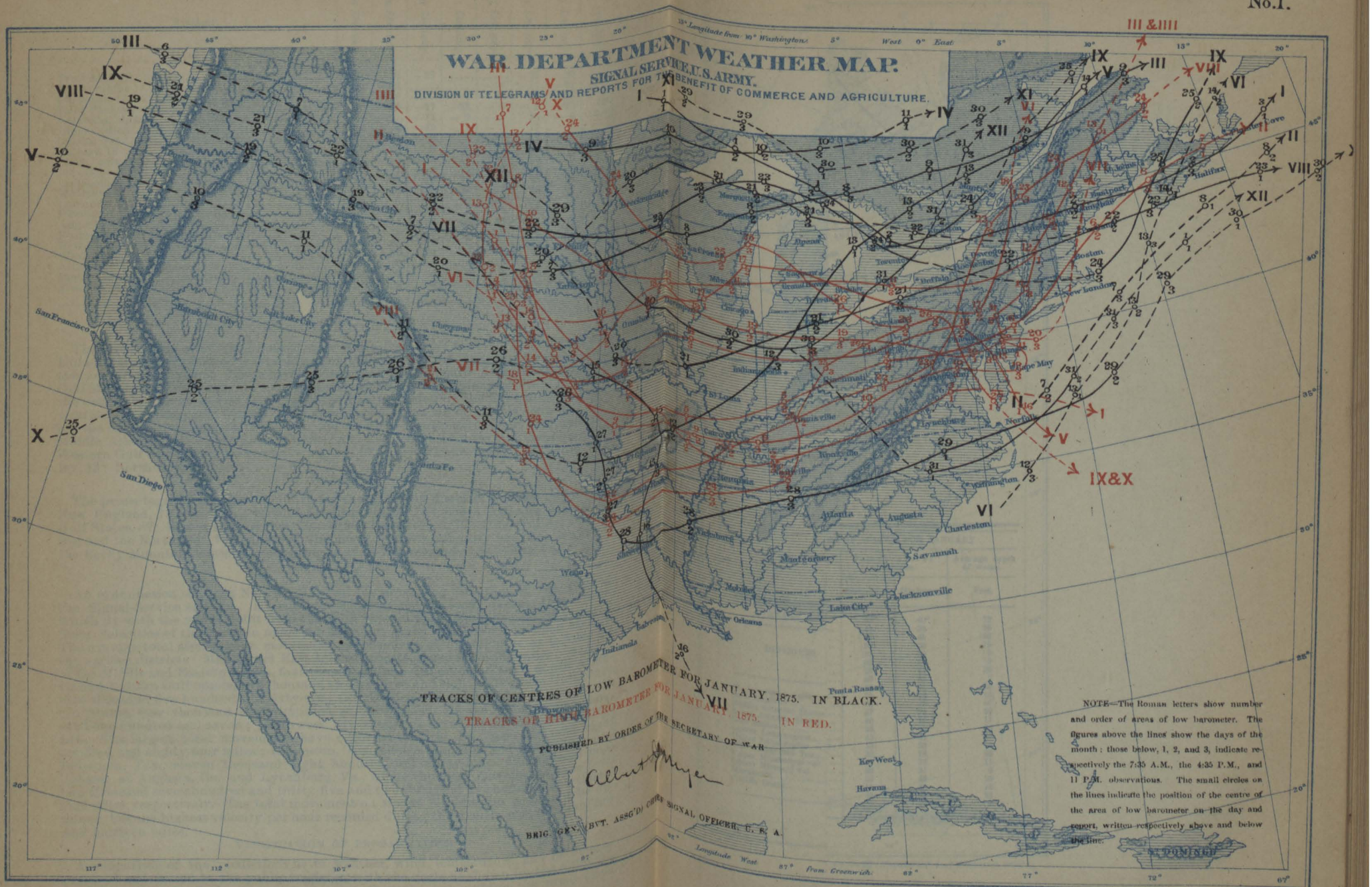
No. I.



AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

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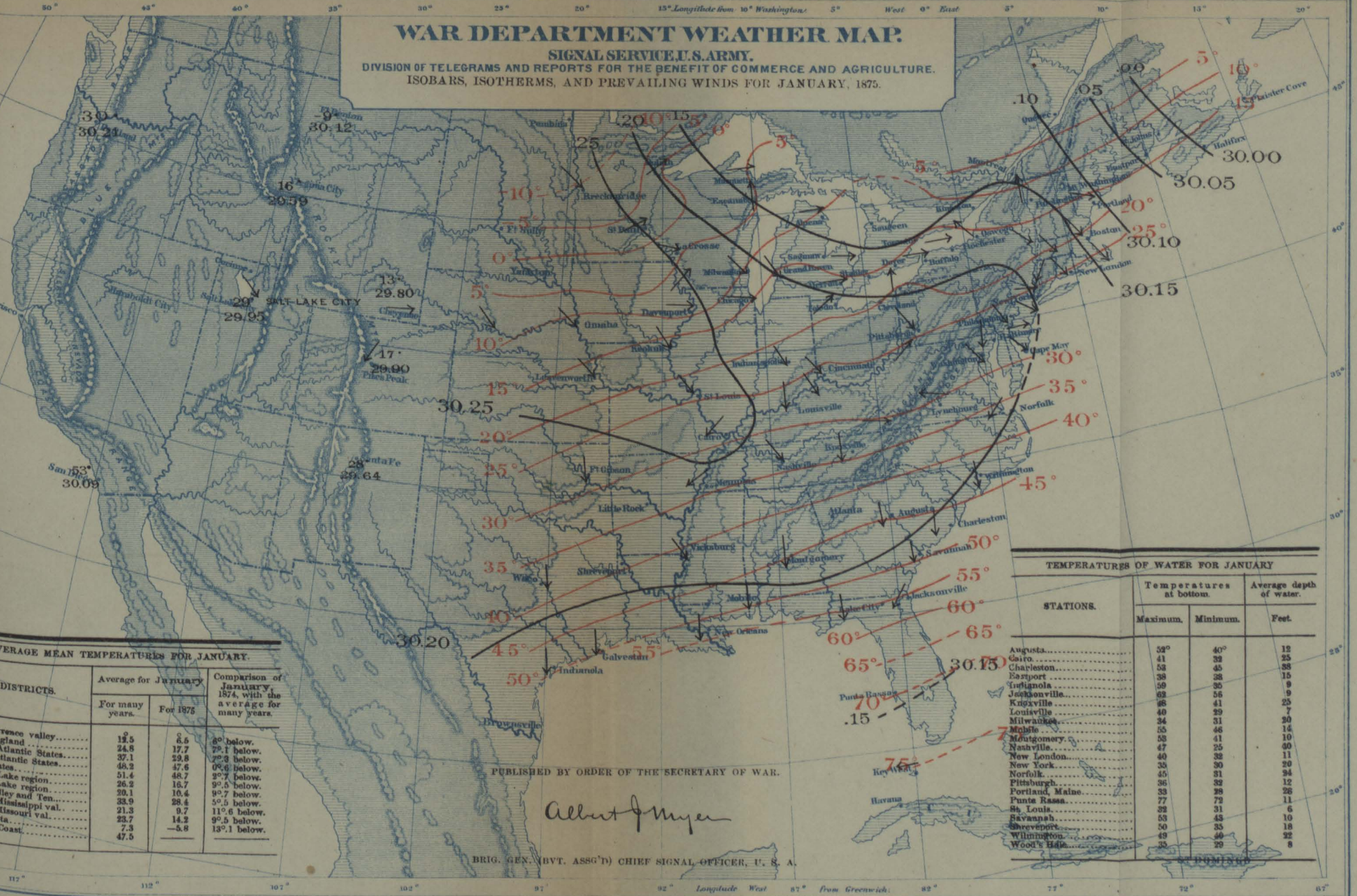
No. II.

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, 1875.



AVERAGE MEAN TEMPERATURES FOR JANUARY.

DISTRICTS.	Average for January: For many years.	Average for January: For 1875	Comparison of January, 1874, with the average for many years.
St. Lawrence valley	12.5°	6.5°	6° below.
New England	24.8	17.7	7°.1 below.
Middle Atlantic States	37.1	29.8	7°.3 below.
South Atlantic States	48.2	47.6	0°.6 below.
Gulf States	51.4	48.7	2°.7 below.
Lower Lake region	26.2	16.7	9°.5 below.
Upper Lake region	20.1	10.4	9°.7 below.
Ohio valley and Ten.	33.9	28.4	5°.5 below.
Upper Mississippi val.	21.3	9.7	11°.6 below.
Lower Missouri val.	23.7	14.2	9°.5 below.
Minnesota	7.3	—5.8	13°.1 below.
Pacific Coast	47.5		

TEMPERATURES OF WATER FOR JANUARY

STATIONS.	Temperatures at bottom: Maximum.	Temperatures at bottom: Minimum.	Average depth of water. Feet.
Augusta	52°	40°	12
Cairo	41	32	25
Charleston	53	45	38
Eastport	38	38	15
Indianola	59	35	9
Jacksonville	62	56	9
Knoxville	48	41	25
Louisville	40	29	7
Milwaukee	34	31	20
Mobile	55	46	14
Montgomery	53	41	10
Nashville	47	25	40
New London	40	32	11
New York	35	30	20
Norfolk	45	31	24
Pittsburgh	36	32	12
Portland, Maine	33	28	26
Punta Rassa	77	72	11
St. Louis	32	31	6
Savannah	53	43	10
Shreveport	50	35	18
Wilmington	49	40	22
Wood's Hole	35	29	8

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

AM PHOTO-LITHOGRAPHIC Co. N.Y. (OSBORNE'S PROCESS)

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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. 1875.

AVERAGE PRECIPITATION FOR JANUARY.

DISTRICTS.	Average for January. For many years.	Average for January. For 1875.	January, 1875, compared with the average for many years.
	Inches.	Inches.	
St. Lawrence Valley	2.5	3.4	Excess.
New England	3.0	2.5	Deficiency.
Middle Atlantic States	3.4	3.35	Normal.
South Atlantic States	3.25	6.27	Large excess.
Eastern Gulf States	4.5	6.25	Large excess.
Western Gulf States	3.6	4.15	Small excess.
Lower Lake region	2.3	1.82	Deficiency.
Upper Lake region	1.8	1.35	Small deficiency.
Ohio Valley	3.1	2.1	Deficiency.
Tennessee	4.2	6.5	Large excess.
Upper Mississippi Valley	1.25	0.87	Small deficiency.
Lower Missouri Valley	1.05	0.38	Large deficiency.
Minnesota	0 8	0.82	Normal.
Pacific Coast	4.0	4.96	Small excess.

HEIGHTS OF RIVERS ABOVE LOW WATER MARK.

STATIONS.	HIGHEST. Date. Jan.	HIGHEST. Height.	LOWEST. Date. Jan.	LOWEST. Height.
		ft. in.		ft. in.
RED RIVER.				
Shreveport	18-19	21 2	1	13 6
MISSOURI.				
Fort Sully	—	— —	—	— —
Yankton	—	— —	—	— —
Omaha	—	— —	—	— —
Leavenworth	—	— —	1	3 3†
MISSISSIPPI.				
St. Paul	—	— —	—	— —
La Crosse	—	— —	—	— —
Dubuque	1	6 4	18	4 6
Davenport	5	9 5	1	2 11
Keokuk	5	9 1	1	1 3
St. Louis	18-19	7 1	3	2 9
Cairo	8	24 7	24	5 4
Memphis	10	18 11	27	4 0
Vicksburg	14-15	25 0	1	8 1
New Orleans*	16	10 6	1	14 3
CUMBERLAND.				
Nashville	31	40 0	23	5 3
OHIO.				
Pittsburgh	1	10 5	12-13	3 0
Cincinnati	3	33 3	17-18	8 9
Louisville	4	13 6	21	4 4

* Below high water mark. † Below bench mark.

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Albert J. Myer

BRIG. GEN'L (BVT. ASS'T) CHIEF SIGNAL OFFICER, U. S. A.

NAVIGATION.

In the right-hand lower corner of Chart No. III will be found a table giving the highest and lowest water-marks for the month, with the dates of occurrence opposite the same. The Missouri was practically closed during the month, also the Mississippi above Saint Louis. The latter, between Saint Louis and Cairo, closed so that Cairo was the head of navigation from the 8th. The Ohio was frozen over at Pittsburgh on the 10th. At Cincinnati navigation was suspended from the 5th to the 29th, and at Louisville from the 11th to the 30th. During the latter half of the month, navigation was much impeded in New York Bay by the ice. On the 18th, Nantucket, Mass., could not be reached by vessels on account of the ice, while on the 20th, Buzzard's Bay was frozen over, and a large fleet of vessels detained off Nantucket. At North Hammond, N. Y., the Saint Lawrence was frozen over on the 6th. At Ardenia, N. Y., the Hudson River has been frozen over since the 1st. The western end of Lake Erie, and in the vicinity of Isle Saint George, has been frozen over during the month. At Sugar Island, Mich., the bay has been frozen over, and ice 30 inches thick, which has not occurred in twenty years. The Potomac River remained closed for several weeks from the 10th.

TEMPERATURE OF WATER.

Upon Chart No. II, in the right-hand lower corner, will be found a table showing the maximum and minimum temperatures of the water at various stations on the lakes, rivers, and sea-coast, taken at the bottom, together with the depth of water. The greatest ranges have occurred in the Southern States. At Indianola, Tex., the water became so cold on the 9th, in the lakes and bayous, that quantities of fish were chilled and washed ashore. At a number of stations, observations were entirely suspended on account of the ice; at others, only during a portion of the month.

ATMOSPHERIC ELECTRICITY.

Thunder-storms.—Thunder-storms are reported as having occurred mostly in the Southern States and during the passage of general storms, viz: on the 7th, in Georgia and Florida; on the 21st, in Georgia, North Carolina, Tennessee, Mississippi, and Texas; on the 22d, in Georgia, Alabama, Mississippi, and Louisiana; on the 23d, in Alabama, Mississippi, Louisiana, and Texas; on the 24th, in Alabama, Louisiana, and North Carolina; on the 27th, in Louisiana, Indian Territory, Tennessee, and Texas; on the 28th, in Georgia, Florida, Alabama, Mississippi, Louisiana, Indian Territory, and Texas; on the 29th, in Georgia and Alabama.

The following extract is made from the observer's report at Santa Fé, New Mexico: "January 15, extraordinary electrical storm on (telegraph) line, noticed first at 12 m., and lasted till 3 p. m. The current was so strong the line could not be worked. The key was left open, and most of the time was surrounded by a ring of fire." It was during the passage of low barometer, No. VIII, that this happened.

Auroras.—Comparatively few displays have been reported, and those generally faint. They were observed, on the 5th, at Alpena, Mich., and La Crosse, Wis.; on the 7th, at Duluth, Minn.; on the 9th, at Shreveport, La.; on the 11th, 25th, and 29th, at Escanaba, Mich.; on the 31st, at Alpena and Salt Lake City.

OPTICAL PHENOMENA.

Solar halos.—Those reported most frequently were observed as follows: On the 4th, in Minnesota, Iowa, Nebraska, and Illinois; on the 5th, in New York, Louisiana, Alabama, Missouri, and Nebraska; on the 6th, in Minnesota, New York, Vermont, New Hampshire, and Maine; on the 8th, in Colorado, Minnesota, Wisconsin, Michigan, New York, New Hampshire, Pennsylvania, Virginia, and Mississippi; on the 9th, in Minnesota, Iowa, Wisconsin, and Ohio; on the 10th, in Minnesota, Ohio, Pennsylvania, New York, New Hampshire, Vermont, Maine, and Alabama; on the 11th, in Illinois, Pennsylvania, and New York; on the 12th, in Colorado, Nebraska, Michigan, Ohio, and New Hampshire; on the 18th, in Maine, Massachusetts, New Hampshire, New York, and Wisconsin; on the 19th, in Minnesota, Ohio, New York, and New Hampshire; on the 24th, in Minnesota, Nebraska, Massachusetts, and Maine; on the 25th, in Georgia, Missouri, Illinois, and Nebraska; on the 30th, in Alabama, Ohio, Michigan, and Nebraska.

Lunar halos.—That of the 14th was seen principally in Georgia, South Carolina, and North Carolina. Those of the 15th, 16th, 17th, 18th, 19th, 20th, 21st, and 23d, were observed at many stations in the Northern States.

Mirage.—Observed at Ellenwood, Kans., on the 5th, 6th, and 7th; at Standish, Me., on the 12th.

Parhelia.—Reported as seen at many stations, and principally in northern sections. The most brilliant occurred on the 4th, 5th, 8th, 12th, 13th, 15th, 18th, and 30th, and the majority in the Western States and Territories.

MISCELLANEOUS.

Meteors.—The night of the 30th, they were seen at Golden City, Colo., Tioga, Pa., and Lyndon, Ill., as well as on a few other dates at single stations.

Earthquakes.—At 4 a. m. of the 24th, two shocks were felt at Carson City, Nev. The direction was from the northeast. The first shock was light, the second quite severe, and lasted several seconds. The same was felt at Sacramento, Cal., but without damage to property.

Migration of birds.—On the 6th, at Warrensburgh, Mo., geese flying south; on the 27th and 28th, at Indianola, Tex., geese flying north; on the 29th, at Nashville, Tenn., cranes flying north, and at Newport, Fla., geese and cranes flying north.

Off Clifton, Staten Island, N. Y., seals were seen on the ice during the 28th.

At Marquette, Mich., out of ninety-three observations made on the rise and fall of the surface of the water in the lake, it acted with the barometer twenty-five times, and contrary to it sixty-eight times.

Published by order of the Hon. Wm. W. Belknap, Secretary of War.

ALBERT J. MYER,
Brig. Gen., (Brt. Assgd.,) Chief Signal-Officer, U. S. A.

MONTHLY WEATHER REVIEW, FEBRUARY, 1875.

INTRODUCTORY.

The current review is based upon the tri-daily telegraphic weather reports from seventy-eight stations in the United States and Canada and upon manuscript material from the following stations:

Canadian meteorological service, 11; United States Army Signal Service, 86; United States Army surgeons, 25; United States naval hospitals, 1; regular volunteer observers, 275; logs of vessels and miscellaneous sources.

The noticeable features of the month have been: First. The temperature, which in all sections, has been below the mean of previous years, and in the northern half of the country lower than during any February recorded for the past twenty and in some sections past forty years. Second. An excess of rain in portions of the Gulf States and Tennessee. Third. The severe storm of the 23d, accompanied by thunder and lightning over a large portion of the country, and in Missouri and Iowa by a destructive tornado; floods also followed in Tennessee. Fourth. The ice-blockade of the Middle and East Atlantic coast, which has not been exceeded in severity before during the present century, being comparable to that of 1780.

BAROMETRIC PRESSURE.

The general distribution of barometric pressure during the month is shown by the isobars on Chart No. II, from which it will be seen that, on the average, the barometer has been lower in the northern and eastern sections of the country than it was in February, 1874, but has been higher in the Southern States.

1. *Areas of high barometer.*—The surface flow of cold air from British America has, as usual, taken place in connection with a series of areas of high barometer, which can be generally traced from Manitoba and Dakota southward. The cold surface-currents have, as a rule, extended southward to Texas, producing "northers" on the Gulf coast, while the supply of cold has, at the same time, sufficed to cover the country eastward. The inward movement of the upper clouds and the outward flow of the lower stratum of air have, as usual, been well marked. The radiation outward during the nights and the early mornings of the 4th, 6th, 9—10th, 12—13th, 14—15th, lowered the temperature of the air at the earth's surface sufficiently to bring about in the central regions of the areas of high barometer Nos. 1, 3, 4, 6, and 7, respectively, such depressions of temperature as are rarely witnessed, securing for the month the reputation of having been in general one of the coldest on record. It has been very generally evident that the cold air flowing southeastward over Dakota and Minnesota was confined to the lowest portions of the country, so that, for instance, the average temperature of mouth is decidedly lower in the river valleys than on the adjacent high grounds. On several occasions areas of high barometer have been separated by belts of strongly contrasted winds and temperatures, which have been marked by slight depressions trending north or northeastward, forming troughs rather than oval areas of low barometer. Under favorable conditions these troughs have developed into centers of low barometer, as fully detailed in section (2.)

No. 1 may be considered as being central on February 1, in Northern Alabama; moved thence eastward over North Carolina, remaining on the Atlantic coast during the 2d.

No. 2 passed over Manitoba on the 1st, Montana on the 2d, reaching Texas on the 3d;

extended eastward to Illinois on the 4th; was central in Tennessee on the 5th and in Alabama on the 6th, by which time area No. 3 had, by extending rapidly southward, overtaken No. 2, and, by its relatively greater pressure, gave rise to low barometer No. V, as detailed below.

No. 3 passed over Manitoba and Dakota on the 5th. The pressure as reduced to sea-level, during the 6th, was one of the highest that has been recorded, as shown from the following table:

	Feb. 6, 7.35 a. m.	Feb. 6, 4.35 p. m.	Feb. 6, 11 p. m.
Pembina	30.91	30.70	30.57
Bismarck	30.92	30.79	30.62
Breckenridge	30.96	30.90	30.78
Duluth	30.88	30.75	30.60
Saint Paul	30.87	30.82	30.72
Yankton	30.96	30.98	30.95
Omaha	30.76	30.84	30.83

After passing over Minnesota on the 6th, it extended thence rapidly southward to Texas and Louisiana by midnight of the 7th.

No. 4 was central in Manitoba on the 8th, and extended on the 9th over Wisconsin, Michigan and Pennsylvania, with very low temperatures, as detailed in subsequent sections. On the 10th the area was central in Maryland, passing thence eastward to the ocean, with possibly a tendency northeastward along the coast.

No. 5 passed on the 10th from Manitoba to Kansas, and on the 11th to Texas, extending thence eastward to Alabama. On the 12th its movement continued eastward to the South Atlantic coast.

No. 6 passed from Manitoba on the 12th, over Dakota and Minnesota on the 13th, to Iowa on the 14th; thence over Illinois and Missouri into Tennessee on the 16th; thence eastward over Cape Hatteras by the morning of the 17th.

No. 7 passed on the 16th over Manitoba and Dakota; over Iowa and Illinois on the 17th, and over West Virginia to the Middle Atlantic coast on the 18th.

No. 8. The low barometer prevailing on the 19th over the greater portion of the country seems to have allowed a flow of air eastward into Texas and Indian Territory, forming high barometer No. 8, which was central in the southwest on the morning of the 20th, and passed thence eastward over Louisiana, reaching Georgia on the afternoon of the 21st; it extended thence northeastward to Cape Hatteras during the next two days.

No. 9. Simultaneously with the preceding an area of high barometer also passed from Western Dakota at midnight of the 20th eastward over the lakes to Lake Erie on the afternoon of the 21st.

No. 10. The preceding area was closely followed by No. 10, which left Manitoba on the 21st, was central in Southern Minnesota at 11 p. m. of the 22d, and extended thence eastward during the 23d to the mouth of the Saint Lawrence.

No. 11 passed over Manitoba on the 23d; was central in Northwestern Minnesota on the morning of the 24th, and moving rapidly southward reached Kansas on the morning of the 25th, and the Texas and Louisiana coasts later in the day, then moved eastward over Mississippi and Alabama to the South Atlantic coast on the afternoon of the 26th.

No. 12 was central over Manitoba on the 25th, and over Kansas by the 27th, 7.35 a. m. The southern portion was then dissipated while the northern portion passed eastward, being over Minnesota and Iowa on the 27th, 4.35 p. m.; over Wisconsin and Illinois on the 27th, 11 p. m., and thence over Michigan, Lakes Huron and Ontario to New York on the 28th, 11 p. m.

(2.) *Areas of low barometer.*—Thirteen areas of low barometer are recorded for February; their distinguishing feature has been the tendency to the formation of troughs of depression between two extended areas of high pressure and of contrasted temperatures. Of these areas of low pressure three have developed into notable storms, *i. e.*, No. II, in Illinois, Iowa, and Missouri, on the 2d; in Kentucky, Illinois, New York, and North Carolina, on the 3d, and the Lower Lakes on the 4th; No. XI, in Missouri, Iowa, Illinois, Wisconsin, and Michigan, on the 23d, and No. XII, in Georgia, South Carolina, North Carolina, Virginia, Maryland, Delaware, New Jersey, and Massachusetts, on the 25th.

No. I. The map of the morning of February 1st shows the storm No. XII of January, off the coast of Nova Scotia, whence it moved northeastward, as shown on the accompanying chart, on which the track of the first area of low barometer proper to February is shown to have that day passed over Lake Superior, while areas of high barometer Nos. 1 and 2 were respectively central in Georgia and Dakota. No. I moved slowly eastward, and was attended only with southerly winds and threatening weather in Canada.

Nos. II and III. The depression No. II originated on the first in Kansas, in a region of conflicting cold northerly and warm southerly winds, the boundaries between which were especially well marked at midnight, when the temperature at Leavenworth was 45° and at Omaha 14°. The storm-center passed northeastward over the northern portion of Michigan and thence eastward to the Saint Lawrence Valley. The dimensions of this disturbance are best shown in the following table:

	Central lowest barometer.	Area enclosed by the isobar of 29.60.
		Square miles.
February 2—7.35 a. m	29.60	5,000
February 2—4.35 p. m	29.45	60,000
February 2— 11 p. m	29.40	80,000
February 3—7.35 a. m	29.10	240,000
February 3—4.35 p. m	(?)	350,000?
February 3— 11 p. m		690,000?

In consequence of the rapid fall over New England during the 3d, a secondary center, marked as No. III on the chart, was formed, but its progress subsequent to the 3d instant could not be further traced with sufficient distinctness to decide whether these two centers remained separate or coalesced over Newfoundland. The latter seems more probable, and is indicated by the dotted lines.

Nos. IV and V. The area of high barometer No. 2 was followed by a slight depression, entered as No. IV on the accompanying chart, which was located on the morning of the 5th in Minnesota. It soon passed north and east, and may be considered as a minor feature in the advance southward of the unusually extensive flow of cold air forming high barometer No. 3. In a similar way, a depression, No. V, which moved during the 7th eastward from Minnesota over the Lakes into the Saint Lawrence Valley, appears to have died away on the 8th, or to have been merged into the more important depression, also designated as No. V, which was developing in the Southwest on the 6th, and after moving eastward over South Carolina on the 7th, then developed into a well-defined storm-center, moving northeastward to the coast of Nova Scotia and accompanied by gales along the Middle and East Atlantic coasts.

Nos. VI. and VII. The supply of cold, dry air afforded by high barometer No. 3, sufficed to maintain clear weather west of the Mississippi until the afternoon of the 8th, at which time warm, southerly winds and cloudy weather prevailed over Texas, but cold, northerly winds in the Lower Missouri Valley. In this region, and on this afternoon, is placed the beginning of low barometer No. VI, which cannot be distinctly marked until the morning of the 10th. During this interval of forty-eight hours the increasing cloudiness of the 8th had been followed by rain on the 9th, and easterly winds steadily blew over the entire country west of the Mississippi, while the great areas of high barometers Nos. 3 and 4 moved from Minnesota to the Middle Atlantic coast. By midnight of the 9th the area of snow extended from Kansas into Manitoba, and that of rain from Kansas to the Gulf, affording a fine instance of the result of the ascent of air up the inclined plains of the Rocky Mountain system. By the morning of the 10th, the inflow of cold northwest winds had begun in Manitoba and Dakota, and the belt or trough over which the pressure was less than 29.80 inches was seven hundred miles long, in a north and south direction, by one hundred broad. We have indicated by a zig-zag line on Chart No. I, the fact that by the afternoon of the 10th the northern end of this belt of low pressure moved rapidly eastward into Wisconsin, while the southern end remained stationary in Texas. It is probable that on this afternoon there existed a number of small areas of 29.70 inches, or less, constituting a belt of low barometer at least one thousand miles long. The heavier precipitation took place in the central portion of this line and throughout the Southern States, but the barometric depression in these regions rapidly closed up, and the low barometer was at midnight of the 10th central in Upper Michigan, at which time heavy snows, with southerly winds, prevailed over the Lake region, Middle and Eastern States, and so continued as the depression advanced eastward into the Saint Lawrence Valley on the 11th. The precipitation on the Middle Atlantic coast was attended on the morning of the 11th by the formation of a small disturbance, No. VII, which, as it moved from Virginia over New Jersey, was attended, for a time, with very severe gales, and which probably by midnight had reached Maine and joined the original depression No. VI.

No. VIII. This depression had an origin similar to that of No. VI; the area of very cold air that, on the 12th, extended southward over Iowa, was opposed by warmer southerly winds over the entire Southwest, and on the 12th there appeared to have existed several slight depressions, with cloudy weather, from the Missouri Valley to

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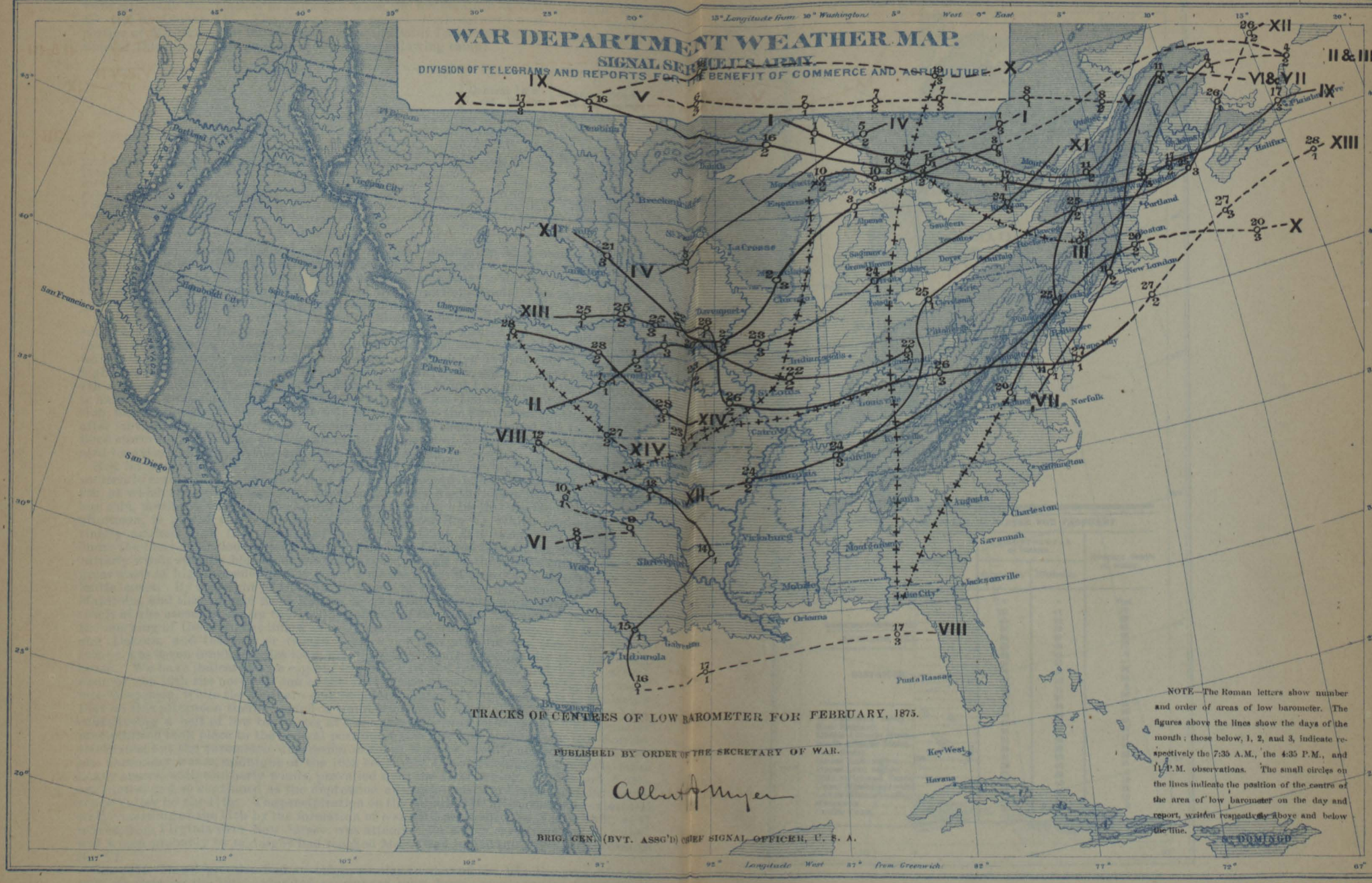
No. I



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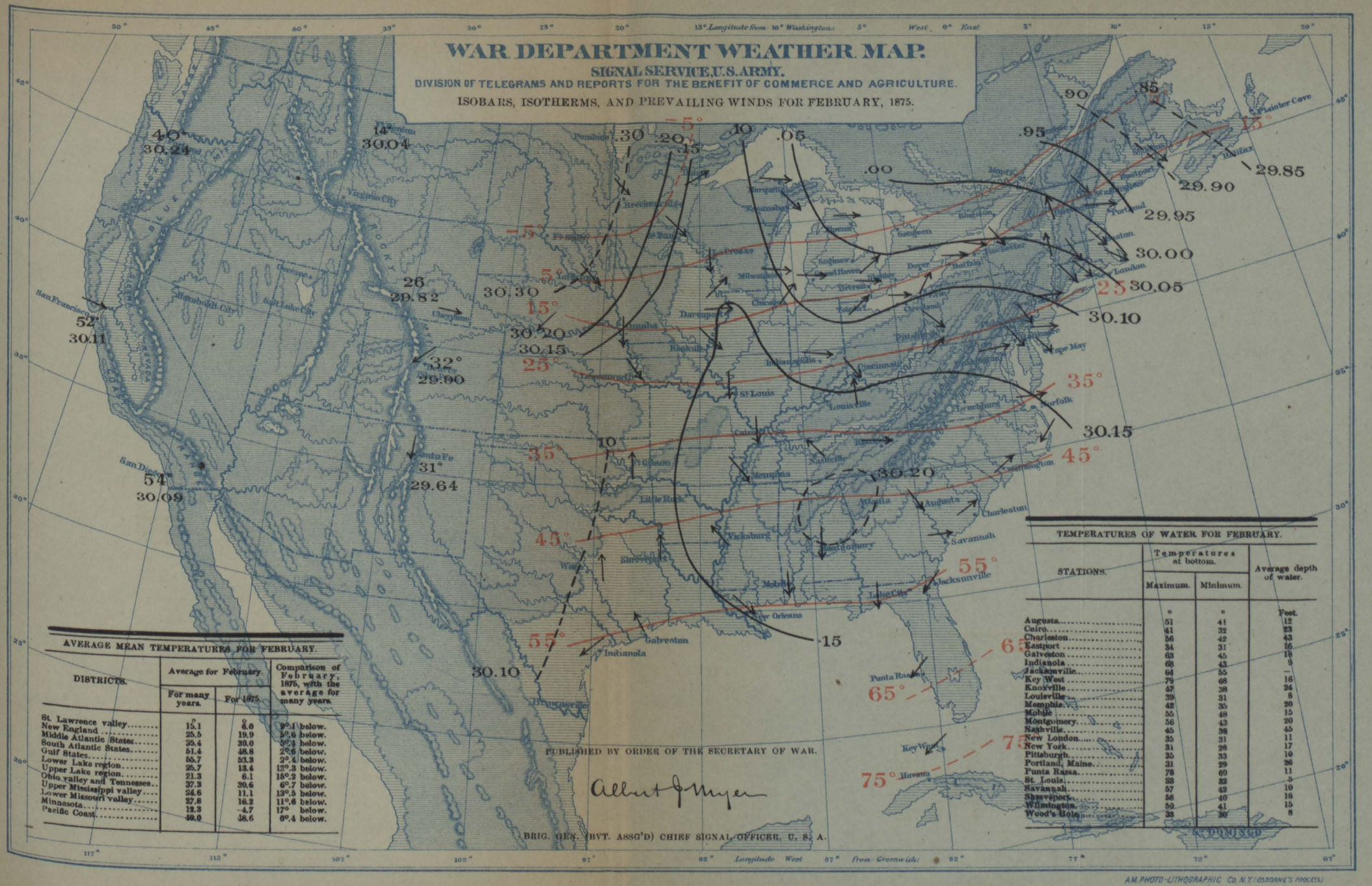
No. II.

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, 1875.



AVERAGE MEAN TEMPERATURES FOR FEBRUARY.

DISTRICTS.	Average for February		Comparison of February, 1875, with the average for many years.
	For many years.	For 1875.	
	°	°	
St. Lawrence valley	15.1	6.0	9°.1 below.
New England	25.5	19.9	5°.6 below.
Middle Atlantic States	35.4	30.0	5°.4 below.
South Atlantic States	51.4	48.8	2°.6 below.
Gulf States	55.7	53.3	2°.4 below.
Lower Lake region	25.7	13.4	12°.3 below.
Upper Lake region	21.3	6.1	15°.2 below.
Ohio valley and Tennessee	37.3	30.6	6°.7 below.
Upper Mississippi valley	24.6	11.1	13°.5 below.
Lower Missouri valley	27.8	16.2	11°.6 below.
Minnesota	12.3	-4.7	17° below.
Pacific Coast	49.0	48.6	0°.4 below.

TEMPERATURES OF WATER FOR FEBRUARY.

STATIONS.	Temperatures at bottom.		Average depth of water.
	Maximum.	Minimum.	
	°	°	Feet.
Augusta	51	41	12
Cairo	41	32	23
Charleston	56	42	43
Eastport	34	31	15
Galveston	63	45	10
Indianola	68	43	9
Jacksonville	64	55	–
Key West	79	68	16
Knoxville	47	38	24
Louisville	39	31	8
Memphis	42	35	20
Mobile	55	48	15
Montgomery	56	43	20
Nashville	45	36	45
New London	35	31	11
New York	31	28	17
Pittsburgh	35	33	10
Portland, Maine	31	29	26
Punta Rassa	78	69	11
St. Louis	38	32	5
Savannah	57	42	10
Shreveport	58	40	18
Wilmington	50	41	15
Wood's Hole	38	30	8

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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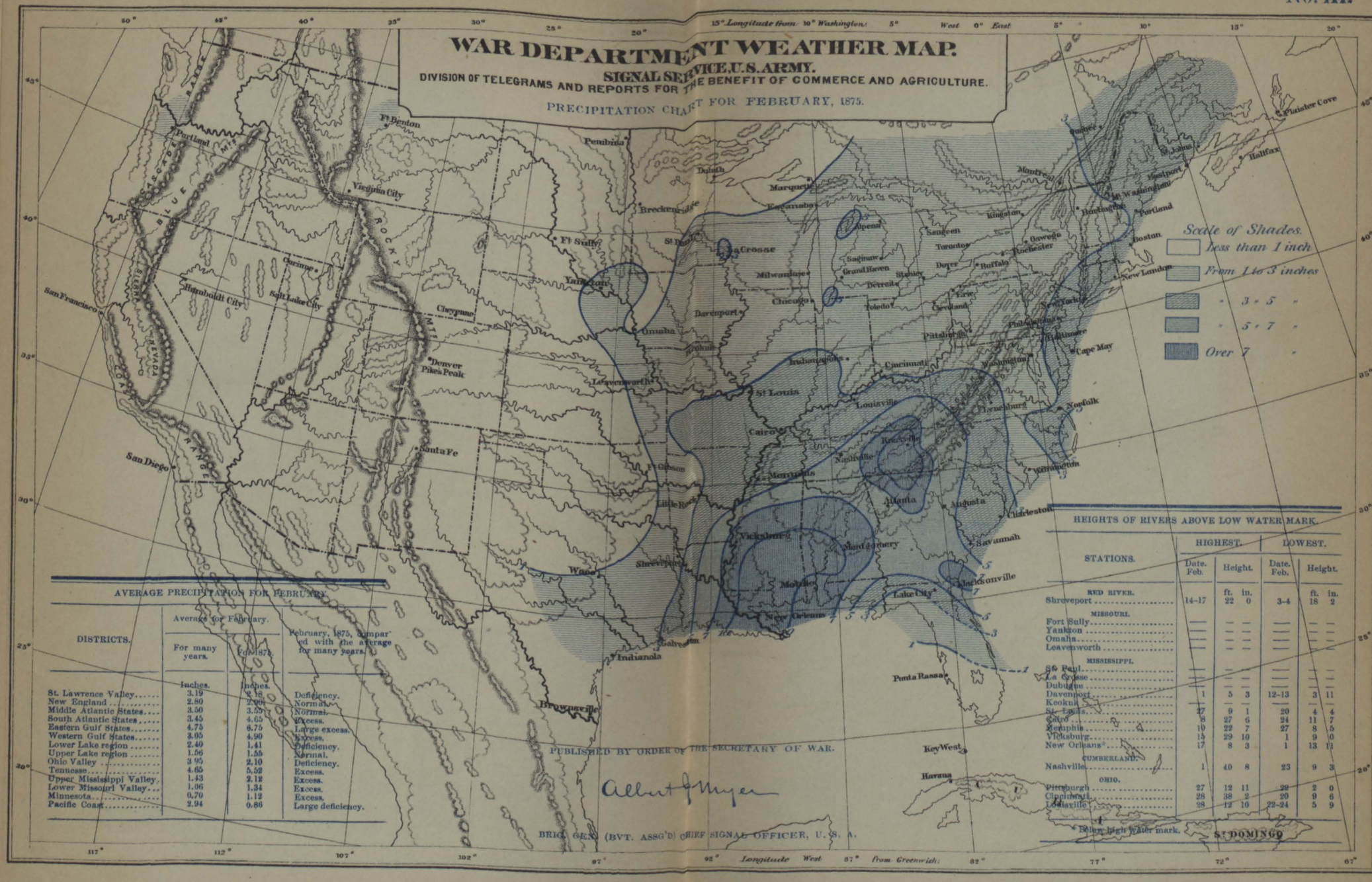
No. III.

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, 1875.



AVERAGE PRECIPITATION FOR FEBRUARY.

DISTRICTS.	Average for February. For many years.	Feb. 1875.	February, 1875, compared with the average for many years.
	Inches.	Inches.	
St. Lawrence Valley	3.19	2.18	Deficiency.
New England	2.80	2.90	Normal.
Middle Atlantic States	3.50	3.53	Normal.
South Atlantic States	3.45	4.65	Excess.
Eastern Gulf States	4.75	6.75	Large excess.
Western Gulf States	3.05	4.90	Excess.
Lower Lake region	2.40	1.41	Deficiency.
Upper Lake region	1.56	1.55	Normal.
Ohio Valley	3.95	2.10	Deficiency.
Tennesse	4.65	5.52	Excess.
Upper Mississippi Valley	1.43	2.12	Excess.
Lower Missouri Valley	1.06	1.34	Excess.
Minnesota	0.70	1.12	Excess.
Pacific Coast	2.94	0.86	Large deficiency.

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HEIGHTS OF RIVERS ABOVE LOW WATER MARK.

STATIONS.	HIGHEST. Date. Feb.	HIGHEST. Height. ft.	HIGHEST. Height. in.	LOWEST. Date. Feb.	LOWEST. Height. ft.	LOWEST. Height. in.
RED RIVER.						
Shreveport	14–17	22	0	3–4	18	2
MISSOURI.						
Fort Sully	—	—	—	—	—	—
Yankton	—	—	—	—	—	—
Omaha	—	—	—	—	—	—
Leavenworth	—	—	—	—	—	—
MISSISSIPPI.						
St. Paul	—	—	—	—	—	—
La Crosse	—	—	—	—	—	—
Dubuque	—	—	—	—	—	—
Davenport	1	5	3	12–13	3	11
Keokuk	—	—	—	—	—	—
St. Louis	27	9	1	20	4	4
Cairo	8	27	6	24	11	7
Memphis	10	22	7	27	8	5
Vicksburg	15	29	10	1	9	0
New Orleans*	17	8	3	1	13	11
CUMBERLAND.						
Nashville	1	40	8	23	9	3
OHIO.						
Pittsburgh	27	12	11	28	2	0
Cincinnati	28	38	2	20	9	6
Louisville	28	12	10	22–24	5	9

* Below high water mark.

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No. I

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the Middle Atlantic States, over which region the isotherms of 10, 20, 30, and 40° were unusually crowded together, so that, for instance, on the afternoon of the 12th there were reported from Indianapolis and Cincinnati northerly winds with temperatures of 13° and 18° respectively, but from Louisville, south winds and temperature of 41°. This belt of depression rapidly gave way before the area of high barometer, No. 6, pressing southward, and there were left, on the morning of the 13th, two slight depressions respectively in Texas and Virginia; the latter disappeared off the East Atlantic coast, while the former continued, until the morning of the 17th, to be represented in Texas and on the Gulf coast by continued threatening and rainy weather. The gradual extension southward of the cold northerly winds, together with their increasing force and the heavy rains along the whole Gulf coast on the 16th and 17th, render it probable that several quite local storms must have prevailed there during those days, of which, however, nothing more is known.

No. IX. This slight depression appears on the morning of the 16th in Manitoba, having to the southeast of it the area of high barometer No. VI, then central in the Ohio Valley. The low pressure moved during the day southeastward over Lakes Superior and Huron, and was, on the morning of the 17th, central at Ottawa, Canada, having been followed by a very rapid increase in pressure over the Northwest and Upper Lakes. At midnight of the 16th, between Marquette and Bismarck, the gradient was 1 inch in five hundred miles. After entering New York State on the 17th, the central depression turned to the northeastward over Maine and the Gulf of Saint Lawrence.

No. X. This depression, like the preceding one, first appears in Manitoba, following closely after high barometer No. 6; its principal development probably took place north of our stations; and on the maps of the 18th the only indication of its presence is a belt of low barometer extending several hundred miles southward from the Lake region, and which may perhaps be regarded as a branch of the main depression to the northward. On the 19th, this branch stretched farther south in Florida, forming an ill-defined belt of low barometer, bounded on the east by southeast winds, clouds, and rain, but on the west by northwest winds and snow. By the afternoon of the 20th, this had contracted into a well-defined low barometer, central over Massachusetts, and which moved then east-northeast, producing the lowest pressure recorded during the month at Halifax.

No. XI. On the afternoon of the 21st of February, southerly winds prevailed from the Gulf coast northward to Lake Superior and Central Dakota, while in Northern Dakota and Manitoba cold northerly winds were reported, with snow, and high westerly winds at Cheyenne, in Wyoming; at midnight of the 21st, falling barometer prevailed west of the Mississippi, the disturbance being probably central in the southeastern corner of Dakota, with rising barometer and falling temperature to the north of it. This disturbance developed by the afternoon of the 22d into a belt of low pressure, extending from Indian Territory to Lake Huron, the isobar of 29.80 being apparently nine hundred and fifty miles long by about two hundred broad. This was accompanied, as usual, by the belt of crowded isothermal lines that mark regions of opposing northerly and southerly winds. The length of this barometric trough was apparently doubled by midnight of the 22d, and on the morning of the 23d its southwestern extremity had formed a well-defined storm-center in Indian Territory, which, during the rest of the day, moved northward to Iowa, forming a violent and destructive tornado in Missouri; thence eastward to Illinois and northeastward over the Lower Lake region. At the same time there formed, to the southwest, a series of slight depressions, constituting an apparent extension of area No. XI into a belt of low pressure, but the formation of which probably was due, as usual, to the conflict between the cold northerly winds of high barometer No. 11 and the warm southerly winds from the Gulf.

No. XII. The beginning of area No. XII is coincident with the formation, on the afternoon of the 24th, of the southwestern extension of No. XI, as mentioned in the preceding section; like No. XI, it was formed by the isolation, as it may be called, of the southwestern end of that belt, and passed northeastward from Arkansas to New York, where it was central on the 25th, being attended with southwesterly gales on the South and Middle Atlantic coasts. On the 26th, in the afternoon, it was apparently central near Cape Roziere.

No. XIII. On the morning of the 25th, high barometer No. 11 extended over Texas; thence to Nebraska southerly winds prevailed during the day, with falling barometer, while to the northward cold northerly winds prevailed over Dakota and Minnesota; thus in the afternoon at Omaha and North Platte the temperatures were respectively 37° and 44°, while at Yankton 8° was reported. The area of falling barometer and temperature contrasts moved slowly south and east, and on the morning of the 26th stretched from Kansas to Lake Erie; southerly winds and higher temperatures prevailing at Leavenworth, Keokuk, Chicago, Indianapolis, Cincinnati, and Cleveland, while cold northerly winds prevailed at the stations immediately north of these. The belt of depression was even more strongly marked on the afternoon of the 26th, when

it extended from Indian Territory to New York; the isotherms for 20° and 40° were parallel to each other over the greater part of this belt at a distance of fifty to one hundred and fifty miles. The western end of this barometric trough being closed up by the rapid advance southward of high barometer No. 12, there was left, principally, an area of low pressure which was in West Virginia at midnight on the 26th, and was central over Chesapeake Bay on the morning of the 27th. Snow prevailed during that day over the Middle and Eastern States, while the depression moved eastward to a considerable distance from the Atlantic coast; it seems probable that during the rest of the 27th the depression must have turned northeastward, unless the well-marked storm-center over Southern Nova Scotia, at midnight of 27th, originated in the heavy snow-fall that prevailed in that region.

No. XIV. High barometer No. 12 appeared central on the afternoon of the 27th over the Upper Mississippi Valley, and falling barometer, with southeast winds, prevailed in Kansas and Nebraska. This, by the afternoon of the 28th, had developed into a well-marked area of low barometer, central between Omaha and Leavenworth, which was drawn southward into Missouri and then developed into an extensive storm, whose history belongs to the following month.

ATMOSPHERIC TEMPERATURE.

The general distribution of temperature during the month is shown by the isothermal lines on Chart No. II, from which it will be seen that an average of —5° or less is recorded for the greater part of Minnesota and the northwestern half of Dakota. On comparing the temperatures for the current month with those of February, 1856, the latter year, which was unusually cold, appears warmer by at least 5° throughout Illinois and Michigan, and by 10° throughout Missouri and Iowa, and by 15° or 20° in Minnesota; but was colder by from 5° to 10° throughout the Middle and Eastern States.

As an indication of the continued severity of the cold, the following figures are reported, showing the depth, in inches, to which the ground has been frozen: Connecticut, 46; Georgia, 6; Illinois, 48 to 72; Indiana, 32; Iowa, 54; Maryland, 20 to 30; Massachusetts, 36; Michigan, 60; Missouri, 12 and 14, 18 and 38; Nebraska, 48, 48, 30 to 40; New Hampshire, 60; New Jersey, 60, 42, 28, and 36; New York, 36, 96, 22; Ohio, 28, 36, 22, 24, 28, 36 to 66, 42; Pennsylvania, 26, 18 to 24, 30; Rhode Island, 48; Virginia, 8, 13.

(1.) *Range of temperature.*—The monthly range of temperature has been largest and most variable in the Middle and Eastern States, having amounted to from 46° to 90°, according to the location of the station. In the Gulf States it has varied from 37° to 62°, and at Key West was 27°. For Minnesota, ranges from 44° to 60° are reported. At San Francisco the range was 23°.

(2). *Unusually low temperatures.*—Temperatures of —35°, or less, have been reported as follows: Signal-service stations: Mount Washington, 35°; Pembina, 41°, 39°, 44°, 40°, 35°; Duluth, 35°. Canadian stations: Fort Garry, 36°, 35°, 38°, 35°, 36°, 36°, 37°, 35°, on as many different days. Volunteer observers: Oxford, Me., 34; Traverse City, Mich., 37; Hutchinson, Minn., 36; Woodstock, Vt., 30; Wien, Wis., 42; Embarrass, Wis., 48, mercury froze on the 9th and 12th; Beloit, Wis., 36.

PRECIPITATION.

The distribution of rain-fall (or melted snow) is given on Chart No. III as closely as possible, considering the unequal distribution and the limited number of returns, there being but about 500 rain-gauges to an area east of the Rocky Mountains of 20° in latitude, by 40° in longitude. The precipitation has, of course, throughout the States north of the thirty-fifth parallel, taken the form of snow; and as many volunteer observers give the depth of the snow in inches, without melting and measuring to ascertain the corresponding amount of water, it has been necessary in some cases to convert the recorded snow-fall into water by multiplying by an empirical factor, for which one-tenth has been generally adopted in this country.

(1.) *Depth of snow.*—The total depth of snow fallen during the month, as recorded mostly by volunteer observers, is as follows in inches: Maine, 6 to 18; New Hampshire, 6 to 15; Vermont, 13 to 15; Massachusetts, 4 to 31; Connecticut, 8; New York, 3 to 42; New Jersey, 5 to 8; Pennsylvania, 5 to 30; Maryland, 3 to 13; Virginia, 1 to 11; Ohio, 2 to 15; Kentucky, 2 to 5; Tennessee, 3; Indiana, 2 to 16; Michigan, 11 to 50; Illinois, 6 to 13; Wisconsin, 6 to 32; Missouri, 3 to 9; Iowa, 5 to 18; Minnesota, 7 to 16; Kansas, 1 to 9; Nebraska, 4 to 20.

(2.) *Special rains.*—The excess of rain-fall in Tennessee, as shown on Map No. III, is due especially to the heavy rain attending storm No. XII, which prevailed during the 23d, 24th, and 25th, in consequence of which a severe flood prevailed in the Holston River and the upper portions of the Cumberland and Tennessee Rivers.

(3.) *Droughts.*—In consequence of the deficient rain-fall in the northern portion of

the country throughout the preceding six months, and the deeply-frozen ground, reports of failing wells or general deficiency of water have been received from Missouri, New Hampshire, New Jersey, New York, Pennsylvania, and Connecticut. From similar causes the rivers have been somewhat lower than usual.

(4.) *Rainy days.*—The average number of days on which some rain or snow fell has been as follows, according to the locations: New England, from 5 to 15; Middle States, 4 to 12; South Atlantic States, 6 to 10; Eastern Gulf States, Ohio Valley, and Tennessee, 9 to 12; Southwest, except 2 in Western Texas, 9 to 14; southern shore of Lake Erie, 13 to 17; southern shore of Lake Ontario, 17 to 23; Michigan, 11 to 22; Wisconsin, 9 to 13; Iowa, 4 to 12; Minnesota, 2 to 12; Nebraska, 1 to 16; Kansas, 1 to 10.

HUMIDITY.

The average relative humidity for the month, as reported from the signal-service stations only, has been very *uniform, and varies from 65 to 75, except at a few localities* on the Lower Lakes, the Texas coast, and the extreme Northwest, where averages of 80 or 85 are reported. Owing to the very low temperature that has prevailed in the latter section, the observations are somewhat uncertain.

WINDS.

The prevailing winds have been northwest in the Middle and Eastern States, northeast in Southern Florida, southeast in the Southwest, and southwest or northwest in the remaining sections of the country, as detailed on Chart No. II.

(1.) The total movement of the wind has been, as usual, least at sheltered positions on the eastern side of the *Appalachian range. The highest record of the month is* 11,600 at Long Branch and Erie; other records are as follows: Indianola, 9,985; Peck's Beach, 9,847; Cheyenne, 9,057; New York, 9,060; Rochester, 9,375; Cape Henry, 9,077. The lowest are Lynchburg, 3,121; Augusta, 3,282; Nashville, 3,416; Shreveport, 3,569; Memphis, 3,880; Portland, Oreg., 2,178; San Diego, Cal., 3,130.

VERIFICATIONS.

(1.) The detailed comparison of published probabilities with the succeeding weathe shows an average percentage of verifications of 83 per cent.; the range being from 7 in the Lower Missouri Valley to 87 in New England.

(2.) The reports of signal-service observers at their respective stations show that, of 149 signals displayed at 28 stations on the Atlantic and Gulf coasts, 13 have not yet been heard from, 67 have been verified at the stations themselves, 40 not so verified and 29 were too late, while 11 occasions have been noted on which signals would have been justifiable if ordered. On the Lakes the display of signals has not yet been resumed.

NAVIGATION.

The maximum and minimum heights of water in the rivers are noted in the table on Chart No. III. Special interest attaches to the serious interruption, by ice, of the navigation, both in the interior and along the coasts from Cape Henry to Nova Scotia. The record of the thickness of ice on the coast, as well as on the fresh-water lakes and rivers, will give some indication of the severity of the season.

(1.) *Fresh-water ice.*—The thickness of ice is reported, in inches, as follows: Nebraska: Missouri River, 25 to 27; Pennsylvania, pond-ice, 16, under 8 inches of snow; river-ice, 18 to 24, and at Williamsport, 30; small creeks solid. New Jersey: Trenton, ice 24; Freehold, 8. Vermont: Lake Champlain, 18; pond-ice, 31 to 48. New Hampshire: Dumbarton, 16; creeks solid. New York: Lockport Canal, 22; Seneca Lake, 6, entirely across. Virginia: Alexandria, *Potomac River, 10 and 12.* Wisconsin: Milwaukee, Lake Michigan, 24.

(2.) *Ocean water.*—New York City, 12 to 16; Sandy Hook, N. Y., 15 at shore, 5 at five hundred yards off shore. New Jersey: Squan Beach, 3. Connecticut: New Haven, 20 to 26. Maine: Penobscot Bay to Machias Bay, 10 to 12, and in retired creek, 30.

(3.) *Obstruction of navigation.*—From special reports in answer to an official circular, it appears that the first inconvenience from ice was felt at New York Bay, January 15, continuing to February 25, and proving the most severe obstruction since 1847. Ice-floes of one or two square miles surface, and packs or hummocks 20 feet high, were quite common. The movements of the ice in *this region* were regulated principally by the tides, unless the hourly wind velocity exceeded twelve miles. In Long Island Sound heavy floes and packs were sometimes 5 or 6 feet thick, and three or four miles in diameter, and harbors were closed for two and three weeks. On the coast of Maine, from Penobscot to Machias Bays, the ice was almost unbroken for fifteen miles off shore, but Eastport Harbor was unobstructed. Baltimore Harbor was nearly blocked up, and heavy ice-drift reported at Cape Henry.

Cape Cod.—A fleet of fifteen or more vessels were frozen in during the latter half of the month.

Harbors and rivers were first freed from ice on the following dates: 22d, Sandy Hook; Louisville, Ky., (closed sixteen days;) 23d, Detroit, Mich.; Dutch Island, R. I.; New Haven, Conn., (closed fourteen days;) Newport, R. I.; 24th, Pittsburgh, Pa.; Washington, D. C.; 25th, Morgantown, W. Va.; Tarentum, Pa., (closed fifty-three days;) New York Bay; 26th, Springfield, Mass.; Saint Louis, Mo.

TEMPERATURE OF WATER.

The maximum and minimum temperatures of the water are given in the table on Chart No. II. The temperatures of the bottom water have been on the average above that of the air for the following stations: *Atlantic and Gulf stations.*—Eastport, 15°; Portland, 10°; Wood's Hole, 7°; New London, 7°; New York, 4°.5; Jacksonville, 4°; Punta Rassa, 6°; Mobile, 0°.5. *River stations.*—Pittsburgh, 12°.5; Louisville, 6°; Knoxville, 7°.5; Nashville, 3°.5; Saint Louis, 6°; Cairo, 4°.

The average temperature of the air and bottom water has been sensibly the same at Wilmington, Augusta, Charleston, and Key West.

The water temperatures have been lower than the air at Savannah, 1°; Memphis, 1°.5; Shreveport, 1°; Galveston, 1°; and Indianola, 1°. Throughout the month the water from New Jersey to Nova Scotia has been from 28° to 34° in temperature.

ATMOSPHERIC ELECTRICITY.

(1.) *Thunder-storms.*—Storms accompanied by electricity, with hail, prevailed very widely on the 23d, 24th, and 25th. The general distribution of the storms for the month is shown by the fact that they occurred on the 2d in Georgia, Tennessee, Alabama, and Indiana; 3d, in Georgia and Tennessee; 10th, Alabama and Louisiana; 11th, Georgia; 19th, Louisiana; 20th, Kansas; 22d, Kansas and Louisiana; 23d, Alabama, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Missouri, Nebraska, North Carolina, Tennessee, and Wisconsin; 24th, Alabama, Georgia, Illinois, Indiana, Kentucky, Maine, Michigan, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Virginia; 25th, Alabama, Georgia, Massachusetts, North Carolina, Tennessee, and Virginia; 28th, Illinois, Indiana, Kansas, Missouri, and Tennessee.

(2.) *Auroras.*—The principal auroras of the month were those of the 26th and 28th. The former, as seen at stations in the West, was more finely developed than as seen in New England; it was observed over an unusually large area. In detail, auroras were visible as follows: On the 3d, in Texas; 6th, New York; 7th, Maine, Minnesota, New York, Vermont, and Michigan; 9th, New Jersey; 14th, Missouri; 18th, Vermont; 24th, Connecticut and Maine; 25th, New York and Virginia; 26th, Maine, Vermont, New Hampshire, Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, Canada, Florida, Tennessee, Michigan, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Nebraska, and Kansas; 27th, Iowa, Illinois, Maryland, New York, New Jersey, Virginia, and Texas; 28th, Maine, Vermont, New York, Connecticut, Rhode Island, Massachusetts, Tennessee, and Indiana.

OPTICAL PHENOMENA.

(1.) *Solar halos.*—The record of solar halos for this month is unusually large, even for so cold a month; they were observed as follows: 1st, Massachusetts and Alabama; 2d, New York, Georgia, Connecticut, Massachusetts, Delaware, New Hampshire, and Pennsylvania; 3d, Minnesota, Alabama, Illinois, Indiana, Iowa, Kansas, Massachusetts, Missouri, Nebraska, and Virginia; 4th, Colorado, Texas, Michigan, Iowa, Indiana, Illinois, and Alabama; 5th, Alabama, Indiana, Nebraska, New York, and Wisconsin; 6th, Illinois, Indiana, Iowa, Kansas, Nebraska, New Hampshire, Ohio, Tennessee, and Wisconsin; 7th, Massachusetts, Minnesota, Connecticut, Illinois, Maine, New Hampshire, New York, Pennsylvania, and Wisconsin; 8th, Indiana, Texas, Illinois, Maine, Massachusetts, Michigan, New Hampshire, New York, Pennsylvania, and Vermont; 9th, Georgia, Illinois, Indiana, Maine, Massachusetts, Michigan, New York, and Wisconsin; 10th, Nebraska, New York, Pennsylvania, and Virginia; 11th, Minnesota, Illinois, Indiana, Iowa, Nebraska, and Wisconsin; 12th, New Mexico, Delaware, Maine, Michigan, New Jersey, New York, Ohio, and Wisconsin; 13th, Massachusetts, Michigan, and New York; 14th, Massachusetts and New Mexico; 15th, Indiana, New Hampshire, and New York; 16th, Minnesota, Colorado, and Michigan; 17th, Massachusetts, Indiana, Iowa, Kansas, Michigan, Nebraska, New York, and Ohio; 18th, Massachusetts, New York, District of Columbia, Illinois, Indiana, Michigan, Pennsylvania, and Wisconsin; 19th, Maine, New Hampshire, and New York; 20th, Iowa; 21st, District of Columbia, Pennsylvania, New Jersey, Michigan, and Wisconsin; 22d, Alabama, Nebraska, New Hampshire, New York, and Wisconsin; 23d, Massachusetts, Pennsylvania,

West Virginia, Connecticut, Delaware, Maryland, New Hampshire, New York, and Wisconsin; 24th, Iowa, Kansas, Maine, Nebraska, and Wisconsin; 25th, Nebraska; 26th, Iowa, Nebraska, and Ohio; 28th, Alabama, Georgia, Tennessee, and Virginia.

(2.) *Lunar halos.*—Full moon occurred February 20, and lunar halos were generally observed over comparatively small areas, the most important one being that of the evening of the 18th, when the entire country was covered by a layer of cold, damp air, which was almost simultaneously precipitated as rain or snow on the morning of the 19th at every station from which reports were received. The record for the month is as follows: 3d, Minnesota, Illinois, and Kansas; 4th, Illinois; 7th, Illinois; 9th, Indiana; 10th, Maryland, District of Columbia, Virginia, New Jersey, Delaware, Maine, Massachusetts, New Hampshire, and Pennsylvania; 11th, Wisconsin; 12th, Tennessee, Michigan, South Carolina, Texas, Georgia, Kansas, Nebraska, New York, and Pennsylvania; 13th, Virginia, Tennessee, Pennsylvania, Connecticut, Indian Territory, New Mexico, Maryland, Missouri, New York, North Carolina, Ohio, and South Carolina; 14th, Alabama, Indian Territory, and New Mexico; 15th, Virginia, Tennessee, New Hampshire, New York, North Carolina, and Utah; 16th, Georgia, Pennsylvania, West Virginia, Mississippi, Iowa, Kansas, Michigan, Missouri, Tennessee, and Wisconsin; 17th, Massachusetts, Maine, Indiana, North Carolina, and Tennessee; 18th, District of Columbia, Delaware, Maryland, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Tennessee, Vermont, West Virginia, Connecticut, and Massachusetts; 19th, Nebraska, Michigan, and New York; 20th, Iowa, Illinois, Indiana, Minnesota, Nebraska, New Jersey, and Ohio; 21st, Michigan, Wisconsin, Illinois, and Ohio; 22d, Massachusetts and Michigan; 25th, Kansas; 26th, Tennessee; 27th, New Hampshire.

(3.) *Mirage.*—Mirage was observed in Kansas, at Atlanta on the 3d, 4th, 5th, 8th, 14th, 15th, 26th, 27th, 28th, and at Ellenwood on the 4th, 7th, and 8th.

MISCELLANEOUS.

(1.) *Zoological.—Bluebirds* were observed at New London on the 23d; Fort Gibson, 21st; Wellborn, Fla., 20th; Burnt Mills, N. J., 22d; Bethel, Ohio, 22d; Jacksonburg, Ohio, 24th; Vineland, N. J., 25th. *Robins.*—New London, 23d; Fort Gibson, 21st; Hinsdale, Mass., 14th; Lynchburg, Va., 15th; Mount Sterling, Ill., 20th; Bethel, Ohio, 22d; Vevay, Ind., 24th. *Frogs.*—Prospect Hill, Va., 3d and 25th; Hacienda Saluda, S. C., 20th and 24th; Troy, Ala., 23d; Cleaveland, Tenn., 24th. *Seals.*—New York outer bay, seen on several occasions. *Larks.*—Wellborn, Fla., 12th, moving north; Bethel, Ohio, 22d; Hudson, Mich., 23d. *Wild Geese.*—Wilsonville, Ala., moving north, 19th; Wet Glaze, Mo., moving north, 20th and 21st; Cave Spring, Mo., moving north, 21st; Brookhaven, Miss., moving north, 26th; Holton, Kans., moving north, 27th; Corning, Mo., moving north, 27th; Alta Vista, Va., moving north, 27th; Wilsonville, Ala., moving north, 28th; Le Roy, Kans., (geese winter here;) Warrensburg, Mo., 20th to 27th, flying north and south. *Brant Geese.*—Le Roy, Kans., 20th. *Wild Ducks.*—Louisville, Ill., going north, 26th and 28th; Warrensburg, Mo., flying north and south, 20th to 27th. *Mocking-Birds.*—Wellborn, Fla., 22d. *Killdeer.*—Le Roy, Kans., 22d. *Cat-Birds and Black-Birds.*—Bellefontaine, Ohio, 23d. *Bees.*—Bethel, Ohio, 24th; Pennville, Pa., 25th. *Cranes.*—Prospect Hill, Va., 24th. *Buzzards.*—Bethel, Ohio, 28th.

(2.) *Meteors.*—The most remarkable meteor of the month is that which actually fell on the 12th in Iowa, a fragment of which, weighing seven pounds, was found near Homestead, and is preserved in the cabinet of the State University. Brief notices are at hand regarding bright meteors from the following States: 1st, New Jersey; 3d, New York; 5th, Georgia; 7th, Wisconsin; 9th, Georgia; 12th, Illinois, Iowa, Minnesota, Nebraska, Kansas; 14th, Indiana, Pennsylvania; 21st, Pennsylvania, Florida; 24th, Missouri, Louisiana; 26th, Minnesota; 27th, Indiana, Wisconsin, Florida; 28th, Vermont.

(3.) *Polar bands* are recorded on the 4th and 14th at Atlantic City; 19th, at North Platte; 15th, at Milwaukee; 21st, at Cleveland.

(4.) *Zodiacal light* was observed on the 1st in Ohio, and on the 7th in Indiana.

(5.) *Earthquakes.*—A severe shock of earthquake was felt on the 7th, at San Francisco, at 10.56 a. m., lasting from two to four seconds, and followed by another at 11.50 a. m., lasting about the same length of time. No damage is reported.

Published by order of the Hon. William W. Belknap, Secretary of War.

ALBERT J. MYER,
Brig. Gen., (Brt. Assgd.,) Chief Signal Officer, U. S. A.

MONTHLY WEATHER REVIEW, MARCH, 1875.

INTRODUCTORY.

The present summary of the weather for March is compiled from the regular tri-daily observations of the United States Signal-Service stations, the regular Canadian obser-

vations, and a large mass of the volunteer observers' reports, together with manuscript, marine, and other occasional communications. The observable characteristics of the meteorology of March are the following: First, the disastrous tornadoes which, on the 20th, visited the States of Alabama and Georgia, and thence passed off toward the Carolinas; second, the general liquidation of the winter's accumulation of ice and snow in the valleys of those rivers which drain the eastern and western slopes of the Alleghany and Blue Ridge Mountain-chains; third, the unusually heavy ice-drifts and icebergs which were reported off the coasts of North America; fourth, the very heavy rain-fall in the cotton-producing region of the Southern States; fifth, the unusually low temperature and late spring.

ATMOSPHERIC PRESSURE.

Chart No. II, by its isobarometric lines, graphically exhibits the average pressure of the atmosphere in the various districts during March. From these lines of equal pressure, it is seen that the area or belt of highest pressure for March stretches along the Atlantic coast from Florida toward Cape Cod.

(1.) *Areas of high barometer.*—The surface-currents of cold air from the frigid regions of British America, so conspicuous in February, were evidently checked as the month of March advanced, and the areas of high barometer grew less and less marked. During March there were no such very high barometers as were reported (viz., 30.92 inches, 30.96 inches, and 30.98 inches, on February 6) in the preceding month. The principal areas of high barometer may be thus enumerated:

No. 1, emerging from the Northwest on the 2d of March, and slowly advancing southeastwardly through the Upper Mississippi Valley, and thence extending eastward on the 3d, over the Lakes and New England, but apparently divided by low barometer No. II, which approached the Lakes from the Gulf region. This high barometer was evidently due to a very broad but shallow surface-current of cold air, flowing from British America southward over the Northwest, the Lakes, and New England, being partly obstructed, as most of the areas of high barometer are, by the "height of land," or elevated wall, running north of the Saint Lawrence River and the Lakes. After the passage of low barometer No. II to the east, the pressure from high barometer No. 1 was soon propagated from the Lakes to the Gulf States.

No. 2, although not marked by very high pressure, had, on the afternoon of the 8th, extended itself almost entirely over the whole country east of the Mississippi Valley, and, at midnight of the same day, was central over the Alleghany belt.

No. 3 was a minor area of high pressure, which moved across the Gulf States on the 9th and 10th, and on the 11th disappeared off the South Atlantic coast.

No. 4. During the 15th of March the pressure increased generally, in a long line from north to south, west of the Mississippi River. On the 16th this area of high barometer remained west of the Mississippi from Dakota to Louisiana. On the 17th it advanced slowly eastward, the southern portion of the high-pressure belt becoming detached in the Gulf States, and moving southeastwardly, while storm-center No. VIII, coming up from the far Southwest, intervened between it and the main or northwestern portion of the high-pressure area. On the night of March 18 the barometer in the Northwest rose as high as 30.61 inches; meantime the southern storm-center (No. VIII) was in Louisiana. This storm-center came in, therefore, between two areas of high pressure, and this fact is of great interest in studying and elucidating the tornadoes which followed in the train of storm-center No. VIII, and, on the 20th instant, inflicted so much damage and disaster in Alabama, Tennessee, and Georgia.

No. 5. The next noticeable high-pressure area appears on the weather-map for March 22, 7.35 a. m., when the barometric readings for the whole interior of the country (from the Lakes, Wisconsin, and Iowa to the Gulf coast) are high. This area is seen during the day of the 22d, in a more concentrated form, central in the Ohio Valley, and moving eastward. On the 23d, this area passed slowly over the Alleghanies and the Middle States, gradually disappearing in the Atlantic on the 24th.

No. 6. Still another area of high-pressure commenced advancing from the northwest on the night of the 23d, and progressed eastward, becoming central in the lower Ohio Valley at midnight of the 24th. Thence, on the 25th, it crossed Tennessee and North Carolina, and left the Carolina coast on the 26th.

No. 7. One more important area of high barometer passed, on the 27th, over the Northwest and Upper Lake region; and on the 28th, at 7.35 a. m., was central just north of Lake Ontario, whence, during that day and the following, it made its way to New England and the Middle States, where it remained nearly stationary, with northeasterly and southeasterly winds and partly cloudy weather, till after the month closed. The meteorological effects of this area will come into further notice in the study of the April weather.

(2.)—The following were the only depressions worthy of notice in the review:

No. I. The first storm-center of the month passed rapidly, during the morning of March 1, from Eastern Missouri to the middle of the Ohio Valley; thence, during the

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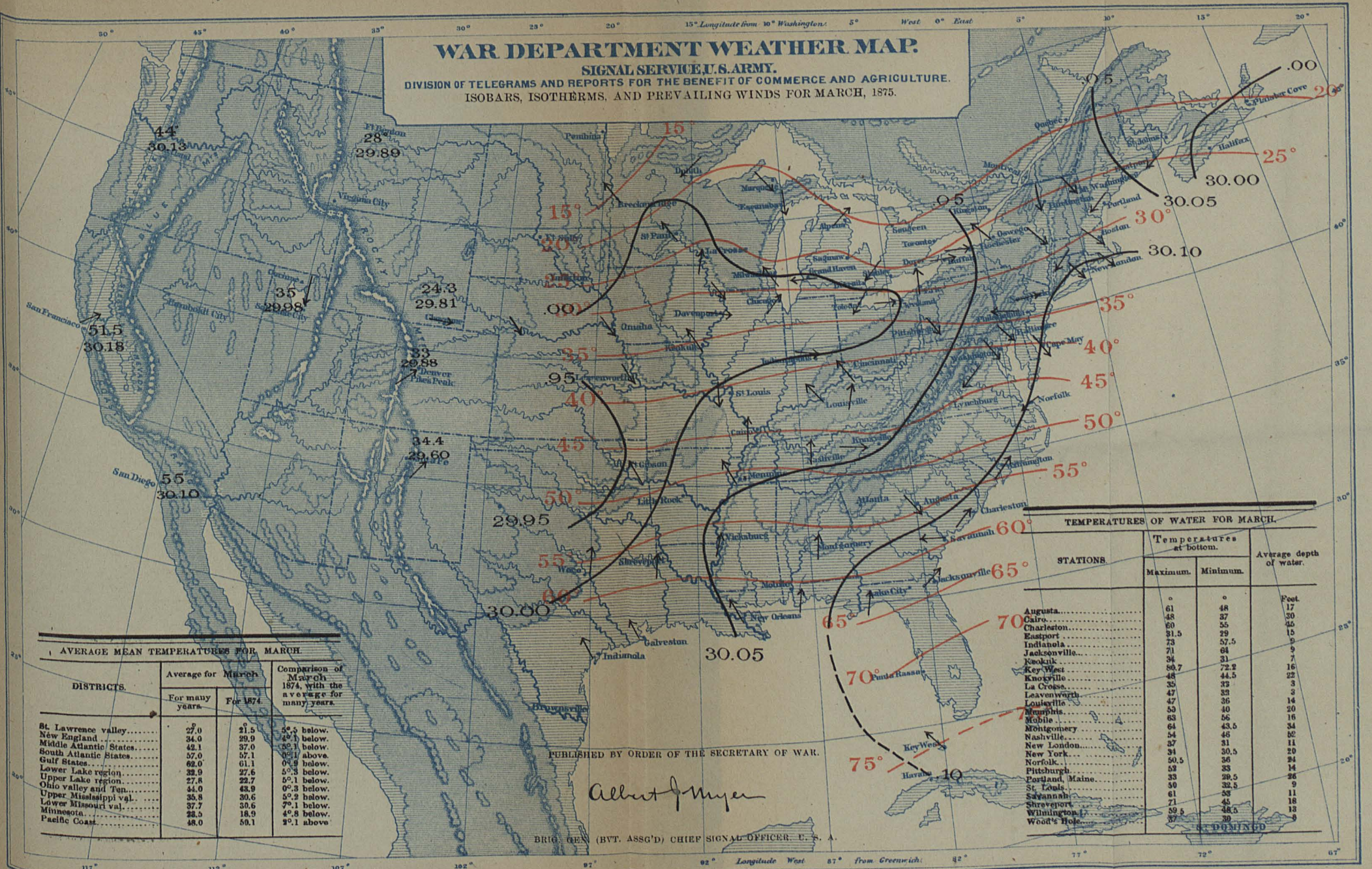
No. II.

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, 1875.



AVERAGE MEAN TEMPERATURES FOR MARCH

DISTRICTS.	Average for March		Comparison of March 1874, with the average for many years.
	For many years.	For 1874.	
	°	°	
St. Lawrence valley	27.0	21.5	5°.5 below.
New England	34.0	29.9	4°.1 below.
Middle Atlantic States	42.1	37.0	5°.1 below.
South Atlantic States	57.0	57.1	0°.1 above.
Gulf States	62.0	61.1	0°.9 below.
Lower Lake region	32.9	27.6	5°.3 below.
Upper Lake region	27.8	22.7	5°.1 below.
Ohio valley and Ten.	44.0	43.9	0°.3 below.
Upper Mississippi val.	35.8	30.6	5°.2 below.
Lower Missouri val.	37.7	30.6	7°.1 below.
Minnesota	23.5	18.9	4°.8 below.
Pacific Coast	48.0	50.1	2°.1 above

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

TEMPERATURES OF WATER FOR MARCH.

STATIONS	Temperatures at bottom.		Average depth of water.
	Maximum.	Minimum.	
	°	°	Feet.
Augusta	61	48	17
Cairo	48	37	30
Charleston	60	55	45
Eastport	31.5	29	15
Indianola	73	57.5	9
Jacksonville	71	64	9
Keokuk	34	31	7
Key West	80.7	72.2	16
Knoxville	48	44.5	22
La Crosse	35	33	3
Leavenworth	47	33	3
Louisville	47	36	14
Memphis	53	40	20
Mobile	63	56	16
Montgomery	64	43.5	34
Nashville	54	46	82
New London	37	31	11
New York	34	30.5	29
Norfolk	50.5	36	24
Pittsburgh	53	33	14
Portland, Maine	33	29.5	26
St. Louis	50	32.5	9
Savannah	61	53	11
Shreveport	71	45	18
Wilmington	59.5	48.5	13
Wood's Hole	37	30	9

ST. DOMINGO

A.M. PHOTO-LITHOGRAPHIC Co. N.Y. (OSBORNE'S PROCESS)

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No. III.

AVERAGE PRECIPITATION FOR MARCH.

DISTRICTS.	Average for March. For many years.	Average for March. For 1875.	March, 1875, compared with the average for many years.
	Inches.	Inches.	
St. Lawrence Valley	2.75	1.81	Deficiency.
New England	3.05	3.48	Excess.
Middle Atlantic States	3.76	5.17	Excess.
South Atlantic States	4.55	6.89	Large excess.
Eastern Gulf States	4.84	5.75	Excess.
Western Gulf States	3.64	6.19	Large excess.
Lower Lake region	2.82	2.66	Deficiency.
Upper Lake region	1.91	2.08	Excess.
Ohio Valley	3.74	4.60	Excess.
Tennessee	4.18	9.94	Large excess.
Upper Mississippi Valley	2.03	2.02	Normal.
Lower Missouri Valley	1.87	1.84	Normal.
Minnesota	1.58	2.03	Excess.
Pacific Coast	2.73	3.72	Excess.

HEIGHTS OF RIVERS ABOVE LOW WATER MARK.

STATIONS.	Highest. Date. March.	Highest. Height. ft.	Highest. Height. in.	Lowest. Date. March.	Lowest. Height. ft.	Lowest. Height. in.
RED RIVER.						
Shreveport	31	24	1	12	17	6
MISSOURI.						
Fort Sully	—	—	—	—	—	—
Yankton	—	—	—	—	—	—
Omaha	29	8	0	30	6	0
Leavenworth	31	9	7	15	4	6
MISSISSIPPI.						
St. Paul	—	—	—	—	—	—
La Crosse	28–31	3	7	30	3	2
Dubuque	31	10	4	1–4	3	9
Davenport	29	12	8	28	3	9
Keokuk	31	9	1	10	4	6
St. Louis	16	12	4	10	5	1
Cairo	21	43	8	1	27	7
Memphis	28–31	33	9	1	11	6
Vicksburg	30–31	41	5	4	16	8
New Orleans*	31	4	11	4–5	10	11
CUMBERLAND.						
Nashville	2	41	4	14	18	10
OHIO.						
Pittsburgh	16	20	6	11	6	8
Cincinnati	2	42	1	28	23	8
Louisville	21	18	0	29–31	9	9

* Below high water mark.

afternoon and evening, to Pittsburgh; and, between midnight of the 1st and the morning of the 2d, it moved off the New England coast. This storm-center was attended with heavy rains in the Southern and Gulf States and Tennessee, with high winds, sleet, and snow on the Middle and Eastern Atlantic coast, and with heavy snows in the Lake region and the Upper Mississippi Valley, and heavy rains in the Ohio Valley. The Ohio and its tributaries rose considerably after the passage of the disturbance.

No. II was slightly developed in the Western Gulf on the morning of the 2d, but its cyclonic influence was not marked till the afternoon of that day, when high, northerly winds and cold weather were reported from the Western Gulf, and warm southerly and easterly winds and rain from the Eastern Gulf and South Atlantic States. This depression moved northward rapidly, crossing the Ohio River about midday of the 3d, a little east of Cincinnati, and thence curving north of Pittsburgh, its course lay somewhat south of east, and, during the night of the 3d, it disappeared off the New Jersey coast. Very high winds accompanied it on the Atlantic coast, the anemometer showing gales of forty miles an hour at Sandy Hook and Long Branch, and fifty miles an hour at Squan Beach. Heavy rains fell along its pathway from Mississippi to Kentucky, and snow and sleet prevailed north of the Ohio Valley and over the Middle and Eastern States.

No. III. The next definite depression comes into view on the midnight of the 4th, preceded by a light snow in the Lower Missouri Valley. Though not an obscure depression, this disturbance was less marked than its two predecessors; it moved more slowly forward, and its rains and winds were more moderate.

No. IV. On the morning of the 6th a storm-center of more decided features appeared on the Gulf coast south of Louisiana, preceded by rain and easterly winds in Mississippi and Alabama. The path of this storm lay almost due northeast, through Alabama, East Tennessee, and Virginia, and thence off the Atlantic coast toward Halifax, which it reached on the morning of the 8th, having kept up nearly a uniform progressive velocity. The rain-fall along its route was very great, as will be seen by some of the reports: At Knoxville, .86 inch of rain fell in twenty-four hours; at New Orleans, 1.20 inches in twenty-four hours; at Montgomery, Ala., 2.02 inches in twenty-four hours; at Norfolk, 2.78 inches in twenty-four hours; at St. Mark's, Fla., 2.84 inches in twenty-four hours. In the Mississippi Valley, snow fell at and south of Memphis, and a severe "norther" (in which the wind blew sixty miles an hour) prevailed on the afternoon and evening of the 6th, off the Texas coast. As the gale approached the Atlantic coast very high winds and heavy seas were experienced, with occasional gales blowing from forty to fifty miles an hour, and heavy rains and snows in the Middle and Eastern States, extending west to the Central Ohio Valley.

No. V. On the 8th, another depression, accompanied by snow, began to move from the Northwest across the Lake region; though in its Lake-track considerable snow fell, it was not otherwise worthy of notice.

No. VI is first seen on the Weather Maps on the afternoon of the 10th, during which it developed into a trough-shaped depression, running north and south from Dakota toward Kansas. During the morning of the 11th, it was passing, in a more concentrated form, across Iowa; and on the evening of that day appeared on the eastern side of Lake Michigan, whence its track lay nearly due northeastward, and it disappeared during the afternoon of the 12th, north of the Saint Lawrence Valley. There is nothing else special to note concerning it.

No. VII pursued an eccentric course, and with a progressive velocity frequently varying. It entered the field of observation in Dakota on the 12th, and moved southeast to Eastern Kansas, where its center was nearly stationary, in the vicinity of Leavenworth, for twenty-four hours. Its path thence runs northeastwardly to Toledo and Detroit, from which points it passed in a northerly direction over Lake Huron and thence nearly due eastward over Canada, not leaving the Atlantic coast till the evening of the 18th. So slow was its motion, and yet low the barometer, that this depression drew toward it large masses of warm, moist air from the Gulf and South Atlantic regions. Drawn toward the interior and Appalachian Mountains in the shape of vapor-laden southerly winds, these warm volumes of air served to liquify the mountain ices and snow—the accumulation of the winter—and dislodging immense quantities of ice along the already rain-swollen rivers that drain the Appalachian slopes, very dangerous ice-gorges and floods were produced in these streams. This result was, of course, intensified by the warm and copious rains that fell over nearly the whole country from the Gulf to the Lakes and New England, during the deliberate passage of this storm-center. This depression was followed by heavy snow-storms in the Lake region and the Northwest.

No. VIII. This storm was the most important in its consequences and far-reaching disturbances that occurred during March. It formed and manifested itself slowly in the Western Gulf region during the 17th and 18th, and moved slowly through Louisiana on the 19th. Its center advanced rapidly northeastward from the vicinity of Vicksburg on the evening of the 19th, reaching the interior of Kentucky on the morning of

the 20th, and thence progressing in a more easterly direction reached Eastern Virginia in the afternoon of the same day. From this district it appears to have progressed in a southeasterly course toward Cape Hatteras, and to have started on its Atlantic track upon or about the 33rd parallel of north latitude. Very heavy rains fell in the Gulf and South Atlantic States on the 19th and 20th. The storm, as it neared the Atlantic coast, produced by its indraught high and dangerous easterly winds. But its most serious consequences were felt in Alabama, Georgia and South Carolina, in the shape of a series of fearful

TORNADOES.

These tornadoes, perhaps four in number, occurred with most disastrous results over the country between Central Alabama and Central South Carolina, about noon and in the afternoon of March 20. One of these storms entered Harris County, Georgia, from Lee County, Alabama, about noon. A wind-storm was reported at Atlanta early in the day, and followed by hail at 1 p. m. One of these tempests appears to have divided near Hancock County, Georgia, one part going east on a track more northerly than that of the other.

But the effects of this remarkable storm are apparently traceable beyond the United States, and as far east on the ocean as the Bermuda Islands. On the 21st of March, the observer reports a gale from the Southwest set in at St. George's, the wind in the afternoon rising to sixty-one miles an hour, with a falling barometer. On the 22d of March, the barometer still falling slowly, the wind was still very high, and at 5 p. m. a thunder-storm passed to the southward. On the 23d, at 12.30 a. m., the wind shifted to northwest suddenly, and at 1.30 a. m. the velocity was eighty-one miles an hour, with squally weather and rain. There is, therefore, reason to suppose that the general depression which passed off the Carolina coast on the 20th, was felt at the Bermudas on the 21st, 22d, and 23d.

No. IX. On March 22, the afternoon reports showed a depression in Dakota moving slowly southeastward. Its track is given on the Storm-Chart, but it does not appear to have been of any special importance.

No. X passed from Dakota north of the Lakes, and thence eastward through the Saint Lawrence Valley, with no very noteworthy phenomena.

No. XI. On the 28th, the barometer was low west of the Mississippi River, and on the night of the 29th there was a noticeable depression, central in Nebraska, which, on the 30th, passed slowly over the Upper Lake region, remaining nearly stationary during the afternoon and night of the 30th, and rapidly moving to the northeastward early on the morning of the 31st.

ATMOSPHERIC TEMPERATURE.

Chart No. II expresses graphically (by the red isothermal lines) the mean distribution of temperature for March; and the table in the left-hand lower corner gives numerically, the actual and comparative severity and mildness of the temperature for the various districts. The isotherms of 20° (running through the Lake region and, the Saint Lawrence Valley) and 60° (running through the Gulf States) indicate the extreme thermometric means for March. The means for the Saint Lawrence Valley, the Middle States, the whole Lake region, and Upper Mississippi Valley, are all 5° or more below those of many years, evidencing the extraordinary severity and protractedness of the winter's cold. In only one district east of the Rocky Mountains (*i. e.* the South Atlantic States) has the temperature been as high as usual for the month. The lateness of the spring is specially marked in the Lower Missouri Valley, and is also observed in New England and the Northwest. The abnormal cold of this month is the lingering result of the intensely severe winter, and is not ascribable to any physical causes operating in March. The isothermal lines run nearly due east and west, with no southward deflection in the Mississippi Valley, due to areas of high barometer and low temperature descending from the Northwest. A comparison of the isothermal lines for February and March shows that, during the latter month, the mean rise of temperature over the United States was from 5° to 10° Fahrenheit.

PRECIPITATION.

On Chart No. III is shown the distribution of rain and melted snow for March. It will be seen from this that a very large excess of rain fell in the Lower Mississippi Valley, the Gulf and South Atlantic States, and Tennessee. In these districts the fall amounted, in some localities, to 12 or 14 inches and more. There was also a very unusual quantity of water precipitated in Southern and Central Virginia. The minimum fall occurs in the Florida peninsula; but in the other portions of the South Atlantic States a very great excess fell, the total amount in Georgia occasionally exceeding 10 inches. The largest excess is in Tennessee, where the month's rain-fall has been more than double the usual quantity. The only deficiency, and that is an insignificant one, is in the Lower Lake region. This immense and general rain-fall is attributable to the large evaporation of ice and snow and the moist southerly winds

encountering, in their movements, the condensing influence of a continent chilled to an unusual degree by the excessive cold of January and February.

The number of days on which rain fell during the month, in the several districts, averages as follows: In New England, 15 days; in the Middle Atlantic States, 15; in the South Atlantic States, 14; the Gulf States, 12; the Lake region, 15; the Ohio Valley and Tennessee, 15; and in the Northwest, 11 days.

HUMIDITY.

The average relative humidity for the various districts is as follows: For New England, 73 per cent.; Middle Atlantic States, 76; South Atlantic States, 72; the Eastern Gulf States, 74; Western Gulf States, 71; Lower Lakes, 75; Upper Lakes, 73; Ohio Valley and Tennessee, 67; Upper Mississippi Valley, 74; the Lower Missouri Valley, 72; and Minnesota, 77.

WINDS.

The mean direction of the wind at the different stations of the Signal Service is shown on Chart II by the arrows, each arrow flying with the prevailing wind. The total movement in miles of the atmosphere, in all directions, as recorded by the anemometer at each station during March, furnishes some interesting maxima and minima. The following maxima may be specially mentioned: Cheyenne, eleven thousand six hundred and fifteen miles; Cape Henry, ten thousand one hundred; Long Branch, nine thousand nine hundred and sixteen; Breckenridge, Minnesota, eleven thousand nine hundred and six; Erie, twelve thousand and forty-two; Indianola, ten thousand four hundred and ninety-five; Omaha, nine thousand three hundred and fifty-three; Sandy Hook, eleven thousand and fifty. Among the chief minima are Baltimore, three thousand eight hundred miles; Augusta, four thousand two hundred and seventy; Lynchburg, three thousand four hundred and seventy-two; Nashville, four thousand six hundred and seventy-four; Pittsburgh, four thousand eight hundred and six.

TEMPERATURE OF WATER.

This element is presented by the table on the lower right-hand of Chart No. II. The table gives the maximum and minimum temperatures of the water at the different Lake, River, and Sea-coast stations, the observations having been taken at the bottom.

VERIFICATIONS.

(1.) The careful comparison of the published predictions (or probabilities) with the weather following, as reported by telegraph, gives as the average of verifications 83.7 per cent. The average per centage of omissions to predict was 1.9.

(2.) During the month of March there were displayed, at United States ports, 162 cautionary signals or storm-warnings. Of this number, 28 were not justified; the remainder, 134, were justified. The percentage of justification, therefore, was 83.7. There were reported seven storms for which no warning signals were ordered. During March no cautionary signals were displayed on the Lakes, because of the suspension of navigation. Their display will be resumed on the 15th of April.

NAVIGATION.

A tabular exhibit of the oscillations of the rivers is given on Chart No. III. The remarkable ice-blockade on the coast from Cape Henry to Halifax, noted in the February Weather Review, was raised almost entirely about the 1st of March. But the European steamships arriving at United States ports in March reported unusually enormous ice-fields and icebergs, floating southward off the Atlantic coast.

(1.) *The breaking up of ice and re-opening of navigation* has taken place as follows: At Rockford, Ill., on the 31st; at Havana, Ill., on the 26th; at Muscatine, Iowa, the Mississippi opened on the 31st, and at Fort Madison, Iowa, on the 29th; the Iowa River, at Iowa City, on the 14th; at Ellenwood, Kan., on the 6th; at Lansing, Mich., ice went out of Cedar River on the 31st; at Plattsmouth, Nebr., ice broke in Platte River on the 14th, and in the Missouri River the 25th; at De Soto, Nebr., the Missouri broke on the 29th; at Clear Creek, Nebr., on the 30th; at Nichols, N. Y., the Susquehanna broke on the 16th; at Tioga, Pa., the Tioga River broke on the 15th; at Cleveland, Ohio, river cleared on the 16th; at Pennville, Pa., on the 16th; at Beloit, Wis., ice cleared on the 29th; at Davenport, Iowa, the river was partly opened on the 30th; at Keokuk, river broke on the 14th; at Sandy Hook, the ice moved out on the 7th; at Toledo, on the 29th; at Leavenworth, river was cleared on the 16th; at Detroit, ice broke up on the 8th.

ATMOSPHERIC ELECTRICITY.

Thunder-storms occurred principally as follows: On the 1st and 2d, in the South Atlantic and Gulf States, Indiana, Kansas, Kentucky, and Missouri; on the 3d, in Georgia and Mississippi; on the 4th and 5th, in Mississippi, Louisiana, and Ohio; on the

7th, from Georgia to New Jersey; on the 12th, in Indiana, Kentucky, Maryland, and Tennessee; from the 13th to the 16th, they were quite general, except in New England. From the 23d to the close of the month, they were frequently reported from the southern and interior districts. Between 300 and 350 thunder-storms have been reported during March.

Auroras were comparatively few in number. They were seen on the 1st, in Vermont and Minnesota; on the 2d, in Iowa, Michigan, Minnesota, Nebraska, New York, Wisconsin, Pennsylvania, and Massachusetts; on the 3d, in Iowa, Vermont, and Massachusetts; on the 6th, in Wisconsin; on the 7th, in Michigan and Wisconsin; on the 8th, in New Hampshire and Ohio; on the 21st, in New York; on the 23d, in Kansas; on the 28th, in Maine, New York, Vermont, Wisconsin, Massachusetts, and Michigan; on the 29th and 30th, in Vermont.

OPTICAL PHENOMENA.

Solar halos were observed frequently, *e. g.*, at Savannah on the 2d, 11th, 17th, 18th, 24th, and 27th; Eastport, Me., 13th and 31st; Rochester, 11th, 28th, 29th, and 30th; Springfield, Mass., 9th; Morgantown, W. Va., 18th; Erie, 29th; Wood's Hole, Mass., 7th; Saint Louis, 10th; Leavenworth and Mobile, the 17th; New London, 25th; Mount Washington, 11th; Fort Gibson, the 12th; Wilsonville, Ala., 11th and 13th; Hutchinson, Colo., 31st; Southington, Conn., 26th; Rockford, Ill., 17th; Riley, Ill., 4th, 12th, and 18th; at Wyanet, Ill., on the 12th, 16th, and 17th; at Lebanon, Ill., 10th; Rising Sun, Ind., 18th; South Bend, Ind., 31st; Rockford, Iowa, 3d; Afton, Iowa, 4th and 19th; Guttenberg, Iowa, 3d, 4th, 7th, and 10th; Independence, Iowa, 3d, 4th, and 17th; Cresco, Iowa, 4th and 7th; Holton, Kans., 17th; at Ellenwood, Kans., 17th, 18th, and 27th; Cornish, Me., 1st, 3d, 5th, 11th, 14th, and 28th; Standish, Me., 3d, 18th, 24th, 25th, 26th, 28th, and 30th; Mount Desert, Me., 14th; Oxford, Me., 18th; Newburyport, Mass., 28th; Somerset, Mass., 14th; Andover, 1st; Florida, Mass., 9th; Fall River, 29th; Detroit, 4th; Lansing, 29th; Warrensburg, Mo., 22d, 23d, 26th, and 27th; Howard, Nebr., 4th, 9th, 15th, 16th, and 17th; Auburn, N. H., 1st, 3d, 6th, 7th, 11th, 13th, 24th and 28th; Troy, N. Y., 26th and 28th; Reading, Pa., the 2d. Solar halos were also seen in Ohio on the 16th and 23d; Pennsylvania, 18th, 19th, 22d, 24th, 26th, and 29th; Tennessee, 6th, 11th, 22d, and 31st; Vermont, 11th, 24th, and 26th; Virginia, 6th, 11th, 12th, and 19th; Wisconsin, 4th, 5th, 8th, and 10th.

Lunar halos were reported at Wilmington, N. C., on the 11th; Buffalo, 15th and 18th; Savannah, 13th, 14th, and 18th; Boston, 18th; New York and Philadelphia, 19th; Memphis, 5th; Cincinnati, 22d; Keokuk, 17th and 22d; Grand Haven, 17th, 18th, and 21st; La Crosse, 13th, 16th, and 20th; Eastport, 13th; Nashville, 18th; Toledo, 16th and 21st; Springfield, Mass., 6th and 22d; Louisville, 14th; Morgantown, 14th and 18th; Cairo, 17th; Erie, 18th; Indianola, 16th and 18th; Denver, 18th; Shreveport, 22d; Oswego, 23d; Atlantic City, 18th and 23d; Escanaba, 20th; Mobile, 16th and 17th; Fort Gibson, 17th and 21st; Detroit, 16th, 18th, and 21st.

Mirage reported from Atlanta, Kans., on the 3d, 7th, and 16th inclusive, 21st, 22d, 24th, 26th, 27th, and 28th; from Ellenwood, Kans., on the 7th, 13th, and 28th.

MISCELLANEOUS.

Meteors were witnessed in Louisiana on the 1st, 4th, 23d, and 29th; in Pennsylvania on the 2d; in Colorado on the 6th; in Texas on the 8th; in New York on the 9th, 22d, and 30th; in Mississippi on the 12th; in Illinois on the 23d and 27th: in Indiana on the 26th; and in Michigan on the 29th.

Polar bands were noted at Cleveland, Ohio, on the 8th; Atlantic City on the 27th; Fort Gibson on the 11th; Iowa City on the 6th; and at Grand Haven on the 13th.

Zodiacal light was observed on the 29th at Ellenwood, Kans.

Zoological.—*Wild geese* were reported going northward at Cleveland on the 13th and 14th; Springfield, Mass., 18th; Morgantown, W. Va., 12th; Atlantic City, 9th; New London, 26th; Fort Gibson, 7th; Saint Paul, 27th; Wilsonville, Ala., 1st; Louisville, Ill., 7th; Riley, Ill., 29th. At Wyanet, Ill., geese going southwest on the 13th; Lyndon, Ill., going north on the 13th; Leesburg, Ind., north on 14th; Afton, Iowa, north on 10th; Rockford, north on 25th; Council Bluffs, north on 10th; Mount Desert, Me., 31st; Woodlawn, Md., on 11th and 31st; Sibley, Minn., on 25th; North Hammond, N. Y., on 28th; Austin, Tex., on 22d; Lynchburg and Alta Vista, Va., on 9th; Bloomfield, Wis., on 26th. *Bluebirds* at Keokuk on 30th; Toledo on 14th; Springfield, Mass., on 11th; Hutchinson, Colo., on 27th; Southington, Conn., on 10th; Galesburg, Ill., on 11th; Afton, Iowa, on 23d; Holton, Kans., on 9th; Billerica, Mass., on 30th. *Robins* first seen at Oswego on 29th; Hutchinson, Colo., on 24th; Southington, Conn., on 12th; Galesburg, Ill., on 11th; Leesburg, Ind., on 14th; Independence, Iowa, on 17th; Holton, Kans., on 10th; Westboro', Mass., on 31st; Westerville, Ohio, on 14th. *Larks.*—Wellborn, Fla., on 26th; Geneseo, Ill., on 28th; Afton, Iowa, on 23d; Ellenwood, Kans., on 12th; Sibley, Minn., on 25th. *Martens.*—Keokuk, 30th; Morgantown, 30th; Indianola, Tex., 13th, (first of the season;) Fort Gibson, 13th; Wilsonville, Ala., 30th and 31st; Wellborn, Fla., 26th. *Wild Pigeons.*—Morgantown, W. Va., 14th and 24th; Riley, Ill., 14th; Ris-

ing Sun, Ind., 30th; Guttenberg, Iowa, 25th; Northport, Mich., 31st; Jacksonburg, Ohio, 14th; Dunbar, Pa., 12th. *Killdee* appeared at Belvidere, Ill., 29th; Fort Madison, Iowa, 29th; Ellenwood, Kans., 25th; Woodlawn, Md., 17th; Sibley, Minn., 28th. *Black-Birds*—nearly about the same time as bluebirds. *Cranes.*—North on 26th at Wellborn, Fla.; Leesburg, Ind., 14th; Independence, Iowa, 31st; LeRoy, Kans., 13th. *Buzzards.*—LeRoy, Kans., 13th. *Swallows.*—Fall River, Mass., 28th. *Fire-flies.*—Indianola, Tex., 27th; Brookhaven, Miss., 28th. *Mosquitoes.*—Ellenwood, Kans., 28th; New Orleans, 15th.

Water and barometer oscillations.—Observations at Marquette, on Lake Superior, show that the water in the lake oscillated sixteen times with the barometer, and seventy-seven times in a contrary manner.

Published by order of the Hon. Wm. W. Belknap, Secretary of War.

ALBERT J. MYER,
Brig. Gen., (Brt. Assgd.,) Chief Signal-Officer, U. S. A.

MONTHLY WEATHER REVIEW, APRIL 1875.

INTRODUCTORY.

The present weather-review expresses the main features of the April meteorology, as deduced from the following reports and records:

Reports from 88 stations of the United States Signal Service.
Reports from 10 stations of the Canadian meteorological service.
Reports from 267 volunteer observers.
Reports from 1 United States Naval Hospital.
Reports from 27 United States Army surgeons.
Records furnished by private observers, marine-logs, and the press.

The most noteworthy peculiarities of the weather are as follows: (1.) The extraordinary and almost universal continuation of the cold weather. (2.) The frequency, lateness, and destructiveness of the April frosts. (3.) The lateness of the rivers and lakes in opening to navigation. (4.) The unusually high range of the barometer. (5.) The unusually large quantities of drift-ice and enormous icebergs off the Atlantic coasts.

ATMOSPHERIC PRESSURE.

The graphic Chart No. II shows the average atmospheric pressure by the isobaric lines in *black*. The monthly phenomena of pressure, as indicated by the barometer, are grouped below under the heads of *Areas of High Barometer* and *Areas of Low Barometer*.

(1.) *Areas of High Barometer.*—Of these, eight are noteworthy, as intimately connected with the controlling features of the month's meteorology. Some of these high barometers reached the figures 30.50 inches, and they were attended by severe cold, killing frosts, and snow. They have served to make the average barometric range for April higher than the normal range, or that which is the mean of many years' observations. The following details give the time, progress, and effects of the different high barometers:

First. A high barometer prevailed over the larger portion of the Gulf States during the first three days of April, being central on the 3d in Southeastern Louisiana. It was attended by low temperature on the 1st and 2d, and by heavy rain on the 1st.

Second. On the 4th, another area of high pressure appeared in the Northwest and Upper Lake region, and moved southeastwardly over the Lower Lakes, the Upper Ohio Valley, and the Middle and Eastern States, which last section it reached on the afternoon of the 5th. Its progress was marked by a decided reduction of temperature and northerly winds. This area, after spreading over all the Atlantic States on the 5th, remained nearly stationary till the afternoon of the 6th. It was then augmented by a

Third area of high pressure, which descended from beyond the Saint Lawrence Valley, with low temperature, northeasterly winds, and occasional snow in New England. This area culminated off the Middle Atlantic coast on the night of the 7th.

Fourth. During the afternoon of the 11th, a decided rise of the barometer was reported from the Northwest, and a belt of high pressure rapidly developed west of the Mississippi, but soon disappeared except in Texas, where, in diminished intensity and extent, it continued till the 14th.

Fifth. An extensive area of very high barometer advanced, on the evening of the 15th, from Dakota and Montana, southeastwardly, along the Missouri Valley, and, very quickly, the pressure rose everywhere west of the Mississippi River, with very cold, frost-bearing winds. This area of high barometer was one of the important features of the April weather. On the 16th, it had overrun the whole Mississippi Valley

and diffused its freezing temperatures as far south as Tennessee and Arkansas. On the 17th, it was accompanied by snow in the Ohio Valley and Lake region, and its chilly influences were further disastrously felt on the morning of the 18th from North Carolina and Tennessee to the Lakes and New England. The injury to vegetation was very great during the 17th and 18th.

Sixth. On the 20th, another area of this character covered the Upper Lakes, and thence progressed southwardly over the Lower Lakes, the Ohio Valley, and the Alleghany Mountain region. But its effects were not felt so disastrously as those of its predecessor.

Eighth. Areas of decidedly high pressure were formed in the Northwest on the 23d, and over the Lake region on the 26th.

(2.) *Areas of Low Barometer.*—Several of these depressions, especially from the 18th to the 26th, were vague, ill-defined, and irregular in their movement. Two or three of a feeble character are not capable of being charted. Ten of the most definite and decided depressions will be found on Chart No. I. Of this number, No. X is probably the most marked and important storm of the month, while No. VII is distinguished as little more than a local disturbance. A small storm-center, attended with rain and snow, passed over Wisconsin, northeastwardly, on the 1st. But the first important storm, here designated as

No. I, appears well developed, with barometric reading 29.33, on the afternoon of the 2d of April, then central in Western Dakota. It traversed only the further Northwest and the Upper Lake region, and was lost to view on the night of the 3d, north of Lake Huron. It was attended, however, with heavy snows over a belt running east and west, about four hundred miles broad and one thousand miles long, from Dakota to Lake Huron.

No. II made its first distinct appearance in the Southwest on the morning of the 4th, and its track lay nearly due northeastward through Kansas, Nebraska, Iowa, and Wisconsin, passing beyond the latter State on the 6th. It occasioned a high temperature in the Mississippi Valley on the 4th and 5th, and high northeast winds on Lake Superior during the afternoon of the 5th, but the precipitation accompanying it was light. The barometer gradients in this depression were also generally light.

No. III pursued very nearly the same track as its predecessor, except that it made a slight detour to the northwestward, after having moved from the Southwest into Northern Iowa. Occupying from the afternoon of the 6th till the midnight of the 8th in reaching Lake Superior, it lingered for twenty-four hours a little north of that lake, and then passed off toward Hudson's Bay. During the midnight of the 6th, sleet and very heavy rain preceded this low-barometer area in the Central Missouri Valley, and the next morning the rain-area progressed in front of it from Nebraska to Wisconsin and Minnesota. The heavy rain-fall along the Missouri and its tributaries was subsequently felt in the rise of that river, reported from the 9th to the 12th of April; it was also perceptible in the increased volume of the Upper Mississippi, as reported on the 9th and 10th. Cold and high northwest winds, with sleet and snow, followed in its rear, as this depression disappeared to the northward.

No. IV also had a southwestern origin in Texas on the 10th, but it moved over more southerly parallels, in a path almost due northeast from Texas to Connecticut, trending a little north into the Ohio Valley. It was attended with considerable rain-fall in the Ohio Valley and Tennessee, and with frequent but light rains in the Middle States. High easterly winds and heavy snows preceded its approach in New York and New England on the 13th.

When in the Upper Ohio Valley, this depression was but ill-distinguished from an extensive area of low barometer then (on the 12th) covering the entire country from Illinois and Lake Michigan to Pennsylvania, Virginia, and the Carolinas. During this day, three smaller depressions were visible within the great area of low barometer—one in Illinois, one in East Tennessee, and one in Pennsylvania. By 7.35 a. m., of the 13th, there were only two of these left, one in Pennsylvania and that previously in East Tennessee, now advanced to the Virginia and Delaware sea-coasts. These remained nearly stationary till the evening of the 13th, and, at midnight of that day, are seen on the weather-map as a single depression, central off Long Island. The Pennsylvania branch, the original nucleus, remained stationary in the vicinity of Pittsburgh nearly twenty-four hours.

No. V was a Lake-depression, emerging on the night of the 14th from Northern Minnesota and passing along the central line of the Lake system to the lower Saint Lawrence Valley, where it vanished on the 16th. It was marked by high and dangerous winds on the Lakes, and by considerable precipitation, and was followed by very low temperatures, *e. g.*, 13° F., 14° F., 4° F., 10° F., and 6° F., in the Northwest and Upper Lake region, the temperatures ranging from 12° to 20° F., in the Lower Lake region. This intense cold was sufficient to restore for the time the rigorous conditions of winter, and milder weather did not intervene over the Lakes till the close of the 18th.

No. VI. A marine-storm, moving along the Atlantic coast on the 16th and 17th, approached Cape Hatteras apparently from the West Indies, and occasioned high 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.

TRACKS OF CENTRES OF LOW BAROMETER FOR APRIL, 1875.

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.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. MAJ. GEN.) CHIEF SIGNAL OFFICER, U. S. A.

A.M. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

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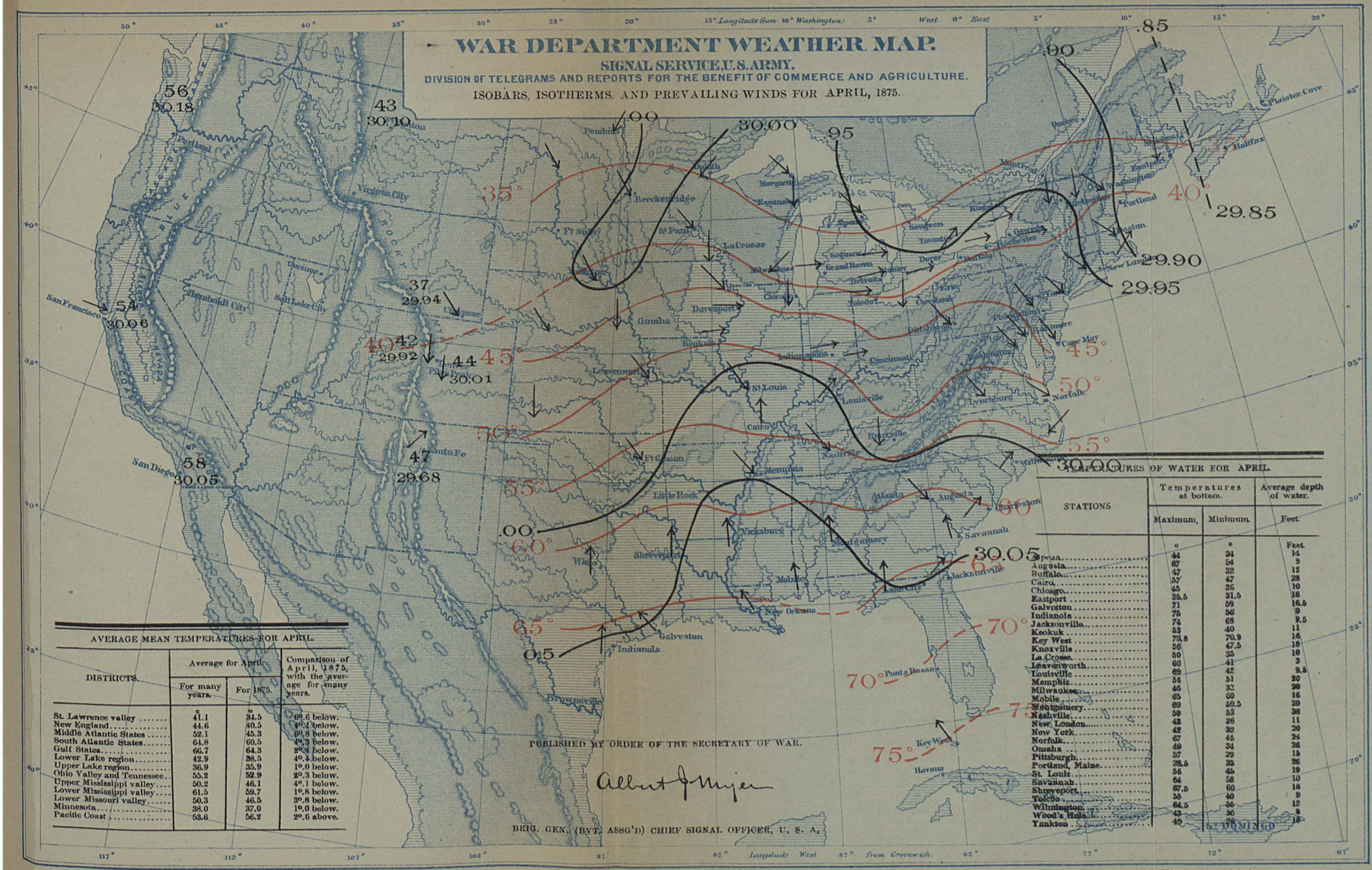
No. II.

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 APRIL, 1875.



AVERAGE MEAN TEMPERATURES FOR APRIL.

DISTRICTS.	Average for April. For many years.	Average for April. For 1875.	Comparison of April, 1875, with the average for many years.
	°	°	
St. Lawrence valley	41.1	34.5	6°.6 below.
New England	44.6	40.5	4°.1 below.
Middle Atlantic States	52.1	45.3	6°.8 below.
South Atlantic States	64.8	60.5	4°.3 below.
Gulf States	66.7	64.3	2°.4 below.
Lower Lake region	42.9	38.5	4°.4 below.
Upper Lake region	36.9	35.9	1°.0 below.
Ohio Valley and Tennessee	55.2	52.9	2°.3 below.
Upper Mississippi valley	50.2	46.1	4°.1 below.
Lower Mississippi valley	61.5	59.7	1°.8 below.
Lower Missouri valley	50.3	46.5	3°.8 below.
Minnesota	38.0	37.0	1°.0 below.
Pacific Coast	53.6	56.2	2°.6 above.

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BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

TEMPERATURES OF WATER FOR APRIL.

STATIONS	Temperatures at bottom. Maximum.	Temperatures at bottom. Minimum.	Average depth of water. Feet.
	°	°	Feet.
Alpena	44	34	14
Augusta	67	54	9
Buffalo	42	32	12
Cairo	57	47	28
Chicago	45	36	10
Eastport	36.5	31.5	16
Galveston	71	59	16.5
Indianola	75	56	9
Jacksonville	74	68	9.5
Keokuk	53	40	11
Key West	73.8	70.9	16
Knoxville	56	47.5	18
La Crosse	50	35	10
Leavenworth	60	41	3
Louisville	69	42	9.5
Memphis	56	51	20
Milwaukee	46	32	20
Mobile	65	60	16
Montgomery	69	59.5	20
Nashville	59	53	38
New London	43	36	11
New York	42	32	20
Norfolk	67	45	24
Omaha	49	34	26
Pittsburgh	57	39	15
Portland, Maine	38.5	33	26
St. Louis	56	45	19
Savannah	64	58	10
Shreveport	67.5	60	18
Toledo	53	40	9
Wilmington	64.5	56	12
Wood's Hole	43	36	8
Yankton	42	36	18

ST. DOMINGO

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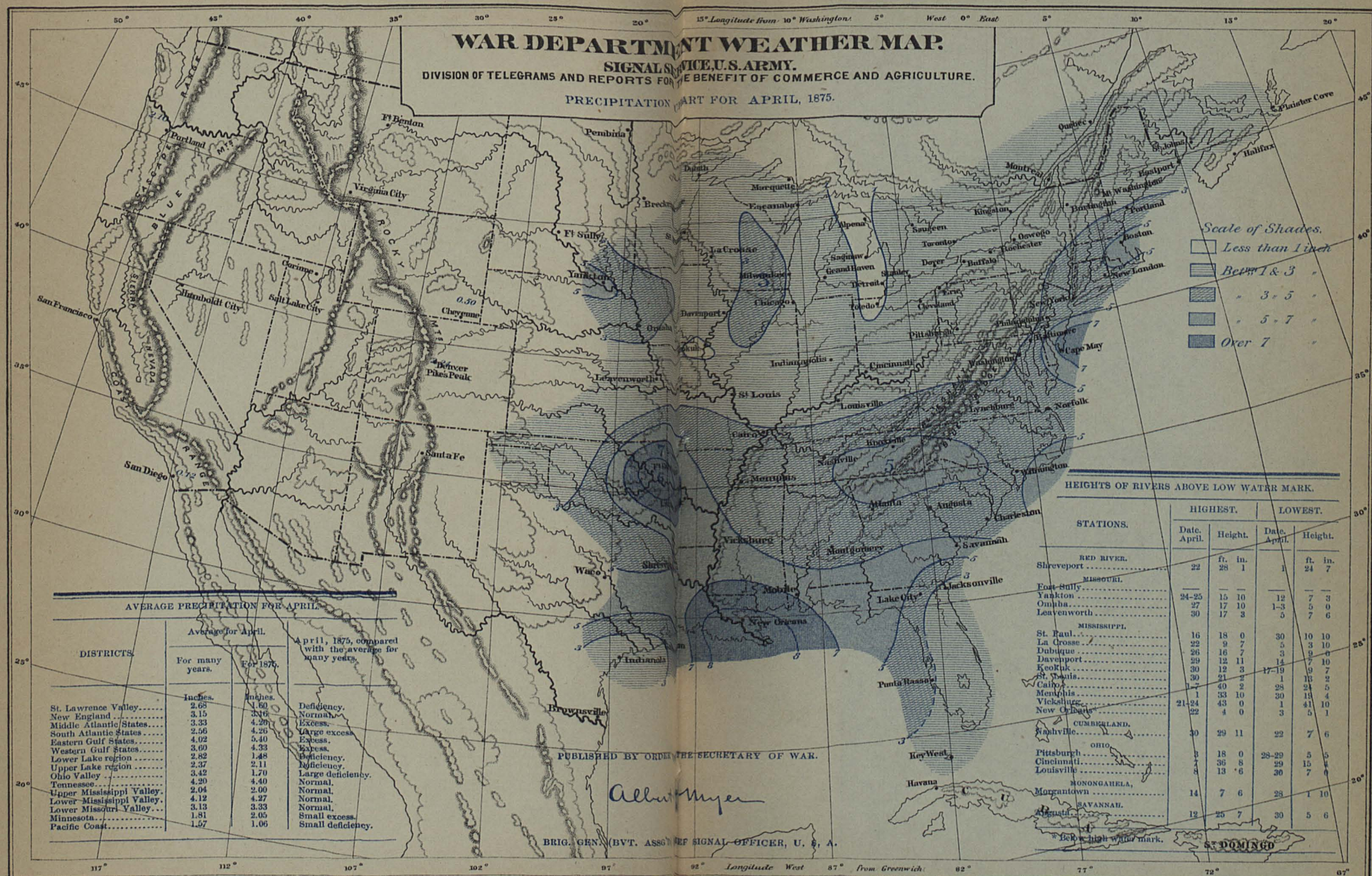
WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U.S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

PRECIPITATION CHART FOR APRIL, 1875.



AVERAGE PRECIPITATION FOR APRIL.

DISTRICTS.	Average for April. For many years.	Average for April. For 1875.	April, 1875, compared with the average for many years.
	Inches.	Inches.	
St. Lawrence Valley	2.68	1.60	Deficiency.
New England	3.15	3.16	Normal.
Middle Atlantic States	3.33	4.26	Excess.
South Atlantic States	2.56	4.26	Large excess.
Eastern Gulf States	4.02	5.40	Excess.
Western Gulf States	3.60	4.33	Excess.
Lower Lake region	2.82	1.48	Deficiency.
Upper Lake region	2.37	2.11	Deficiency.
Ohio Valley	3.42	1.70	Large deficiency.
Tennessee	4.20	4.40	Normal.
Upper Mississippi Valley	2.04	2.00	Normal.
Lower Mississippi Valley	4.12	4.27	Normal.
Lower Missouri Valley	3.13	3.33	Normal.
Minnesota	1.81	2.05	Small excess.
Pacific Coast	1.57	1.06	Small deficiency.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert Myer

BRIG. GEN. (BVT. ASST.) CHIEF SIGNAL OFFICER, U. S. A.

HEIGHTS OF RIVERS ABOVE LOW WATER MARK.

STATIONS.	HIGHEST. Date. April.	HIGHEST. Height.	LOWEST. Date. April.	LOWEST. Height.
		ft. in.		ft. in.
RED RIVER.				
Shreveport	22	28 1	1	24 7
MISSOURI.				
Fort Sully	—	—	—	—
Yankton	24-25	15 10	12	7 3
Omaha	27	17 10	1-3	5 0
Leavenworth	30	17 3	5	7 6
MISSISSIPPI.				
St. Paul	16	18 0	30	10 10
La Crosse	22	9 7	5	3 10
Dubuque	26	16 7	3	9 0
Davenport	29	12 11	14	7 10
KeoKuk	30	12 3	17-19	9 7
St. Louis	30	21 2	1	13 2
Cairo	1-7	40 2	28	24 5
Memphis	1	33 10	30	19 4
Vicksburg	21-24	43 0	1	41 10
New Orleans	22	4 0	3	5 1
CUMBERLAND.				
Nashville	30	29 11	22	7 6
OHIO.				
Pittsburgh	3	18 0	28-29	5 5
Cincinnati	7	36 8	29	15 4
Louisville	8	13 *6	30	7 0
MONONGAHELA.				
Morgantown	14	7 6	28	1 10
SAVANNAH.				
Augusta	12	25 7	30	5 6

* Below high water mark.

ST DOMINGO

dangerous winds from that cape to Cape May—the wind-velocity at Kittyhawk reaching forty-six miles per hour, with a heavy ocean-swell from the east. This gale was experienced by vessels off Cape Hatteras on the 17th and 18th, the gale commencing at southwest and backing round to north and north-northwest, with great fury, causing a heavy cross-sea, and lasting fifty-one hours. On the 19th, the southwest wind following rose to sixty-two miles per hour at Kittyhawk. One vessel reports being "surrounded by whirlwinds and waterspouts, culminating in a violent gale from north-northwest, with blinding snow, so dense that one could scarcely see the distance of three lengths of the vessel." This violent snow-storm at sea, connected with storm-center No. VI., is traced by other marine reports seventy miles south of Cape Henry on the 16th, 17th and 18th.

No. VII was of short duration and extent, so far as it is in the power of the Office to trace it. Being, also, a feeble depression, the deficiency of pressure was restored on the night of the 19th, and the phenomenon disappears within the field of weather-observations. Its track does not appear to be more than four hundred miles long.

No. VIII. This was at first a feeble disturbance, manifested in Southern Louisiana, thence slowly moving northeastward to Central Alabama; thence, yet more slowly, changing its course to southeast, and passing over Western and Northern Florida, reaching the Gulf stream, by very tardy advances, on the afternoon of the 23d near Fernandina; after which, its progress was steadily and rapidly maintained along the western margin of the great ocean-current, until, on the 25th, it vanished in the direction of Newfoundland. On Saturday afternoon, while this storm-center was passing off Cape Henry, vessels on the Chesapeake Bay experienced one of the most severe hurricanes of the winter. The progressive velocity of the gale when off the coast exceeded at times thirty-five miles per hour, while its cyclonic winds occasionally reached forty miles an hour. The rain on the seaboard, however, was not very heavy, as the center kept well out to sea.

No. IX, commencing in the Southwest on the 26th, passed over Tennessee, North Carolina, and Virginia, and was attended with heavy rains along its pathway. Otherwise it was not worthy of special note.

No. X. This was, perhaps, the most noteworthy storm of the month. Its course lay due northeast from Indian Territory to the Saint Lawrence Valley. Its progress was very rapid, occasionally attaining or exceeding a velocity of forty-two miles per hour after crossing the Mississippi River; and the cyclonic winds on the Lakes were reported as high as sixty miles an hour. The barometric gradients there were steep, and the barometer fell on Lake Erie to 29.24 inches and, probably, lower. It was accompanied by considerable, but not very heavy or protracted, rains and snows. Winds of from forty to fifty miles velocity per hour were frequent on Lake Erie. At Erie, Pa., buildings were unroofed and local damage was reported. Thunder and zigzag lightning followed in the rear of the storm after its passage of Lake Erie.

ATMOSPHERIC TEMPERATURE.

The collective observations of the month's temperature appear on Chart No. II graphically by the isothermal lines in red, and more accurately by the table in the lower left-hand corner.

(1.) *General range.*—It is a most remarkable fact, as numerically shown by the table on Chart II, that, in every district of the United States east of the Rocky Mountains, the April temperature has been extraordinarily low. This unusual cold is most noticeable in the Middle and South Atlantic States, New England, the Lower Lake region and the Upper Mississippi Valley. The only exception to this abnormal distribution of temperature is on the Pacific coast, where the range is 2°.6′ above the average of many years. The temperature for the whole northern frontier, from Maine to Dakota, very nearly averages that of freezing to the end of April. The isotherms in the country west of the Mississippi Valley, notwithstanding the season, have scarcely any deflection northward. This fact shows the protractedness of the late winter. A private observer at New Bedford, Mass., gives the following as a record of the coldest winters since 1812:

	1874–'75.	1871–'72.	1855–'56.	1835–'36.
	° *F.*	° *F.*	° *F.*	° *F.*
December	31.20	28.40	34.20	26.40
January	21.60	25.90	20.95	28.25
February	21.73	28.25	22.64	22.25
March	30.17	27.20	29.10	32.30
Average for January and February	21.67	27.08	21.80	25.25
Average for December, January, and February	24.84	27.52	25.93	25.63
Average for December, January, February, and March	26.18	27.44	26.72	27.30

(2.) *Destructive frosts.*—The lateness of the spring, the prevalence of severe frosts and the injury to vegetation have been among the most obvious features of this month's weather. A record of April frosts, kept in Florence, Ala., from 1849 to 1853, and from 1853 to the present year in Knoxville, Tenn., gives the following data: April 16, 1849, at Florence, Ala., "severe frosts, and vegetation supposed to be all killed." April 16, 1850, "disastrous frosts, which killed vegetation, and even young oak trees, from Tennessee to the Gulf." April 19, 1852, "snow in the morning." April 17, 1870, at Knoxville, "cold, cloudy day, with snow." April 22 and 23, 1871, "frost at night."

April 23, 1875, frost was reported at Knoxville. At Norfolk, on the 17th, there was a heavy frost, which was reported as very disastrous to peas, strawberries, and peaches. On the 18th and 19th, another heavy frost (thermometer 27° F.) fell at Norfolk, nearly destroying the pears, plums, and cherries; also ruining the early vegetables and strawberries.

At Nashville, Tenn., on the 17th, the thermometer fell to 25°.5 F., forming ice about one-eighth of an inch thick, seriously injuring vegetation and killing many fruit trees. There was frost at Leavenworth, Kans., on the 16th, and snow at Lynchburg, Va., on the 17th, and freezing weather nearly all day at the latter place on the 18th, causing great loss of all varieties of early fruits and early wheat. Frost occurred at Wytheville, Va., on the 22d, 23d, and 24th; at Charleston, S. C., on the 19th, (heavy;) at Aiken, S. C., on the 17th and 18th; at Mobile, on the 3d; heavy frost at Savannah, Ga., on the 18th and 19th, with ice nearly half an inch thick on tranquil pools in the country. Light frost was deposited at Augusta, Ga., and Wilsonville, Ala., on the 17th and 19th. On the interior lakes of New York, and in the Adirondacks, it is reported ice remained two to three feet thick as late as April 15th. Frost was also reported at Brookhaven, Miss., on the 24th, (latest known;) light frost on the 18th, at Mayport, Fla., and on the 24th, at Troy, Ala.; at Saint Mark's, Fla., on the 18th, and on the 19th at Wellborn, Fla.

(3.) *Temperature of the soil.*—At Fallston, Md., water-pipes, three feet under ground, frozen in the winter, were first sufficiently thawed to admit flow of water on the 3d of April. At Nichols, N. Y., the ground was not free from frost till the last of the month. At Kenton, Ohio, and Hector, Schuyler County, N. Y., frost disappeared from the soil, not till the 10th. At Fall River, Mass., water-pipes frozen February 12, remained so till after the 20th of April.

TEMPERATURE OF WATER.

The reader will find this element given in the table on the lower right-hand corner of Chart No. II. This table presents the maximum and minimum temperatures of the water at the various lake, river, and sea-coast stations, the observations being taken at the bottom.

PRECIPITATION.

This item for April is exhibited on Chart No. III, the figures giving the total amounts of rain and melted snow. The extraordinary excess of rain-fall recorded in March was not repeated in April. Still there is, generally, an excess of precipitation throughout the United States east of the Rocky Mountains. The only noteworthy exceptions to this remark are in the Ohio Valley, in which the last month's rain-fall fell short of the usual quantity by more than one-half, *i. e.*, by 1.72 inches, and on the Lower Lakes, where the deficiency is an inch and a half. There was, on the contrary, a large excess (of 1.70 inches) in the South Atlantic States and an excess of about 1 inch in the Gulf States. Elsewhere the variation from the normal supply of rain is unimportant. On the 30th of April, at Fort Gibson, Indian Ter., occurred the very remarkable condensation of 4.54 inches of rain in four hours.

The number of days upon which rain or snow fell during the month, in the several districts, averages as follows: New England, 9; the Middle States, 13; South Atlantic States, 9; Eastern Gulf States, 7; Western Gulf States, 8; Lower Lake region, 13; Upper Lake region, 12; Ohio Valley and Tennessee, 11; Upper Mississippi Valley, 9; Lower Missouri Valley, 12; Minnesota, 10 days.

HUMIDITY.

The average relative humidity for the different districts is as follows: For New England, 65 per cent.; Middle Atlantic States, 70 per cent.; South Atlantic States, 66; Eastern Gulf States, 69; Western Gulf States, 66; Lower Lakes, 67; Upper Lakes, 68; Ohio Valley and Tennessee, 56; Upper Mississippi Valley, 59; Lower Missouri Valley, 60; Minnesota, 67.

WINDS.

The average direction of the wind at each station is indicated by the arrows on Chart II, the arrows being supposed to fly with the wind. The following figures show some of the highest and lowest totals of wind-movement for the whole month at the points

named: Cheyenne, 11,112; Galveston, 10,008; Indianola, 10,565; Cape Hatteras, 10,992; Long Branch, 11,449; Peck's Beach, 10,916; Sandy Hook, 11,692; Nashville, 3,856; Mobile, 3,505; Lynchburg, 3,484; Augusta, 3,560. The prevailing winds were from northwest to southwest.

VERIFICATION OF PREDICTIONS AND CAUTIONARY SIGNALS.

A critical investigation shows—

1. The average percentage of verification, for all the weather predictions issued telegraphically, is 87.2. The average percentage of omissions to predict is 0.6.

2. The number of cautionary signals displayed during April, at all sea-ports and lake-stations of the Signal-Office in the United States, was 146. Of this number, 24 were not justified by the result; 122 were justified. The storm-warnings were, therefore, justified to the extent of 83 per cent.

NAVIGATION.

The usual tabular exhibit of river-changes for the month will be found on Chart No. III. The following data show the condition of navigation on the rivers, the lakes, and along the Atlantic sea-coasts:

(1.) *Ice in the North Atlantic.*—European steamships arriving at American ports reported very large quantities of ice in the North Atlantic during the first part of April On April 1 the steamer China passed a very large iceberg; also a very large ice-floe in latitude 46° 53′ north, longitude 41° 25′ west. The next day and the day following, the steamer City of New York had similar experience in latitude 41° 53′ north, longitude 53° 09′ west. On April 2 the steamship Italy passed several icebergs in latitude 42° 10′ north, longitude 50° 04′ west. The day after, the steamship Ethiopia, in latitude 42° 38′ north, longitude 49° 31′ west, encountered a large iceberg, and the steamship Switzerland numerous icebergs and field-ice, extending westward to longitude 50° 31′. April 8, the steamship Baltic, in latitude 42° 02′ north, longitude 42° 12′ west, met five large icebergs. As late as April 10, Penobscot Bay was still solidly bridged with ice, averaging 15 inches thick, and on that date the steamship Schiller, in latitude 42° north, longitude 50° west, saw an immense iceberg. April 13 the steamship Weser, in the same locality, passed a great quantity of drift-ice and a large iceberg. April 15 the steamship W. A. Scholten, in latitude 44° 07′ north, longitude 49° 12′, was surrounded by heavy fields of ice, stretching as far as the eye could reach, many cakes 20 feet thick, with surfaces of 5,000 square feet, while icebergs 80 feet high and 600 feet long surrounded the steamer, which escaped with difficulty. Still later, on the 26th, the steamship Severn, in latitude 47° 36′ north, longitude 69° 28′, was embayed and fast stuck in the midst of large quantities of ice, and after escaping, in a damaged condition, ran through the ice-fields one hundred and eighty-five miles south.

(2.) *The re-opening of river and lake navigation.*—As late as April 5 large quantities of ice came down the North River and obstructed New York Harbor. Ice broke up in Seneca Lake, New York, and navigation resumed on the 5th. At Mount Desert, Me., the lower harbor opened on the 26th. At Bangor, Me., river opened on the 16th. Grand Traverse Bay, Michigan, cleared on the 14th. The Red River of the North on the 19th, and first boat arrived on the 22d. Chautauqua Lake, New York, cleared on the 13th. Navigation partly opened on Lake Ontario about the middle of April. At Muscatine, Iowa, first boat on the 5th; at Fort Madison, Iowa, first boat on the 4th. At Albany, N. Y., ice moved on the 1st and 2d; Connecticut River thawed at Springfield, Mass., on the 2d; on the 1st ice broke above West Point, N. Y.; on the 8th the Hudson River was open from New York to Albany. At Erie, Pa., Lake Erie was open on the 17th; on the 12th navigation opened from Detroit to Cleveland; the Saint Paul ice-gorge broke on the 4th and navigation opened on the 25th. Navigation was resumed at Buffalo on the 2d; at Chicago ice broke on the 1st, and at Grand Haven navigation was free on the 3d.

ATMOSPHERIC ELECTRICITY.

(1.) *Thunder and lightning.*—The following data exhibit the prevalency of thunder and lightning: On the 1st in Alabama, Louisiana, and New York; on the 3d in Illinois, Indiana, and Maine; on the 6th in Iowa, Kansas, and Nebraska; on the 7th in Iowa, Kansas, and Texas; on the 8th in Alabama, Illinois, Louisiana, Mississippi, and Tennessee; on the 9th in Alabama, Louisiana, and South Carolina; on the 10th in Alabama, Georgia, Louisiana, Pennsylvania, South Carolina, and Tennessee; on the 11th in Alabama, Georgia, Kansas, Ohio, Pennsylvania, and South Carolina; on the 16th in Georgia, Illinois, Maine, Massachusetts, New Hampshire, and Rhode Island; on the 19th in Illinois, Indiana, Iowa, Kansas, Missouri, New York, Ohio, Tennessee, and Texas; elsewhere on the 20th, 27th, and 29th.

(2.) *Auroras* have been observed as follows: On the 6th in Illinois, Maine, and New York; on the 7th in Connecticut, Illinois, Maine, Massachusetts, Michigan, New Hampshire, New Jersey, New York, and Vermont; on the 8th in Maine, New Hampshire, and Vermont; on the 9th in Vermont and Iowa; on the 26th in Connecticut, Maine, Massachusetts, Michigan, New Hampshire, and New York.

OPTICAL PHENOMENA.

(1.) *Solar halos* were reported as follows: From New Hampshire, New York, and Pennsylvania on the 1st; Indiana and Ohio on the 2d; Iowa on the 4th; Tennessee on the 5th; and from many other points on the 14th, 22d, 26th, 28th, and 29th.

(2.) *Lunar halos* were reported as follows: From Maryland, New Jersey, New York, Pennsylvania, and Ohio, on the 10th; Maine, New Hampshire, and Michigan, on the 13th; Illinois, Indiana, Iowa, Missouri, New York, Pennsylvania, and North Carolina, on the 14th; and from other points on the 16th, 18th, and 20th.

(3.) *Mirage.*—Ellinwood, Kans., on the 14th, 17th, 22d, and 27th; Traverse City, Mich., 8th and 28th.

MISCELLANEOUS.

(1.) *Injury to vegetation.*—In addition to the remarks already made on this topic, under the head of ATMOSPHERIC TEMPERATURE, (2,) the following notes are important: At Troy, Ala., the field and garden crops have suffered. At Wilsonville, Ala., on the 19th, the frost was damaging to fruits and vegetables. At Gainesville, Ga., fruit was largely killed. At Wyanet, Ill., plants froze under cover from the 15th to the 18th. At Vevay, Ind., frost on 17th was killing. At Rising Sun, Ind., on the 16th, 17th, and 18th, the same case occurred. At Winchester and Pine Grove, Ky., fruits and vegetables were generally damaged. At Northport, Mich., the winter-cold was very damaging to all fruits; grapes, however, wintered better than usual. At Asheville, N. C., on the 17th and 18th, peach and cherry crops were killed and apples injured; so also at Mount Pleasant, N. C. At Bellefontaine, and other points in Ohio, fruits of all kinds were injured. At Tarentum, and other points in Pennsylvania, fruit and wheat were injured. Beans were destroyed on 17th and 18th, at Hacienda Saludar, S. C. In Tennessee and Virginia, fruit and vegetables were injured and trees and plants frozen.

(2.) *Meteors* were reported in Illinois on the 2d and 3d; Georgia and South Carolina on the 4th; Maryland on the 5th, 7th, and 14th; Mississippi and New Jersey on the 6th; Alabama on the 15th and 17th; Iowa on the 18th; Kansas on the 20th and 21st; New York on the 23d; Massachusetts on the 27th; Rhode Island on the 30th.

(3.) *Polar bands* on the 19th at New Haven; on the 21st and 28th at Buffalo; on the 22d at Alpena; on the 19th, 21st, and 28th at Iowa City.

(4.) *Zodiacal light* on the 1st at Corning, Mo.; on the 4th at Linden, Ill.; on the 6th at Point Pleasant, La.; on the 25th at Wooster, Ohio.

(5.) *Water and barometer oscillations.*—At Marquette, on Lake Michigan, the water and the barometer oscillated together twenty-five times, and in a contrary manner sixty-five times.

(6.) *Zoological.*—*Wild geese* were seen going southeast at Madison Barracks, N. Y., on the 1st; going north at New London on the 1st, 2d, and 11th; going south at Detroit on the 21st; going north at Dubuque on the 1st, 17th, 22d, and 26th; at Saint Paul on the 2d and 8th; at Atlantic City on the 1st, 2d, and 8th; at Wood's Hole on the 8th, and harbor full of geese on the 14th. *Blue-birds* arrived at Standish, Me., on the 2d; at Amherst, Mass, 1st; on the 2d, Contocookville, N. H.; Auburn, N. H., 1st. *Wild pigeons* arrived, Independence, Iowa, on the 3d; going north at Cresco, Iowa, on the 2d; on the 11th at Auburn, N. H. *Robins* on the 6th, at Springfield, Mass.; at Cornish and Standish, Me., on the 2d. *Swallows* on the 29th, at Morgantown, W. Va.; at Ellinwood, Kans., on the 2d. *Buffalo-gnats* first appear at Memphis on the 22d; on the 29th very destructive to stock. *Grasshoppers* reported on the 20th from all parts of Colorado Territory; at Leroy, Kans., young grasshoppers, very numerous and destructive, were actively attacking vegetation.

Published by order of the Hon. Wm. W. Belknap, Secretary of War.

ALBERT J. MYER,
Brig. Gen., (Brt. Assgd.,) Chief Signal-Officer, U. S. A.

MONTHLY WEATHER REVIEW, MAY, 1875.

INTRODUCTION.

The weather review for the current month is based upon the regular tri-daily telegraphic weather-maps and upon regular monthly reports from 92 signal-service sta-

tions, 12 Canadian stations, 52 Army surgeons, 1 naval hospital, 301 volunteer observers, and upon miscellaneous sources of information.

The principal features of the month have been (1) the low temperature in the eastern portions of the country, attending an extensive area of high barometer. The temperature has been generally below the average for the month, and especially so in the Saint Lawrence Valley. It has been above the average from the Gulf States to the Lower Lake region. (2) The tornadoes in Iowa, Illinois, Indiana, and Ohio. (3) The excess of rain on the South Atlantic coast and from Missouri to Indiana, the deficiency in Tennessee, the Gulf and Middle Atlantic States. (4) The absence of auroras and thunderstorms. (5) The continuance of extensive ice-fields and large icebergs in the Gulf of Saint Lawrence and to the south and east of Newfoundland.

BAROMETRIC PRESSURE.

The general distribution of barometric pressure during the month is easily seen from the isobars on Map No. II. The highest pressure, as usual, is on the South Atlantic coast. The lowest pressure is in the Northwest, where the barometer is apparently lower by 0.05 than in May, 1874. On the Pacific coast the pressures have been lower in California and higher in Oregon than in the preceding year.

1. *Areas of high barometer.*—The prevailing high barometer off the South Atlantic coast was especially marked on the 14th and 19th. The great southward flow of dry, cold air that took place on the 14th, 15th, 16th, and 17th, reaching from British America to Florida, and prevailing over the entire country east of the Mississippi until the 18th, was the most remarkable feature of the month.

I. Passed eastward on the 2d over the Southwest, and on the 3d over the Ohio Valley to the Atlantic coast.

II. Passed from the Southwest on the 4th eastward to the South Atlantic coast on the 5th.

III. Passed from Texas on the 10th eastward to the South Atlantic coast on the 11th.

IV. Extended on the 11th from Dakota to Texas; continued on the 12th in the Lower Mississippi Valley, and moved eastward on the 13th over Kentucky and Virginia, with clear, cold weather from Tennessee to Michigan and Maine. On the 14th it remained off the Middle and East Atlantic coasts.

V. The slight depression following the preceding area was immediately succeeded on the 14th by one of the most extensive regions of dry, cold air and high pressure. Its southward advance over Lake Superior began on the night of the 13th–14th. The highest pressures were: On the morning of the 14th, over Lake Superior, 30.20; on the morning of the 15th, Lake Superior, 30.56; on the morning of the 16th, Lake Superior, 30.67; on the morning of the 17th, Michigan and Ohio, 30.40; on the morning of the 18th, Northern New England, 30.33. The low temperature prevailing during these days throughout the northern and eastern portion of the country contributed materially to reduce the average temperature of the month. The average pressure off the South Atlantic coast seems to have received a decided increase during the week following the passage of this area of high pressure.

VI. This, also, flowed southward over the Lake region on the 25th and 26th, and the Saint Lawrence Valley on the 27th, being off the New England coast on the 28th, whence it apparently flowed southward to Cape Hatteras.

VII. Appears to have extended from Texas to Minnesota on the 29th, whence it moved eastward, was central on the Lower Lakes on the 30th, and disappeared in the Saint Lawrence Valley on the 31st.

2. *Areas of low barometer.*— Eleven areas of low barometer are traced on the accompanying Map No. I, of which four are well-marked severe storms. With one exception, these have probably originated north of the Platte River, under the influence of the increasing temperature in the interior of British America. Their paths have, west of the ninety-second meridian, been almost entirely confined between the parallels of 42° and 45°, and the majority of them have crossed the seventy-second meridian between the parallels of 45° and 47°. Their paths, therefore, have differed greatly from those of the storms of May, 1871 and 1873, but agreed more nearly with those of May, 1872 and 1874, excepting only that they lie three degrees to the southward of those of the latter month. Severe hurricanes occurred on the Atlantic to the eastward of our stations on several dates, but the marine reports do not suffice to show the positions and paths of the storms.

I. This, which was the severest storm of the month, began in April in the Southwest, and was, on the morning of May 1, central in Southern Illinois, whence it passed northeastward over Lakes Erie, Ontario, and the Saint Lawrence Valley. The rain area was quite evenly distributed on all sides, and heavy snows occurred in its rear over the Upper Lakes.

Brisk and high winds from all directions prevailed in succession over the Ohio Valley, Lakes, Middle, and Eastern States. At midnight, May 1, a small secondary depression had formed in the Middle Atlantic States, but whose further progress could not

be traced. Local tornadoes were reported from Georgia, South Carolina, Tennessee, Indian Territory, the Lower Lakes, and destructive squalls on the Middle Atlantic coasts.

II. Area No. I was followed by an area of high barometer in the Lower Mississippi Valley, west of which appears to have formed during the 2d of May over Kansas low barometer No. II, which was but a slight depression, but can be somewhat hypothetically traced eastward and southward into the South Atlantic States, until it appears as a well-defined storm-center on the morning of the 4th off the coast of North Carolina, followed in that region by brisk and high northeast winds.

III. Area No. III appears on the afternoon of the 4th, central in Southern Dakota, and, after extending in a northeast direction, with rain and snow and local tornadoes on the Upper Lakes, may be considered to have turned southeastward into Missouri, while a branch area moved southeastward over the Lake region and Central New York to the Middle Atlantic coast, where it developed during the 6th into a severe storm, and moved thence northeastward over Southern New England, with a heavy rain during the 7th in Eastern Massachusetts. A remarkable hail-storm occurred on the 6th off Cape Hatteras.

IV. During May 5, the barometer continued to fall in Dakota, and, on the 6th, area No. IV was apparently central in that Territory, with brisk and high southeast winds, warm, cloudy and rainy weather from Kansas and Illinois to Manitoba. The depression moved rapidly in a south-southeast direction during the 7th, and was at midnight, probably, central in Iowa, over which entire State prevailed the area of lowest pressure. During the 8th, this area moved more rapidly northeastward over Lake Superior, and thence apparently more nearly eastward toward the valley of the Saginaw.

V. While the preceding depression was moving over the Lake region, area No. V originated, on the 8th, in the Southwest, apparently in the region where the warm, southerly winds of the Gulf States were met by the cold, northerly winds following in the rear of storm No. IV, probably in the region of the Red River in Texas. It passed northeastward over Arkansas and Missouri, and on the afternoon of the 9th was central in Indiana, and severe storms and rains prevailed during that day in the Ohio Valley. The storm-center continued moving rapidly northeastward over Western Pennsylvania and New York and down the Saint Lawrence Valley. Southwest gales, following this depression, prevailed on the 9th and 10th at Cape Hatteras. Local tornadoes were reported in Iowa, Illinois, and Indiana on the 8th, and Northern Ohio, Michigan, and Lake Erie on the 9th.

VI. On the afternoon of the 10th, a disturbance was evidently central over Northern Nebraska, and the severest westerly gale of the month was simultaneously reported from Cheyenne. Our reports do not allow us to decide whether this disturbance may not possibly have, during the preceding twenty-four hours, moved toward the region indicated from some point to the northwest or southwest thereof. The movement of the central low pressure was first southeast, thence directly eastward to a point just north of Chicago on the afternoon of May 11, at which time heavy winds prevailed from Ohio to Kansas and northward to Lake Superior, and heavy rains in Southern Wisconsin. Passing east-northeastward, the storm was central north of Montreal on the afternoon of the 12th, and was followed by brisk southwest to northwest winds over the Lake region and the Middle Atlantic States.

No. VII. The high barometer that followed the storm No. VI, and was central in Missouri on the morning of the 12th, was immediately followed on the afternoon of that day by the origin of a new storm-center near the northern border of Nebraska. On the morning of the 13th, cold westerly winds prevailed at Cheyenne, and southeast winds, with rain, in the Upper Mississippi Valley. The lowest pressure being apparently central near Yankton, subsequently moved east-southeastward into Northern Illinois, and was central a little to the south of Grand Haven on the morning of the 14th. During that day, increasing winds and light rains prevailed over the Lake region, while the storm-center moved eastward between Buffalo and Kingston, and was, on the morning of the 15th, central near Lake Champlain, whence it moved northeastward beyond our stations, and was followed by the remarkable area of cold air and high barometer No. V.

Nos. VIII and IX. On the 14th, an area of cold air, with dry, clear weather, began moving southward over the Lake region, and its influence prevailed over the entire country east of the Rocky Mountains until the 19th, during which interval southerly winds, occasionally increasing to gales, prevailed from Kansas to Manitoba, with cloudy weather, and, on the 17th and 18th, light rains. Northerly winds, gradually diminishing in force and shifting to southeast, prevailed east of the Mississippi. Local depressions appeared on the 19th in New England, and a general fall of pressure occurred over the Lake region, probably in connection with a central low barometer, between Lake Huron and Hudson's Bay, on the morning of the 20th, which depression may be considered central in Northern New England on the afternoon of the 20th, at which time, also, a slight depression existed in Iowa. The latter, which is marked as area

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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.

TRACKS OF CENTRES OF LOW BAROMETER FOR MAY, 1875.

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.

AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS)

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No. II.

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 MAY, 1875.

AVERAGE MEAN TEMPERATURES FOR MAY

DISTRICTS.	Average for May		Comparison of May, 1875, with the average for many years.
	For many years.	For 1875.	
	°	°	
St. Lawrence valley	55.5	50.7	4°.8 below.
New England	55.3	54.5	0°.8 below.
Middle Atlantic States	62.3	61.4	0°.9 below.
South Atlantic States	73.0	72.2	0°.8 below.
Gulf States	74.0	75.2	1°.2 above.
Lower Lake region	52.9	54.7	2°.7 above.
Ohio Valley and Tennessee	51.3	50.5	0°.8 below.
Upper Mississippi valley	65.8	66.0	0°.2 above.
Lower Mississippi valley	62.7	61.5	1°.2 below.
Lower Missouri valley	71.0	70.0	1°.0 below
Minnesota	62.4	63.3	0°.9 above.
Pacific Coast	53.6	54.2	0°.6 above.
	59.5	58.3	1°.2 below.

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BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

TEMPERATURES OF WATER FOR MAY.

STATIONS.	Temperatures at bottom. Maximum.	Temperatures at bottom. Minimum.	Average depth of water.
	°	°	Feet.
Alpena	65	39	14
Augusta	81	67	5
Buffalo	61	32	12
Burlington	52	34	22
Cairo	73	55	25
Charleston	75	64	44
Chicago	61	39	16
Duluth	46	33	15
Eastport	40	35	16
Escanaba	54	36	21
Galveston	83	72	15
Indianola	85	72	9
Jacksonville	81	73	10
Keokuk	73.5	52	13
Key West	87	74	17
Knoxville	77	59	17
La Crosse	75	49	10
Leavenworth	74	48	3
Louisville	73	54	7
Marquette	44.5	35	17
Memphis	73.5	54.5	20
Milwaukee	57	40	20
Mobile	82	64	16
Montgomery	85.5	68	8
Nashville	77	55	35
New London	54	42.5	12
New York	57	41.5	18
Norfolk	74	61	24
Omaha	72	44	27
Pittsburgh	71	50	10
Portland, Maine	51.5	38.5	26
Punta Rassa	87	76	12
St. Louis	75	59	20
San Francisco	60	56	9
Savannah	79	65	10
Shreveport	81	63	18
Toledo	74	46	11
Wilmington	73	64	12
Wood's Hole	56	43	8
Yankton	70	43	12

AM. PHOTO LITHOGRAPHIC Co. N.Y. (OSBORNE'S PROCESS)

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No. III.

AVERAGE PRECIPITATION FOR MAY.

DISTRICTS.	Average for May. For many years.	Average for May. For 1875.	May, 1875, compared with the average for many years.
	Inches.	Inches.	
St. Lawrence Valley	2.70	3.91	Excess.
New England	3.87	3.16	Deficiency.
Middle Atlantic States	3.92	1.64	Large deficiency.
South Atlantic States	4.09	4.95	Excess.
Eastern Gulf States	4.43	2.11	Large deficiency.
Western Gulf States	3.82	1.68	Large deficiency.
Lower Lake region	3.07	3.84	Excess.
Upper Lake region	3.30	3.70	Excess.
Ohio Valley	4.14	3.47	Deficiency.
Tennessee	4.17	2.39	Large deficiency.
Upper Mississippi Valley	3.27	4.06	Excess.
Lower Mississippi Valley	4.34	3.00	Deficiency.
Lower Missouri Valley	4.20	3.30	Deficiency.
Minnesota	3.13	2.35	Deficiency.
Pacific Coast	1.17	1.10	Normal.

HEIGHTS OF RIVERS ABOVE LOW WATER MARK.

STATIONS.	HIGHEST. Date. May.	HIGHEST. Height. ft.	HIGHEST. Height. in.	LOWEST. Date. May.	LOWEST. Height. ft.	LOWEST. Height. in.
RED RIVER.						
Shreveport	1	26	4	31	17	7
MISSOURI.						
Fort Sully	—	—	—	—	—	—
Yankton	1 & 31	13	0	27	11	3
Omaha	1	13	7	29	7	6
Leavenworth	1	16	9	28	10	7
MISSISSIPPI.						
St. Paul	1	10	6	29 & 30	7	9
La Crosse	1	8	0	30 & 31	5	0
Dubuque	1	15	3	31	11	3
Davenport	1	12	8	31	8	2
Keokuk	2, 3 & 4	12	10	31	9	0
St. Louis	3	24	7	31	16	4
Cairo	6–7	37	6	31	20	0
Memphis	10	29	0	31	16	11
Vicksburg	1	41	10	31	35	7
New Orleans*	9	4	1	31	5	2
CUMBERLAND.						
Nashville	3	34	0	31	4	0
OHIO.						
Pittsburgh	4	7	0	23 & 24	3	8
Cincinnati	1	24	4	30	8	4
Louisville	3	11	3	31	5	11
MONONGAHELA.						
Morgantown	2	3	5	31	0	8
SAVANNAH.						
Augusta	3	18	0	25	3	8
ALABAMA.						
Montgomery	3 & 4	15	0	18–24	5	0

* Below high water mark.

No. IX, continued nearly stationary until the afternoon of the 21st, a tornado being reported in Indian Territory on the 20th, while the area of cloudy weather and light rain extended slowly to Arkansas, the Ohio Valley and New York. The depression itself seems to have moved eastward into Michigan, where it disappeared at midnight, and a general area of cloud and rain extended eastward over the Middle and Eastern States.

No. X. From the 21st to the 24th, no well-marked depression is presented, except the continued formation and disappearance of slight depressions and numerous light rains. On that day areas of low barometer existed in the South Atlantic States and the Upper Lake region, but did not develop further. The steady diminution of pressure in the extreme Northwest, and probably in British America, seems to have exceeded its normal rate, and finally to have culminated in the formation, on the 26th, of an area of low barometer in Nebraska and Dakota, and increasing northerly winds continued, with light rains, during the 27th, from Nebraska to Manitoba. The central lowest pressure moved from Iowa northeastward over Lake Superior on the 28th, and thence southeastward to Lake Ontario on the morning of the 29th, accompanied by very general rains over the Lake region. During the 29th, colder northerly winds and rain, followed by clear weather, prevailed over the Lower Lakes, while the storm-center turned again northeastward down the Saint Lawrence Valley.

No. XI. May be approximately located in Western Dakota in the afternoon of the 29th, and in Western Minnesota on the afternoon of the 30th, but apparently oscillated about in this region until midnight of the 31st. It was near Saint Paul on the morning of June 1, and its subsequent history belongs to that month. During the nights of the 31st of May and 1st of June, unusually heavy rain-storms prevailed in Western Iowa and Southern Minnesota.

TEMPERATURE OF THE AIR.

The average temperature of the air is shown by the isotherms on Map No. II, and by the table in the lower left-hand corner, from which it will be seen that the general average for the whole country is about 0°.5 below its normal value, the greatest depression being in the Saint Lawrence Valley, and the greatest excess in the Lower Lake region.

Frosts.—The frosts have during the month been especially destructive in Ohio and Illinois, and others are reported in Minnesota on the 17th; Connecticut, 18th; Delaware, 18th; Illinois, 16th and 18th; Indiana, 17th; New Jersey, 18th; New York, 18th and 31st; Virginia, 19th and 31st.

PRECIPITATION.

The general distribution of rain-fall is shown by the isohyetal on Chart No. III, from which it will be seen that the rain-fall is, on a general average, about 0.6 inches below its normal value. The largest deficiencies occur in the Gulf and Middle Atlantic States, where the rain-fall is less than one-half its usual amount. A slight excess of rain, amounting to one-quarter of its average amount, is reported from the Upper Mississippi Valley, the Lake region, and South Atlantic coast, and a still larger excess from the Saint Lawrence valley.

Cloudy days.—The cloudiness during the month has been decidedly below the average. It has been greatest in New England, where the average is from seven to eleven cloudy days during the month; an average of seven days is reported from New York, the Lake region, and Minnesota, whence, as we proceed southward, the amount of cloud diminishes to an average of one or two days in the Gulf and South Atlantic States.

Rainy days have been, as usual, far more numerous than cloudy days, the average number being fifteen over the Lower Lakes, New York, and New England; seventeen in Kansas and Indian Territory; ten on the South Atlantic coast and in Tennessee, Kentucky, Missouri, and Illinois.

RELATIVE HUMIDITY.

The relative humidity averages 70 per cent. along the Atlantic coast stations; 50 per cent. at stations in the neighborhood of the Appalachian ranges; 60 per cent. from the Lower Lake region to Missouri, and between 55 and 65 per cent. northward of this region.

WINDS.

The prevailing wind has been southeast to southwest throughout the Gulf States and Atlantic coast stations. It has been southeast in Kansas, Iowa, and Minnesota, and west in the Lower Lake region.

Total movement of the air.—The largest total movements of the air are: at Pike's Peak, 14,808; Cape Hatteras, 11,377; Sandy Hook, 9,945; Cheyenne, 9,780; Peck's Beach, 9,500; Long Branch, 9,466; Erie, 8,969; San Francisco, 8,785; Indianola, 8,699; Cape Henry, 8,510. The lowest, at Portland, Oreg., 3,042; Lynchburg, 3,122; Augusta, 3,261; Montgomery, 3,802; Wytheville, 3,809; Shreveport, 3,853; Vicksburg, 3,866; Nashville, 3,894; San Diego, 3,978.

VERIFICATIONS.

The detailed critical comparison of the published Probabilities with the weather of the succeeding twenty-four hours shows, on the average, for the whole country, that 91.4 per cent. of the predictions have been verified.

One hundred and seventeen cautionary signals have been displayed at the forty-three signal-stations on the Lakes and Atlantic coast, of which sixty-five were reported well justified by the succeeding high winds, while forty-eight were partially justified, and four were too late; forty-nine occasions were noted on which brisk winds were not signaled, in the most of which cases, however, the winds did not come from dangerous points of the compass.

NAVIGATION.

Ice.—Ice moved out of the harbor of Escanaba on the 4th. In the eastern portion of Lake Ontario ice continued to impede navigation until the 14th. Sabago Lake, in Maine, was opened to navigation on the 4th. The navigation of the larger lakes was continued throughout the month. Lake Champlain was generally open on the 30th of April, being the latest date for sixty years—it had been closed for one hundred and four days—the longest period, with one exception, during this century.

The extreme depth of water in the Mississippi and its tributaries is shown by the table on Chart No. III, whence it appears that at all river-stations the water was, in the last week of the month, from 3 to 30 feet lower than during the first week.

TEMPERATURE OF THE WATER.

The temperature of the water has varied between 29° and 40° at Eastport, Me., but between the extremes, 74° and 87° at Key West, Fla., the change being quite gradual as we proceed southward along the Atlantic coast. The range of temperature has increased from 5° in Maine to 13° along the South and Middle Atlantic coasts, but to 18°, 20°, and 30° in the rivers and lakes in the interior of the country. The details, for all stations, are given in the table on Chart No. II.

ATMOSPHERIC ELECTRICITY.

Thunder-storms.—Displays of thunder and lightning have been least frequent in the Middle Atlantic States, where they have occurred on the 7th, 12th, 15th, 16th, 19th, and 23d, and in Southern New England, where they have occurred on the 1st, 2d, 8th, 9th, 12th, 15th, 19th, 20th, 24th, 29th, and 30th. They have been most frequent in the Eastern Gulf States, Tennessee, and the Ohio Valley, the Upper Mississippi and Lower Missouri Valleys, where they have occurred on from sixteen to twenty days during the month.

Auroras.—The auroras most extensively visible were those of the 4th, in Connecticut, Maine, New York, Michigan, Wisconsin, Minnesota; on the 22d, in Connecticut, Maine, New Hampshire, Vermont, Massachusetts, New York, Ohio, Michigan, Wisconsin, and Minnesota. Less extensive displays were reported from two or more stations, on the 2d, 3d, 5th, 7th, 9th, 10th, 11th, 12th, 13th, 15th, 16th, 18th, 23d, 24th, 26th, 27th, 29th, 30th, and 31st.

OPTICAL PHENOMENA.

(1.) *Solar halos* were observed at some stations on every day of the month but the 23d. The following is a list of those observed in two or more different States: 1st, Maine, Massachusetts, New Hampshire, New York, Connecticut, Georgia, and New Jersey; 2d, Iowa and Georgia; 3d, Illinois, Maine, Missouri, New York, North Carolina, Ohio, Virginia, Wisconsin, Michigan, Georgia, Nebraska, and Minnesota; 4th, Dakota, Iowa, Kansas, Missouri, Nebraska, New Hampshire, New York, Michigan, and Minnesota; 5th, Alabama, Kansas, Nebraska, New Hampshire, New York, North Carolina, Ohio, Virginia, West Virginia, and Louisiana; 6th, Iowa, Maine, New Hampshire, Ohio, and Wisconsin; 7th, Iowa, Nebraska, New York, Ohio, Louisiana, and Wisconsin; 8th, Virginia, Louisiana, Maine, and Mississippi; 9th, Iowa and Wisconsin; 10th, Kansas, Virginia, and Wisconsin; 11th, Canada, Indiana, Mississippi, New York, Ohio, and Georgia; 12th, Alabama, Dakota, Delaware, Iowa, Massachusetts, Mississippi, Nebraska, New York, Wisconsin, New Jersey, Connecticut, Louisiana, and Michigan; 13th, Indiana, Mississippi, Ohio, New Jersey, Connecticut, Michigan, Georgia, and Florida; 14th, California, Illinois, Indiana, Iowa, Maine, and Ohio; 15th, Iowa, Missouri, Tennessee, and Wisconsin;

16th, Alabama, Illinois, Indiana, Tennessee, Wisconsin, and Georgia; 17th, Iowa, Michigan, Missouri, New York, Ohio, Wisconsin, and Louisiana; 18th, California, Iowa, Kansas, Maine, New Mexico, and Ohio; 19th, Nebraska, Alabama, Colorado, Dakota, New York, Ohio, Wisconsin, Georgia, Maine, and Illinois; 20th, California, Mississippi, New Hampshire, and New York; 22d, New York and Maine; 24th, Maryland, Massachusetts, New York, and New Jersey; 25th, Alabama and Illinois; 26th, Mississippi and New York; 27th, Indiana and Kentucky; 29th, Mississippi, Nevada, New Hampshire, Massachusetts, and Louisiana; 30th, Canada, Iowa, New York, Ohio, Wisconsin, Louisiana, and Michigan; 31st, Illinois, Indiana, Ohio, Virginia, Louisiana, and Wisconsin.

(2.) *Lunar halos.*—The principal lunar halos were observed as follows: On the 8th, Colorado, Kentucky, Ohio, Tennessee, Virginia; 9th, Georgia, Maryland, Ohio, Pennsylvania, Virginia, Wisconsin, Massachusetts, and Iowa; 10th, New Hampshire, Wisconsin, and Florida; 11th, Massachusetts, New Jersey, New York, Texas, Connecticut, Wisconsin, and Indian Territory; 12th, Alabama, Illinois, Iowa, Kansas, Louisiana, Mississippi, Wisconsin, Florida, Minnesota, and Indian Territory; 13th, Georgia, Kentucky, Maryland, Massachusetts, New Jersey, New York, Ohio, Pennsylvania, Texas, Utah, Virginia, West Virginia, Louisiana, Colorado, and Indian Territory; 14th, Iowa, New York, Texas, Massachusetts, North Carolina, Florida, and Indian Territory; 15th, Kentucky, Louisiana, Mississippi, Tennessee, Virginia, Texas, Illinois, and Florida; 16th, Kansas, Maine, Massachusetts, North Carolina, Texas, Florida, and Georgia; 17th, Alabama, Iowa, Michigan, Minnesota, New York, Ohio, South Carolina, Colorado, Kansas, and Indian Territory; 18th, Nebraska, Texas, South Carolina, Georgia, Utah, Iowa, Tennessee, and Indian Territory; 19th, Canada, Ohio, Virginia, Massachusetts, Michigan, and Georgia; 20th, Indiana, Maine, Massachusetts, New York, Utah, and Florida; 21st, Utah and Georgia.

(3.) *Mirage.*—The phenomenon of mirage was observed on the 9th at Alpena; 10th, in Iowa and Kansas; 14th, in Kansas; 17th, Milwaukee; 25th, Kansas.

MISCELLANEOUS PHENOMENA.

(1.) *Natural history.*—The following items relating to natural history have been reported:

Grasshoppers were reported in Kansas throughout the month, and in Nebraska thick during the latter part of the month, especially from the 22d to the 26th, during which time they were moving north and northwestward. They were especially reported on the 23d at Cheyenne, and on the 21st at Denver.

Locusts.—Kansas, 8th to 12th and 25th.

The Colorado potato-bug was reported from Delaware, Indiana, New Jersey, West Virginia, and Ohio.

The first appearance of—Frogs, Vermont and Massachusetts, 7th; Duluth, 20th. *Catbirds*, Nebraska, 4th. *Yellow-birds*, New York, 23d. *Cuckoo*, New York, 28th. *Bluebirds*, Ohio, 3d. *Bobolinks*, Kansas, Massachusetts, and New York, 10th; Vermont, 24th. *Doves*, Colorado, 12th. *Night-hawks*, Connecticut, 20th. *Swallows*, Connecticut, 1st; Utah, 6th; Wisconsin, 7th; Vermont and New Hampshire, 9th; Minnesota and New York, 11th; Nebraska, 15th; North Carolinia, 17th. *Thrushes*, Kansas, 3d; New York, 11th. *Orioles*, Michigan, 4th; New York, 9th; Ohio, 8th. *Blackbirds*, Utah, 1st. *Robins*, Utah, 1st. *Whippoorwills*, Nebraska and Iowa, 6th; Kansas, 7th; Wisconsin, 8th; New York, 11th; Michigan, 16th; Indiana, 19th. *Martins*, Vermont, 1st. *Eagles*, Pike's Peak, 14th. *Bluefish*, Squan Beach, 18th.

Migration of birds, &c.—Gulls.—Hudson, Mich., 9th, flying west. *Eagles.*—Corsicana, Tex., 20th, flying southeast. *Pigeons.*—La Crosse, Wis., 14th and 15th, flying east. *Geese.*—Grand Haven, Mich., 3d, flying north; Atlantic City, N. J., 6th, flying north; Nashville, Tenn., 7th, flying north. *Ducks.*—Atlantic City, N. J., 6th, flying north.

(2.) *Forest-fires.*—Important forest-fires are reported during the month from New Hampshire, Pennsylvania, Massachusetts, New Jersey, New York, Virginia, West Virginia, Michigan, Wisconsin, and Nebraska.

(3.) *Polar bands.*—These were observed on the 3d in Virginia; 5th, Virginia and West Virginia; 11th, Virginia; 13th, Virginia; 14th, Iowa; 15th, Iowa; 16th, Ohio and Wisconsin; 18th, Michigan and Ohio; 19th, Virginia; 20th, South Carolinia; 31st, Virginia and South Carolina.

(4.) *Meteors.*—Bright meteors were reported on the 2d at Newfoundland and Maryland; 4th, Texas; 6th, Maryland; 9th, Newfoundland; 13th, Massachusetts; 17th, Ohio; 23d, New York; 26th, Indiana; 27th, Indiana; 28th, Indiana; 31st, Maryland.

(5.) *Zodiacal light* was observed at Galesburg, Ill., on the 15th, 29th, 30th, and 31st.

(6.) *Earthquakes.*—Slight shocks or rumbles were reported from El Monte, Cal., on the 15th, 30th, and 31st; Milton, Mass., 15th.

Published by order of the Hon. Wm. W. Belknap, Secretary of War.

ALBERT J. MYER,
Brig. Gen., (Brt. Assgd.,) Chief Signal-Officer, U. S. A.

MONTHLY WEATHER REVIEW, JUNE, 1875.

INTRODUCTION.

The present review is compiled from data furnished by 82 regular Signal-Service observers, 12 Canadian stations, 5 United States Army surgeons, 1 naval hospital, 259 volunteer observers of the Signal-Service, newspapers, and other records.

The chief characteristics of the month's meteorology have been: (1.) The immense masses of drift-ice, and the long-continued presence of icebergs in the North Atlantic, greatly affecting the weather in all the Atlantic States. (2.) The comparatively high barometer in the Gulf and South Atlantic States. (3.) The low temperature in the interior of the country and the Northwest. (4.) The number and violence of local storms and tornadoes west of the Alleghanies. (5.) Frequent frosts north of Virginia about the middle of June, which, in some localities, were seriously felt by farmers.

ATMOSPHERIC PRESSURE.

The mean monthly distribution of pressure is exhibited on Chart No. II. The high periodic pressure of the South Atlantic and Eastern Gulf States was maintained in June as usual. The lowest pressure is in the Northwest and Upper Lake region.

(1.) *Areas of high barometer.*—These have not been so well defined, nor so extended in area, as those of the preceding or colder months; but probably exceed the usual June pressures. Several of these areas, on reaching the Atlantic coast, remained nearly stationary for several days, occasioning cool southeast winds.

I. The first marked area of high barometer, of June proper, became clearly developed on the 5th, as it then descended over the Northwest, moving in a southeastward direction. This area was preceded by cold northerly winds, which produced considerable rain-fall in the Mississippi and Ohio Valleys, as also, when its chilling influence was felt, in the Gulf States. In the Northwest the barometer rose half an inch or more above its normal June reading, and the temperature sank to an unusual low figure over the Mississippi Valley and the country east of it. This area gradually worked its way toward Tennessee and the Ohio Valley, and finally eastward to the Middle and South Atlantic coasts, which it reached by slow degrees. On the 8th it was accompanied by high winds near and off Cape Hatteras. It also occasioned low temperatures for the Eastern Gulf and South Atlantic States, while it remained in their vicinity.

II. On the 12th, another area of high pressure began its progress from the Northwest, but its course was directed more duly eastward over the Lakes, and thence toward the Upper Ohio Valley. It remained nearly central, however, over the Upper Lake region during the 12th and 13th, when it moved toward the Middle Atlantic coast, attended by low temperatures.

III. Another high-pressure area was reported on the afternoon of the 17th, from the Upper Lake region, whence it steadily developed in a southeastward direction, though the crest of the wave remained nearly stationary over Lake Michigan. This area finally, on the 19th, is seen in a long, narrow band running from Lake Michigan to Virginia and North Carolina, after which it ceases to be of any importance.

IV. A small area of pressure, amounting to 30.20 inches, was formed on the Middle Atlantic coast on the 20th, and remained nearly stationary producing cool southeast winds, until the morning the of 22d. It then disappeared in a southerly quarter.

V. On the 25th, another decidedly high pressure was reported from the Eastern Gulf and South Atlantic coast, where it continued nearly stationary till the 28th.

VI. On the 28th, a long area of high barometer developed in the Northwest, and west of the Mississippi Valley, occasioning a decided fall of temperature and considerable precipitation in its front. But the barometer readings were not very high.

VII. A seventh area of high pressure made its appearance in the Northwest on the morning of the 27th, and slowly worked eastward to the Lake region and the Ohio Valley, producing cooler and cloudy weather, with considerable rain in the Ohio Valley. This area was apparently but part of a more extensive one, central near Hudson's Bay, and which gradually extended on the 28th and 29th southward over New England and the Middle Atlantic coast. On the afternoon of the 27th, it occasioned a high and destructive tornado at Detroit and brisk winds generally on the Lakes. On Tuesday, the 29th, it occasioned severe local storms near Frederick, Md., and in Southeastern Pennsylvania. This area, after reaching the Middle Atlantic States, slowly moved toward the South Atlantic coast.

VIII. During the 29th and 30th, another area of high barometer was formed in the Northwest and Lake region, reducing the temperature over the northern part of the country. As it progressed southeastwardly its effects were very decidedly felt. But its history, &c., belong to the month of July.

(2.) *Areas of low barometer.*—Only seven marked areas of low barometer were reported during the month, the barometric fluctuations having been of a more local character.

No. I. This first depression of the month appears in Nebraska on the morning of the 1st of June, accompanied by heavy rains from Omaha to Duluth. It progressed slowly during that day toward Lake Superior, and, by the afternoon of the 2d, it was central over that lake, attended by brisk northeasterly winds and rain, which extended to Lake Michigan. On the 3d and 6th it disappeared, without further noteworthy effect, north of the Saint Lawrence Valley.

No. II. On the morning of June 4, a slight depression was visible in Kansas, preceded on its eastern side by cloud and occasional heavy rain. This depression, at first stationary, extended and progressed very slowly eastward during the day, and, on the morning of the 5th, had apparently reached eastward to Indiana and Ohio. During the remainder of the latter day it advanced rapidly to a point north of Lake Erie, and thence, on the 6th, without noticeable consequences, it passed down the Saint Lawrence Valley and off the coast of Maine.

No. III. First appears on Sunday, June 6, in Western Pennsylvania, where it was probably generated by the condensation and rain-fall of that day, due to the falling temperature in the northerly winds, preceding the high-pressure area No. 1. This depression advanced, with falling barometer, due east off the Middle Atlantic coast, with considerable rain and fresh northwest winds in the rear, on the morning of the 7th.

No. IV. Though formed on the 9th, and possibly on the 8th, was not clearly defined till the evening of the 10th, when it was central in the far Northwest. It then began to move eastwardly, with light rains, toward Lake Superior, over which it became central in the afternoon of the 11th. It was then followed by high winds in the Northwest and on the Upper Lakes, the wind velocity at Duluth reaching thirty-six miles per hour at 4.35 p. m. From Lake Superior, its course continued due east towards the Saint Lawrence Valley, which it attained on the forenoon of the 12th, accompanied on its southern sides by considerable rain-fall. During the evening and night of the 12th, it moved off the New England coast, with the usual northwest wind and cooler weather in its rear.

No decided storm-center of any magnitude or definite cyclonic character appears on the weather-maps from the 12th to the evening of the 16th, when a slight barometric depression, No. V, is seen advancing from Nebraska toward the Mississippi River. Though scarcely distinguishable, it appears to have passed eastward very rapidly on the forenoon of the 17th, and on the afternoon of that day had become traceable in the Ohio Valley. At midnight of the 17th, it was central in Western Pennsylvania. But, in eight hours, it had rapidly moved eastward to the Middle Atlantic coast. On the 18th, it took a somewhat northerly course and approached the coast of Maine. Although the barometer was not unusually low, while the storm was within the observation of this Office, after it passed north of Cape Cod the pressure rapidly fell, and on the morning of the 19th very high and dangerous winds were experienced at and near Eastport, Me., and farther to the northeast. Considerable rain also fell in the rear of this gale along the New England coast. As it approached Eastport, the barometer very rapidly fell, and, subsequently, the anemometer showed the high wind velocity of fifty-seven miles per hour.

No. VI. On the afternoon of the 23d, a depression of minor importance began its eastward progress from the Missouri Valley toward Lake Michigan, which it nearly reached on the morning of the 24th, with occasional heavy rain-fall in the Upper Mississippi Valley. During the latter day it advanced eastward beyond the State of Michigan, and, during the night, passed to the Saint Lawrence Valley, whence, on the 25th, it disappeared to the northward.

No. VII was quite rapid in its progressive motion, having first clearly appeared on the afternoon of the 26th in Northern Kansas, and thence moved across Iowa and the Lake region, reaching the Saint Lawrence Valley and New England on the morning of the 28th. It was followed by brisk northwest winds and rain, with decidedly cooler weather.

On the 29th, a slight but indefinite depression appeared in the Upper Ohio Valley, and slowly disappeared amidst the considerable fluctuations of pressure due to diurnal changes of temperature, without noticeable results, associated with these barometric fluctuations.

(3.) *Tornadoes and severe local storms* were reported from various sections. Among the most prominent of these were the storms which visited Switzerland County, Indiana, on the 2d and 21st; Wythe County, Virginia, on the 25th; Saint Joseph County, Indiana, on the 1st; Hardin County, Ohio, on the 2d; Adams County, Pennsylvania, on the 29th; Indianapolis, on the 1st and 2d; Quincy, Ill., on the 14th; Saint Louis, on the 18th; Omaha, Nebr., on the 17th; Chicago, on the 22d; Dubuque, Iowa, on the 21st; North Platte, Nebr., on the 26th; Detroit, on the 27th; and Philadelphia, on the 28th.

The tornado at Detroit was one of great violence and destructiveness in and around that city. Its path through the city was nearly north or north-northeast. It was apparently unaccompanied by electrical phenomena. Its rate of progress was irregular,

sometimes appearing to stand still, and again moving with great velocity. Its duration was estimated at from three to five minutes, the length of its track a little more than a mile, and its width about 150 feet. The vorticose motion was from right to left. It was first seen in the southwest as an exceedingly dark mass, with a violent whirling motion, and a funnel suspended from it of the color of coal-smoke. In one or two localities it was attended by torrential rain, but generally it was a dry storm. There was considerable loss of life in its immediate vicinity; many houses were shattered beyond recognition.

This tornado was accompanied by terrific roaring, hissing, and rumbling noises. It was preceded by hot and very oppressive weather for the four days previous. Three hours before its fatal stroke, it was preceded by a light shower of rain. The great outburst of the storm commenced about 6.15 p. m. of the 27th. This violent meteor was apparently not al ne, but attended by others of minor importance in the immediate vicinity.

Hail-storms.—A severe hail-storm was reported from Bismarck, Dak., on the 23d, with stones from one-third to one-half inch in diameter; at Troy, Ala., on the 12th; at Mount Ida, Ark., on the 20th; near Detroit on the 27th; on the 2d, at Algona, Iowa; and on the 2d, 18th, 20th, and 26th, at Leroy, Kans.; at Winchester, Ky., on the 6th; on the 12th, at Attaway Hill, N. C., and at several other points.

TEMPERATURE OF THE AIR.

The mean monthly temperature of the air will, as usual, be found in isotherms on Chart No. II, and in the table in the left-hand corner.

From these exhibits it will be seen that the temperature has been nearly normal for the Atlantic and Gulf States and Lower Lake region, but has fallen below the normal by nearly 2° in the Upper Lake region, the Ohio Valley, and Tennessee, and the Upper Mississippi and Lower Missouri Valleys.

The lowest temperature has occurred on the coast of Maine, and the highest in the Southwest.

Frosts occurred very generally north of Maryland on the 13th and 14th. Frost was reported on the 14th from Oswego, Rochester, and Buffalo, N. Y., Squan Beach, N. J., Portland and Mount Desert, Me., Florida and Springfield, Mass., and many points in New York and Pennsylvania; on the 15th, in Pennsylvania and Vermont; on the 16th, from New Hampshire. The frosts of the 13th and 14th were quite heavy and damaging to crops. The frosts of the 13th were specially reported from New Market, Md., Freehold, N. J., and Fall River, Mass. Light frost was reported from Wayne County, Pennsylvania, as late as the 21st.

PRECIPITATION.

This element is graphically exhibited on Chart No. III. The rain-fall at San Francisco was 1.02 inches. There is a very striking excess of rain in a large irregularly-shaped belt of country, extending throughout the Lower Missouri and Lower Ohio Valleys, and having a variable but average breadth of one hundred and seventy-five miles. Within this wide-spread region the June rain-fall has been from 8 to 12 inches. For several hundred miles around this belt the rain-fall has been in large excess. It has also been in decided excess in New England and the Lower Lake region. The deficiencies are in the Middle States, about 1 inch below the normal quantity, and the Upper Lake region, about .60 of an inch. But in the Western Gulf States also the deficiency (1.60 inches) is very large.

The explanation of the very large excess of rain in the Upper Mississippi, the Lower Missouri and Lower Ohio Valleys is obvious, if we connect the abnormally low temperature (see previous article) in these sections with the prevailing southerly and vapor-laden winds. As fast as the latter could bring the moisture of the Gulf region, it has been condensed by the low temperature, producing often copious and torrential rains. On the 17th, 5.02 inches of rain fell at Omaha within eight hours. Several similar falls were reported at other stations in these sections. While somewhat destructive to railroads, these very heavy rain-storms swept millions of grasshoppers from the fields, and greatly brightened the agricultural prospects.

Rainy days.—The number of days on which rain in any quantity has fallen during the month averages about as follows: New England, 11; Middle States, Lower Lake region, and the Ohio and Upper Mississippi Valleys, 15; South Atlantic and Eastern Gulf States, Missouri and the Lower Mississippi Valleys and the Upper Lake region, 10; Texas and Indian Territory, 5.

RELATIVE HUMIDITY.

This element averages 80 per cent. for the immediate coast of New Jersey and New England and 75 per cent. on the South Atlantic coast. Elsewhere over nearly the

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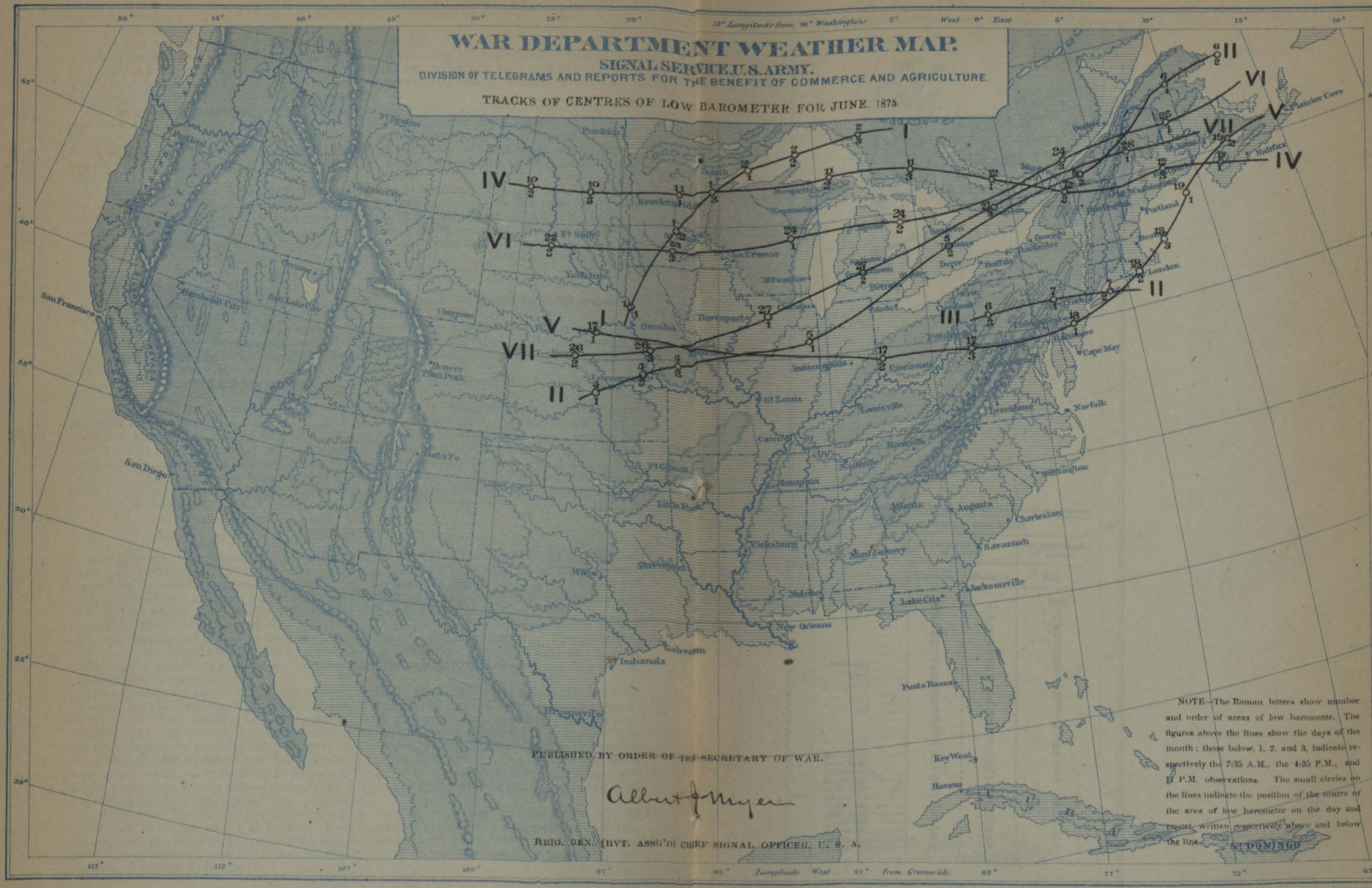
No. I.

WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U.S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

TRACKS OF CENTRES OF LOW BAROMETER FOR JUNE, 1875.



PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. ASS'T) 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.

AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

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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, 1875.

AVERAGE MEAN TEMPERATURES FOR JUNE.

DISTRICTS.	Average for June		Comparison of June 1875, with the average for many years.
	For many years.	For 1875.	
St. Lawrence valley	66°.0	—°.—	
New England	64 .5	64 .2	Normal.
Middle Atlantic States	71 .3	71 .4	Normal.
South Atlantic States	78 .4	78 .0	Slightly below.
Gulf States	80 .2	80 .8	Slightly above.
Lower Lake region	65 .4	66 .0	Slightly above.
Upper Lake region	62 .8	60 .4	2°.4 below.
Ohio valley and Tennessee	74 .6	73 .6	1° below.
Upper Mississippi valley	72 .1	66 .5	2°.6 below.
Lower Missouri valley	72 .6	71 .6	0°.9 below.
Minnesota	68 .8	—.—	
Pacific Coast	62 .7	—.—	

TEMPERATURES OF WATER FOR JUNE.

STATIONS.	Temperatures at bottom.		Average depth of water.
	Maximum.	Minimum.	Feet.
			Feet.
Augusta	86°	77°	5
Buffalo	69	58	12
Cairo	80	74	27
Chicago	68	57	10
Duluth	64	39	15
Eastport	44	39	15
Escanaba	60	43	16
Galveston	87	80	14
Ladianola	87	79	9
Jacksonville	83	82	10
Keokuk	80	57	10
La Crosse	75	66	8
Leavenworth	79	69	3
Louisville	76	71	6
Memphis	80	73	20
Marquette	50	36	17
Milwaukee	62	50	23
Nashville	81	77	26
New London	67	56	11
New York	70	59	13
Norfolk	83	71	24
Pittsburgh	79	69	7
Portland, Maine	54	51	26
St. Louis	81	70	20
Savannah	83	78	10
Shreveport	86	78	18
Toledo	69	60	11
Wilmington	82	74	14
Wood's Holl	73	56	8

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

Albert J. Myer

BRIG. GEN. (BVT. ASSG'D) CHIEF SIGNAL OFFICER, U. S. A.

AM. PHOTO-LITHOGRAPHIC Co. N.Y. (OSBORNE'S PROCESS)

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No. III.

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, 1875.

AVERAGE PRECIPITATION FOR JUNE.

DISTRICTS.	Average for June.		Comparison of June, 1875, with the average for many years.
	For many years.	For 1875.	
	Inches.	Inches.	
St. Lawrence Valley......	2.65	2.15	Small deficiency.
New England	3.35	4.35	Excess.
Middle Atlantic States....	3.75	2.75	Deficiency.
South Atlantic States.....	4.50	5.40	Small excess.
Eastern Gulf States.......	6.90	3.70	Large deficiency.
Western Gulf States......	4.05	2.40	Large deficiency.
Lower Lake region	3.25	3.70	Small excess.
Upper Lake region	3.50	2.85	Small deficiency.
Ohio Valley and Tennessee	4.20	5.75	Small excess.
Upper Mississippi Valley.	4.50	6.75	Large excess.
Lower Missouri Valley....	3.67	8.70	Very large excess.
Minnesota...............	4.85	—	—
Pacific Coast............	0.51	1.00	Large excess.

HEIGHTS OF RIVERS ABOVE LOW WATER MARK.

STATIONS.	HIGHEST.			LOWEST.		
	Date. June.	Height.		Date. June.	Height.	
		ft.	in.		ft.	in.
RED RIVER.						
Shreveport	20	22	9	1	17	5
MISSOURI.						
Fort Sully..............	23	14	6	11	10	5
Yankton	4	14	0	14	11	5
Omaha..................	28	15	2	16	8	7
Leavenworth	29	16	9	1	10	10
MISSISSIPPI.						
St. Paul................	8	10	11	30	7	0
La Crosse	13	5	10	30	4	5
Dubuque	3	11	5	24	9	11
Davenport	1	8	0	10–11	6	10
Keokuk.................	29	10	8	13	7	6
St. Louis................	30	24	0	1	16	4
Cairo	30	28	11	4–5	17	5
Memphis	30	21	11	6–8	14	4
Vicksburg...............	1	34	10	26	26	0
New Orleans*	5	5	1	28–29	8	7
CUMBERLAND.						
Nashville...............	23	7	7	6	3	2
OHIO.						
Pittsburgh	12	5	2	27	2	6
Cincinnati...............	22	17	0	1	8	8
Louisville	23*	7	10	1	4	10

* Below high water mark.

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BRIG. GEN. BVT. ASSG'D CHIEF SIGNAL OFFICER, U. S. A.

entire country east of the western plains the average is from 65 to 70 per cent. It is, as usual, very low at the Rocky Mountain stations, being 33 per cent. at Cheyenne, 29 at Salt Lake City, and 28 at Denver.

WINDS.

The prevailing winds have been from southeast to southwest over all the country east of the Rocky Mountains. From the Ohio Valley to the Gulf the direction has been nearly due south.

Total movement of the air.—The larger total movements of the air for the month have been: at Kitty Hawk, N. C., 11,048 miles; Cheyenne, 9,332; Sandy Hook, 8,479; Indianola, 8,417; Erie, 7,606; Peck's Beach, N. J., 7,963; and Squan Beach, 7,210. The smallest, at Lynchburg, 2,092; Wytheville, 2,605; Augusta, 2,611; Nashville, 3,140; Vicksburg, 3,219; Montgomery, 3,248; Morgantown, 3,352.

VERIFICATIONS.

The critical comparison of the published predictions with the weather actually following them, shows that, on the average, for all the districts predicted for, 87.5 per cent. of the predictions have been verified.

During the month thirty-one cautionary signals have been ordered at the forty-three signal-stations on the Lakes and Atlantic coasts. Of this number, twenty-two have been justified by the fact of succeeding high winds. There were four partly justified or of doubtful necessity. The remaining five were not justified.

NAVIGATION.

It appears that navigation was universally resumed, without ice-obstruction, before June set in on the lakes and rivers.

The extreme depth of water in the Mississippi and its tributaries is shown by the table on Chart No. III. In the extreme Upper and Lower Mississippi and the Upper Ohio, the lowest stage of water is seen toward the close of the month. But in the Lower Missouri it was otherwise, the water rising to its highest on the 25th, 28th, and 29th. In the Central Mississippi, from Keokuk to Memphis, the highest water was recorded on the 29th and 30th.

Ice in the North Atlantic.—The ice drift and icebergs in the North Atlantic have been, as also noticed in the last review, unusually large and late. During the whole month of June, vessels making Canadian and American ports were in jeopardy from ice-obstructions. In the early part of June the steamer Golden Horn, in latitude 47° 33′, and longitude 49° 30′, was detained ten days amid ice-fields and icebergs. On the 11th, the steamship State of Nevada, latitude 43° 23′, longitude 47° 26′, came in collision with a large iceberg, staving in forecastle-head and damaging her plates considerably. June 24th, the steamship City of Brussels, in latitude 42° 25′, longitude 49° 18′, and on June 22d, the steamship State of Louisiana, in latitude 42° and 43°, and longitude 48° and 49°, passed large icebergs. On the 21st, the steamer Bermuda found the Straits of Belle Isle completely blocked with ice, and had to steer one hundred and seventy-five miles to the southeast to get clear, but was still embayed in the ice for a considerable time. The steamship Scandinavian, while off the coast of Newfoundland, on the 29th of June, sighted no less than 100 icebergs, many of them of monstrous size. The steamship Caspian, which touched at Saint John's on July 1, was five days among the icebergs, and previous to that day steamships could not get to Saint John's on account of ice-obstructions.

TEMPERATURE OF THE WATER.

The details of water temperatures appear on the table in lower right-hand corner of Chart No. II.

The least thermometric variations in the water on the Atlantic coast are at Eastport, Me., and Portland, Me.,—5° to 3° respectively. The greatest range is at Wood's Hole, Mass., where it is 16°. On the Lakes, the monthly range of temperature has been about 11°. In the interior rivers it has been from 9° to 12°. The greatest variation reported is 25° at Duluth.

ATMOSPHERIC ELECTRICITY.

Thunder-storms.—This item is noticed in part on page 4, as many of the local storms there recorded were attended by electrical phenomena. Thunder-storms were reported

at one or more stations every day in June, except on the 9th. After the middle of the month, they became quite general over the whole country. None were reported in New England before the 7th.

Auroras.—The principal auroras were those recorded on the 3d in New York and Pennsylvania; on the 6th, in Vermont, Massachusetts, New Hampshire, and Connecticut; on the 1st, 7th, 8th, and 10th, in New York; on the 2d, in Michigan; on the 4th, in New York and Iowa; on the 24th, in Wisconsin and Iowa; on the 27th, in Iowa; on the 17th, in Vermont; on the 20th, in Ohio and Pennsylvania; on the 30th, in New York and Wisconsin.

OPTICAL PHENOMENA.

(1.) *Solar halos* were less frequently observed than usual. The chief phenomena of the kind reported were as follows: On the 3d, in Kentucky; 4th, in Iowa, Nevada, and New Hampshire; 5th, in Maryland, Massachusetts, New Hampshire, New York, and Rhode Island; 6th, in Illinois, Massachusetts, New York, and Vermont; 7th, in Iowa, Nebraska, and New York; 8th, in Maryland, New York, and Vermont; 9th, in Massachusetts, New Hampshire, and Vermont; 10th, in New York and Pennsylvania; 11th, in New York; 13th, in Illinois; 14th, in Kansas and New York; 16th, in Tennessee; 17th, in Iowa, Kansas, New Hampshire, New York, and Tennessee; 19th, in New Hampshire and Virginia; 20th, in Nevada and Ohio; 22d, in Illinois; 23d, in New York; 24th, in New Hampshire and New York; 25th, in Kansas; 30th, in Illinois.

The solar halos of the 5th were very extensively observed, and reported as quite brilliant.

(2.) *Lunar halos* were also very few in number. The principal were as follows: The 5th, Massachusetts; 7th, Colorado; 8th and 9th, New York; 11th, South Carolina; 12th, Iowa; 14th, Ohio; 15th, Pennsylvania; 17th, Ohio and Virginia.

(3.) *Mirage.*—Only one mirage was noted. This was on the 7th and 19th at Ellinwood, Kans.

(4.) *A lunar rainbow* was reported at Clarksville, Tex., on the 19th, and also at Buffalo, on the 24th.

MISCELLANEOUS PHENOMENA.

(1.) *Natural history.*—Under this head, the following items are of note:

Grasshoppers.—At Denver, Colo., about the middle of June, grasshoppers were reported leaving in all directions. At Leavenworth, on the 11th, they were reported flying north and northwest, and were all gone by the 13th. Grasshoppers left Iowa on the 18th. In Kansas, they were seen going northeast on the 3d, and northwest on the 12th. In Nebraska, going north from the 10th to the 17th. Millions are reported drowned by the heavy rains in the Missouri Valley. Grasshoppers were very bad in New Mexico, where distressing drought also prevailed.

Locusts.—At Plattsmouth, Neb., immense swarms of locusts moved north, northeast, and northwest from the 13th to the end of the month. The river-observer there says: "Vast quantities of locusts were seen flying over from the 15th to the 25th of June, inclusive, except the 19th, 20th, and 21st. The line was from one hundred to one hundred and fifty miles in width, and from one-quarter to one-half mile in depth. As only a few descended, no serious damage resulted." They seem to have floated along in the prevailing wind. Locusts were at Ellinwood, Kans., on the 17th.

The Colorado beetle or potato-bug was in large quantities in Waupaca and Waushara Counties, Wisconsin, during the month, and in Hunterdon County, New Jersey. It was also reported in New York.

(2.) *Forest fires.*—In Duchess County, New York, on the 19th; near Denver, on the 18th, 24th, and 25th; in Saint Lawrence County, New York, from the 13th to 21st.

(3.) *Polar bands* at Buffalo on the 3d and 4th.

(4.) *Meteors* at Albany on the 24th; at Shreveport on the 4th and 21st; on the 21st at Lyndon, Ill.; also near Detroit one was observed; on the 23d and 30th at New York City; brilliant one on the 24th at Trenton, N. J.; and on the 29th at Weldon, N. C.

(5.) *Earthquakes.*—The ship Hamilton, at sea, June 4th, latitude 19° 16′ north and longitude 57° 5′ west, felt the shock of an earthquake, lasting about ten minutes, and reports that during the time there was a tremendous sea on the vessel, pitching her bows under. On the 18th, an earthquake, with distinct rocking and trembling motion, was felt at Indianapolis, and also at Columbus and Sandusky, O.; Urbana, Degraef, Vincennes, Anderson, and Pickway, Ind.

Published by order of the Hon. William W. Belknap, Secretary of War.

ALBERT J. MYER,
Brig. Gen., (Bvt. Asst'd,) Chief Signal-Officer, U. S. A.

PAPER 21.

WEEKLY WEATHER CHRONICLE.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER, DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE,
Washington, D. C., June 29, 1875.

GENERAL SUMMARY FOR THE WEEK ENDING TUESDAY, JUNE 29, 1875.

An area of low barometer in Western Dakota and Nebraska on Wednesday afternoon, passed northeastward to Lake Superior, followed by a second, which also passed from Minnesota eastward, north of Lake Huron, into Canada. Another center of low barometer appeared in the Lower Missouri Valley on Saturday evening, progressed eastward over the Lake region during Sunday, and thence down the Saint Lawrence Valley. A fourth area, apparently in Dakota, Monday morning, has passed northeastward to Manitoba; while a fifth developed during Monday afternoon and night in the Lower Ohio Valley. During the night the barometer has risen rapidly in New England, where it is highest.

The amount of rain for the past week averages about as follows in the various districts: Saint Lawrence Valley, 0.30 inch; New England, 0.35; Middle Atlantic States, 0.35; South Atlantic States, 0.40; Eastern Gulf States, 1.10; Western Gulf States, 0.70; Lower Lake region, 1.10; Upper Lake region, 0.20; Ohio Valley, 1.90; Tennessee, 0.55; Upper Mississippi Valley, 1.60; Missouri Valley, 0.85; Minnesota, 0.40.

Tuesday, 22.—Cloudy and threatening weather, southerly winds, and rain prevailed in the morning from Tennessee to Lake Erie, and extended subsequently to Lake Ontario and the Middle States, clearing away in the former section. The rain-fall was heavy in the Lower Ohio Valley. Throughout the Mississippi Valley and westward, the Eastern Gulf, South Atlantic and New England States, clear or fair weather, south or southwest winds and rising temperature generally prevailed. In the extreme Northwest, cloudy weather and northwest winds were reported.

Wednesday, 23.—During the morning cloudy or partly cloudy, warmer weather, occasional light rain, and southerly winds, prevailed over Lake Erie, the Middle Atlantic coast and the Saint Lawrence Valley, and subsequently from the Western Gulf coast to Tennessee. In the northwest and over Lakes Superior and Michigan, cloudy and threatening weather, with rain, prevailed. Heavy rain-falls were reported from Augusta, Ga., and Bismarck, Dak., the former having fallen very early in the morning.

Thursday, 24.—Clear, warm weather and southerly winds prevailed in the Atlantic and Gulf States, except rain on the immediate Gulf coast. Falling barometer, increasing southwest winds and partly cloudy weather, followed by frequent rains, prevailed in the Ohio and Missouri Valleys and Lower Lake region. Clear weather continued in the Northwest and Upper Lake region until midnight, with calms and diminishing southwest winds, occasionally shifting to the northeast.

Friday, 25.—Southwest winds, warm, clear weather prevailed in the Gulf and Atlantic States, followed by numerous light rains, lower temperature and occasional northerly winds over the Lakes, Middle and Eastern States, Ohio and Upper Mississippi Valleys.

Saturday, 26.—Southwest winds and clear weather prevailed on the South Atlantic coast, but in the interior of these States and westward to the Mississippi, cloudy or partly cloudy weather, southerly winds and light rains. Partly cloudy, cooler weather, with numerous light rains, prevailed in New England, over the Lower Lakes, the Ohio Valley, Tennessee and the Lower Missouri and Upper Mississippi Valleys, with generally southerly winds, veering to northwest in the Missouri Valley in the evening. Cloudy weather, northerly winds and light rain in the Northwest.

Sunday, 27.—Southwest winds and clear or clearing weather, with local rains, prevailed in the Gulf and South Atlantic States. Southwest winds, cloudy or partly cloudy and threatening weather, with numerous rains, from the Ohio Valley and Lower Lakes to the Middle and East Atlantic coasts. Northwest winds, cloudy or partly cloudy weather, and rain in the Northwest; a heavy fall occurred at La Crosse.

Monday, 28.—South or southwest winds and generally clear weather prevailed in the South Atlantic States. Cloudy or partly cloudy weather, with numerous rains, prevailed in the Eastern Gulf States, Tennessee, the Ohio Valley, Middle States and Lower Lake region. Westerly winds and cloudy weather in New England, changing at night to northerly winds and clear weather. Southerly winds and generally clear weather prevailed in the Northwest. Heavy rain-falls were reported from Saint Mark's and Louisville.

Tuesday, 29.—The morning map shows clear or fair weather prevailing in the Atlantic and Gulf States, with easterly winds in New England and the Middle States, but southerly winds over the rest of this region. Cloudy weather and light rain from Tennessee to Lake Erie. Generally clear weather in the Northwest.

RIVERS.

During the past week the Missouri has risen 2½ feet at Omaha, and 5½ at Leavenworth. The Mississippi has fallen 1 foot at Saint Paul, 7 inches at Vicksburg, and 13 at New

Orleans, but has risen nearly 5 feet at Memphis. The Ohio has fallen 8 inches at Pittsburgh, 2 feet at Cincinnati, and 18 inches at Louisville.

Published by order of the Secretary of War.

ALBERT J. MYER,
Brig. Gen., (Bvt. Assg'd,) Chief Signal-Officer, U. S. A.

NOTE.—Editors receiving the Chronicle are requested to inform this Office on which day of the week it should be mailed, in order to reach them in time for publication.

PAPER 22.

[Circular No. 7.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF SIGNAL-OFFICER,
Washington, D. C., March 10, 1874.

The following rules will be observed, in addition to those contained in General Orders No. 28, War Department, Office Chief Signal-Officer, dated Washington, September 1, 1873.

The officer or assistant in charge of the preparation of facts, &c., for publication, will, in addition to his other duties, determine the percentage of verification of the current probabilities, in accordance with the following instructions:

1. The blank forms already prepared to facilitate this work will be used with the following modifications: The column of the blank headed "wind velocity" will not be used. The percentage of verifications of predictions referring to wind will be determined by considering only that portion of the predictions which refers to the direction of the wind. Predictions referring to the velocity of the wind are of decided importance, and should be frequently made, but the limited number of stations now reporting will not justify the consideration of such predictions as an independent element of verifications.

2. The sixth column of the blank will be used for special predictions, and so designated. Three blanks will be used for each month's percentages, and will be numbered, respectively, 1, 2, and 3. Blank No. 1, referring to New England, Middle States, South Atlantic States, and Eastern Gulf States; blank No. 2, referring to the Lower Lakes, Upper Lakes, Tennessee, and Ohio Valley, and Western Gulf States; blank No. 3, referring to Upper Mississippi Valley, Lower Missouri Valley, the Northwest, and the Pacific States.

3. The probabilities made up from each report will be carefully compared with the facts as obtained from the three succeeding tri-daily reports, unless the prediction applies to a definite time, in which case the prediction will determine the facts with which it is to be compared.

4. In estimations of percentages it will be determined whether the conditions announced as to prevail in each district named have prevailed over geographical sections of that district to the amount of one-fourth, one-half, three-fourths, or the whole of the extent of the district. All predictions which are found to be more than three-fourths verified will be considered completely verified, and represented by 100, or 100 per cent., in that column of the blank to which the prediction refers. Predictions which are not wholly verified will be represented in the proper column of the blank by 75 per cent., 50 per cent., or 25 per cent., as the facts may warrant. Predictions which fall below 25 per cent. in verification will be rated as not verified, and represented by 000 in the proper column.

5. If, in the probabilities for any particular district, any class of prediction is not referred to, such omission will be represented by a dash, (—.)

6. The percentage of verifications of a single class of predictions will be determined by dividing the sum of the percentages of that class for the month by the number of predictions of that particular class. The percentage of verifications of probabilities for any district will be determined by dividing the sum of the percentages of the several classes of predictions by the number of classes.

The percentage of verifications of probabilities for the United States will be determined by dividing the sum of the percentage of verifications of probabilities by the number of districts.

7. A maximum percentage of verifications can only be obtained when the four elements under each district are named in the probabilities of the entire month.

8. The percentage of failures to predict for any element will be determined by dividing the number of failures to predict for that particular element by the entire number of tri-daily reports during the month.

By order of the Chief Signal-Officer of the Army.

(Signed) GARRICK MALLERY,
Capt. and Bvt. Lieut. Col. U. S. A., Acting Signal-Officer and Assistant.

PAPER 23.

Percentage of verification of probabilities for the month ending April 30, 1875.

April.	New England.					Middle States.					South Atlantic States.					Eastern Gulf States.					Western Gulf States.				
	Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.	
1	100	100	100	100	....	100	100	100	100	....	25	100	100	0	....	100	75	100	100	....	50	100	100	100	....
	50	75	100	100	....	100	100	100	100	....	100	50	75	50	....	100	100	100	100	....	100	0	100	100	....
	100	100	25	75	....	100	100	100	25	....	100	50	100	0	....	100	100	100	25	....	100	100	75	100	....
2	75	100	100	100	....	100	50	100	100	....	100	75	100	100	....	100	100	100	100	....	100	75	100	100	....
	75	100	75	0	....	100	25	100	100	....	100	100	100	100	....	75	0	100	100	....	100	75	100	100	....
	100	100	100	100	....	100	100	100	100	....	75	100	100	100	....	100	0	100	100	....	100	100	100	75	....
3	75	75	100	50	....	100	100	100	100	....	100	100	100	100	....	100	75	100	100	....	100	100	100	100	....
	100	0	100	100	....	75	0	100	0	....	75	100	100	100	....	100	100	100	100	....	50	100	100	100	....
	100	25	100	50	....	100	25	100	50	....	100	25	25	100	....	100	100	100	100	....	100	100	100	100	....
4	75	0	100	100	....	100	0	100	100	....	100	75	100	100	....	100	100	100	100	....	50	100	100	100	....
	75	100	100	100	....	75	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	100	....	100	100	100	100	....	100	100	100	75	....	100	100	100	100	....	75	100	100	100	....
5	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	75	100	100	100	....
	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	75	100	100	....
	100	75	100	75	....	100	100	100	75	....	100	100	100	100	....	100	100	100	100	....	0	100	100	100	....
6	25	100	100	100	...	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	75	0	0	0	....
	75	100	100	100	....	100	75	100	100	....	100	100	100	100	....	100	100	100	100	....	75	100	100	100	....
	75	100	100	100	....	50	100	0	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
7	100	100	100	100	....	25	100	100	100	....	100	100	100	100	....	100	100	100	100	....	50	100	100	100	....
	100	100	100	100	....	50	100	100	100	....	100	100	100	100	....	75	100	100	100	....	100	100	100	100	....
	75	100	100	100	....	75	100	100	100	....	75	75	0	100	....	100	100	100	100	....	50	100	100	100	....
8	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	75	100	100	....	100	75	100	100	....
	100	100	0	100	....	100	100	0	100	....	75	100	100	100	....	0	100	0	100	....	75	25	0	75	....
	75	100	25	100	....	75	100	25	100	....	75	100	75	100	....	75	100	75	100	....	0	76	100	100	....
9	100	100	100	100	....	100	100	100	100	....	100	100	75	100	....	75	100	100	100	....	50	100	100	100	....
	100	50	100	100	....	100	50	100	100	....	25	100	100	100	....	0	100	100	100	....	100	100	100	100	....
	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	50	100	100	....
10	100	25	100	100	....	75	100	100	100	....	100	100	75	100	....	100	100	75	100	....	100	100	100	100	....
	100	75	100	100	....	100	75	100	100	....	100	100	75	100	....	100	100	100	100	....	100	100	100	100	....
	100	50	100	100	....	100	100	75	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
11	100	50	100	0	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	75	50	100	50	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	75	....	100	100	100	75	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....

Percentage of verification of probabilities for the month ending April 30, 1875—Continued.

April.	New England.					Middle States.					South Atlantic States.					Eastern Gulf States.					Western Gulf States.				
	Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.	
12	25	100	100	0	....	50	100	100	0	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
13	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	.....	....
	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	.....	....
14	75	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	75	100	100	100	....
	100	50	100	50	....	75	50	100	100	....	100	75	100	100	....	100	100	100	100	....	75	100	100	100	....
	50	75	100	0	....	50	75	100	0	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
15	100	100	100	100	....	75	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	...
	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
16	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	100	....	75	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	100	....	75	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
17	100	100	100	100	....	75	100	100	100	....	100	100	100	100	....	100	100	100	100	....	50	100	100	100	....
	100	100	100	100	....	75	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	75	100	100	....	100	100	100	100	....
18	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	75	100	100	100	....	75	100	100	100	....	100	75	100	100	....	100	100	100	100	....	100	75	100	100	....
	100	100	100	100	....	100	100	100	100	....	100	75	100	100	....	100	100	100	0	....	50	100	100	100	....
19	100	75	100	100	....	100	75	100	100	....	100	75	100	100	....	100	50	100	75	....	0	100	100	100	....
	25	100	100	0	....	100	100	100	75	....	100	100	100	100	....	100	100	25	25	....	100	100	25	0	....
	50	100	100	75	....	100	100	100	100	....	100	75	100	100	....	100	100	100	100	....	100	100	75	100	....
20	75	75	100	100	....	75	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	50	100	..
	100	100	100	100	....	100	100	100	100	....	100	100	100	50	....	100	100	100	0	....	100	25	.....	50	....
	100	75	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	0	....	100	100	.....	75	....
21	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	50	....	100	100	100	25	....	100	100	100	100	....	100	100	100	100	....	100	100	100	.....	....
	100	100	100	0	....	100	100	100	0	....	100	100	100	0	....	100	100	100	100	....	100	100	100	100	....
22	100	100	50	100	....	100	100	75	50	....	100	100	100	0	....	100	100	100	0	....	75	100	100	100	....
	100	100	50	0	....	100	100	75	0	....	100	100	0	0	....	100	100	50	25	....	100	100	100	100	....
	100	100	50	25	....	100	100	100	25	....	100	100	100	0	....	100	100	100	75	....	100	50	100	50	....
23	100	100	100	100	....	100	50	100	100	....	100	100	100	100	....	50	100	100	100	....	100	50	100	100	....
	100	100	0	100	....	50	100	0	100	....	100	100	100	100	....	100	100	100	100	....	100	0	100	.....	....
	100	100	100	0	....	100	100	100	50	....	100	100	100	100	....	100	100	100	50	....	100	75	100	75	....

24	100	100	100	100	....	100	100	50	0	....	100	100	100	100	....	100	50	50	100	....	100	100	100	....										
	100	100	50	100	....	100	100	0	100	....	100	50	100	100	....	100	25	50	25	....	100	0	50	100	....									
	100	100	100	100	....	100	100	100	100	....	100	100	50	100	....	100	100	100	100	....	100	50	100	50	....									
25	100	100	100	100	....	100	100	100	100	....	75	....	75	50	....	100	100	100	100	....	100	50	100	100	....									
	100	100	0	100	....	100	100	100	100	....	50	100	100	100	....	100	100	100	100	....	75	50	75	50	....									
	100	100	100	100	....	50	100	100	100	....	0	100	100	100	....	100	100	50	100	....	25	0	100	50	....									
26	100	50	0	0	....	100	100	100	0	....	100	100	100	100	....	100	75	75	100	....	25	.....	100	100	....									
	100	100	100	0	....	100	75	75	100	....	100	100	100	100	....	100	50	0	100	....	100	100	100	100	....									
	100	100	100	0	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	50	50	100	....									
27	100	100	100	100	....	50	100	0	100	....	100	75	100	100	....	100	75	100	100	....	100	100	100	75	....									
	100	100	100	100	....	100	100	25	100	....	100	100	100	100	....	100	100	100	100	....	100	75	100	.....	....									
	75	100	50	100	....	100	50	100	100	....	100	100	75	100	....	100	100	100	100	....	100	100	100	.....	....									
28	100	100	50	100	....	0	0	100	0	....	100	50	100	100	....	100	100	100	100	....	50	100	50	100	....									
	50	100	100	100	....	0	25	100	0	....	100	50	100	100	....	100	100	100	100	....	100	100	100	100	....									
	0	75	100	100	....	0	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	75	100	100	....									
29	50	100	100	100	....	50	100	50	50	....	75	50	50	0	....	50	50	50	0	....	100	25	0	0	....									
	75	100	100	75	....	100	100	50	100	....	50	100	100	100	....	25	100	50	25	....	100	25	25	0	....									
	25	100	100	100	....	100	100	100	100	....	50	75	100	0	....	75	100	100	100	....	100	100	100	100	....									
30	100	50	75	100	....	100	25	50	50	....	100	100	100	100	....	100	100	75	100	....	100	75	100	75	....									
	50	100	100	0	....	50	0	50	50	....	50	50	100	75	....	50	100	75	0	....	0	50	100	50	....									
Verifications:																																		
Sums	7,925	8,075	8,100	7,350	....	7,850	7,925	7,950	7,500	....	8,375	8,225	8,450	8,000	....	8,450	8,350	8,225	7,825	....	6,700	7,425	8,050	7,425	....									
Percentage by elements	88.1	89.7	90.0	81.7	....	87.2	88.1	88.3	83.3	....	93.1	92.4	93.9	88.9	....	93.9	92.8	91.3	86.9	....	74.4	83.4	91.5	89.5	....									
Percentage by districts	.....	.....	.....	.....	87.4	.....	.....	.....	.....	86.7	.....	.....	.....	.....	92.1	.....	.....	.....	.....	91.2	.....	.....	.....	.....	84.6									
Omissions:																																		
Sums	0	0	0	0	....	0	0	0	0	....	0	1	0	0	....	0	0	0	0	....	0	1	2	7	....									
Percentage by elements	0	0	0	0	....	0	0	0	0	....	0	1	0	0	....	0	0	0	0	....	0	1.1	2.2	7.8	....									
Percentage by districts	.....	.....	.....	.....	0	.....	.....	.....	.....	0	.....	.....	.....	.....	0.3	.....	.....	.....	.....	0	.....	.....	.....	.....	2.9									

Percentage of verification of probabilities for the month ending April 30, 1875—Continued.

April.	Lower Lakes.					Upper Lakes.					Tennessee and the Ohio Valley.					Upper Mississippi Valley.					Lower Missouri Valley.				
	Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.	
1	100	100	100	100	....	75	75	75	100	....	100	100	100	100	....	25	75	75	100	....	0	75	100	100	....
	100	100	100	.....	....	50	100	100	100	....	100	100	100	100	....	0	75	100	50	....	25	100	100	0	....
	100	100	50	100	....	100	100	100	100	....	100	75	100	100	....	100	100	100	100	....	75	100	100	100	....
2	50	100	100	100	....	75	100	100	100	....	75	75	100	75	....	75	75	100	100	....	75	75	100	100	....
	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	75	100	100	....	100	75	100	100	....
3	100	75	100	100	....	75	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	50	75	50	0	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	75	25	100	100	....	100	100	100	100	....	100	50	100	100	....	75	100	100	100	....	75	100	100	100	....
4	100	25	100	100	....	75	100	100	100	....	100	50	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	100	....	50	100	100	100	....	0	100	100	100	....	75	100	100	100	....	75	100	100	100	....
					....	100	100	100	100	....	100	100	100	75	....	75	100	100	100	....	100	100	100	100	....
	50	100	100	100	....	100	100	100	100	....	100	100	100	100	....	25	100	100	100	....	100	50	100	100	....
5	100	100	100	100	....	75	100	100	100	....	100	100	100	100	....	75	75	0	100	....	100	75	0	100	....
	50	100	100	100	....	75	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	50	100	100	100	....	75	100	100	100	....	100	100	100	100	....	75	100	50	100	....	100	100	100	100	....
6	100	50	100	100	....	75	100	100	100	....	75	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	100	....					....	100	100	100	100	....	100	75	0	0	....	0	0	100	.....	....
	75	100	100	100	....	75	100	100	100	....	50	100	100	100	....	100	100	100	100	....	100	100	100	100	....
7	75	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	100	....	100	100	100	100	....	75	100	100	100	....	100	75	75	75	....	100	100	0	0	....
	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
8	50	100	100	100	....	100	100	100	100	....	100	75	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	100	....	100	100	100	100	....	50	50	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	100	....	100	100	100	100	....	75	100	100	100	....	50	100	100	100	....	100	100	100	100	....
9	100	100	100	100	....	100	100	100	100	....	100	50	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	100	....	50	100	100	100	....	100	50	100	100	....	75	75	75	75	....	75	75	75	75	....
	75	100	100	100	....	25	50	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
10	100	100	100	100	....	100	100	100	100	....	100	100	75	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	100	....	100	100	100	100	....	100	75	50	100	....	75	100	100	100	....	75	100	100	100	....
	100	100	100	75	....	100	100	100	75	....	100	100	100	100	....	75	100	100	100	....	75	100	100	100	....
11	100	100	100	100	....	100	100	100	100	....	75	100	100	100	....	50	100	100	100	....	50	100	100	100	....
	100	100	100	0	....	100	100	100	0	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	25	25	100	100	....	100	100	100	100	....	25	25	100	100	....	100	100	100	100	....	100	100	100	100	....
12	25	100	100	100	....	100	100	100	100	....	50	75	100	100	....	100	100	100	100	....	100	100	100	100	....
	75	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....

	100	100	100	100	....	100	100	100	100	....	75	100	100	100	....	100	100	100	100	....	100	100	100	100	....
13	100	100	100	100	....	100	100	100	100	....	100	75	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	......	....	100	100	100	......	....
	50	100	100	100	....	50	100	100	200	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
14	100	100	100	0	....	100	100	100	0	....	75	100	100	100	....	100	75	0	0	....	100	75	0	0	....
	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	0	0	....	100	100	0	0	....
	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	0	100	100	100	....
15	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	50	100	100	100	....	50	100	100	100	....
16	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	75	100	100	....	100	75	100	100	....
	75	100	100	100	....	75	100	100	100	....	100	100	100	100	....	100	50	100	100	....	100	50	100	100	....
	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	75	100	100	....	100	75	100	100	....
17	100	100	100	100	....	100	75	100	100	....	100	100	100	100	....	100	25	100	100	....	100	50	100	100	....
	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	100	....	100	50	100	100	....	75	100	100	100	....	100	75	100	100	....	100	75	100	100	....
18	100	100	100	100	....	100	75	0	100	....	100	100	100	100	....	100	75	75	100	....	100	75	100	100	....
	100	0	0	100	....	50	25	50	100	....	100	100	100	100	....	75	75	100	100	....	75	75	100	100	....
	75	0	0	100	....	100	0	0	100	....	25	75	100	100	....	75	0	100	100	....	100	50	100	100	....
19	50	75	100	0	....	25	75	100	50	....	100	50	50	25	....	50	25	100	100	....	75	25	100	100	....
	50	100	100	100	....	75	100	100	100	....	100	100	50	75	....	100	100	100	100	....	100	100	100	100	....
	100	100	100	100	....	100	50	0	0	....	100	50	25	50	....	100	50	0	0	....	100	50	0	0	....
20	75	50	75	0	....	25	0	50	0	....	100	0	100	100	....	100	50	0	0	....	100	50	100	0	....
	100	50	100	100	....	50	50	0	50	....	100	100	100	75	....	75	50	75	50	....	75	50	75	75	....
	100	100	100	100	....	100	75	100	100	....	100	100	100	100	....	100	100	100	25	....	100	100	100	0	....
21	50	100	100	50	....	100	100	100	50	....	50	100	100	100	....	100	100	100	100	....	100	100	100	100	....
	100	25	100	0	....	100	75	100	25	....	100	100	100	100	....	0	50	100	0	....	0	50	100	25	....
	75	100	100	50	....	100	100	100	100	....	100	100	100	75	....	100	100	100	0	....	100	100	100	0	....
22	100	100	100	0	....	100	100	100	0	....	100	100	75	0	....	100	100	100	0	....	100	100	100	0	....
	50	50	100	0	....	25	100	25	0	....	100	100	100	0	....	100	100	50	50	....	100	100	100	0	..
	75	100	50	100	....	75	100	0	25	....	100	100	100	100	....	100	100	100	75	....	100	100	100	50	....
23	100	75	100	100	....	100	100	100	100	....	100	100	100	25	....	0	100	100	0	....	100	100	0	0	....
	100	50	100	100	....	50	100	100	100	....	75	100	100	100	....	0	100	100	100	....	100	100	100	100	....
	100	50	100	100	....	25	50	100	100	....	25	100	100	100	....	100	0	100	50	....	100	100	100	75	....
24	100	100	100	100	....	75	100	50	100	....	50	50	25	100	....	75	50	50	100	....	100	100	100	100	....
	100	100	50	100	....	100	75	50	75	....	50	100	25	50	....	100	50	50	0	....	100	100	50	75	....
	100	100	100	100	....	75	100	100	100	....	100	100	50	100	....	100	100	100	100	....	100	100	100	100	....
25	100	50	100	100	....	100	100	100	100	....	100	75	100	100	....	100	100	100	100	....	100	50	100	100	....
	100	0	100	50	....	0	25	25	100	....	100	50	50	100	....	50	100	50	100	....	100	50	50	100	....
	0	25	100	100	....	0	25	100	100	....	100	50	100	100	....	25	50	100	100	....	50	50	100	100	....
26	0	75	100	100	....	0	100	75	100	....	100	50	50	100	....	25	75	75	100	....	25	100	0	100	....
	0	75	100	100	....	100	75	100	100	....	100	0	75	......	....	50	100	100	100	....	50	100	100	100	....
	75	100	100	100	....	100	100	100	100	....	100	50	100	100	....	50	100	100	100	....	100	100	100	100	....
27	100	50	50	100	....	100	100	100	75	....	100	100	100	100	....	100	100	50	100	....	100	100	50	100	....
	100	100	100	100	....	75	100	100	100	....	100	100	100	100	....	50	100	100	100	....	50	100	100	75	....
	100	100	100	100	....	100	75	100	75	....	100	100	100	50	....	100	100	100	0	....	100	100	50	0	....
28	100	100	100	100	....	100	50	100	100	....	100	100	100	100	....	100	100	75	100	....	100	100	75	100	....
	0	25	50	25	....	100	100	50	100	....	75	25	25	25	....	50	100	50	100	....	50	100	75	100	....
	100	50	......	100	....	100	50	100	100	....	100	50	100	100	....	100	100	100	100	....	100	100	100	100	....
29	100	100	100	100	....	100	100	25	100	....	100	100	100	100	....	100	50	50	100	....	100	0	50	100	....
	100	100	75	100	....	100	75	75	100	....	100	50	50	0	....	75	50	75	0	....	75	0	50	0	....

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Percentage of verification of probabilities for the month ending April 30, 1875—Continued.

April.	Lower Lakes.					Upper Lakes.					Tennessee and the Ohio Valley.					Upper Mississippi Valley.					Lower Mississippi Valley.				
	Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.		Weather.	Wind, direction.	Temperature.	Barometer.	
30	75	100	100	75	....	100	25	100	100	....	100	100	50	100	....	100	50	100	100	....	25	50	100	100	....
	100	0	50	100	....	100	100	100	75	....	100	100	25	100	....	100	100	100	100	....	100	100	100	100	....
	75	0	100	25	....	50	50	100	100	....	0	0	25	25	....	75	50	75	100	....	75	0	25	100	....
Verifications:																									
Sums	7,475	7,350	8,200	7,650	....	7,450	7,750	7,850	7,575	....	8,025	7,650	8,075	8,025	....	7,475	7,675	7,775	7,350	....	7,775	7,650	7,825	7,250	....
Percentage by elements		82.6	93.2	87.0	....	83.7	87.1	88.2	85.1	....	89.2	85.0	89.7	90.2	....	83.1	85.3	86.4	82.6	....	86.4	85.0	86.9	82.4	....
Percentage by districts	.....	.....	.....	.....	86.6	.....	.....	.....	.....	86.0	.....	.....	.....	.....	82.5	.....	.....	.....	.....	84.3	.....	.....	.....	.....	85.2
Omissions:																									
Sums	1	1	2	2	....	1	1	1	1	....	0	0	0	1	....	0	0	0	1	....	0	0	0	2	....
Percentage by elements	1.1	1.1	2.2	2.2	....	1.1	1.1	1.1	1.1	....	0	0	0	1.1	....	0	0	0	1.1	....	0	0	0	2	....
Percentage by districts	.....	.....	.....	.....	1.5	.....	.....	.....	.....	1.1	.....	.....	.....	.....	0.3	.....	.....	.....	.....	0.3	.....	.....	.....	.....	0.5
Total percentage of verifications by districts																									87.2
Total percentage of omissions by districts																									00.6

PAPER 24[1].—FORM 2.

WAR DEPARTMENT, SIGNAL-SERVICE UNITED STATES ARMY,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE.

Telegraphic report of observations received at Washington, D. C., September 30, 1875, at 8 a. m.

WASHINGTON AND NEW YORK CIRCUIT.

8.00 A. m.	Baltimore.	Mistic.	Aloft.	Build.	Cement.	Early.
	Fisher.	Gunner.	Trash.			
	Philadelphia.	Mission.	Aloft.	Build.	Chart.	Deadly.
	Gleam.	Trammel.				
	York.	Mission.	Almost.	Buff.	Chart.	Eaves.
	Glide.	Transit.				
	Lynchburg.	Mistful.	Along.	Brad.	Chase.	Fester.
	Trammel.					
	Albany.	Minute.	Aloft.	Bridal.	Charm.	Debate.
	Firmer.	Gingham.	Trailing.			
	Oswego.	Minor.	Aloft.	Bread.	Chart.	Dance.
	Gunner.	Haddock.	Town.			
	Rochester.	Millie.	Almost.	Boyle.	Census.	Deem.
	Gird.	Haden.	Trade.			
	Buffalo.	Milroy.	Allow.	Brad.	Chart.	Demur.
	Gunner.	Hampton.	Trade.			
	Cleveland.	Misgive.	Allege.	Both.	Chart.	Eclat.
	Gushing.	Hair.	Tragic.			
	Erie.	Minister.	Almond.	Book.	Chart.	Demur.
	Gunner.	Johnson.	Transit.			
	Toledo.	Misjoin.	Allege.	Brain.	Chart.	Eclat.
	Favor.	Glen.	Traffic.			
	Detroit.	Misform.	Alien.	Boyle.	Charge.	Deaf.
8.20	Gushing.	Trace.				
	Marquette.	Missive.	Alden.	Bride.	Charles.	Earth.
	Glad.	Token.				
	Milwaukee.	Mistful.	Alden.	Bud.	Charles.	Damage.
	Gutter.	Gunner.	Token.			
	Escanaba.	Miss.	Album.	Bridal.	Charles.	Data.
	Glen.	Hacking.	Toga.			
	Eastport.	Mistrust.	Alford.	Budge.	Chalk.	Data.
	Glaze.	Harem.	Told.			
	Portland.	Mistake.	Alight.	Brim.	Camden.	Damage.
	Garner.	Johnson.	Towel.			
	Boston.	Missive.	Allot.	By.	Candle.	Eager.
	Garner.	Habit.	Traitor.			
	Burlington.	Minstrel.	Allay.	By.	Charm.	Earth.
	Glaze.	Hart.	Total.			
	Mount.	Misuse.	Aim.	By.	Cement.	Efflux.
	Garland.	Hanker.	Tipton.			
	Springfield.	Missing.	Allow.	Buff.	Charm.	Damp.
	Gun.	Hacket.	Trailing.			
	London.	Mistful.	Aloft.	Bud.	Chart.	Data.
8.30	Garland.	Travel.				
	Breckenridge.	Mister.	Album.	Bud.	Chafe.	Earth.
	Favor.	Gimp.	Token.			
	Bismarck.	Misrule.	Alien.	But.	Clean.	Eaves.
	Grand.	Halting.	Towel.			
	Duluth.	Misty.	Allen.	Brief.	Chafe.	Damp.
	Glide.	Halving.	Token.			
	Chicago.	Mission.	Alike.	Brad.	Census.	
	Damage.	Fife.	Given.	Trace.		
	Cheyenne.	Minster.	Alford.	Belch.	Cent.	
	Earnest.	Fruit.	Gang.	Total.		
	Platte.	Mint.	Alien.	Bold.	Charge.	Earth.
	Glide.	Toulon.				
	Garry.	Mob.	Alden.	By.	Charles.	Daisy.
	Flag.	Gough.	Token.			
	Pembina.	Mitchell.	Alcove.	Bud.	Cheese.	Glide.
	Toddy.					
	Huron.	Mischief.	Alert.	Brandish.	Charge.	Eclat.
	Glen.	Touch.				

8.00	Alpena.	Mint.	Albert.	By.	Climate.	Echo.
A. m.	Grace.	Harvest.	Toga.			
8.41	Haven.	Miss.	Alias.	Brave.	Chafe.	Damp.
	Flutter.	Glen.	Toulon.			
	Saugeen.	Mill.	Alexis.	Burden.	Chafe.	Eaves.
	Grab.	Haines.	Told.			
	Toronto.	Milroy.	Allay.	Bray.	Chart.	Dealing.
	Gunner.	Total.				
	Kingston.	Mindful.	Allude.	Bulb.	Chart.	Eagle.
	Fought.	Gig.	Hawkins.	Token.		
	Stanley.	Mischief.	Alight.	Bring.	Chart.	Brisk.
	Garnish.	Halcom.	Trace.			
	Dover.	Mint.	Allege.	Bow.	Charge.	Edgar.
	Fled.	Hand.	Traduce.			
	Montreal.	Minstrel.	Album.	Bulb.	Clinch.	Ebbed.
	Grade.	Hayward.	Toddy.			
	Quebec.	Mission.	Aiken.	By.	Corn.	Devote.
	Grace.	Hackman.	Tipple.			
	Father.	Modest.	Alarm.	Bridal.	Cedar.	Easy.
	Formal.					
	Chatham.	Moist.	Alarm.	Bulb.	Clara.	Eager.
	Gunnery.	Haden.	Tipton.			
	Halifax.	Model.	Alford.	Bud.	Chalk.	Deaf.
	Graft.	Hackman.	Toil.			
	Sydney.	Monstrous.	Alden.	Budge.	Cleft.	Habit.
	Tipple.					
8.40	Roziere.	Molest.	Aisle.	Brad.	Charge.	Easy.
	Fester.	Glee.	Tinsel.			

WASHINGTON AND LAKE CITY CIRCUIT.

8.02	Passa.	Moment.	Amount.	Bulb.	Chain.	Earnest.
	Glance.	Trat.				
	Marks.	Monarch.	Always.	Build.	Census.	Eager.
	Found.	Trench.				
	Jacksonville.	Molest.	Ambler.	Broad.	Caleb.	Data.
	Fast.	Trepan.				
8.07	Savannah.	Moist.	Always.	Brief.	Censure.	Earth.
	Frozen.	Trend.				
	Charleston.	Mohun.	Amaze.	Brim.	Censure.	Damp.
	Feed.	Trepid.				
8.08	Augusta.	Mohair.	Altar.	Brute.	Chase.	Glee.
	Tremor.					
	Orleans.	Moment.	Amber.	Brief.	Chart.	Earnest.
	Frozen.	Gipsy.	Tribe.			
	Galveston.	Moment.	Ambit.	Bulb.	Cable.	Dark.
	Tribune.					
	Corsicana.	Moffat.	Aloft.	Brunt.	Caleb.	Ease.
	Tray.					
	Mobile.	Moment.	Amaze.	Buchu.	Chase.	Glad.
	Tribe.					
	Montgomery.	Molten.	Although.	Budge.	Chase.	Fusion.
	Garner.	Trepan.				
	Wilmington.	Model.	Amber.	Brief.	Change.	Ease.
	Fought.	Trepid.				
8.12	Norfolk.	Mitchell.	Altar.	Brute.	Chart.	Ease.
	Found.	Habit.	Treble.			
9.10	Malone.	Millie.	Alden.	By.	Climate.	Earnest.
	Grab.	Hensbaw.	Tipsy.			

WASHINGTON AND CINCINNATI CIRCUIT.

8.00	Pittsburgh.	Mischief.	Altar.	Bow.	Charge.	Dealing.
	Gushing.	Trench.				
	Cincinnati.	Mistake.	Almond.	Bold.	Charles.	Eagle.
	Favor.	Glen.	Transit.			
	Indianapolis.	Mister.	Allen.	Boyle.	Charge.	Dale.
8.10	Dense.	Haze.	Traffic.			

8.10	Leavenworth.	Museum.	Allow.	Brake.	Civil.	Daisy.
A. m.	Glen.	Trammel.				
	Saint.	Mistress.	Alone.	Both.	Charles.	Dale.
	Glide.	Trammel.				
	Cairo.	Mitchell.	Almond.	Buff.	Cement.	Damp.
	Forage.	Gently.	Travel.			
	Keokuk.	Missing.	Allot.	Brown.	Chase.	Glad.
	Hammon.	Traitor.				
	Gibson.	Misuse.	Almost.	Brash.	Favor.	Trammel.
8.15	Knoxville.	Mixture.	Allude.	Brown.	Chart.	Dan.
	Funny.	Guilty.	Trammel.			
8.20	Shreveport.	Moment.	Almond.	Build.	Cannot.	Eager.
	Garland.	Trash.				
	Vicksburg.	Monish.	Altar.	Bride.	Caleb.	Earth.
	Trench.					
	Memphis.	Mixture.	Altar.	Bray.	Censure.	Easy.
	Flutter.	Gang.	Treble.			
	Nashville.	Mitten.	Alpine.	Bride.	Census.	Damage.
	Foot.	Gang.	Tremor.			
	Louisville.	Misty.	Aloft.	Brace.	Charge.	Dale.
	Glide.	Tremor.				
8.31	Denver.	Mood.	Alexis.	Bless.	Cage.	Earth.
	Favor.	Gang.	Toulon.			
	Pikes.	Mordant.	Aghast.	Brunt.	Cent.	Demur.
	Gimlet.	Tiff.				
	Salt.	Mood.	Allude.	Beadle.	Cement.	Easy.
	Favor.	Traffic.				
	Francisco.	Monster.	Allot.	Brown.	Chart.	Earnest.
	Glide.	Traitor.				
	Oregon.	Mood.	Almond.	Brown.	Certain.	Earnest.
	Falcon.	Gang.	Transit.			
	Diego.	Monarch.	Along.	Build.	Tremor.	
	Omaha.	Missive.	Alone.	Buff.	Charge.	Glen.
	Hackman.	Trailing.				
	Davenport.	Missive.	Allege.	Bring.	Class.	Earth.
	Halt.	Traffic.				
	Yankton.	Misty.	Allege.	Buff.	Charles.	Early.
	Glide.	Haggard.	Tragic.			
	La Crosse.	Missive.	Alias.	Brim.	Claim.	Dale,
	Hacket.	Towel.				
	Paul.	Misrule.	Alert.	Brief.	Claim.	Earth.
	Grace.	Hackman.	Touch.			

SIGNAL-LINE CIRCUIT.

8.03	May.	Missive.	Altar.	Brunt.	Cement.	Edgcomb.
	Gift.	Trench.				
8.04	Pecks.	Mistake.	Always.	Bride.	Chart.	Edgcomb.
	Future.	Glide.	Tray.	Heavy.	S. E.	
8.06	Atlantic.	Missive.	Although.	Build.	Cage.	Dealing.
	Famous.	Tray.	Heavy.	East.		
	Barnegat.	Mission.	Always.	Buchu.	Cement.	Ebbing.
	Favor.	Traitor.	Heavy.	S. E.		
8.10	Squan.	Mislead.	Altar.	Build.	Cement.	Early.
	Fruit.	Traffic.	S. E.			
	Hook.	Missing.	Aloft.	Build.	Chart.	Echoing.
8.16	Fraud.	Guilty.	Trash.	Light.	S. E.	
	Branch.	Missing.	Always.	Bray.	Censure.	Echo.
8.18	Fast.	Fidget.	Trammel.	Heavy.	S. E.	
	Henry.	Mitchell.	Always.	Both.	Censure.	Eaves.
	Fork.	Treble.	Light.	S. E.		
	Hatteras.	Mob.	Amend.	Buchu.	Censure.	Ebbing.
	Forage.	Fife.	Trepan.	Light.	East.	
8.20	Hawk.	Mixed.	Amaze.	Brute.	Censure.	Deceit.
	Few.	Trepan.	Light.	East.		

PAPER 24[2]—FORM 2.

WAR DEPARTMENT, SIGNAL-SERVICE UNITED STATES ARMY,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE.

Telegraphic report of observations received at Washington, D. C., September 30, 1875, *at* 5 *p. m.*

WASHINGTON AND NEW YORK CIRCUIT.

Baltimore.	Encroach.	Amity.	Blithe.	Censure.	Eastern.
Foot.	Gushing.				
Philadelphia.	Encourage.	Amiss.	Blight.	Censure.	Deaf.
Foot.	Gang.				
York.	Enclose.	Amidst.	Bold.	Cellar.	Eastern.
Forget.	Graze.				
Lynchburg.	Endanger.	Amity.	Bloom.	Chart.	Damp.
Fester.					
Knoxville.	Endear.	Amiss.	Blight.	Caleb.	Debris.
Fife.					
Albany.	Enamor.	Alpine.	Brunt.	Charles.	Data.
Gun.					
Oswego.	Enclosure.	Allege.	Brain.	Charge.	Ebbing.
Gushing.					
Rochester.	Enclose.	Alive.	Batch.	Charge.	Decide.
Glee.					
Buffalo.	Encounter.	Alien.	Bold.	Census.	Debris.
Faint.	Guilty.	Johnson.			
Erie.	Encumber.	Allege.	Both.	Charge.	Death.
Gunner.					
Cleveland.	Encroach.	Alien.	Bow.	Chart.	Eaves.
Gushing.					
Toledo.	Encroach.	Allude.	Bold.	Chart.	Eastern.
Gleam.					
Detroit.	Encumber.	Allay.	Blown.	Chafe.	Dance.
Frozen.	Glen.				
Port Huron.	Endear.	Alford.	Box.	Charles.	Earnest.
Glen.					
Chicago.	Endear.	Alive.	Bring.	Clad.	Gullet.
Hallet.					
Milwaukee.	Endow.	Alien.	Boyle.	Chain.	Data.
Gully.	Hacket.				
Eastport.	Enclosure.	Allay.	By.	Clasp.	Ebony.
Gargle.	Haines.				
Portland.	Encage.	Along.	Brave.	Cement.	Deaf.
Feeling.	Gimlet.				
Boston.	Encage.	Always.	Brake.	Charm.	Edgar.
Feed.	Fruit.				
Burlington.	Emptage.	Alpine.	Bow.	Chart.	Eager.
Fist.	Giver.	Halcom.			
Springfield.	Encage.	Ambit.	Bread.	Circuit.	Damp.
Forget.	Guilty.				
New London.	Encounter.	Although.	Brute.	Chart.	Deacon.
Felon.	Gunner.				
Marquette.	Enforce.	Alexis.	Blush.	Chain.	Data.
Forget.	Gullet.				
Escanaba.	Endow.	Alias.	Brave.	Chafe.	Death.
Glad.					
Breckenridge.	Enjoin.	Alien.	Brave.	Chain.	Deaf.
Glance.	Hagar.				
Fort Garry.	Enripen.	Allay.	Brash.	Cedar.	Echo.
Float.	Guano.				
Bismarck.	Enrank.	Alight.	Bold.	Chafe.	Depot.
Gullet.	Habit.				
Pembina.	Enquire.	Alight.	Bold.	Chafe.	Deceit.
Fling.					
Duluth.	Englut.	Alight.	Brace.	Cedar.	Deaf.
Fib.	Gibbon.	Haden.			
Grand Haven.	Endeavor.	Alike.	Brace.	Chafe.	Dark.
Glide.	Hacket.				

Saugeen.	Endanger.	Alcove.	Bring.	Clad.	Eaves.
Grace.	Haden.				
Stanley.	Endorse.	Alien.	Brace.	Charge.	Eaves.
Granade.					
Dover.	Endow.	Alias.	Body.	Charge.	Ebony.
Fled.					
Toronto.	Encounter.	Alight.	Blithe.	Charge.	Deceit.
Gushing.	Halting.				
Kingston.	Enchant.	Alive.	Brain.	Chart.	Deep.
Gunner.					
Ottawa.	Emphatic.	Alive.	Breathe.	Choke.	Dealing.
Field.	Golden.	Habit.			
Montreal.	Empress.	Allow.	Both.	Chart.	Defeat.
Gushing.	Hallo.				
Quebec.	Encamp.	Aisle.	By.	Chafe.	Defeat.
Grade.	Hallo.				
Father Point.	Endorse.	Albert.	Bud.	Claim.	Ebbed.
Haden.					
Rozier.	Blank.	Albert.	By.	Clinch.	Eclipse.
Garner.	Hand.				
Chatham.	Encumber.	Alias.	By.	Cleft.	Glide.
Harping.					
Halifax.	Endear.	Allot.	Burg.	Clinch.	Earnest.
Grade.	Hagar.				
Cheyenne.	Entitle.	Almond.	Beard.	Cease.	Dial.
Final.					
Platte.	Enchafe.	Alien.	Belfast.	Cease.	Effect.
Fitch.					

WASHINGTON AND LAKE CITY CIRCUIT.

Rassa.	Enliven.	Anna.	Brace.	Charm.	Eastern.
Frown.	Grass.				
Jacksonville.	Enhance.	Anna.	Bind.	Censure.	Dan.
Fisher.					
Marks.	Enlighten.	Amity.	Brash.	Chart.	Eastern.
Gleam.					
Savannah.	Engrasp.	Andrew.	Blight.	Chart.	Earth.
Fusion.					
Charleston.	Engrave.	Amount.	Brad.	Charm.	Ebbed.
Funny.					
Augusta.	Engrain.	Amidst.	Boyle.	Chart.	Earnest.
Gleam.	Reach.				
Wilmington.	Englut.	Amity.	Book.	Charm.	Ebbed.
Fusion.					
Norfolk.	Endure.	Amiss.	Bowl.	Chart.	Death.
Funny.					
Mobile.	Enjoin.	Amount.	Brad.	Cement.	Dark.
Fist.					
Orleans.	Enhance.	Andrew.	Blot.	Cement.	Eastern.
Fist.	Lineal.				
Galveston.	Enlarge.	Amuse.	Blush.	Cady.	Dance.
Clear.					
Corsicana.	Enfilade.	Anoint.	Beale.	Cage.	Ebbing.
Montgomery.	Engrasp.	Ample.	Bloom.	Caleb.	Dark.
Fast.					

WASHINGTON AND CINCINNATI CIRCUIT.

Pittsburg.	Endanger.	Almond.	Blot.	Charge.	Deacon.
Glide.	Lamp.				
Cincinnati.	Encourage.	Aloft.	Boyle.	Cinder.	Earth.
Glass.	Hacking.	Libby.			
Shreveport.	Engraft.	Ankle.	Bevy.	Caleb.	Data.
Lykens.					
Vicksburg.	Enlarge.	Ancient.	Blot.	Censure.	Eastern.
Field.	Roland.				
Memphis.	Ending.	Andrew.	Blame.	Censure.	Death.
Fault.	Gang.	Lynch.			

Nashville.	Enclose.	Andrew.	Bevy.	Censure.	Deaf.
Fisher.	Johnson.	Lawful.			
Louisville.	Encounter.	Alone.	Both.	Chafe.	Dan.
Glide.	Johnson.	Leather.			
Indianapolis.	Encourage.	Allude.	Brew.	Clasp.	Dan.
Grammar.	Haines.				
Saint.	Enclosure.	Amaze.	Bison.	Charles.	Death.
Glide.	Lynch.				
Leavenworth.	Evening.	Almond.	Brew.	Clean.	Ebbing.
Grand.	Hackman.	Lympet.			
Denver.	Endure.	Annex.	Belfast.	Calf.	Dance.
Fault.					
Sill.	Europe.	Ankle.	Beard.	Cabin.	Edgar.
Gently.					
La Crosse.	Endure.	Alight.	Brave.	Chain.	Eaten.
Gland.	Hammon.	Landing.			
Paul.	Enemy.	Alight.	Bow.	Cheap.	Eastern.
Gullet.	Hagar.	Lavish.			
Yankton.	Engrave.	Alike.	Bread.	Chafe.	Decrease.
Glad.	Halving.				
Omaha.	Enemy.	Allen.	Breathe.	Charles.	Debris.
Glen.	Hair.				
Davenport.	Encroach.	Alive.	Bring.	Chain.	Ebbing.
Glad.	Handy.	Leaping.			
Diego.	Enlist.	Amidst.	Brace.	Calf.	Deceit.
Oregon.	Enslave.	Amuse.	Beak.	Captive.	Easy.
Gently.					
Frisco.	Enslave.	Aloft.	Brash.	Calf.	Decrease.
Salt.	Ensor.	Amount.	Bang.	Cent.	Ebbed.
Gang.					
Denver.	Entitle.	Ambit.	Barley.	Cedar.	Edgcomb.
Forbid.	Gage.				
Pikes.	Envy.	Ailing.	Boyle.	Cent.	Dance.
Fiance.	Gang.				
Cairo.	Encourage.	Amidst.	Bold.	Circus.	Data.
Glee.	Object.				
Gibson.	Endless.	Anneal.	Belt.	Census.	Earnest.
Few.					
Keokuk.	Enchafe.	Aloft.	Budge.	Churning.	Flag.
Gibe.	Halting.	Lewis.			
Dubuque.	Endeavor.	Alive.	Brad.	Chain.	Eastern.
Green.	Haddock.	Levity.			
Dodge.	Empress.	Anneal.	Bead.	Cent.	Deceit.
Feed.					

COAST-LINE.

Squan.	Encage.	Amber.	Buchu.	Light.	Charm.
Deaf.	Fusion.	S.	E.		
Hook.	Enchant.	Amidst.	Blown.	Light.	Chart.
Decide.	Fertile.	Grate.	S.	E.	
Branch.	Enchant.	Amaze.	Brief.	Heavy.	Carlot.
Echoing.	Frown.	Douse.	Haze.	S.	E.
Henry.	Endow.	Amiss.	Blown.	Light.	Chart.
Deaf.	Fester.	Fluting.	East.		
Hawk.	Enfetter.	Amount.	Bowl.	Light.	Charge.
Deaf.	Glide.	East.			
Hatteras.	Engage.	Amiss.	Brash.	Light.	Charge.
Edwin.	Fusion.	S.	E.		
May.	Encumber.	Amber.	Brief.	Censure.	Eclat.
Gipsey.					
Pecks.	Encumber.	Amber.	Brief.	Heavy.	Chart.
Deface.	Fulton.	S.	E.		
Atlantic.	Encroach.	Amber.	Brief.	Light.	Chart.
Deceit.	Funny.	Gang.	S.	E.	
Barnegat.	Encounter.	Amaze.	Buchu.	Censure.	Heavy.
Eaten.	Fisher.	S.	E.		

PAPER 24[3].—FORM 2.

WAR DEPARTMENT, SIGNAL-SERVICE UNITED STATES ARMY,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE.

Telegraphic report of observations received at Washington, D. C., September 30, 1875, midnight.

WASHINGTON AND NEW YORK CIRCUIT.

Baltimore.	Nillson.	Altar.	Bride.	Chase.	Glide.
Haggard.					
Philadelphia.	Nightmare.	Alpine.	Bride.	Calf.	Earth.
Hackman.					
York.	Nightly.	Altar.	Brain.	Caleb.	Eaves.
Eastport.	Nifle.	Allege.	By.	Cane.	Eastern.
Garner.	Hacking.				
Portland.	Niggler.	Allude.	Brown.	Censure.	Earnest.
Given.	Hackle.				
Boston.	Niggler.	Alone.	Build.	Census.	Early.
Guinea.					
Burlington.	Nifle.	Allot.	Bowl.	Census.	Eastern.
Gild.					
Springfield.	Nighest.	Almond.	Brandish.	Carry.	Falcon.
Gang.	Johnson.				
London.	Nighest.	Alpine.	Build.	Census.	Eager.
Given.					
Albany.	Nightly.	Alive.	Buchu.	Cent.	Dale.
Given.					
Oswego.	Nightmare.	Alight.	Brake.	Civil.	Eastern.
Glide.					
Rochester.	Nightmare.	Alexis.	Brash.	Change.	Earnest.
Glee.					
Erie.	Nightly.	Alike.	Book.	Chafe.	Deaf.
Glide.	Hacket.				
Buffalo.	Nightly.	Alden.	Brandish.	Cent.	Data.
Gillem.					
Cleveland.	Nigher.	Alias.	By.	Claim.	Dark.
Hassam.					
Toledo.	Nighest.	Alight.	Bold.	Chafe.	Eclat.
Glad.	Hacket.				
Detroit.	Nightward.	Alden.	Brandish.	Carbon.	Data.
Falcon.	Gang.				
Grand Haven.	Nimbus.	Alias.	Box.	Chalk.	Echo.
Glide.					
Port Huron.	Nightward.	Alexis.	Brash.	Claim.	Debt.
Gossip.	Johnson.				
Chicago.	Nightward.	Alight.	Bray.	Cedar.	Death.
Gillet.	Halsey.				
Milwaukee.	Ninepence.	Alexis.	Brief.	Chafe.	Deacon.
Glide.	Hacket.				
Pembina.	Nominate.	Aisle.	Buchu.	Cabin.	Data.
Gang.					
Fort Garry.	None.	Aiken.	Brute.	Calvert.	Ease.
Bismarck.	Noiseful.	Alcove.	Botch.	Charles.	Early.
Gutter.					
Breckenridge.	None.	Alcove.	Bud.	Chafe.	Eastern.
Glance.					
Duluth.	Nixon.	Alden.	Brandish.	Calvert.	Damp.
Gimlet.	Hacket.				
Escanaba.	Niobe.	Album.	Brake.	Chafe.	Eastern.
Glad.					
Marquette.	Nipper.	Alarm.	Brain.	Census.	Eastern.
Gillem.					
Saugeen.	Ninefold.	Ainsley.	Bulb.	Chase.	Grant.
Habit.					
Stanley.	Nimmo.	Albert.	Brew.	Calf.	Earth.
Dover.	Ninepin.	Album.	Bud.	Calvert.	Early.
Toronto.	Nimbus.	Aisle.	Brew.	Calvert.	Early.

Kingston.	Nimbly.	Albert.	Brave.	Calvert.	Daisy.
Gillem.					
Ottawa.	Nifle.	Albert.	Brim.	Citron.	Deceit.
Granade.					
Montreal.	Nidus.	Alien.	Both.	Census.	Debate.
Glide.					
Quebec.	Niece.	Alarm.	Bud.	Chafe.	Death.
Grab.					
Father Point.	Nickname.	Albert.	Bud.	Cedar.	Deacon.
Fragment.	Gang.				
Chatham.	Niggard.	Alden.	Bulb.	Claim.	Eagle.
Glide.	Hand.				
Halifax.	Nigh.	Allude.	Busy.	Charge.	Earnest.
Grant.	Hallet.				
Sydney.	Nimblers.	Allow.	By	Cipher.	Ease.
Grant.	Hallo.				
Cheyenne.	Noon.	Album.	Blythe.	Cabin.	Earth.
North Platte.	Nipping.	Alien.	Bold.	Cabin.	Eastern.

WASHINGTON AND LAKE CITY CIRCUIT.

Rassa.	Node.	Amuse.	Bring.	Cell.	Damp.
Given.					
Jacksonville.	Noah.	Ample.	Botch.	Censure.	Earnest.
Gipsy.					
Marks.	Nobleman.	Ambler.	Buchu.	Chase.	Glide.
Savannah.	Nitrogen.	Amidst.	Brew.	Chart.	Eastern
Glide.					
Charleston.	Nitrogen.	Amidst.	Buchu.	Charm.	Ease.
Glide.					
Augusta.	Nipper.	Although.	Brute.		
Wilmington.	Nipsic.	Ambler.	Brief.	Chart.	Eastern.
Glide.					
Norfolk.	Ninepin.	Always.	Brief.	Censure.	Eaves.
Given.					
Mobile.	Noah.	Amend.	Brim.	Caleb.	Earnest.
Montgomery.	Nipple.	Amber.	Brute.	Cage.	Eastern.
Flown.					
Orleans.	Noble.	Amend.	Brunt.	Caleb.	Damage.
Free.					
Galveston.	Noblest.	Amend.	Brim.	Cage.	Earth.
Corsicana.	Nipper.	Amidst.	Blew.	Caleb.	Eaten.

WASHINGTON AND CINCINNATI CIRCUIT.

Pittsburgh.	Nigher.	Alive.	Bray.	Clad.	Damp.
Hacket.					
Cincinnati.	Niggard.	Allot.	Brown.	Clip.	Earth.
Halo.					
Vicksburg.	Noah.	Ambit.	Brain.	Caleb.	Eaves.
Shreveport.	Nitric.	Ambush.	Brandish.	Caleb.	Easy.
Memphis.	Ninefold.	Ambush.	Bow.	Cent.	Ebbing.
Gently.					
Nashville.	Nightmare.	Although.	Bride.	Clock.	Dance.
Hayes.					
Louisville.	Niece.	Allude.	Brown.	Citron.	Damp.
Glide.	Hallo.				
Knoxville.	Night.	Amber.	Bluff.	Carlot.	Eddie.
Falcon.	Gimlet.				
Lynchburg.	Nigher.	Although.	Brief.	Cage.	Damp.
Indianapolis.	Nickname.	Allen.	Buff.	Chafe.	Damp.
Glide.	Garner.	Hallet.			
Leavenworth.	Nixon.	Allege.	Brain.	Cent.	Edgcomb.
Gist.	Hacket.				
Saint.	Nimbless.	Allen.	Bread.	Charles.	Deceit.
Glide.	Halcom.				
Gibson.	Noblest.	Along.	Bison.	Cabin.	Dealing.
Salt.	Noise.	Always.	Barn.	Cable.	Eaten.
San Francisco.	Noddle.	Allot.	Budge.	Caleb.	Edgcomb.
Gig.					

Diego.	Noah.	Always.	Buchu.		
Oregon.	Noise.	Altar.	Bray.	Carey.	Gently.
Denver.	Norman.	Allot.	Benzine.		
Pikes.	Noonday.	Aghast.	Brave.	Calvert.	Edge.
Omaha.	Nocturn.	Alight.	Brim.	Cent.	Ebbing.
Fugal.	Hagar.				
Davenport.	Nineteen.	Alien.	Brave.	Chafe.	Eaves.
Glide.					
La Crosse.	Nipper.	Alert.	Brief.	Cheap.	Earnest.
Felon.					
Paul.	Nixon.	Alcove.	Brown.	Calvert.	Dance.
Yankton.	Nominal.	Alexis.	Budge.	Charles.	Eclat.
Glide.	Johnson.				
Keokuk.	Nimbly.	Alike.	Bread.	Chafe.	Dealing.
Glad.					
Cairo.	Nillson.	Almost.	By.	Clay.	Ebbing.
Grand.	Hacking.				

COAST-LINE.

Hook.	Highest.	Altar.	Brute.	Heavy.	Circus.
Eastern.	Gleam.	Johnson.	S. E.		
Branch.	Nightly.	Although.	Brute.	Heavy.	Choke.
Death.	Guilty.	Hacking.	S. E.		
Henry.	Ninepin.	Ambit.	Brad.	Light.	Censure.
Echo.	Fatal.	Glee.	East.		
Hawk.	Ninham.	Ambler.	Brim.	Light.	Chart.
Ebony.	Glide.	East.			
Hatteras.	Ninth.	Amend.	Brim.	Light.	Chart.
Edgecomb.	Fusion.	S. E.			

PAPER 25.—(FORM 3 A.)

DAILY BULLETIN.

WAR DEPARTMENT, SIGNAL-SERVICE UNITED STATES ARMY,
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

Meteorological record, Washington, September 30, 1875—7.35 a. m.

(Observations taken at the same moment of time at all stations.)

Place of observation.	Height of barometer.	Change in last eight hours.	Thermometer.	Change in last twenty-four hours.	Relative humidity, per cent.	WIND.				CLOUDS.			Rain-fall in last eight hours.	Change in river for last twenty-four hours, + or —.	State of weather.
						Direction.	Velocity, miles, per hour.	Pressure, pounds, per square foot.	Force reduced to Beaufort scale.	Amount of upper clouds.	Upper clouds moving from the—	Amount of lower clouds.			
Albany, N. Y	29.62	—.10	60	+17	82	S.	15	1.12	Brisk	2 C.	S.	2 S.	.00	.....	Cloudy.
Alpena, Mich	29.60	+.02	40	— 8	100	N.	14	.98	Fresh	.....	.....	4 N.	.67	.....	Heavy rain.
Augusta, Ga	29.99	—.05	64	0	89	0	0	.00	Calm	.....	.....	4 S.	.00	.....	Cloudy.
Baltimore, Md	29.82	—.09	60	+ 3	94	S.	12	.72	Fresh	2 C.	S. W.	1 S.	.00	.....	Fair.
Bismarck, Dak	29.73	—.05	48	+ 3	85	N. W.	10	.50	Fresh	.....	.....	4 N.	.18	.....	Light rain.
Boston, Mass	29.78	—.11	55	+ 4	100	S. E.	1	.01	Light	.....	.....	Fog.	.01	.....	Cloudy.
Breckenridge, Minn	29.80	—.02	41	— 2	91	N.	4	.08	Gentle	1 Ci.	0	3 S.	.00	.....	Cloudy.
Buffalo, N. Y	29.50	—.11	56	+ 9	79	S. W.	28	3.92	Brisk	.....	.....	4 S.	.30	.....	Cloudy.
Burlington, Vt	29.59	—.13	52	+11	100	S.	4	.08	Gentle	.....	.....	4 S.	.53	.....	Cloudy.
Cairo, Ill	29.88	—.06	58	+ 2	93	S.	4	.08	Gentle	2 Ci. C.	W.	Smoke.	.00	.....	Fair.
Cape May, N. J	29.78	—.13	64	— 1	88	S.	20	2.00	Brisk	0	0	1 S.	.00	.....	Fair.
Charleston, S. C	30.00	—.06	67	— 4	85	S. W.	4	.08	Gentle	2 Ci.	S. W.	0	.00	.....	Fair.
Chatham, Canada	30.01	—.06	39	...	95	S. E.	1	.01	Light	.....	.....	4 S.	.07	.....	Light rain.
Cheyenne, Wyo	30.14	—.03	46	+ 6	42	N. W.	6	.18	Fresh	2 Ci. S.	0	Haze.	.00	.....	Fair.
Chicago, Ill	29.77	.00	50	— 8	72	W.	3	.04	Gentle	1 C.	W.	1 S.	.00	.....	Fair.
Cincinnati, Ohio	29.79	+.05	58	+ 1	63	N. W.	3	.04	Gentle	1 Ci.	0	3 S.	.00	.....	Cloudy.
Cleveland, Ohio	29.68	+ 13	53	— 3	66	S. W.	16	1.28	Brisk	.....	.....	4 S.	.10	.....	Cloudy.
Corsicana, Tex	29.98	—.09	60	+ 6	88	S. W.	7	.24	Fresh	0	0	0	.00	.....	Clear.
Cape Rosier	30.03	+.01	38	.....	72	W.	2	.02	Light	3 Ci.	W.	1 S.	.00	.....	Cloudy.
Davenport, Iowa	29.77	—.15	53	— 7	86	S. W.	4	.08	Gentle	.....	.....	4 N.	.17	.....	Light rain.
Denver, Colo	30.18	+.06	45	— 1	53	S.	4	.08	Gentle	1 C.	0	Haze.	.00	.....	Clear.
Detroit, Mich	29.67	+.12	48	— 7	70	W.	12	.72	Fresh	.....	.....	4 S.	.00	.....	Cloudy.
Duluth, Minn	29.83	—.04	54	+ 9	84	N.	4	.08	Gentle	.....	.....	4 S.	.20	.....	Cloudy.
Eastport, Me	29.86	—.22	46	+ 6	92	E.	8	.32	Fresh	.....	.....	4 S.	.50	.....	Cloudy.
Erie, Pa	29.58	+.07	58	+ 2	64	S. W.	28	3.92	Brisk	.....	.....	4 S.	—	.....	Cloudy.

Escanaba, Mich	29.74	−.06	41	− 4	82	N. W.	8	.32	Fresh			4 S.	.04		Cloudy.
Fort Garry, Manitoba	29.93	−.02	43	− 1	100	N. W.	1	.01	Light	2 C.	N.	2 S.	.00		Cloudy.
Fort Gibson, Ind. T	29.87	−.09	59	+ 2	76	0	0	.00	Calm	1 Ci.	0	0	.00		Clear.
Galveston, Tex	30.05	−.05	69	+ 2	95	N. E.	7	.24	Fresh	0	0	0	.00		Clear.
Grand Haven, Mich	29.74	+.02	47	−11	77	N.	4	.08	Gentle	1 Ci. C.	N. W.	3 S.	.00		Cloudy.
Halifax, Nova Scotia	29.95	−.16	46	+ 7	91	E.	12	.72	Fresh			4 N.	.05		Cloudy.
Indianapolis, Ind	29.80	−.02	54	− 4	70	W.	2	.02	Light		Dense	Haze.	.00		Cloudy.
Jacksonville, Fla	30.03	−.04	70	− 4	79	S. W.	2	.02	Light	1 Ci.	S. W.	0	.00		Clear.
Keokuk, Iowa	29.76	−.13	55	− 5	87	0	0	.00	Calm			4 S.	.25		Cloudy.
Kingston, Canada	29.52	−.26	57	+16	95	S. W.	3	.04	Gentle	3 Ci. C.	S. W.	1 S.	.24		Cloudy.
Knoxville, Tenn	29.91	−.10	57	+ 5	87	S. W.	5	.12	Gentle	3 Ci. S.	S. W.	1 S.	.00		Cloudy.
La Crosse, Wis	29.78	−.09	47	− 3	85	N. W.	2	.02	Light			4 N.	.02		Light rain.
Leavenworth, Kans	29.87	−.09	56	− 1	74	N. W.	1	.01	Light			4 S.	.00		Threatening.
Louisville, Ky	29.83	+.01	60	+ 2	71	W.	2	.02	Light			4 S.	.00		Cloudy.
Lynchburg, Va	29.81	−.10	62	+ 2	72	0	0	.00	Calm	4 Ci.	W.	0	.00		Cloudy.
Marquette, Mich	29.78	−.04	43	− 4	83	N. W.	4	.08	Gentle			4 S.	.09		Cloudy.
Memphis, Tenn	29.91	−.10	64	+ 5	78	S. W.	2	.02	Light	1 Ci. C.	N. W.	Haze.	.00		Fair.
Milwaukee, Wis	29.81	.00	43	− 6	91	N. W.	3	.04	Gentle			4 S.	.00		Cloudy.
Mobile, Ala	30.05	−.07	67	+ 3	90	0	0	.00	Calm			4 S.	.00		Cloudy.
Montgomery, Ala	30.04	−.03	65	+ 3	92	0	0	.00	Calm	4 Ci. S.	W.	Fog.	.00		Cloudy.
Montreal, Canada	29.59	−.28	41	+ 2	95	E.	11	.60	Fresh			4 N.	1.00		Heavy rain.
Mount Washington, N. H	29.87	−.18	36	+11	100	S. W.	30	4.50	High			Fog.	.37		Foggy.
Nashville, Tenn	29.89	−.05	63	+ 7	83	W.	3	.04	Gentle	2 Ci. C.	S. W.	Haze.	.00		Fair.
New London, Conn	29.81	−.08	60	+ 6	91	S. W.	8	.32	Fresh			Fog.	.00		Cloudy.
New Orleans, La	30.05	−.07	68	+ 1	84	S. W.	6	.18	Fresh	2 Ci. S.	W.	2 S.	.00		Cloudy.
New York, N. Y	29.77	−.11	59	− 1	93	S. W.	10	.50	Fresh			4 S.	.00		Cloudy.
Norfolk, Va	29.88	−.07	64	− 4	89	S. W.	7	.24	Fresh	4 Ci. C.	W.	0	.01		Cloudy.
North Platte, Nebr	29.60	+.01	48	− 1	63	W.	4	.08	Gentle			4 S.	.00		Cloudy.
Omaha, Nebr	29.78	−.12	54	+ 9	93	W.	4	.08	Gentle			4 S.	.05		Cloudy.
Oswego, N. Y	29.53	−.17	60	+11	79	S. W.	6	.18	Fresh			4 S.	.06		Cloudy.
Ottawa, Canada															
Pembina, Dak	29.98	−.02	42	− 1	91	0	0	.00	Calm			4 S.	.00		Cloudy.
Philadelphia, Pa	29.77	−.12	60	+ 6	94	S. W.	11	.60	Fresh			4 S.	.00		Cloudy.
Pittsburgh, Pa	29.64	−.12	64	+14	67	W.	13	.84	Fresh			4 S.	.00		Cloudy.
Port Dover, Canada	29.60	−.05	53	+ 5	67	W.	19	1.80	Brisk	4 C.	S. W.	0	.33		Cloudy.
Port Huron, Mich	29.64	+.13	44	− 6	75	W.	16	1.28	Brisk			4 S.	.00		Cloudy.
Port Stanley, Canada	29.64	+.08	49	− 1	86	S. W.			Brisk			4 N.	.12		Cloudy.
Portland, Me	29.79	−.15	49	+ 6	85	N.	3	.04	Gentle			Fog.	—		Foggy.
Portland, Oreg	30.18	+.03	58	+ 2	87	0	0	.00	Calm	Haze.	0	Haze.	.00		Fair.
Punta Rassa, Fla	30.05	−.08	76	− 4	95	N. E.	6	.18	Fresh			4 S.	.00		Cloudy.
Quebec, Canada	29.77	−.21	34	− 5	100	N. E.	36	6.48	High			4 N.	.05		Sleet.
Rochester, N. Y	29.49	−.17	59	+12	70	W.	22	2.42	Brisk	0	0	2 S.	.07		Fair.
Saint Louis, Mo	29.85	−.07	61	....	66	N. W.	2	.02	Light			4 S.	.00		Cloudy.
Saint Mark's, Fla	30.06	−.02	66	− 3	94	W.	1	.01	Light	3 Ci. C.	W.	0	.00		Fair.
Saint Paul, Minn	29.73	−.08	44	− 4	84	N. E.	4	.08	Gentle			4 N.	.05		Light rain.
Salt Lake City, Utah	30.18	−.01	57	+ 2	30	S.	2	.02	Light	1 Ci.	0	0	.00		Fair.
San Diego, Cal	30.06	−.03	62	− 3	94	0	0	.00	Calm	0	0	0	.00		Clear.
San Francisco, Cal	30.14	+.01	55	+ 1	87	S. W.	6	.18	Fresh			4 S.	.00		Cloudy.
Santa Fé, N. Mex	29.91	....	46	....	51	0	0	.00	Calm	0	0	0	.00		Clear.
Sangeen, Canada	29.48	.....	45	+ 3	96	N.	10	.50	Fresh			4 N.	.10		Cloudy.
Savannah, Ga	30.01	−.06	66	− 5	84	S. W.	4	.08	Gentle	2 Ci. S.	W.	0	.00		Fair.
Shreveport, La	30.05	−.05	58	+ 3	94	S. W.	1	.01	Light			Fog.	.00		Foggy.

Meteorological record, Washington, September 30, 1875—7.35 *a. m.*—Continued.

Place of observation.	Height of barometer.	Change in last eight hours.	Thermometer.	Change in last twenty-four hours.	Relative humidity, per cent.	WIND.				CLOUDS.			Rain-fall in last eight hours.	Change in river for last twenty-four hours, + or —.	State of weather.
						Direction.	Velocity, miles, per hour.	Pressure, pounds, per square foot.	Force reduced to Beaufort scale.	Amount of upper clouds.	Upper clouds moving from the—	Amount of lower clouds.			
Springfield, Mass	29.76	.....	54	....	93	N. E.	4	.08	Gentle	.....	.....	4 S.	.02	.....	Cloudy.
Sydney, Can	30.15	.00	43	....	92	0	0	.00	Calm	.....	.....	4 N.	.01	.....	Light rain.
Toledo, Ohio	29.70	+.10	53	— 4	73	S. W.	16	1.28	Brisk	1 Ci.	0	3 S.	.00	.....	Cloudy.
Toronto, Canada	29.50	—.15	52	+ 9	78	S. W.	13	.84	Fresh	.....	.....	4 S.	.00	.....	Cloudy.
Vicksburg, Miss	30.10	—.05	64	+ 5	83	S. W.	4	.08	Gentle	0	0	0	.00	.....	Clear.
Washington, D. C	29.77	—.12	63	+ 5	83	S.	8	.32	Fresh	1 Ci. S.	S. W.	1 S.	.00	.....	Fair.
Wilmington, N. C	29.95	—.09	68	+ 4	84	W.	7	.24	Fresh	4 Ci. C.	S. W.	0	.00	.....	Cloudy.
Yankton, Dak	29.83	—.14	53	+ 8	93	N. W.	5	.12	Gentle	.....	.....	4 S.	.09	.....	Cloudy.

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NOTE.—Barometer corrected for temperature and elevation. Reports are received over circuits arranged at the War Department with the Western Union, Atlantic and Pacific, Franklin, Northwestern, and Southern and Atlantic Telegraph Companies, and are furnished gratuitously to such newspapers as desire to publish them for the benefit of their readers.

PAPER 25ª.—(Form 3 A.)

DAILY BULLETIN.

WAR DEPARTMENT, SIGNAL-SERVICE UNITED STATES ARMY,
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

Meteorological record, Washington, September 30, 1875—4.35 *p. m.*

(Observations taken at the same moment of time at all stations.)

Place of observation.	Height of barometer.	Change in last eight hours.	Thermometer.	Change in last twenty-four hours.	Relative humidity; per cent.	WIND.				CLOUDS.			Rain-fall in last eight hours.	Change in river for last twenty-four hours, + or —.	State of weather.
						Direction.	Velocity, miles, per hour.	Pressure, pounds, per square foot.	Force reduced to Beaufort scale.	Amount of upper clouds.	Upper clouds moving from the—	Amount of lower clouds.			
Albany, N. Y	29.58	—.04	63	+11	88	N. W.	8	.32	Fresh			4 S.	.00		Cloudy.
Augusta, Ga	29.89	—.10	73	— 3	70	S. W.	6	.18	Fresh			4 S.	.00	+ 1	Cloudy.
Baltimore, Md	29.68	—.14	75	+ 4	56	S. W.	8	.32	Fresh	2 Ci. C.	S. W.	2 S.	.00		Fair.
Bismarck, Dak	30.04	+.31	49	—11	63	N.	31	4.80	Brisk			4 S.	.01		Cloudy.
Boston, Mass	29.59	—.19	66	+11	74	S.	19	1.80	Brisk	2 C.	S. W.	2 S.	.00		Cloudy.
Breckenridge, Minn	29.94	+.14	48	—10	77	N. E.	12	.72	Fresh			4 S.	.08		Cloudy.
Buffalo, N. Y	29.67	+.17	48	—12	63	W.	20	2.00	Brisk	Hazy.	W.	2 S.	—		Fair.
Burlington, Vt	29.52	—.07	63	+17	67	S. W.	1	.01	Light	2 C.	W.	2 S.	.12		Cloudy.
Cairo, Ill	29.66	—.22	73	— 8	63	S. W.	8	.32	Fresh			4 S.	.00	—11	Threatening.
Cape May, N. J	29.69	—.09	68	+ 2	84	S. W.	16	1.28	Brisk	0	0	2 S.	.00		Fair.
Charleston, S. C	29.91	—.09	76	— 2	72	S.	11	.60	Fresh	4 Ci. S.	S. W.	0	.00		Cloudy.
Chatham, Canada	29.69	—.32	47	— 1	100	0	0	.00	Calm			4 S.	.62		Light rain.
Cheyenne, Wyo	30.18	+.04	58	—15	34	N.	33	7.22	High	2 C.	N.	0	.00		Fair.
Chicago, Ill	29.71	—.06	51	—14	86	N.	8	.32	Fresh			4 S.	.14		Light rain.
Cincinnati, Ohio	29.68	—.11	60	—18	70	E.	4	.08	Gentle			4 S.	.04	— 4	Threatening.
Cleveland, Ohio	29.68	.00	54	—23	67	S. W.	10	.50	Fresh			4 S.	.00		Cloudy.
Corsicana, Tex	29.82	—.16	79	— 7	32	S.	12	.72	Fresh	0	0	0	.00		Clear.
Cape Rosier			40	— 4	100	E.	17	1.44	Brisk			Fog.	.33		Heavy rain.
Davenport, Iowa	29.68	—.09	51	—10	86	N. E.	12	.72	Fresh			4. S.	.40	— 3	Cloudy.
Denver, Colo	30.18	.00	69	— 7	19	N. E.	20	2.00	Brisk	2 Ci. S.	N. W.	Hazy.	.00		Fair.
Detroit, Mich	29.49	+.02	52	—25	59	N.	6	.18	Fresh	2 Ci. S.	W.	2 S.	.09		Cloudy.
Dubuque, Iowa	29.72		51	— 5	72	N. E.	8	.32	Fresh			4 S.	.06		Cloudy.
Du Luth, Minn	29.87	+.04	49	— 5	71	N. E.	12	.72	Fresh	1 C.	N. E.	1 S.	.07		Fair.
Eastport, Me	29.65	—.21	52	+ 6	100	S.	13	.84	Fresh			Fog.	.10		Light rain.
Erie, Pa	29.69	+.11	53	—20	66	W.	14	.98	Fresh			4 S.	.00		Cloudy.

Meteorological record, Washington, September 30, 1875—4.35 p. m.—Continued.

Place of observation.	Height of barometer.	Change in last eight hours.	Thermometer.	Change in last twenty-four hours.	Relative humidity, per cent.	WIND.				CLOUDS.			Rain-fall in last eight hours.	Change in river for last twenty-four hours, + or —.	State of weather.
						Direction.	Velocity, miles, per hour.	Pressure, pounds, per square foot.	Force reduced to Beaufort scale.	Amount of upper clouds.	Upper clouds moving from the—	Amount of lower clouds.			
Escanaba, Mich	29.76	+.02	47	+ 4	77	N.	14	.98	Fresh	.....	.....	4 S.	.00	.....	Cloudy.
Fort Dodge, Kans	29.50	—.20	81	.....	39	N. W.	16	1.23	Brisk	2 Ci.	S. W.	0	.00	.....	Fair.
Fort Garry, Manitoba	30.06	+.13	52	+ 2	76	N. E.	14	.98	Fresh	1 Ci. C.	N.	2 S.	.00	.....	Fair.
Fort Gibson, Ind. T	29.74	—.13	81	— 4	41	W.	16	1.23	Brisk	3 Ci.	0	0	.00	.....	Fair.
Galveston, Tex	29.96	—.09	78	+ 3	61	S. E.	6	.18	Fresh	0	0	0	.00	.....	Clear.
Grand Haven, Mich	29.72	—.02	50	— 7	71	N.	7	.24	Fresh	.....	.....	4 S.	.02	.....	Cloudy.
Halifax, N. S	29.71	—.24	55	+ 9	97	E.	6	.18	Fresh	.....	.....	4 N.	.08	.....	Heavy rain.
Indianapolis, Ind	29.66	—.14	57	—21	81	S.	5	.12	Gentle	.....	.....	4 N.	.10	.....	Light rain.
Jacksonville, Fla	29.93	—.10	85	— 1	49	S. W.	5	.12	Gentle	2 C.	S. W.	0	.00	.....	Fair.
Keokuk, Iowa	29.62	—.14	60	— 8	92	0	0	.00	Calm	2 C.	N.	1 S.	.00	— 4	Clearing.
Kingston, Canada	29.63	+.11	51	+ 6	73	S. W.	24	2.64	Brisk	.....	.....	4 S.	.00	.....	Cloudy.
Knoxville, Tenn	29.71	—.20	74	+ 4	55	S. W.	20	2.00	Brisk	1 C.	W.	0	.00	.....	Clear.
La Cross, Wis	29.77	—.01	49	— 5	77	N. E.	9	.40	Fresh	.....	.....	4 S.	.25	— 1	Cloudy.
Leavenworth, Kans	29.78	—.09	58	—15	81	N. W.	12	.72	Fresh	.....	.....	4 N.	.05	0	Light rain.
Louisville, Ky	29.67	—.16	61	—17	66	N.	5	.12	Gentle	.....	.....	4 S.	—	— 4	Cloudy.
Lynchburg, Va	29.70	—.11	75	+ 1	57	S. W.	4	.08	Gentle	4 Ci.	W.	0	.00	.....	Cloudy.
Marquette, Mich	29.83	+.05	45	— 1	61	N. E.	8	.32	Fresh	2 Ci. C.	0	2 S.	.00	.....	Cloudy.
Memphis, Tenn	29.73	—.18	80	+ 2	51	S. W.	14	.98	Fresh	1 Ci.	N. W.	Hazy.	.00	— 8	Fair.
Milwaukee, Wis	29.76	—.05	48	— 5	70	N. E.	8	.32	Fresh	.....	.....	4 S.	.02	.....	Cloudy.
Mobile, Ala	29.94	—.11	76	+ 3	72	S.	7	.24	Fresh	2 C.	W.	0	.00	.....	Fair.
Montgomery, Ala	29.90	—.14	77	+ 4	57	S. W.	7	.24	Fresh	1 Ci.	S. W.	0	.00	.....	Clear.
Montreal, Canada	29.50	—.09	56	+ 9	65	S. W.	25	3.12	Brisk	.....	.....	4 S.	.15	.....	Cloudy.
Nashville, Tenn	29.64	—.25	80	+ 3	47	S. W.	12	.72	Fresh	2 C.	S. W.	0	—	— 6	Fair.
New London, Conn	29.67	—.14	65	+ 4	89	S. W.	10	.50	Fresh	2 Ci.	0	2 S.	.00	.....	Cloudy.
New Orleans, La	29.93	—.12	80	+ 8	58	S.	8	.32	Fresh	2 Ci.	W.	0	.00	— 2	Fair.
New York, N. Y	29.64	—.13	73	+ 8	63	S. E.	8	.32	Fresh	2 Ci. C.	0	1 S.	.00	.....	Fair.
Norfolk, Va	29.77	—.11	74	+ 8	68	S. W.	14	.98	Fresh	4 Ci. S.	S. W.	0	.00	.....	Cloudy.
North Platte, Nebr	29.62	+.02	61	—14	40	N.	28	3.92	Brisk	2 C.	N. W.	0	.00	.....	Fair.
Omaha, Nebr	29.78	.00	54	—12	80	N. W.	20	2.00	Brisk	.....	.....	4 S.	.11	— 2	Cloudy.
Oswego, N. Y	29.65	+.12	53	+ 1	73	W.	12	.72	Fresh	.....	.....	4 S.	.00	.....	Cloudy.
Ottawa, Canada	29.46	.....	51	+ 6	80	S. W.	13	.84	Fresh	1 C.	S. W.	2 N.	.01	.....	Cloudy.
Pembina, Dak	30.02	+.14	49	— 2	63	N.	16	1.28	Brisk	4 C.	N. W.	0	.00	.....	Cloudy.
Philadelphia, Pa	29.66	—.11	74	+ 2	55	S. W.	12	.72	Fresh	2 Ci. C.	S. W.	Hazy.	.00	.....	Fair.
Pike's Peak, Mont	30.25	+.01	35	0	70	N. W.	6	.18	Fresh	1 C.	N.	Hazy.	.00	.....	Fair.
Pittsburgh, Pa	29.70	+.06	53	—18	58	W.	10	.50	Fresh	.....	.....	4 S.	.00	0	Cloudy.
Port Dover, Canada	29.76	+.16	47	—13	62	W.	13	.84	Fresh	4 C.	S. W.	0	.00	.....	Cloudy.

Port Huron, Mich	*29.71*	*+.13*	*46*	*−29*	*69*	*N. W.*	*6*	*.18*	*Fresh*			*4 S.*	*.00*		*Cloudy.*
Portland, Me	*29.59*	*−.20*	*62*	*+10*	*77*	*S.*	*12*	*.72*	Fresh	2 Cl.	W.	1 S.	.00		Fair.
Portland, Oreg	*30.10*	*−.08*	*78*	+ 2	*31*	*N.*	2	.02	Light	0	0	Smoke.	.00		Smoky.
Port Stanley, Canada	29.75	+.11	*48*	−17	71	W.	10	.50	Fresh			4 N.	.00		Cloudy.
Punta Rassa, Fla	29.99	−.06	85	0	71	S.	8	.32	Fresh	2 Ci. S.	S. W.	1 S.	.00		Cloudy.
Quebec, Canada	29.60	−.17	38	−11	100	N.	23	2.64	Brisk			4 N.	.15		Cloudy.
Rochester, N. Y	29.64	+.15	51	− 2	65	W.	17	1.44	Brisk			4 S.	.00		Cloudy.
Saint Louis, Mo	29.65	−.20	67	−15	50	N. W.	14	.98	Fresh			4 S.	.00	— 6	Cloudy.
Saint Mark's, Fla	29.97	−.09	75	− 6	76	S. W.	8	.32	Fresh			4 S.	.90		Cloudy.
Saint Paul, Minn	29.78	+.05	49	− 4	67	N.	8	.32	Fresh	0	0	3 S.	.08	— 2	Clearing.
Salt Lake City, Utah	30.13	−.05	76	− 3	15	N. W.	11	.60	Fresh	0	0	Hazy.	.00		Clear.
San Diego, Cal	29.98	−.08	73	+ 1	71	W.	16	1.28	Brisk	0	0	0	.00		Clear.
San Francisco, Cal	30.10	−.04	60	− 2	76	W.	18	1.62	Brisk	0	0	0	.00		Clear.
Sangeen, Canada	29.70	−.22	42	− 2	86	N.	10	.50	Fresh			4 N.	.07		Light rain.
Savannah, Ga	29.90	−.11	80	+ 1	55	S. W.	4	.08	Gentle	4 Ci. S.	W.	0	.00		Cloudy.
Shreveport, La	29.88	−.17	84	+ 5	47	S. W.	8	.32	Fresh	0	0	0	.00	— 5	Clear.
Springfield, Mass	29.59	−.17	69	+19	76	S.	4	.08	Gentle	2 Ci. C.	0	2 S.	.00		Threatening.
Sydney, Canada	29.95		50		90	S. E.	3	.04	Gentle			4 S.	.02		Cloudy.
Toledo, Ohio	29.68	−.02	57	−20	63	S. W.	8	.32	Fresh			4 S.	.00		Cloudy.
Toronto, Canada	29.67	+.17	49	+ 1	56	W.	16	1.28	Brisk			4 S.	.18		Cloudy.
Vicksburg, Miss	29.96	−.14	79	+ 1	58	S. W.	8	.32	Fresh	1 C.	S. W.	0	.00	+ 3	Fair.
Washington, D. C	29.67	−.10	74	− 1	67	S.	10	.50	Fresh	2 Ci. C.	W.	2 S.	.00		Cloudy.
Wilmington, N. C	29.87	−.08	75	− 2	64	S.	11	.60	Fresh	4 Ci. S.	S.	0	.00		Cloudy.
Yankton, Dak	29.91	+.08	50	−18	79	N.	18	1.62	Brisk			4 S.	.20		Cloudy.

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NOTE.—Barometer corrected for temperature and elevation. Reports are received over circuits arranged at the War Department with the Western Union, Atlantic and Pacific, Franklin, Northwestern, and Southern and Atlantic Telegraph Companies, and are furnished gratuitously to such newspapers as desire to publish them for the benefit of their readers.

PAPER 25³.—(Form 3 A.)

DAILY BULLETIN.

WAR DEPARTMENT, SIGNAL-SERVICE UNITED STATES ARMY,
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

Meteorological record, Washington, D. C., September 30, 1875—11 p. m.

(Observations taken at the same moment of time at all stations.)

Place of observation.	Height of barometer.	Change in last eight hours.	Thermometer.	Change in last twenty-four hours.	Relative humidity, per cent.	WIND.				CLOUDS.			Rain-fall in last eight hours.	Change in river for last twenty-four hours, + or −.	State of weather.
						Direction.	Velocity, miles per hour.	Pressure, pounds per square foot.	Force reduced to Beaufort scale.	Amount of upper clouds.	Upper clouds moving from the—	Amount of lower clouds.			
Albany, N. Y	29.69	+.11	51	−4	90	N. W.	2	.02	Light	0	0	2 S.	.00		Fair.
Alpena, Mich	29.78		38		80	N. W.	4	.08	Gentle	0	0	Haze.	.00		Clear.
Augusta, Ga	29.88	−.01	65	−1	89	0	0	.00	Calm	0	0	0	.00		Clear.
Baltimore, Md	29.72	+.04	64	+2	83	0	0	.00	Calm			4 S.	.09		Cloudy.
Boston, Mass	29.64	+.05	61	+6	94	W.	5	.12	Gentle	0	0	2 S.	.00		Fair.
Breckenridge, Minn	30.18	+.24	42	−5	91	N.	8	.32	Fresh			4 S.	.00		Cloudy.
Buffalo, N. Y	29.69	+.02	43	−2	75	N. W.	8	.32	Fresh	0	0	1 S.	.00		Fair.
Burlington, Vt	29.61	+.09	55	+10	68	W.	8	.32	Fresh	0	0	1 S.	.00		Fair.
Cairo, Ill	29.72	+.06	59	−9	100	W.	12	.72	Fresh			4 N.	.04		Light rain.
Charleston, S. C	29.93	+.02	73	+2	90	S.	7	.24	Fresh			4 S.	.00		Cloudy.
Chatham, Canada	29.62	−.07	43	+3	95	N. E.	1	.01	Light			4 S.	.33		Light rain.
Cheyenne, Wyo	30.22	+.04	41	−12	56	N.	4	.08	Gentle	0	0	0	.00		Clear.
Chicago, Ill	29.70	−.01	49	−4	78	N.	14	.98	Fresh			4 S.	.16		Threatening.
Cincinnati, Ohio	29.62	−.06	55	−15	87	S. E.	4	.08	Gentle			4 N.	.15		Light rain.
Cleveland, Ohio	29.66	−.02	47	−21	100	N. E.	7	.24	Fresh			4 N.	.77		Light rain.
Corsicana, Tex	29.88	+.06	73	+6	54	S. W.	9	.40	Fresh	0	0	0	.00		Clear.
Davenport, Iowa	29.83	+.15	48	−4	77	N.	10	.50	Fresh			4 S.	.00		Cloudy.
Denver, Colo	30.30	+.12	55	−2	44	0	0	.00	Calm	0	0	0	.00		Clear.
Detroit, Mich	29.71	+.02	43	−12	75	N. E.	8	.32	Fresh	Haze.	0	Haze.	.00		Hazy.
Duluth, Minn	29.94	+.07	43	−3	75	N. W.	4	.08	Gentle	0	0	1 S.	.02		Clear.
Eastport, Me	29.61	−.04	53	+10	100	S.	8	.32	Fresh			Fog.	.04		Foggy.
Erie, Pa	29.69	.00	50	−19	64	N.	12	.72	Fresh			4 S.	.02		Cloudy.
Escanaba, Mich	29.86	+.10	41	−2	74	N.	8	.32	Fresh			4 S.	.00		Cloudy.
Farther Point, Canada	29.58	−.17	40	−2	91	N. E.	10	.50	Fresh	1 Ci.	S. E.	Haze.	.00		Fair.
Fort Garry, Manitoba	30.18	+.12	34	−10	89	N. W.	7	.24	Fresh	0	0	0	.00		Clear.
Fort Gibson, C. N	29.98	+.24	62	−1	50	N.	15	1.12	Brisk	0	0	0	.00		Clear.

Galveston, Tex	*29.98*	*+.02*	*72*	*+ 1*	*85*	*S.*	*4*	*.08*	Gentle	*0*	*0*	*0*	*.00*		Clear.
Grand Haven, Mich	*29.76*	*+.04*	*47*	*— 5*	*69*	E.	14	.98	Fresh			4 S.	.00		Cloudy.
Halifax, Nova Scotia	29.65	—.06	57	+14	94	N.	6	.18	Fresh			4 S.	.14		Cloudy.
Havana, Cuba															
Indianapolis, Ind	29.58		54		93	N.	4	.08	Gentle	4 S.	0	Fog.	.14		Cloudy.
Jacksonville, Fla	29.96	+.03	77	+ 2	65	S. W.	6	.18	Fresh	0	0	2 S.	.00		Fair.
Keokuk, Iowa	29.75	+.13	50	— 7	79	N.	13	.84	Fresh			4 S.	.00		Cloudy.
Key West, Fla															
Kingston, Canada	29.75	+.12	40	— 4	77	N. W.	1	.01	Light	0	0	1 S.	.00		Clear.
Knoxville, Tenn	29.68	—.03	68	+11	60	S. W.	18	1.62	Brisk	Haze.	0	1 S.	.00		Hazy.
La Crosse, Wis	29.88	+.11	44	— 6	84	N.	6	.18	Fresh	2 Ci.	0	0	.00		Clearing.
Leavenworth, Kans	29.94	+.16	53	—10	73	N. W.	20	2.00	Brisk	0	0	2 S.	.02		Fair.
Louisville, Ky	29.60	—.07	57	—12	87	W.	4	.08	Gentle			4 S.	.15		Threatening.
Lynchburg, Va	29.66	—.04	65	+ 6	84	S.	4	.08	Gentle	0	0	0	.00		Clear.
Marquette, Mich	29.88	+.05	39	— 6	73	W.	8	.32	Fresh	0	0	1 S.	.00		Fair.
Memphis, Tenn	29.78	+.05	71	+ 2	67	N. W.	12	.72	Fresh	0	0	Smoke.	.00		Fair.
Milwaukee, Wis	29.80	+.04	45	— 2	81	N.	10	.50	Fresh			4 S	.02		Cloudy.
Mobile, Ala	29.96	+.02	72	+ 4	85	S. W.	6	.18	Fresh	0	0	0	.00		Clear.
Montgomery, Ala	29.90	.00	68	+ 1	89	S.	8	.32	Fresh	1 Ci. C.	S.	0	.00		Clear.
Montreal, Canada	29.59	+.09	48	+ 6	66	W.	15	1.12	Brisk	0	0	3 S.	.00		Fair.
Nashville, Tenn	29.70	+.06	65	— 2	83	S. W.	6	.18	Fresh			4 N.	.98		Heavy rain.
New London, Conn	29.67	.00	63	+ 1	94	W.	1	.01	Light	0	0	2 S.	.00		Fair.
New Orleans, La	29.97	+.04	72	+ 3	88	S. W.	3	.04	Gentle	1 Ci. S.	0	0	.00		Clear.
New York, N. Y	29.69	+.05	64	+ 4	73	S. W.	10	.50	Fresh	0	0	0	.00		Clear.
Norfolk, Va	29.79	+.02	66	+ 2	84	S. W.	10	.50	Fresh	0	0	2 S.	.00		Fair.
North Platte, Nebr	29.89		48	—11	63	N.	8	.32	Fresh			4 S.	.00		Cloudy.
Omaha, Nebr	30.02	+.24	49	+11	85	N. W.	12	.72	Fresh	2 Ci S.	N. W.	0	.03		Fair.
Oswego, N. Y	29.70	+.05	49	— 3	74	N. W.	9	.40	Fresh			4 S.	.00		Threatening.
Ottawa, Canada	29.61	+.15	40		85	W.	16	1.28	Brisk			4 N.	.00		Threatening.
Pembina, Dak	30.14	+.12	38	— 8	90	N.	8	.32	Fresh	0	0	Haze.	.00		Clear.
Philadelphia, Pa	29.70	+.04	63	+ 3	83	W.	4	.08	Gentle	0	0	0	.05		Clear.
Pike's Peak, Colo	30.23	—.02	27	— 3	77	N. W.	21	2.20	Brisk	0	0	0	.00		Clear.
Pittsburgh, Pa	29.66	—.04	51	—14	78	N.	4	.08	Gentle			4 N.	.02		Light rain.
Port Dover, Canada	29.79	+.03	41		91	N. W.	5	.12	Gentle	0	0	0	.00		Clear.
Port Huron, Mich	29.71	.00	45	—10	76	N. E.	21	2.20	Brisk			2 N.	—		Light rain.
Port Stanley, Canada	29.77	+.02	40	—21	81	W.	4	.08	Gentle	0	0	0	.00		Clear.
Portland, Me	29.64	+.05	57	+ 5	87	S. W.	6	.18	Fresh	0	0	2 S.	.03		Fair.
Portland, Oreg	30.09	—.01	64	— 1	78	0	0	0	Calm	0	0	Smoke.	.00		Smoky.
Punta Rassa, Fla	30.03	+.04	78	0	86	E.	4	.08	Gentle	0	0	2 S.	.00		Fair.
Quebec, Canada	29.60	0	39	— 3	91	N.	14	.98	Fresh			4 N.	.00		Cloudy.
Rochester, N. Y	29.70	+.06	45	— 4	76	W.	6	.18	Fresh			4 S.	.00		Cloudy.
Saint Louis, Mo	29.74	+.09	54	—12	79	N. W.	16	1.28	Brisk			4 S.	.12		Cloudy.
Saint Mark's, Fla	29.99	+.02	70	+ 1	90	0	0	0	Calm			4 S.	.00		Cloudy.
Saint Paul, Minn	29.94	+.16	42	— 7	85	N. W.	6	.18	Fresh	0	0	0	.00		Clear.
Salt Lake City, Utah	30.09	—.04	66		20	N. E.	9	.40	Fresh	0	0	0	.00		Clear.
San Diego, Cal	29.96	—.02	66	0	90	0	0	0	Calm	0	0	0	.00		Clear.
San Francisco, Cal	30.06	—.04	55	0	92	S. W.	20	2.00	Brisk	0	0	1 S.	.00		Clear.
Santa Fé, N. Mex															
Saugeen, Canada	29.78	+.08	37	— 1	95	0	0	0	Calm			4 N.	.01		Cloudy.
Savannah, Ga	29.93	+.03	73	+ 3	81	S. W.	8	.32	Fresh			4 S.	.00		Cloudy.
Shreveport, La	29.92	+.04	71	+ 6	75	S. W.	2	.02	Light	0	0	0	.00		Clear.
Springfield, Mass	29.67	+.08	58	+ 8	75	0	0	0	Calm	Haze.	0	Haze.	.00		Hazy.

Meteorological record, Washington, D. C., September 30, 1875—11 *p. m.*—Continued.

Place of observation.	Height of barometer.	Change in last eight hours.	Thermometer.	Change in last twenty-four hours.	Relative humidity, per cent.	WIND.				CLOUDS.			Rain-fall in last eight hours.	Change in river for last twenty-four hours, + or —.	State of weather.
						Direction.	Velocity, miles per hour.	Pressure, pounds per square foot.	Force reduced to Beaufort scale.	Amount of upper clouds.	Upper clouds moving from the—	Amount of lower clouds.			
Sydney, Canada	29.74	—.21	56	+18	100	N. E.	7	.24	Fresh	.....	.....	4 N.	.15	.....	Threatening.
Toledo, Ohio	29.67	—.01	49	—13	63	N.	16	1.28	Brisk	.....	.....	4 S.	.02	.....	Cloudy.
Toronto, Canada	29.76	+.09	38	— 7	81	N. W.	5	.12	Gentle	0	0	0	.00	.....	Clear.
Vicksburg, Miss	29.96	.00	69	+ 2	73	S. W.	10	.50	Fresh	0	0	0	.00	.....	Clear.
Washington, D. C	29.71	+.04	62	0	83	0	0	0	Calm	Haze.	0	3 S.	.00	.....	Cloudy.
Wilmington, N. C	29.87	.00	70	+ 3	84	S. W.	8	.32	Fresh	.....	.....	4 S.	.00	.....	Cloudy.
Yankton, Dak	30.13	+.22	45	—12	92	N. W.	16	1.28	Brisk	.....	.....	4 S.	--	.....	Cloudy.

PUBLISHED BY ORDER OF THE WAR DEPARTMENT.

NOTE.—Barometer corrected for temperature and elevation. Reports are received over circuits arranged at the War Department with the Western Union, Atlantic and Pacific, Franklin, Northwestern, and Southern and Atlantic Telegraph Companies, and are furnished gratuitously to such newspapers as desire to publish them for the benefit of their readers.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

Washington, D. C., March 15, 1875.

(The following tables, showing the range between high and low water marks, and the rises considered dangerous to commercial interests on the principal western rivers, are published for the information of all concerned.)

DANGER-LINE OF THE MISSISSIPPI RIVER.

Station.	High water.	Low water.	Range, (feet.)	Zero of signal-service gauge.	Danger-point on gauge above zero.	Remarks.
Saint Paul, Minn	1850	1861	21.85	Low water, 1861	14 feet 6 inches	Houses and crops on lower ground between Saint Paul and La Crosse are flooded.
La Crosse, Wis	1870	1871	15.50	Low water, October 1, 1871	18 feet.	Bottom-lands overflowed between La Crosse and Dubuque.
Dubuque, Iowa	1871	1864	21.83		Unknown.	A rise of 1 foot per hour is the only dangerous rise known.
Clinton, Iowa	1870	1864	19.75			
Le Claire, Iowa	1870	1864	13.08	Low water, 1864	13 feet	10 feet above zero backs up the Wapsipinicon River and damages farms.
Davenport, Iowa	1870	1864	16.96	Low water, 1863	15 feet	Gauge is located at Rock Island bridge; this rise endangers buildings at Buffalo and Muscatine, Iowa, and Keithsburgh, Ill.
Rock Island, Ill	1870	1864	16.96			
Burlington, Iowa	1870	1864	15.00			
Keokuk, Iowa	1851	1873	21.48	Low water, 1873	14 feet 6 inches	Injures Government dams and improvements at foot of rapids.
Keokuk Rapids	1851	1873	13.—			
Warsaw, Ill	1851	1873	21.92	Low water, 1873	18 feet	Overflows some bottom-lands; overflow increased in extent very considerably by another foot of water.
Alexandria, Iowa						Would suffer at 19 feet on Warsaw gauge.
Quincy, Ill	1851	1867	20.00			16 feet above low water (1867) would damage farms below city.
Hannibal, Mo	1851	1867 and 1872	22.25			18 feet above low water (1867) would damage farms. Any sudden rise would endanger merchandise on levee.
Louisiana, Mo	1851	1867	20.5			12 feet 6 inches above low water (1867) overflows a large area of bottom-lands.
Saint Louis, Mo	1844	1863	41.39	Low water, 1863	30 feet	At this point water commences to damage buildings in the city. Any sudden rise endangers merchandise on levee.
Evansville, Ill						The adjacent country from the Kaskaskia to the Mississippi floods at 30 feet on Saint Louis gauge.

DANGER-LINE OF THE MISSISSIPPI RIVER—Continued.

Station.	High water.	Low water.	Range, (feet.)	Zero of signal-service gauge.	Danger-point on gauge above zero.	Remarks.
Cape Giradeau, Mo Commerce, Mo						The Mississippi overflows western banks at 29 feet on Saint Louis gauge.
Cairo, Ill	1867	1871	51.97	Low water, December, 1871	40 feet	Overflows country back of Cairo. 41 feet overflows country in Kentucky opposite. 45 feet overflows country from twenty miles up the Ohio to Columbus, Ky., and extending three miles back from the river. At 47 feet it commences overflowing the Missouri banks, and at that stage is dangerous to levees around Cairo.
Point Pleasant, Mo						Floods at 51 feet on Cairo gauge.
Osceola, Ark						Floods about 41 feet on Cairo gauge.
Memphis, Tenn	1867	1872	35.75	Low water, 1872	34 feet	Overflows country opposite. 34 feet 7 inches floods Memphis and Little Rock Railroad.
Helena, Ark	1862	1872	46.40	Low water, 1872	40 feet	Levees show weakness at this point. When water falls to 4 or 5 feet above low water it endangers navigation.
Mouth of White River, Ark	1867	1872	46.80			
Lake Providence, La	1862	1872	44.72			At 37 feet 1 inch the Basse Crevasse formed. The gauge at Helena showed 41 feet 6 inches at the time.
Vicksburg, Miss	1862	1872	52.40	Low water, 1872	41 feet	Danger to levees commences. Northern Louisiana and Texas Railroad overflowed, and ceased running at 42.85 on Vicksburg gauge.
Grand Gulf, Miss						Levee broke at 43.05 feet on Vicksburg gauge.
Natchez, Miss	1859	1855	52.7			40 feet on gauge (engineers') endangers levees below the city. 40 feet 7 inches endangers buildings in lower town.
Glasscock's Crevasse						Formed with water 44.10 feet on Vicksburg gauge and 41.15 on Natchez gauge.
Red River Landing, La	1874	1872	47.05			
Baton Rouge, La	1862	1854	35.88			29 feet on gauge (engineers') is dangerous, the zero of which is low water of 1854.
Port Hudson, La						Crevasse opposite formed with water 33.73 feet on Baton Rouge gauge. Crevasse at Bonnet Carre formed at 42.65 feet. Levee at Morganza and Hickey's broke at 36.15 feet at Baton Rouge gauge.
Carrollton, La	1874	1870	16.55			
New Orleans, La	1874	1872	16.07	High water, 1874	2 feet 6 inches below zero of gauge.	At 1.50 feet below it creates great alarm. Belle Chasse, Greenwood, and Pointe La Hache Crevasses occurred at 0.4 feet on gauge.

Fort Benton, Mont	1862	1873	10.25	Low water, 1872		
Fort Sully, Dak						Actual depth of water is reported.
Yankton, Dak			26.00			
Omaha, Nebr	1867	1867	19.58	Low water, 1867	16 feet	At 15 feet smoke-stacks of steamers may strike bridge.
Plattsmouth, Nebr	1864	1865	20.42	Low water, December, 1873	16 feet 7 inches	To farms on east side of river.
Saint Joseph, Mo	1844	1873	20.00	3.45 feet above low water, December, 1873.	15 feet 6 inches	Or 95.70 feet on bridge gauge.
Fort Leavenworth, Kans	1867	1871	22.06			
Leavenworth, Kans	1873	1871	17.74	Low water, November, 1871	21 feet	Danger confined to farms.
Kansas City, Mo	1844	1874	37.08	One inch above low water, January 6, 1874.	21 feet	
Camden, Mo					18 feet	On Kansas City gauge. The Saint Joseph and Lexington Railroad will suffer at 21 feet on Kansas City gauge.
Lexington, Mo	1867	1861	20.58	Low water, 1861	21 feet	24 feet 6 inches will drive out all settlers between Camden and Crooked River, and 22 feet will flood all bottom-farms between Lexington and Brunswick.
Brunswick, Mo				Low water, year unknown	11 feet	Damage to farms.
Booneville, Mo	1844	1872	33.61	Low water, December 1, 1872	23 feet	Damage to farms.
Jefferson City, Mo	1844	1867	31.00	Low water, 1867	22 feet	A fall of the river to 1 foot on gauge endangers navigation.
Hermann, Mo	1844	1874	27.50	Low water, January 7, 1874	16 feet	

DANGER-LINE OF THE OHIO RIVER.

Pittsburgh, Pa	1832	1868	34.42	Bed of river	20 feet	Floods lower part of city. Lowest known water is 9 inches. A sudden rise of either river is dangerous to merchandise on banks.
Marietta, Ohio	1832	1856	48.67	Bottom of river on Duck Creek Bar.	32 feet	To farms. 24 feet will cause steamers to lower smoke-stacks when passing bridges.
Cincinnati, Ohio	1832		62.50		50 feet	Gauge used is at the water-works. At 50 feet the water commences to overflow lower part of city. A sudden rise of 10 feet or more, at any stage of water, endangers merchandise on bank. Danger to property slight.
Louisville, Ky	1832	1856	39.66	Sill of lock of the Louisville and Portland Canal.	24 feet	The danger of boats striking bridge at or near high water is considerable, the bridge being only 100 feet above low-water mark. 3 feet of water on falls is equivalent to 8 feet in channel.
Portland, Ky., (at foot of falls)	1832	1856	66.50			
Evansville, Ind	1832	1856	49.00	Low water, 1867	34 feet	Zero is 6 feet above bed of river. Over 34 feet causes heavy damage to farms, flooding twelve to fifteen miles back from river.
Paducah, Ky	1867	1857	53.00		40 feet	Damages farms.

DANGER-LINE OF THE MONONGAHELA RIVER.

Station.	High water.	Low water.	Range. (feet.)	Zero of signal-service gauge.	Danger-point on gauge above zero.	Remarks.
Morgantown, W. Va	1852	1852	33.70	Bed of river		Property on banks is endangered.
New Geneva, Pa	1852	1854	36.67	4 feet of water in channel	18 feet	

DANGER-LINE OF THE ALLEGHANY RIVER.

Oil City, Pa	1865	1873	16.50	1 foot above bed of river		1 foot 6 inches on this gauge is equivalent to 1 foot 6 inches of water on "Charlies Riffle," the shallowest point between here and Pittsburgh.
Freeport, Pa	1865	1868	31.42	Average low water	12 feet	

DANGER-LINE OF THE YOUGHIOGHENY RIVER.

Confluence, Pa*	1873	1873	14.00	1 foot 6 inches above low water. Year unknown.	15 feet 6 inches	Property on bank is endangered.

* The years of high and low water and range are doubtful.

DANGER-LINE OF THE CUMBERLAND RIVER.

Nashville, Tenn	1847	1855	54.00	Extreme low water	42 feet	Endangers buildings in Nashville and Edgefield. Any rise over 1 foot per hour is dangerous.

DANGER-LINE OF THE TENNESSEE RIVER.

Florence, Ala	1867	1872	31.84			

DANGER-LINE OF THE RED RIVER.

Shreveport, La	1849	1872	33.00	Bed of river	58 feet	From bed of river to high-water mark, 1849, is 65 feet.
Alexandria, La	1866	1872	39.06			

Jacksonport, Ark	1867	1872	33.93			

DANGER-LINE OF THE ARKANSAS RIVER.

Little Rock, Ark	1857	1872	32.30	2 feet above bed of river	30 feet	This zero is used by all river-men, and is that reported by the Memphis and Saint Louis Packet Company. At 30 feet on gauge the plantations above and below the city are flooded.
Lower portion of the Arkansas River Valley.						Is flooded at 25 feet on Little Rock gauge.

Parties receiving this circular are requested to inform the Chief Signal-Officer of any errors in the data, in order that the proper corrections may be made.
Published by order of the Hon. William W. Belknap, Secretary of War.

ALBERT J. MYER,
Brig. Gen. (Bvt. Assgd.) Chief Signal-Officer, U. S. A.

PAPER 27ª.

WAR DEPARTMENT, SURGEON-GENERAL'S OFFICE,
Washington, D. C., June 19, 1874.

GENERAL: If agreeable to you, I propose, after July 1, proximo, to turn over to you, as they are received and contents noted at this Office, the monthly reports of meteorological observations made under the direction of the medical officers of the Army. I make this proposition with the conviction that these observations will be of greater service to science if studied in connection with the extensive series of observations made under the auspices of the Signal-Corps, than they could be by themselves.

I have the honor to be, very respectfully, your obedient servant,

J. K. BARNES,
Surgeon-General.

General ALBERT J. MYER, *Chief Signal-Officer of the Army.*

PAPER 27ᵇ.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE,
Washington, D. C., June 26, 1874.

SIR: I have the honor to acknowledge the receipt of your communication of 19th instant, stating that you propose to turn over to this Office after July 1, next, as they are received and their contents noted, the monthly records of meteorological observations made under the direction of the medical officers of the Army. This Office will be pleased to receive the valuable records and to charge itself with the proper care of them.

I avail myself of this opportunity to express my thanks for the complimentary terms in which you allude to the duties of the Signal-Bureau, and my appreciation of the generous feeling which has induced you to tender, for the benefit of the public interests it represents, the records which the medical corps was the first to inaugurate, and which the Office of the Surgeon-General has made so valuable.

I am, sir, very respectfully, your obedient servant,

ALBERT J. MYER,
Brig. Gen., (Brt. Asstgd.,) Chief Signal-Officer of the Army.

General JOSEPH K. BARNES,
Surgeon-General United States Army.

PAPER 28ª.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
Washington, D. C., 1875.

Mr. —— ——,
—— ——.

SIR: I have the honor to inclose a copy of the "Bulletin of International Meteorological Observations," the issue of which has been commenced at this Office.

The co-operation of the observers has been in pursuance of a proposition of the late congress of Vienna, with which you are doubtless familiar, as follows: "That it is desirable, with a view to their exchange, that at least *one* uniform observation, of such character as to be suitable for the preparation of synoptic charts, be taken and recorded daily and simultaneously at as many stations as practicable throughout the world." The present inclosure shows the extent to which the system is already established.

The United States desires to exchange, with the institution with which you are connected, one simultaneous report, to be taken daily at 7.35 a. m., Washington mean time, corresponding with that indicated for fourteen prominent localities in Europe, mentioned in the heading of the Bulletin. In the event of a co-operation on your part, the Bulletin would contain the record of the observations reported by the institution. Copies of the Bulletin would be regularly mailed to your proper address, post-paid, as a slight acknowledgment of the valuable cooperation requested.

For the purpose of uniformity, the reports should embrace at least pressure, (reduced,) temperature, wind, rain, relative humidity, and clouds. If your institution cannot conveniently furnish all of the particulars, the record will, none the less, be gratefully received.

It would be desired that these reports should be mailed in packages addressed to the Chief Signal-Officer of the Army at this city, on the fifteenth and last days of each month, in order that there may be time for their insertion in the Bulletin of the proper date.

It is hoped that you may find it convenient to lend your valuable assistance to a work which aims to accomplish a common good.

I have the honor to be, very respectfully,

———— ————,

Brig. Genl., (Bvt. Assd.,) Chief Signal-Officer of the Army.

PAPER 28ᵇ.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
Washington, D. C., 1875.

À Monsieur ———— ————,

———— ————.

Monsieur LE DIRECTEUR: J'ai l'honneur de vous adresser sous ce pli un exemplaire du Bulletin des observations météorologiques internationales que notre bureau vient de mettre en circulation.

La collaboration des observateurs des différents pays s'est réalisée conformément à une proposition adoptée par le congrès tenu à Vienne, en 1873, et dont vous êtes sans doute au courant, à savoir: "Qu'il est à désirer qu'en vue de leur échange, au moins une observation uniforme, et d'un caractère qui la rende appropriée au dressage des cartes synoptiques, soit faite simultanément et enregistrée journellement en autant de stations que possible sur tout le globe." Le bulletin ci-inclus donne l'étendue de la base sur laquelle ce système est déjà établi.

Les États-Unis d'Amérique désirent échanger avec l'institution que vous dirigez, un rapport simultané qui devra être fait à 7 heures 35 minutes du matin, temps moyen de Washington, correspondant à celui indiqué en tête du bulletin pour quatorze des principaux centres météorologiques de l'Europe. Au cas où vous prêteriez votre concours, le bulletin contiendra les comptes-rendus des observations de votre institution et des exemplaires vous seront adressés régulièrement, francs de port, comme un faible témoignage de la précieuse coöpération que nous sollicitons.

Dans des vues d'utilité et de régularité, les rapports comprendront au moins, la pression (réduite,) la température, le vent, la pluie, l'humidité relative, et les nuages. Si toutefois votre institution ne pouvait pas commodément fournir tous ces détails, le rapport n'en serait pas moins reçu avec reconnaissance.

On désirerait aussi que ces rapports fussent mis à la poste par paquets et adressés ici au "Chief Signal-Officer of the Army," le 15 et le dernier de chaque mois, afin qu'ils arrivent à temps pour l'insertion au bulletin suivant leurs dates respectives.

Vous voudrez bien être assez aimable de prêter votre précieux concours à un travail, qui, on l'espère, tend au progrès du bien commun.

Veuillez agréer, monsieur le directeur, l'assurance de ma parfaite considération.

———— ————,

Brig. Gen., (Brevet Assigned,) Chief Signal-Officer of the Army.

PAPER 29ᵇ.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE,
Washington, D. C., March 22, 1875.

To the Postmaster

———— ————,

———— ————.

SIR: I have the honor to request that you will hand the inclosed papers to the mayor or other proper authority at ————, and transmit to this Office the address of the person to whom they have been so delivered as soon as you can conveniently do so.

Very respectfully,

ALBERT J. MYER,
Brig. Gen., (Bvt. Assgd.,) Chief Signal-Officer, U. S. A.

NOTE.—Please inclose reply in the accompanying envelope.

PAPER 29b.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE,
Washington, D. C., March 22, 1875.

To the MAYOR or other proper authority,

_____ _____:

The Chief Signal-Officer has the honor to announce that he is authorized by the honorable Secretary of War to say that each village upon the western rivers which will establish, at its own cost, a signal-service gauge upon the plans herewith, and maintain the same under the general supervision of the mayor or other principal officer of the place, will be entered upon this list. All facts thereafter properly communicated to this Office in reference to the different interests at the villages, or places at which gauges are established, or in their vicinity to be endangered by such rises as may be marked upon the gauges, will be entered on the list. It is hoped that by comparison with the information given in the Danger-Line Circular, and the records had from the gauges located at different cities, the inhabitants in each locality will soon be enabled to judge from the river data published in the principal journals, in time of danger, what injury is likely to occur at or near the different river towns as the rise follows the course of the river.

Very respectfully,

ALBERT J. MYER,
Brig. Gen., (Brt. Assgd.,) Chief Signal-Officer, U. S. A.

Instructions for making and reporting river observations for the Signal Service, United States Army.

1. All measurements at each station will be made from the bench-mark or water-level in common use by river-men at that station, from which river-rises are estimated; and the depth of water from the bed of the river to this level at the point where the gauge in use is located, will be reported to this Office at the time of sending in the first mail reports.

2. The gauge used may be made of pine or oak timber, two inches thick by ten inches in width, and of sufficient length to cover the full range of the river between extreme low-water and high-water marks. This timber will be placed edgewise and firmly bedded in the earth, leaving one and a half inches of its width exposed above the level of the ground. The upper edge will be planed smooth, and carefully graduated in feet and inches, after being placed in position, taking the established bench-mark or level, referred to in paragraph 1, as the zero of the scale, and numbering the feet and inches both above and below that point, unless it is at extreme low-water mark, in which case the numbers will all be above the zero of the scale. [Figures I and II.] Especial pains should be taken in graduating the gauge to see that the distances marked off upon it for each foot and its subdivisions correspond exactly to the vertical foot and subdivisions of which they are the measure. This can be readily done by means of an ordinary spirit-level, a straight-edge on which to place the level, and a graduated rod fixed vertically from which to take the measurement.

3. Reports will be made on forms furnished by this Office, and forwarded by mail monthly to the Chief Signal-Officer, U. S. A., Washington, D. C.

PAPER 30.

AN ACT making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, eighteen hundred and seventy-four, and for other purposes.

* * * * * * *

For the construction of a military telegraph from San Diego, Cal., via Fort Yuma and Maricopa Wells, to Prescott, and Tucson, Ariz., fifty thousand three hundred and eleven dollars and eighty cents.

* * * * * * *

Approved March 3, 1873.

AN ACT to provide for the better protection of the frontier settlements of Texas against Indiann and Mexican depredations.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of War be, and he is hereby, authorized to construct and operate a line of telegraph, beginning at or near the city of Denison, in Grayson County, Texas; thence by the nearest practicable route to Fort Sill, Indian Territory; thence to Fort Richardson, Tex.; thence along the northern frontier-line of settlements to Forts Griffin and Concho; thence to the Pecos River at or near the mouth of Toyah Creek; thence to Fort Clarke on Las Moras Creek; thence to Fort Duncan on the Rio Grande; thence down the Rio Grande, via Fort McIntosh and Ringgold Barracks, to Brownsville, so as to connect the military posts which are now, or may hereafter be, established on said line with the military headquarters of said district; and that the sum of one hundred thousand dollars, or so much thereof as may be necessary, be, and the same is hereby, appropriated out of any money in the Treasury of the United States not otherwise appropriated.

Approved June 3, 1874.

AN ACT to protect lines of telegraph constructed or used by the United States from malicious injury and obstruction.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That any person or persons who shall wilfully or maliciously injure or destroy any of the works or property or material of any telegraphic line constructed and owned, or in process of construction, by the United States, or that may be hereafter constructed and owned or occupied and controlled by the United States, or who shall wilfully or maliciously interfere in any way with the working or use of any such telegraphic line, or who shall wilfully or maliciously obstruct, hinder, or delay the transmission of any communication over any such telegraphic line, shall be deemed guilty of a misdemeanor, and, on conviction thereof in any district court of the United States having jurisdiction of the same, shall be punished by a fine of not less than one hundred nor more than one thousand dollars, or with imprisonment for a term not exceeding three years, or with both, in the discretion of the court.

Approved June 23, 1874.

AN ACT making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, eighteen hundred and seventy-six, and for other purposes.

* * * * * * * *

For completing the construction, and for maintenance and use of military telegraph lines on the Indian and Mexican frontiers, and for the connection of military posts and stations, for the better protection of immigration and the frontier settlements from depredations, especially in the State of Texas, the Territories of New Mexico and Arizona, and the Indian Territory, eighty-eight thousand dollars: *Provided,* That the Secretary of War be, and he is hereby, authorized to pay the expenses of operating and keeping in repair the said telegraph-lines out of any money received for dispatches sent over said lines; any balance remaining after the payment of such expenses to be covered into the Treasury as a miscellaneous receipt; the money received in any one fiscal year to be used only in payment for the expenses of that year. And a full report of the receipts and expenditures in connection with the said telegraph-lines shall be made quarterly to the Secretary of War through the Chief Signal-Officer; and the Chief Signal-Officer shall have the charge and control of said lines of telegraph in the construction, repair, and operation of the same. And so much of this appropriation as may be necessary, not to exceed thirty thousand dollars in all, shall be used in constructing a telegraph line from Fort Marcy to Fort Bayard, in New Mexico, and from Fort Bayard to Camp Grant, in Arizona.

* * * * * * * *

Approved March 3, 1875.

PAPER 31.

AN ACT making appropriations for the legislative, executive, and judicial expenses of the Government for the year ending June thirtieth, eighteen hundred and seventy-six, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and the same are hereby, appropriated out of any money in the Treasury not otherwise appropriated, for the service of the fiscal year ending June thirtieth, eighteen hundred and seventy-six, for the objects hereinafter expressed, namely:

* * * * * * * *

WAR DEPARTMENT.

* * * * * * *

In the Signal-Office.—Two clerks of class four; one messenger, at eight hundred and forty dollars; in all, four thousand four hundred and forty dollars.

* * * * * * *

Approved March 3, 1875. (Statutes, vol. 18, p. 360.)

AN ACT making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, eighteen hundred and seventy-six, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and the same are hereby, appropriated, for the objects hereinafter expressed, for the fiscal year ending June thirtieth, eighteen hundred and seventy-six, namely:

* * * * * * *

SIGNAL-OFFICE.

Observation and report of storms: For expenses of the observation and report of storms by telegraph and signals, for the benefit of commerce and agriculture throughout the United States; for manufacture, purchase, or repair of meteorological and other necessary instruments; for telegraphing reports; for expenses of storm-signals, announcing probable approach and force of storms; for continuing the establishment and connection of stations at life-saving stations and light-houses; for instrument shelters; for hire, furniture, and expenses of offices maintained for public use in cities or ports receiving reports; for river reports; for maps and bulletins to be displayed in chambers of commerce and boards of trade rooms and for distribution; for books and stationery; and for incidental expenses not otherwise provided for, four hundred and fifteen thousand dollars; thirty thousand dollars of which shall be expended on the Atlantic coast south of Cape Hatteras: *Provided*, That no expenditure shall be made or obligation incurred for any amount in excess of the sum hereby appropriated.

For completing the construction, and for maintenance and use of military telegraph-lines on the Indian and Mexican frontiers, and for the connection of military posts and stations, for the better protection of immigration and the frontier settlements from depredations, especially in the State of Texas, the Territories of New Mexico and Arizona, and the Indian Territory, eighty-eight thousand dollars: *Provided*, That the Secretary of War be, and he is hereby, authorized to pay the expenses of operating and keeping in repair the said telegraph-lines out of any money received for dispatches sent over said lines; any balance remaining after the payment of such expenses to be covered into the Treasury as a miscellaneous receipt; the money received in any one fiscal year to be used only in payment for the expenses of that year. And a full report of the receipts and expenditures in connection with the said telegraph-lines shall be made quarterly to the Secretary of War through the Chief Signal-Officer; and the Chief Signal-Officer shall have the charge and control of said lines of telegraph in the construction, repair, and operation of the same. And so much of this appropriation as may be necessary, not to exceed thirty thousand dollars in all, shall be used in constructing a telegraph-line from Fort Marcy to Fort Bayard, in New Mexico, and from Fort Bayard to Camp Grant, in Arizona.

* * * * * * *

Approved March 3, 1875. (Statutes, vol. 18, p. 388.)

AN ACT making appropriations to supply deficiencies in the appropriations for fiscal years ending June thirtieth, eighteen hundred and seventy-five, and prior years, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and they are hereby, appropriated, out of any money in the Treasury not otherwise appropriated, to supply deficiencies in the appropriations for the service of the Government for the fiscal year ending June thirtieth, eighteen hundred and seventy-five, and for former years, and for other purposes, namely:

* * * * * * *

WAR DEPARTMENT.

* * * * * * *

To the Dudley Observatory, at Albany, New York: For the use of the building now occupied by the Government for officers for meteorological work and quarters for sig-

nal observers in the service of the Government and for furnishing and maintaining the same, and also for instruments for astronomical observations, and other necessary incidental expenses, twenty thousand dollars.

For expenses of the observation and report of storms by telegraph for signal for the benefit of commerce and agriculture throughout the United States; for manufacture, purchase, or repair of meteorological or other necessary instruments; for telegraphing reports; for the expenses of storm-signals announcing probable approach and force of storms; for continuing the establishment and connection of stations at life-saving stations and light-houses, for instruments, shelters, for hire [of] furniture, and expenses of offices maintained for public use in cities or ports receiving reports; for river reports; for maps and bulletins to be displayed in chambers of commerce and boards of trade rooms and for distribution; for books and stationery, and for incidental expenses not otherwise provided for, fifty-five thousand dollars.

* * * * * * *

Approved March 3, 1875. (Statutes, vol. 18, p. 410.)

AN ACT making appropriations for the support of the Army for the fiscal year ending June thirtieth eighteen hundred and seventy-six, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and the same are hereby, appropriated, out of any money in the Treasury not otherwise appropriated, for the support of the Army for the year ending June thirtieth, eighteen hundred and seventy-six, as follows:

* * * * * * *

For expenses of recruiting and transportation of recruits, one hundred and five thousand dollars. And no money appropriated by this act shall be paid for recruiting the Army beyond the number of twenty-five thousand enlisted men, including Indian scouts and hospital-stewards. Nothing, however, in this act shall be construed to prevent enlistments for the Signal Service, which shall hereafter be maintained as now organized, and with the force of enlisted men now provided by law.

* * * * * * *

For expenses of the Signal Service of the Army, purchase, equipment, and repair of electric field-telegraphs and signal-equipments, twelve thousand five hundred dollars.

* * * * * * *

Approved March 3, 1875. (Statutes, vol. 18, p. 452.)

PAPER 32.

AURORA OF APRIL 7, 1874.

Extracts from journals and subsequent communications of Signal-Service observers.

NOTE.—Local time converted to Washington time.

1. *Squan Beach.*—An aurora was visible at 10.16 p. m. Was of the first class. Altitude 30°, azimuth 160° to 190°. 11 p. m., two streamers visible within the arch; altitude of streamers was about 20°, sometimes rising to 30°, and inclined to the northeast at an angle of about 85°. The aurora was bounded by an arch of heavy cloud. Became indistinct at 11.18 p. m.

2. *Sandy Hook.*—At 10.38 p. m. a faint aurora was observed, growing brighter until 11.08 p. m., when it was hidden by the fog; its variety, extent, and altitude could not be ascertained for the fog.

3. *Toledo.*—At a few minutes before 9.26 p. m. a perfect auroral coronæ was observed by Private Montague, who was on duty at the time. Its position in the sky was north-northeast, at an elevation of its center of about 55°. The beams all tended into the center, and were brilliant white. An irregular arch was observed low down on the horizon. After 30 minutes cirrus clouds obscured the aurora.

4. *Albany.*—Continuous display between 7.07 p. m. and 10.07 p. m. At first an arch in the north, with its extremities at 160° and 220° azimuth. Altitude of vertex 12°, below it a dark segment apparently of heavy clouds, exhibiting a moderate white light. Numerous streamers, 2° or 3° broad, issued from the arch up to an altitude of 30°; the streamers were of white light, with occasional red rays. Several streamers were apparently in front of the dark segment. At 8.47 p. m. streamers became innu-

merable, of a light crimson tint; the arch dissolved into streamers, which rapidly, one after the other, shot up to altitude 30°, then formed a curtain 20° high, extending from azimuth 160° west to 220° west, with slight inclination toward the northwestern horizon. The curtain was principally white, with light-yellow, blue, and greenish tints; its undulating motion from northwest to southwest was very slow. At 9.07 p. m. aurora faded out, followed in the same position by light fleecy clouds of similar formation. Simultaneously with the curtain was observed a perfect arch from azimuth 100° west to azimuth 200° west, passing 12° south of the zenith. Arch was 4° broad, of a brilliant white light, continued until 11.07 p. m.; it moved slowly south until 9.32 p. m.; was stationary until 10.07, and returned to initial position at 10.47.

5. *Erie.*—Aurora observed in north at 8.13 p. m. Beams soon began shooting up to altitude 45°. At 9.13 p. m. it changed to two arches, extending entirely across the heavens from east to west, having altitudes 45° and 60° respectively. Beams extended from lower to upper arch. At 11.13 p. m. the extremities stretched from northeast to northwest, and arches disappeared and aurora changed to "merry dancers," moving from every point of the compass except south; they were almost directly in the zenith, of pale straw-color, and disappeared at 12.13 a. m.

6. *Oswego.*—At 8.39 p. m. observed dark segment resting on northern horizon from northeast to northwest. At 8.44 p. m. a denser cloud of conical shape, resembling a cumulus, appeared in the east. At 8.49 p. m. pale straw-colored arch proceeded from this cloud to the zenith, and in a moment reached the western horizon; its extremities were due east and 60° west, (or 15° north of west.) By 9.19 p. m. eastern extremity had changed about 5° to the south of east. Arch began to recede toward the south and gradually disappear, its summit being 7° south of the zenith. At the same time the dark segment in the north began extending in filaments upward. Beyond this cloud was a bright light. At 9.29 p. m. arch had entirely disappeared and beams had extended from the north nearly to the zenith. After this nothing remarkable except flashes of serpentine form, shooting and darting continued until after 12.29 a. m.

7. *New Haven.*—About 7.44 p. m., extremity of auroral beam became visible at altitude 35° in the northwest, above some clouds; 8.14 p. m., sky continuing to clear, revealing about 10° of the upper part of the beam, but in a few minutes cumuli overspread and obscured the aurora; 9.14 p. m., the sky clear again, the whole, solitary, luminous beam appeared resting on the horizon at 20° west of north, and extending to 10° southeast of the zenith. Sky continued clear, and the beam moved bodily toward the southwest, with recurring fits of brilliancy; was brightest at 11 p. m.; was still visible at 11.44 p. m., extending from altitude 20° and azimuth due northwest to altitude 60°, azimuth due southeast, and crossing the zenith. Aurora disappeared between 12.44 and 1.44 a. m., not recurring throughout the night.

8. *Barnegat Inlet.*—At 10.49 p. m., auroral light seen in the north; altitude about 15°.

9. *Saint Paul.*—Between 8.04 and 9.04, aurora visible in the north from northeast to northwest; one beam 4° wide from northeast end of aurora, reaching to 70° or 80°, or nearly to zenith. Its color was a rosy red, and it was visible until after midnight. The aurora was simply a diffused light, having an altitude of 10° to 15°. Between 10.04 and 11.04 p. m., at a point a little south of east were three beams, each about 8° wide, extending obliquely from each other, their lower ends having an altitude of about 12° to 15°, while the upper end of the longest reached the zenith; they had entirely disappeared at 10.20 p. m. Shortly after, a single beam spanned the sky from the east-southeast horizon to a point a little west of northwest; it appeared to incline a little south of actual zenith; was of a pale straw-color at each end, but of a faint red near the zenith; of somewhat uniform width, about 1° to 3°, and very distinct; disappeared about 11 p. m. The extreme ends of the aurora did not reach within 8° or 10° of the extended beam or auroral bow. The aurora remained visible until after midnight.

10. *Grand Haven.*—A fine aurora observed at 8.07 p. m., continuing until 3.37 a. m. of the 8th, with a short disappearance at midnight. It was a faint, yellowish light from north to northeast, from 3° to 5° above the horizon, accompanied by luminous beams of same color, extending from 3° to 50° toward zenith. At 10.57 p. m., an arch of same kind, extending from east-northeast to north-northwest and reaching nearly to the zenith, formed, and lasted a few minutes.

11. *Long Branch.*—At 10.45, an aurora observed in the northwest, altitude 30°, and visible until after midnight. It consisted of a plain arch without much action; after 10.48 p. m., it was only a luminous arch, resembling cirrus clouds somewhat phosphorescent; last observed at 12.18 a. m. of the 8th.

12. *Fort Gibson.*—Between 7.12 and 8.12 p. m., arch of light from northeast to west, with rays shooting up more than half-way to zenith.

13. *Buffalo.*—At 8.58 p. m., aurora observed, consisting of slender luminous beams of a pale bluish color, resting on a dark bank of stratus clouds, extending along northern horizon from 155° to 205° azimuth; altitude of center of bank about 15°. An arch of luminous vapor, altitude of center 75°, extended from east to west 2° broad, but its ends too dim to be distinguished from the surrounding sky. At 9.28 p. m., arch had disappeared, but beams still shot up to altitudes 20° and 50°. These had remained sta-

tionary while the arch was visible, but at intervals several seemed to blend together into columns of pale yellow light lasting three to five minutes. Now a thin haze began to grow denser, veiling the stars that had previously been unusually bright. At 9.48 p. m., slender beam shot up from eastern horizon toward zenith, while puffs of thin white vapor issued from it, moving toward the west through the zenith; puffs gradually united into an arch, completed at 9.58 p. m.; breadth from 2° to 5°, spanning from east to west. At this time, thin white ripples, 2° to 6° broad, with extremities pointing north and south, were seen in the zenith, moving rapidly along the arch from east to west. Arch visible until 11.58, and then gradually disappeared. Its light was at no time brilliant; it seemed occasionally to wave from north to south, and *vice versa*. Again it would divide, the light overhead being parted, as if by a strong current of air, but would then re-unite as before. There was no apparent connection between the arch and the beams. About 12.25 a. m., the arch again formed and was being completed at 12.38 a. m., in a position 15° south of the zenith; meanwhile the beams in the north became brighter, with a purple tinge, and moved with a quick motion from east to west, and *vice versa*. This arch disappeared, and at 1.38 a. m. reformed 20° farther south, while northern beams assumed appearance of a curtain arranged in folds. This arch disappeared and at 3.23 a. m. another formed at an altitude of 25° above southern horizon. About 4 a. m. this arch began to break up and the beams diminished; both faded and disappeared toward daybreak. In the early part of the evening the relative humidity was about 90°, toward morning it was about 75°.

14. *Eastport.*—Dense cirri covered the sky at 11.15 p. m., through which observed auroral lights.

15. *Milwaukee.*—At 9.13 p. m. faint light appeared in the northeast. Aurora in the northeast after 9.38 p. m., consisting of band of pale light extending from 2° east to 5° east, height at center about 4°; pale yellow color, with short alternate crimson flashes, at and after 12.43 a. m. During this display on an average five distinct streamers prevailed at intervals, moving from about 47° above due east, westward about 20°, and downward toward the northwest, their average length 25°, width from 1° to ½°. Aurora ceased after 2.43 a. m.

16. *Detroit.*—Aurora visible at 8.54 p. m. Saw two distinct concentric arches, extending from the northeast by east to the northwest by west; the upper one had an altitude 40°; the lower stratum of haze much darker than usual. Beams constantly shooting toward and sometimes to the zenith; observed no lateral motion. 10.04 p. m., a third, much broader, more brilliant, band appeared, extending from east to west through the zenith. From this there shot beams reaching sometimes the southern horizon. Shortly before 11.24 p. m. the two lower and the greater part of the upper arch disappeared. The remaining middle portion of the arch disappeared at 11.24 p. m. The position of this arch did not change; the northern heavens still continued luminous. The color pale-yellow throughout the display.

17. *Burlington.*—First observed at 10 p., m. due north. Was beautiful at 10.45; the position of the aurora changing from northwest to northeast, forming curves or arches from northwest to northeast, with slender beams shooting from the center to altitude of 15° above northern horizon.

18. *Pembina.*—Aurora at 9.45. A narrow, irregular, pale-straw color belt resting on northern horizon; rest of sky covered with stratus. At 10.10 patches of aurora seen through the clouds in the north; 10.50 p. m., clouds breaking away; aurora-like broken arch, altitude 60°, partly obscured by stratus. 11.15 p. m., clouds clearing rapidly; aurora now diffuse, falling gradually.

19. *Davenport.*—Aurora very faint, pale yellow and diffuse; visible in the north only from 9.54 to 10.14; no prominent features.

20. *Dubuque.*—From 9.55 p. m. until after 11 p. m. large number of northern lights observed, extending from northwest around to northeast horizon.

21. *Marquette.*—8.01, aurora along northern horizon where cloud-bank obscures the view. In the east a white bright streamer rises to altitude 60°. There is also a smaller streamer in the northwest. 8.41, an arch is evidently in northern horizon, much obscured by cloud. The upper portion and eastern and western extremities are bright white tinged with red. 9.41, large streamer in the east disappears, but others are moving along the arch from east to west and shooting up to altitude 60°, 40°, and less. Vertex of arch has an altitude 30°. 11.26, streamers less active; greatest azimuth of aurora has been from north 60° west to north 70° east; barometer rising, weather fair.

22. *Rochester.*—Faint aurora at 9.08 in the north.

23. *Barnegat.*—At 10.49 aurora seen in the north, altitude 15°.

24. *Breckenridge.*—Aurora resembled that of April 4, but soon entirely obscured by clouds; saw only a pale light extending 30° along the northern horizon, with altitude 5°.

25. *Alpena.*—7.56 p. m. first noticed aurora as an arch, bright yellow, from 90° east to 60° west; altitude, 45°; sparkling streamers rise and fall on the east border. 9.26 p. m., the base of aurora is illumed by rosy, green, and yellow streamers varying in height.

11 p. m. pale-green light and occasional streamers. 11.26 p. m., a bright yellow light, nearly obscured by stratus.

26. *Fort Sully.*—Bright aurora, during the evening; first observed at 6.25 p. m.; still visible, without change, at 7.50; position, north-northeast; altitude, a few degrees.

27. *La Crosse.*—Aurora, supposed to be a halo. Extended from north and northeast to south and southeast. Long, slender bands, with small circles at intervals. When first seen it formed an arch from north to southeast, altitude vertex 45°; formation changed several times; at one time four very small distinct circles; at no time before 11.03 did it extend west of the north and south line.

28. *New London.*—8.20 p. m., column seen in the northwest, from horizon to 40° upward; midnight moved due southeast from first position, and extended from 10° above northwest horizon to a point 10° southeast of the zenith; base of aurora ill defined.

29. Blank.

30. Blank.

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31. *Freehold, Monmouth County, New Jersey.*—Appeared at 7.49 p. m., disappeared at 9.49. Not a distinct arch, as the upper portion merged into an indistinct cloud. From 8.09 to 9.39 four white beams on a delicate pink background, of uniform width, but varying intensity; these beams were crossed by three stratus clouds of about 30° elevation.

32. *South Orange, Essex County, New Jersey.*—Aurora in the evening.

33. *West Charlotte, Chittenden County, Vermont.*—Crimson aurora at 7.15, followed at 7.45 by a steady auroral light.

34. *Mount Forest, Ontario, Canada.*—9.15, main arch of a first-class aurora spanned by compass from northeast to northwest 90°; altitude of vertex 25°, as measured by a quadrant; corruscations observed.

35. *Grand Rapids, Kent County, Michigan.*—Aurora observed at 8.04; beautiful arch and streamers; at its height about 9.04; ended at 12.04.

36. *Oneida, Madison County, New York.*—Appeared at 7.55, disappeared at 9.55. Very bright arch extended nearly across the heavens. Merry dancers in the north.

37. *Oxford, Oxford County, Maine.*—Aurora at 8.34.

38. *Riley, McHenry County, Illinois.*—At 8.46 bright arch 20° altitude; at 9.31 a narrow arch 2° or 3° broad had risen to an altitude of 30°; in a minute or two, it contracted to a cloud-like patch, extending from Corona Borealis to Perseus, and disappeared in a very few minutes; at 10.16 a few streamers shot up and moved from east to west, with a motion like the spokes of a wheel. Display had nearly ceased at 11.16.

39. *Southington, Hartford County, Connecticut.*—8.43, bright aurora.

40. *Fallston, Harford County, Maryland.*—Auroral flashes from north to northeast; stratus cloud along horizon; flashes reached up 20°, disappearing immediately.

41. *Vevay, Switzerland County, Indiana.*—A little before 9.32, faint, pale-yellow, undefined form around the north horizon, rosy-tinted at upper limit; entire absence of luminous beams or flashes; vanished at 10.02.

42. *New Germantown, Hunterdon County, New Jersey.*—As seen from 6.51 to 9.51 several times in the evening; was quite uninteresting; were segments of light; was surprised that it appeared so fine elsewhere.

43. *Factoryville, Wyoming County, Pennsylvania.*—Observed at 8.25 an arch from north-northeast to north-northwest; altitude, 23°; corona at 8.55; no streamers noticed; dark clouds, and disappeared about 9.55.

44. *Castleton, Rutland County, Vermont.*—Occasional wavy red flames just above the horizon at the east of north. A few white streamers; a dense black cloud near the horizon; stars sometimes seen through it. Watched aurora until 9.44.

45. *Benton Centre, Yates County, New York.*—Observed all the evening; very light. A white arch overhead from east to west; disconnected from 10.01 to 11.01 or longer; light in the north during the display.

46. *Cazenovia, Madison County, New York.*—8.55, long arch, 20° to 30° high, from northwest to northeast, summit nearly in the north. Dark and bright beams shot up higher, and the whole moved from east to west and back again several times.

47. *Troy, Rensselaer County, New York.*—Noticed arch of 30° elevation, at 7.16, altitude 45° at 8.16, and particularly bright in the northwest; 8.28, altitude 45°, and very brilliant in the northwest; 8.31, whole northern sky alive with merry dancers, undulating west to east; 8.46, receding to 30° or 40° and much fainter; at 8.59 a narrow beam rose about 25° north of west, and by 9.01 extended through zenith to the horizon at 15° south of east, forming a perfect belt; 9.21, belt 1° wide, very perfect, passes 10° to 15° south of zenith; brilliant emerald-green occasionally tinged with crimson; undulations like a flag waving in the breeze; numerous complex folds in the northern sky. In the belt the undulations are from east to west, but from west to east in the arch in the north. Belt grew fainter at 9.22; at 9.31 belt disappeared, and the aurora fading in the north; at 9.41 belt re-appeared in nearly same position as at

9.21, and remained very well defined and perfect for 15 minutes. The arch in the north has an altitude of 50° and sends out numerous streamers that rise as high as 70°. At 10.01 the belt had disappeared, the arch in the north receding to 40°, and is surmounted by a peculiar dark cloud, through which stars are seen. At 10.46 p. m. aurora much fainter, and a few streamers, and observations ceased.

48. *Cornish, York County, Maine.*—Aurora, two-thirds way up to Polaris, with streamers in the northwest, lasted all night.

49. *Woodstock, Windsor County, Vermont.*—Early in the evening fine aurora, height 50° to 60°, diffused light. Soon after 8.42 p. m., white arch formed, extending from west horizon a few degrees north of the zenith, nearly to east, at right angles, with magnetic meridian, and 3° to 5° broad. At first it moved southward, with a slow but wavy and irregular motion. At 9.57 p. m. it reached the magnetic zenith and separated into innumerable patches by lines passing obliquely across it; very soon after, it faded away; meanwhile the broad arch remained in the north, sending up beams that moved along its entire length. At 10.17 column of light sprang from west horizon up 35° or 40°, and on its southern side a streamer branched off about 15° or 20° long, to the southeast.

50. *Hennepin, Putnam County, Illinois.*—Bright aurora in the north.

51. *Waterburg, Tompkins County, New York.*—First noticed at 7.59 p. m. a faint arch, altitude 45°, fully formed at 8.59 p. m.; disappeared about 9.29 p. m. Arch extended from east to west.

52. *Boonesborough, Boone County, Iowa.*—Slight aurora.

53. *Houseville, Lewis County, New York.*—Low arch from 7.24 to 7.54 p. m. Streamers at 8.54 p. m. Perfect arch from east horizon to zenith, to west horizon, from 8.54 to 9.14 p. m. Arch 5° wide in middle, tapering to a point at the extremes, of a bright white light; did not change its position, but had a gentle, wave-like motion from east to west; disappeared at 9.14 p. m. The rest of the aurora remained quite bright to 9.54 p. m.

54. *Near Benneville, Clearfield County, Pennsylvania.*—Appeared at 7.36 p. m., formed an arch at 8.26 p. m., very bright, with dark clouds beneath, which did not obstruct the light at the horizon. Remained until 10.06 p. m. and later. The atmosphere entirely clear.

55. *West Union, Fayette County, Iowa.*—Aurora of the second class, arch most perfect at 9.29 p. m., when its lower side was 13° altitude. Then its continuity was broken. The summit of arch very poorly defined. Sky entirely clear. No other arches observed up to 11.59 p. m.

56. *Lunenburg, Essex County, Vermont.*—Aurora observed.

57. *Argyle, Washington County, New York.*—First observed at 8.50 a. m., when an arch spanned from east to west near the zenith, moving very slowly southward; 3° wide at the zenith, and 1 to ½ at each horizon. At same time a diffuse light in the north nearly up to Polaris, and slight darkness near the horizon. At 9.15 p. m. streamers commenced with eastward motion, and continued till 9.25 p. m., when the arch had disappeared. Immediately after the disappearance of the arch, streamers began moving westward. During the eastward motion of streamers they seemed to burst from a very black cloud and to rise upward. During the continuance of the arch its light near the zenith moved rapidly from east to west, like clouds driven by the wind, but much quicker. 9.55 p. m. observations ceased. The streamers from the black cloud had various colors at their base like a rain-bow; while these colors were visible, and during the continuance of the arch, the streamers moved east, but changed to west on the disappearance of arch and color. The times here given may be 10 minutes too late.

58. *Depauville, Jefferson County, New York.*—First seen at 8.58 p. m. Sky cloudless. Temperature +31; wind south, gentle; moon in last quarter, rising at midnight. Two arches of light, the upper complete, broad, dense, diffuse, passing centrally over Polaris, the extremities bearing by compass respectively 70° east of north and 70° west of north. The lower arch apparently continuous, but irregular, as if consisting of two arcs, *a* and *b*, intersecting each other near the middle, *c*; arch narrow, bright, well defined, brightest on the lower edge. The beams shot from its upper edge, not reaching the lower edge of the upper arch. The altitude of its summit 12°; compass-bearings of its extremities, 45° east of north and 45° west of north. At the same time, not connected with either arch, and above the upper arch, a streamer extends from northeast to the zenith and some distance beyond toward the southwest. Also at 9.03, in addition to the preceding, a segment of an inferior converging arch appears in the dark space below the lower arch, which is a continuation of the eastern half of the inner arch; its upper end did not quite reach the lower edge of the arch; the upper arch is fading away. At 9.08 p. m. the upper arch has disappeared, as also has the streamer across the zenith. The lower arch is sinking gradually to the horizon, and of the beams only three faint ones remain on the northeast limit. The segment in the blank space has formed a complete arch parallel to the second arc. At 9.28 p. m. both of these arches have united into one, sending up temporary short white beams. Near the horizon, due east, a narrow white belt passes up to the zenith, nearly reaching the western horizon,

It passes a little north of Jupiter and the zenith, and includes Mars in its western descent, extending about two-thirds of the way beyond that planet to the horizon. Short faint beams spread over the atmosphere. 9.43, the zenithal belt has moved to the south, and is south of Jupiter and north of a bright star, Arcturus, in the middle. At 9.58 p. m. upper arch re-appeared, but faint and higher up, covering the Dipper; its lower edge is above Polaris; its upper edge approaches the zenith. The lower arch has also moved up, with distinct bright edge, along the black cloud beneath. 10.08, the upper arch and the belt have gone and in their place a hazy sky dimming the stars with diffused, streaky light; the lower arch again sunk lower, but retaining its brightness. At 10.28 p. m. dark segment contracting or sinking lower; the lower arch alone remains and fading; some beams, like comet-tails, reach the zenith, and, diffused, perva e everywhere. No more observations. The aurora apparently lasted all night.

59. *Sturgeon Bay, Door County, Wisconsin.*—Aurora commenced at 8.12 p. m.

60. *Manitowoc, Monitowoc County, Wisconsin.*—Observed arch in the north at 8.43 p. m. until 12.43 a. m. Also an arch from the eastern horizon to very near the western horizon, between 8.45 and 9.45 p. m., passing about 10° north of the zenith. At 12.43 observed arch, beams, and dark clouds below.

61. *Margaretta, Erie County, Ohio.*— Observed at 8.22 p. m.

62. *North Volney, Oswego County, New York.*—After 8.57 p. m. diffused bright patches observed behind clouds in the north. After 9.57 p. m., bright striated patches floating from east to west. Compass-bearing of the extremities, from northwest to east.

63. *Adams, Jefferson County, New York.*—Brilliant arch, continually chaning in outline. The space below intensely black. 8.06 p. m., in addition to the streamers, brilliant white band spanned from east to west, moving southward, and passed the zenith about 8.41 p. m.; it was 5° broad in the zenith, narrowing down to either horizon; it passed some 15° or 20° to the south of the zenith and disappeared about 9.11 p. m.

64. *Rodman, Jefferson County, New York.*—Noticed about 8.25 p. m., magnificent display running from northeast to southwest, streamers and bright light.

65. *Wyanet, Bureau County, Illinois.*—At 8.51 p. m., small arch, dark underneath.

66. *Contoocookville, Merrimac County, New Hampshire.*—First observed 7.39 p. m. At 8.09 short streamers rose above arch. At 8.39 a bright band, 2° or 3° wide, rose from the horizon at 10° north of west, and passed over through the zenith to the horizon at 10° south of east. This remained with but slight change until 9.39, or later, no other light, except the arch, being visible at the time.

67. *Latitude 43° 54′ north, longitude 11° 30′ west, Fond du Lac County, Wisconsin.*—Aurora observed from 8.46 to ——. An arch, beams, and corona.

68. *North Hammond, Saint Lawrence County, New York.*—Aurora at 8.54 p. m.

69. *Northport, Leilanaw County, Michigan.*—Aurora at 11.37 p. m., arch raised about 15°.

70. *Palermo, Oswego County, New York.*—An arch reaching from east to west with a dark cloud below.

71. *Clarinda, Page County, Iowa.*—Aurora at 9.13 p. m. One beam in the northeast; one in the north; one in northwest; and one in southwest; red lights in all directions; display visible at twilight; observations ceased at 12.13. Beams only visible a few minutes; no perfect arch; did not get higher than 45°.

72. *Wautoma, Waushara County, Wisconsin.*—9.50, aurora very bright.

73. *Rocky Run, Columbia County, Wisconsin.*—9.34, arch from southeast to northwest, little south of the "Great Bear," with very active streamers to the zenith. At times very dark, base constantly changing, with luminous spots therein.

74. *Embarrass, Waupaca County, Wisconsin.*—Aurora at 8.49 p. m. Aurora began as a banner of light extending from the east to the northwest and no arch, then appeared for some time like a cloud. At no time was there a distinct arch, but only misty cloud. It spread over one-fourth of the northeast quarter with a band on the south side. Last observed at 10.16, then like a quiet, faint, misty, floating cloud.

75. *Kingston, Plymouth County, Massachusetts.*—At 10.05, bright belt across the sky from east to west.

76. *Independence, Buchanan County, Iowa.*—9 p. m., observed aurora. At 9.30 p. m., a double arch, white streamers, and obscure cloud beneath the arch.

77. *Williamstown, Berkshire County, Massachusetts.*—Observed, 8.50 p. m., a magnificent broad band extending east and west through the bowl and handle of Big Dipper. At 9.20 p. m., narrow band of uniform width, passing a little north of Orion, through the northern stars of the sickle in Leo, a little south of Arcturus; faded away almost entirely before 9.45 p. m., when another band appeared in the same place, which was not as bright, as narrow, or as uniform in width as the one of 9.20. At one time a wave ran longitudinally through the band of 9.45 p. m. This band slowly moved a little southward, running through the sickle down nearly as far as the handle; it gradually widened in the middle, and on its southern side split up so as to resemble the bone of a vertebrated animal. Toward the east the vertebræ disappeared and the band grew intensely bright and narrow, and ended suddenly in a point at some distance from the horizon; the vertebræ moved south until those nearest the zenith extended almost as

far below the last star in the handle of the sickle as that star is south of the most northern part of the sickle. At 10.15 the band was hardly visible. About 11 p. m., noticed that the same band had grown quite broad and bright again in the east. The color of the display was white. Some of the flashes in the north were sharply defined and rose very high.

78. *Detroit, Wayne County, Michigan.*—After 7.54 p. m., smoky aurora. At 8.24 a double arch with dark clouds below and between the arches. The crown of the upper arch, 18° in altitude; that of the lower about 10°; their summits about 5° or 10° east of the magnetic meridian. Arches quite elliptical, short streamers, none higher than 32°. At 8.54 upper arch disappeared, soon succeeded by a curved line of short streamers having rapid lateral motion from east to west; these lasted about ten minutes and were soon followed by a broad white belt, which moved rapidly from east to west, forming an arch whose summit had an altitude of about 25°. At 9.24 p. m., double arch, streamers, and patches of bright white light. At 9.54 p. m. dark cloud dissipated, arches indistinct, streamers faint, rising to 45° altitude; not observed thereafter.

79. *Cresco, Howard County, Iowa.*—Fine aurora, tending from east to northwest, began at 8.46 p. m. Last seen, 11.01 p. m. Most vivid, 9.31 p. m. Dark clouds on horizon beneath it.

80. *Sugar Island, Alpena County, Michigan.*—At 9 p. m., aurora, bright, partially cloud.

81. *Saint John's, Newfoundland.*—Evening fine. At night sky dull-looking. (Evidently no aurora.)

82. *Shelburne, Coos County, New Hampshire.*—Nothing noted.

83. *Harbor Grace, Newfoundland.*—Overcast; aurora not noted. A. Mann, observer.

84. *Winchester, Clarke County, Kentucky.*—7.29 to 8.29, thunder and lightning, with hail.

85. *Toronto, Canada.*—Fine aurora from 7.09 p. m. to 10.09 p. m. Auroral light, patches, and streamers, fine band across the sky from northwest to east-southeast. At 10.39, disappeared; 12.09, band again visible, waving of auroral vapors, passing from east to west; first class.

86. *Little Current, Algona.*—About 9 p. m., aurora; second class.

87. *Welland.*—About 9 p. m., aurora; second class.

88. *Granton.*—At 10 p. m., arch from southeast to northwest; first class.

89. *Point Clark.*—From 8 to 10 p. m., aurora from northwest to northeast; first class.

90. *Ingersoll.*—Beautiful auroral arch and streamers.

91. *Montreal.*—Aurora at 11.45.

92. *Huntingdon.*—9.40 p. m., magnificent arch; first class.

93. *Fredericton, New Brunswick.*—Aurora, second class.

94. *Saint John, New Brunswick.*—Aurora, fourth class.

95. *Sydney, Nova Scotia.*—Bright aurora, first class.

96. *Winnipeg, Manitoba.*—Three beautiful arches. About 9.20 p. m. formed into one, and shortly after the whole sky was covered with auroral light.

97. *Washington, D. C., Naval Observatory.*—No account of aurora.

98. *Adrian, Michigan*—No aurora. Sky not so obscured as to prevent its being seen.

99. *Guttenburgh, Clayton County, Iowa.*—12.55 a. m. bright light nearly northeast, three times the width of a rainbow, extending from the horizon nearly to the zenith; broadest at the horizon; no movement; about 2.55 a. m. it faded out. At 1.55 a. m. saw a bright white light towards southwest.

100. *Tioga, Tioga County, Pennsylvania.*—No aurora seen.

101. *Florida, Berkshire County, Massachusetts.*—Unusual aurora from 7.44 to 10.44 p. m.; was constantly changing into indescribable forms. Running fantastic forms extended from east to west. A bow extended from east to west horizons; at first a little north of zenith and moved slowly to 10° or more south of the zenith. Breadth from 1° to 3° and occasionally very bright.

102. *South Trenton, Oneida County, New York.*—7.51 broad luminous band darted toward zenith at different points in northern horizon, many extending to eastern point of compass. From the east jets moved until the western point was met; this band continued for some little time, appearing and disappearing. Arch constantly changing. Aurora continued until 1.51 a. m. of the 8th.

103. *Traverse City, Grand Traverse County, Michigan.*—9.49 p. m. aurora in east like cumulus cloud, differently shaped and sized, rolling, trembling, and expanding in a due west direction, and soon forming a narrow arch extending a distance of about 120° across the heavens; this swayed slightly from north to south, gradually receding in same manner as it formed; a portion remained after 10.34 p. m., when observations ceased.

104. *Sandusky, Erie County, Pennsylvania.*—8.22 p. m. aurora north, and more east than west. Obscured by mist.

105. *Saint Anthony, Hennepin County, Minnesota.*—10.5 p. m. Dim aurora in north.

106. *Nicholls, Tioga County, New York.*—10.53 p. m. aurora very large and bright in north. 10.58 p. m. aurora almost overhead, a little to north; a very bright streak from

northwest to southeast, like a rainbow; shortly after it moved east so that the west end could be seen; same time, flashes in north in every direction.

107. *Fallsington, Bucks County, Pennsylvania.*—Aurora No. 1 of Smithsonian directions. No streamers observed.

108. *Lockport, Niagara County, New York.*—8.37 p. m. Bright aurora began; arch in north 30° high, with streamers shooting toward zenith.

109. *Harbor Grace, Newfoundland.*—Night; luminous phosphorescent cloud all round.

110. *Bellefontaine, Logan County, Ohio.*—9.27 p. m.; 6 nimbus; auroral light seen through clouds, but soon obscured entirely.

111. *Riley, McHenry County, Illinois.*—8.46 arch of light 20° altitude. 9.16 p. m. narrow arch 2° to 3° broad extended from 15° north of east to 15° north of west; altitude of center, convex surface, 30°; 9.36 p. m. contracted to a cloud-like patch 98° long and 4° to 5° broad; 9.46 this arch disappeared; 10.16 p. m. bright streamers shot up; formed perfect resemblance to spokes of a wheel revolving with considerable velocity from east to west; 11.16 whole display resolved itself into a mere northern twilight.

112. *North Adams, Berkshire County, Massachusetts.*—8.14 to near 10.44 p. m. brilliant, well-defined silver arch from horizon in east-northeast to west-northwest, at about 60° polar distance; the extremities hidden by mountains; occasional streamers of a pale green tint shot up from the northern horizon.

PAPER 33.

OFFICE OF THE CHIEF SIGNAL-OFFICER,
January 28, 1875.

GENERAL: I have the honor in the following report to present, in accordance with your desire, a general circular to all our observers and co-laborers, embodying suggestions in relation to observations of earthquakes, and especially in relation to the instruments by means of which automatic records of a simple character may be obtained.

I have, as you will see, omitted all mention of the numerous kinds of vibratory apparatus that were of old time in use, because they do not give useful results except in rare combinations of favorable circumstances, while the still simpler seismometers that I have described are abundantly able to give definite and valuable details as to the time, force, and direction of the shock. I have not attempted to describe any apparatus that pretends to give all the information that might be considered desirable; in fact none such exists; nor have I, with one exception, mentioned any apparatus the principles of which have not been recommended by Mallet, Schmidt, Seebach, Lasaulx, and other seismologists. This exception is the rolling-ball recommended in section 2 for ascertaining the varying horizontal movements of the earth.

I have the honor to remain, very respectfully, yours,

CLEVELAND ABBE.

The CHIEF SIGNAL-OFFICER, U. S. A.

EARTHQUAKE CIRCULAR.

The recent progess of our knowledge in regard to the origin and nature of earthquakes, and the great importance of this subject to certain portions of our country, renders it desirable that observers, whether official or volunteer, should, on the occurrence of any earthquake shock, no matter how slight, carefully note and report to the Chief Signal-Officer the following items:

1. Observe the exact time (to the nearest second if possible) of the main shock and of the numerous fainter shocks that frequently precede and follow it. These observations of time should, if any way possible, be recorded in Washington or other well known standard time, and the observer should seek to secure perfect accuracy by immediately obtaining the difference between his own clock and Washington time, the latter being easily obtained every noon at the nearest office of the Western Union Telegraph Company.

2. Observe the exact directions in which the earth appears to vibrate, and note the height and directions to which bodies are overthrown or projected, giving the dimensions and weights of the objects themselves, the height through which they pass, &c. Note the exact position of cracks in buildings, walls, &c., and the dimensions, materials, strength, and positions of the buildings. Illustrate these subjects by diagrams. Note also the direction and extent of the swashing of water, &c., standing in vessels. Note on a map or diagram the places where the shock seems to have produced the

greatest and the least destruction. In general, record all such phenomena as can give an accurate idea of the forces that produced the shock and can be subjected to calculation.

3. Observe the noises heard in connection with the earthquake, describe their nature as plainly as possible, and the times at which they occur.

4. If near a lake or sea-shore, note the waves that accompany or follow the earthquake, their number, height, time, &c.; observe, also, any permanent change in the relative level of the land and water as shown by marks made beforehand on adjacent rocks or posts.

To those observers who are able to provide themselves with the simple apparatus appropriate for accurate observation, the following suggestions are offered.

An earthquake shock may be considered as simply the effect of the passage of a wave of compression through the elastic rocks of the earth, and bears some resemblance to the passage of a wave of sound through the air. Those phenomena attending an earthquake which relate directly to its origin, nature, and force, are especially to be recorded; these are simply the time of the occurrence and the extent, direction, and velocity of the movement of the ground. Of this movement, which is generally quite complicated, the following features are susceptible of exact observation and are desirable to be known, viz :

1st. The exact time of the beginning or of the first movement of the earth, also the exact time of the arrival of the heaviest shock. The interval between these is approximately one-half the duration of the whole vibration, and often amounts to several seconds.

2d. The maximum velocities of the movements of the ground in the vertical and horizontal directions.

3d. The linear extent of these movements or the aptitude of the variation.

1ST. TIME OF THE ARRIVAL OF THE EARTHQUAKE SHOCKS.

If minute accuracy be practicable the costly apparatus devised by Mallet is to be recommended; valuable results, however, may be obtained by attaching to a clock any apparatus that shall promptly and infallibly stop it or set it agoing at the proper moment. In the former case the observer should frequently ascertain the error of the clock, and should keep a written record thereof, so that when it is found to have been stopped at a given moment he can apply to the reading of the clock-dial the correction proper to give the exact Washington time of the occurrence, In the second case the observer has to wind up the clock and set it at 12 hours 0′ 0″; it then needs no care until it is found to be agoing, when the observer notes what time by the clock corresponds to a given moment of Washington time or other standard time. He then by counting backwards ascertains the moment by Washington time at which the shock occurred. In this method the clock should occasionally be allowed to run for several hours, and its hourly rate of gaining or losing be determined by making two comparisons with the standard time.

Among the devices by which a clock may be promptly stopped or started by a slight earthquake, the following are suggested:

1. Let a slender cylinder of wood, 3 inches in diameter and 30 or more in height, stand alone upon a horizontal base near a clock so that a slight sudden movement of the ground will overthrow it; let a string be tied to the cylinder and pass to the clock, where it should be attached to the pendulum or wheel-work, so that the fall of the bar will stop the clock.

2. Place in the clock-case directly under the pendulum an apparatus consisting of a metallic ball an inch or more in diameter nicely poised on top of a vertical rod; let the rod rest upon a vertical spring which is compressed by the weight of the ball so that the pendulum swings in safety above the latter; when the earthquake shock displaces the ball the rod will be pushed up by the spring high enough to interfere and stop the pendulum.

3. Place the following apparatus within the clock-case under the pendulum or wheel-work so as to interfere with and stop it at the proper moment. Let a metallic ball rest on the long arm of a horizontal lever to whose short end a counterpoise is fastened. The weight of the ball may be more than sufficient to balance the counterpoise and should be partly supported by a prop beneath it. The ball is caused to roll off by the earthquake shock, when at once the counterpoise sinks and raises the longer lever-arm so that it interferes with the pendulum or wheel-work.

4. Equally simple devices may be constructed by which to set a clock agoing on the arrival of the earthquake shock. In this case the pendulum should be drawn to the side of the clock-case and there held by a slight loop of string so adjusted that the fall of the cylinder or of the ball mentioned in the previous sections may draw the loop aside.

NOTE 1.—In these arrangements, if the falling ball or cylinder be made too sensitive, the occurrence of other shocks than those due to earthquake waves will be likely to

be recorded. As a rule, therefore, the clock should not be liable to shocks from passing railroad trains, blasting operations, &c.; or, if so exposed, the falling parts should be made less sensitive.

NOTE 2.—In order not to lose the record of a succeeding earthquake, the clock should be adjusted for a new observation as soon as possible after its record of any shock has been ascertained.

NOTE 3.—By the above methods we record the arrival of the very first shock that is of the requisite force. If the severest shock occur several seconds or minutes later, as is frequently the case, it will pass unrecorded. For such cases we must use the more complicated chronograph arrangement of Mallet, or an arrangement of several clocks furnished with cylinders of different degrees of instability.

2D. HORIZONTAL MOVEMENT.

The velocity, extent, and direction of the horizontal movement of the ground at any station must be registered by separate devices, for which the following are suggested as practicable:

DIRECTION OF HORIZONTAL MOVEMENTS.

1. The very first movement that is felt at any point is probably always that due to the so-called "normal component of the elastic wave," by virtue of which the earth is pushed forward in the direction in which the wave is itself being transmitted. The direction of this movement may be ascertained by providing a bed of sand into which the cylinder or ball mentioned in section 1 may fall and remain quiet.

VELOCITY OF HORIZONTAL MOVEMENT.

2. The horizontal velocity is shown by its effect in overturning erect objects, and a close approximation to both the maximum velocity and the direction may be obtained by the following simple apparatus: Provide a series of ten or more cylinders (hard wood is an excellent material) whose lengths or heights are to their diameters, respectively, as 2, 3, 4, 5, &c., to 1. Stand each of these vertically upon a horizontal pedestal or base of the same or larger diameter, these bases being imbedded in a bed of sand, so that when any cylinder falls it will lie quiet without rolling. The earthquake shock will, according to its horizontal velocity, overthrow one or more of the pillars, beginning with the least stable. The force may be calculated by knowing the dimensions of the pieces overturned and of those not overturned. If a series of shocks of increasing severity come in rapid succession from different directions, this fact will be recorded by the various positions of the pillars lying in the bed of sand.

The observations to be made when an earthquake shock has passed consist in noting the number of each pillar that has fallen, giving for each its dimensions and the position in which it lies with reference to its pedestal. These items can be best preserved and reported by means of a diagram drawn by tracing on thin paper the appearance of the bed of sand with its pedestals, fallen columns, and meridian line. There should always accompany the diagram a list showing the number, diameter, height, and weight of each pillar.

NOTE.—In the foregoing method the following items should be carefully attended to:

1. The pillars and pedestals should be numbered consecutively on their *top ends*.

2. The friction between pillars and pedestals should be great enough to prevent the former from sliding over the latter.

3. The pillars should stand exactly vertically.

4. The pillars should stand so far apart as not to interfere with each other in falling.

5. The tray, or bed of sand, should be on or near the natural surface of the ground; note should be made as to whether it be placed on a bed of rock, in a sandy plain, a hill-side, &c.

6. The relative dimensions of the series of pillars may be varied and the number increased, so as to secure a wider range of sensitiveness and more precise results.

3. The maximum velocity of horizontal movement may be accurately found by means of the "ball seismographs" described by Mallet in the report of the British Association for the Advancement of Science for 1858, pp. 87–95, which apparatus, in its modified form, although rather costly and perhaps troublesome, is to be recommended to those who would obtain by one instrument very precise measurements of several of the important features in the motion of the earth; *i. e.*, the time and direction of initial movement and the direction and velocity of the maximum horizontal and vertical movements.

4. The linear extent of the horizontal movement to and fro of the earth may be approximately determined by means of a heavy ball rolling or sliding in a perfectly horizontal plane strewn with some fine powder that will serve to mark the path of the

ball. The apparatus will be best made by placing a very neatly turned ball of thin iron or sheet-brass, filled in solid with lead, between two perfectly horizontal planes of metal faced with lead, leaving a space of one-tenth of an inch between the ball and upper plane. Cover the ball with some sticking lubricant—tallow is best—and cover also the metal planes with thin layers of lamp-black, chalk, or other powder. The observation consists in, 1st, observing the horizontality of the lower plane, before and after the shock, by means of a spirit-level; and, 2d, tracing carefully on this paper the track of the ball on both the upper and lower planes, and also the corresponding dust-tracks sticking to the ball itself. The material, dimensions, and weight of the ball should be given.

3D. VERTICAL MOVEMENT.

The vertical velocity of the movement of the ground is that force by which any loose body is thrown upward. This velocity varies during the duration of the shock, being in fact first upward and then downward, or *vice versa;* and it is in general difficult to obtain a clear record of any but the maximum upward and downward velocities.

The maximum vertical velocity is given by the use of the ball-seismometer, as constructed by Mallet, with galvanic recording-apparatus before alluded to. Some idea of the maximum velocity may, however, be obtained by attaching a string to a heavy ball resting on the ground, so that when the latter is projected upward the length of string uncoiled will indicate the extent of vertical movement of the ball. In another form of the apparatus a vertical spiral-spring supports a heavy weight, the movement of the earth being only slowly communicated to the weight and extension or compression of the spring takes place, which may be graphically recorded by some simple device. The vibrations of the mercury in a barometer-tube, or, better still, in a siphon-tube specially constructed, also depend on the vertical component of the shock, and may be recorded by means of light paper-markers that ordinarily rest on the surface of the mercury.

PAPER 24.

A LIST OF DISASTERS ON THE INLAND LAKES DURING THE YEAR ENDING JUNE 30, 1875, PREPARED BY I. A. LAPHAM, MILWAUKEE, WIS.

JULY.

1.—Schooner Lone Star lost jib-boom in Welland Canal.
Tug McClellan broke her crank-pin on Lake Saint Clair.
Schooners Sea Gull and Mary Merritt badly damaged by collision in Welland Canal.
Joseph Conway drowned from bark Maggie McRae, in Welland Canal.
2.—Propeller Norman damaged by fire at Chicago to the extent of $2,500.
Schooner Two Brothers and steam-barge Leland damaged by collision at Chicago.
3.—Schooners Ellingwood and J. C. King damaged by collision at Chicago.
Scow Butcher Boy lost her small boat by collision in Detroit River.
Schooner B. W. Folger ran on middle ground near Northport, Bay of Quitle, and sank.
Schooner Ardent sprang a leak off Milwaukee.
A sailor drowned from schooner White Oak.
4.—Schooner Wave run into by schooner Southwest in Welland Canal. Damage amounted to $500.
Schooner Lillie Parsons struck a rock in Welland Canal, and was obliged to return to Buffalo.
Propeller India ran aground at foot of Stag Island; released after twenty-four hours' delay.
Bark S. V. R. Watson run down by steam-barge W. H. Barnum on Lake Erie; sunk in 35 feet of water.
Four persons drowned by capsizing of yacht off Buffalo: John Langley and William Forest, of schooner Annie Vought, and Mary Kurts and Lizzie Glass, of Buffalo.
Propeller America arrived at Saint Catherine's leaking.
Tug Oswego damaged by collision on Saint Clair Flats.
6.—Schooner Rainbow arrived at Chicago leaking.
7.—Steamer Corinthian struck upon Split Rock, Lachine Rapids, and sank; steamer Osprey sank in Saint Lawrence River at same time; the effects of a hurricane.
Schooner Louise carried away gate in Welland Canal, and ran into schooner M. C. Upper; schooner Upper will prove a total loss.

Schooner William Grandy lost mizzenmast and some canvas on Lake Huron.
Schooner Kate Lyons had her mainmast shattered by lightning on Lake Michigan.
Tug Margaret badly damaged by collision with tug Parsons at Manistee.
Schooner Norway capsized on Lake Huron; crew saved.
Schooner China damaged her rudder and sprang a leak on Lake Ontario.
Steamer Chief-Justice Waite ran aground at Toledo.
Bark Great West and schooners Imperial, Pauline, Ida Keith, and J. R. Bentley, damaged by collision at Chicago.
Steamer Stranger ran ashore near Sea Breeze house, Lake Ontario.
Schooner Eliza Fisher dismasted on Lake Ontario.
Bark John Breden sprang foremasts in the Straits.
Propeller City of New York broke her wheel near Detroit.
Steam-barge Tecumseh broke foretopmast in a storm on Lake Erie.
Propeller Prussia damaged to extent of $200 by schooner Evaline Bates in Welland Canal.

8.—Jared Merrigo drowned from steam-barge Eclipse at Essexville.
Scow J. A Sanders struck a rock at Forest Bay, Lake Huron, and arrived at Detroit in a sinking condition.
Tug James Amadeus damaged by collision with schooner Watts Sherman at Cleveland.
Schooners Augusta and G. M. Neelon damaged by collision near Port Colborne.

9.—Tug Queen City ran down a scow at Buffalo; Joshua Sheldon and his wife and child drowned.
A deck-hand named Smith drowned from steamer Keweenaw at Detroit.
Propeller Bertschy broke cross head off Manistee.

10.—Schooner R. B. King struck dock and drove fluke of anchor into her hull at Milwaukee.
Propeller Mary Robertson damaged machinery at Detroit.

12.—Propeller Sun sprang a leak and foundered off Rond Eau, Lake Erie; total loss.
Alexander Pecan, sailor on barge Energy, drowned at La Chine Canal.
Propeller E. B. Ward, jr., ran ashore at Northport, Lake Michigan.
Propeller Roanoke disabled machinery on Lake Erie in a storm.
Propeller Pacific and two vessels grounded on Saint Clair Flats.
Propeller Missouri ran into schooner E. P. Ryerse, lying at anchor near Long Point.

13.—Scow Chapin lost jib-boom by collision with schooner Tomine at Chicago.
Ferry-steamer Bouquet sank at her dock at Toronto.
John Shepard, fireman on steamer Union, killed at Oconto by being crushed against dock.
Scow Iosco ran ashore at Port Austin Reef, Lake Huron; 280 tons plaster jettisoned.
Schooner E. M. Blake sprang a leak on Lake Erie in a storm, and threw ten tons freight overboard.

15.—Schooner Maggie McRae broke her center-board near Port Colborne.
Schooner M. L. Higgie broke center-board on Lake Ontario.

16.—Schooner G. M. Filer lost jib-boom by colliding with bridge at Chicago.
Patrick Tracy drowned at Oconto.
Schooner Harvest Home aground in Waiska Bay, Lake Superior.
Bark Gibraltar lost foretop-gallant mast on Lake Huron.
Schooner Pilgrim dragged ashore at Antrim City, Traverse Bay, lies in 5 feet water.
Schooner Curlew beached in Traverse Bay.
Bark L. C. Woodruff lost jib-boom in Straits.
Schooners Anna Maria and Topsey lost jib-booms in Lake Michigan.
Schooner A. Cohn ran aground in Detroit River.

18.—Scow Lily Gary ran on beach at Michigan City, and went to pieces.
Propeller Roanoke damaged by collision with propeller Norman at Chicago.
Steamer Dove ran aground on Stony Island, Detroit River.

20.—A sailor on schooner J. I. Case killed by falling into hold of schooner at Buffalo.

21.—Scow Planet sprang a leak on Lake Michigan.
Tug Favorite damaged by fire to extent of $200 on Lake Erie.
Schooner Australia sprang a leak on Lake Michigan.
Schooner Hubbard sprang a leak near Oswego.
Steam-barge Sparta ran aground on Saint George's Flats, Saint Mary's River.
Walter Payne, son of engineer of steamer Inter-Ocean, drowned from steamer near Detroit.

22.—Schooner Richard Mott damaged by colliding with bridge at Milwaukee.
Steamer Maguet broke her walking-beam and cylinder, off Clayton.
Schooner M. L. Breck ran aground on Fighting Island, Detroit River.

24.—Schooner Arcturus lost jib-boom off Kewaunee.

Thomas Boggs, sailor, drowned at Buffalo.
Propeller Merchant ashore on South Point, near Milwaukee.
25.—Schooner Pauline lost jib-boom by collision at Chicago.
Propeller Lowell and tug Gladiator damaged by collision at Port Huron.
Schooner Eliza Gerlach, laden with steel rails, struck by lightning on Saint Clair Flats.
Propeller City of Duluth ran aground in a squall on Hurson's Island, Detroit River.
26.—Tug Ransom sunk in Detroit River by collision with tug Urania while racing for a tow.
Schooner A. L. Lyon and barge Arizona damaged by collision off Lexington, Lake Huron.
Scow Supply arrived at Milwaukee leaking.
Schooners Mary Collins, Winona, and Comet, and the brig Mechanic damaged by squall on Lake Michigan.
Schooner Pensaukee ran into pier at Chicago.
Bark J. C. King damaged by collision on Saint Clair Flats.
Schooner Nellie Redington torn from her moorings and damaged by a sudden rise of water at Buffalo.
Scow Hurrah Boys ran ashore at Milwaukee and went to pieces.
Brigs Commerce and Fountain City and schooners Imperial and Maggie Thompson damaged by storm on Lake Michigan.
Schooner Argo lost jib-boom by collision with schooner M. A. Scott off Chicago.
Schooner Gerritt Smith had her foretop-mast carried away by squall on Lake Ontario.
Schooners Higgie and Jones and Unadilla lost canvas by squall on Lake Michigan.
Scow Maria capsized off Lexington, Lake Huron, and drifted ashore.
Propeller Dromedary sprang a leak on Lake Ontario.
27.—Schooner John M. Hutchinson grounded on Saint Clair Flats and damaged her stearing-gear.
Oscar Turner drowned from propeller Scotia at Detroit.
Tug J. F. Behn exploded her boiler at Buffalo; a total loss.
A sailor on barge Racine drowned off Sand Beach, Lake Huron.
Michael McMahon, sailor on bark Gibraltar, drowned at Kingston.
Schooner Exile struck on reef at Calumet, Lake Michigan, and sprang a leak.
Schooner Seaton damaged by collision at Chicago.
Scow Butts ran on harbor-pier at Chicago, was towed up the North Branch, and became water-logged.
28.—Steamer Island Queen broke her cross-head near Malden; towed to port.
29.—Tug Little Giant damaged by collision at Chicago.
Propeller Mohawk, tug Favorite, and schooner John S. Miner damaged by collision at Detroit.
Barge M. R. Warner aground on Grassy Island, Detroit River.
Schooner Chicago Board of Trade sprang a leak and sank near Fairport, Lake Erie, in 13 fathoms of water.
30.—Scow William Bates lost foresail, &c., in storm off Racine.
Steam-barge B. W. Jenness broke machinery on Lake Erie, and was towed to Detroit.
Schooner William Hunter sprang a leak and sank in 13 feet of water at Dunkirk.

AUGUST.

2.—Barge Oneida lost deck-load of wood and became water-logged on Lake Michigan.
Henry Evans, sailor on schooner Australia, killed by being thrown upon anchor by tow-line at Muskegon.
Tug Neshoto collided with schooner Silver Cloud at Two Rivers and lost her smoke-stack.
3.—Bark John Breden lost foretop-gallant mast on Lake Michigan.
Schooner William Sturgis damaged by collision with propeller Norman at Chicago.
Schooner Irouside sprang a leak on Lake Erie.
Schooner Cecilia Jeffrey ran ashore at Painesville, Ohio.
Barge City of Port Huron ran afoul of scow Saint Charles in Saint Clair River.
4.—Schooner Mystic lost bowsprit and jib-boom by collision with propeller C. J. Kershaw at Chicago.
Schooner C. N. Johnson arrived at Chicago leaking badly.
Schooners Great West and Little Belle lost jib-booms by collision at Chicago.
Tugman Earnest Fesing drowned in Torch Lake, Lake Superior.
Schooner Queen of the Lakes arrived at Chicago leaking.
6.—Barge Golden Harvest damaged by collision with schooner J. C. Harrison at Chicago.

7.—Schooner Maid of the Mist dismasted off Huron, Ohio.
Steamer Fawn burst her boiler at Port Fortune, Ontario; loss $3,000; engineer badly scalded.
Steamer Warrington damaged by collision with a raft on Lake Saint Clair.
8.—Charles Williams, sailor on barge Norway, drowned at Buffalo.
Steamer Kewenaw, ashore near Detour, Lake Huron.
10.—Steamer Mystic ran aground in Detroit River.
Tug Union broke her shoe at Chicago.
Schooner Lewis Wells struck by squall and lost her jib; afterward ran on pier at Buffalo and stove a hole in her bottom.
Steamer Gazelle broke machinery near Detroit.
Edward McNamara, of steam-barge Clinton, drowned at Port Dalhousie.
11.—Bark Erastus Corning aground at Buffalo.
13.—Albert Green of propeller City of Duluth, drowned at Duluth.
Steamer Thomas L. Parsons sunk in Welland Canal near Thorold.
Schooner Bessie Bolt damaged by collision at Chicago.
Steam-barge Bay City disabled and returned to Cleveland.
Steam-barge Thames burned down to hull at Lambton, Ontario.
Sailor on barge Venice killed at Toledo by a fall from the mast.
Schooner R. P. Mason aground at Sheboygan.
Propeller Clinton ran into schooner Willard at Toledo.
14.—Schooner Mary Amelia arrived at Port Colborne leaking.
Propeller City of New York broke her wheel in Welland Canal; towed to Cleveland.
15.—Barge Wyoming ashore at Sandusky.
16.—Schooner King Sisters ran ashore near False Presque Isle, Lake Huron; jettisoned 100 tons pig-iron and got off.
17.—Tug Margaret damaged by collision with tug Osgood at Manistee; loss $1,500.
Wm. Kelley, sailor on steamer W. L. Wetmore, drowned near Point au Pellee.
18.—Schooner Senator Blood ashore at Bay Point, Lake Erie; released with little injury.
19.—Schooners C. A. King and E. G. Gray lost jib-booms by collision at Chicago.
Schooner C. J. Wells arrived at Buffalo with a broken bowsprit.
Schooner W. S. Crossthwaite ashore at Point Albino, twelve miles from Buffalo; released.
Steamship W. T. Graves sprang a leak on Lake Michigan.
Sailor on steamer Saint Lawrence drowned at Indian Cove.
Propeller Ontario arrived at Detroit with a broken wheel.
20.—Schooner Alvira Cobb sprang a leak at Chicago.
Bark S. V. R. Watson, after being pulled off from Point au Pellee, leaked so badly that she was beached at Port Burwell, Lake Erie, and now lies full of water.
Capt. John Morrison, of schooner Eva, struck by lightning off Manitowoc and remained senseless for three hours. Next day he was knocked overboard and drowned by jibing of main boom.
Schooner Union ashore near Port Colborne; released with slight injury.
Ferry-steamer Stillman Witt sprang a leak and sunk at Duluth; in water up to her guards.
21.—Schooner L. J. Farwell ran ashore in Detroit River.
Steamer City of London destroyed by fire at Collin's Inlet, Georgian Bay; deck-hand named Campbell burned to death.
Barge Advance and schooners J. G. Masten and City of the Straits damaged by lightning at Chicago.
22.—Schooner Raleigh lost foretop-mast on Lake Michigan.
Propeller Shickluna lost foretop-mast by collision with schooner Typho at Milwaukee.
Schooner Wm. Sanderson struck by a squall and sprang a leak, and was beached at White Rock.
A convict named Kane jumped overboard from a propeller at Algonac and was drowned.
Scow Shaw struck old pier off Fairport, Ohio, and went to pieces.
24.—Steamer City of Toledo burned at Manistee; all inside work burned; loss $10,000.
Tug Annie M. Pierce broke wheel on Lake Huron.
Schooner Evelyn had her bulwarks stove in and anchor carried away by schooner Monitor, at Two Rivers.
Schooner C. H. Walker passed Detroit minus foretop-mast.
Schooner Butcher Boy sprang a leak on Lake Erie; towed to Cleveland.
Tug J. L. Higgie sunk in Mud Lake, near Chicago.
25.—Scow Industry wrecked off Black River, Lake Erie; a total loss.
Barge Chester B. Jones returned to Chicago leaking.
A deck-hand on tug McClellan drowned at Chicago.

Schooner John T. Mott sprang a leak in the Straits and was towed to Detroit.
Deck-hand named Sutherland drowned from steamer Watertown in Saint Lawrence River.
Propeller Music broke her shaft on Lake Michigan; towed to Traverse City.
27.—Steam-barge S. C. Baldwin sprang a leak during storm on Lake Michigan; arrived at Milwaukee with water running into hold at the rate of 14 inches per hour.
Schooner Dashing Wave lost jib-boom by collision with bark Erastus Corning, at Chicago.
Barge F. X. arrived at Bay City leaking badly.
Lewis S. Bloudheim drowned from schooner Augusta on Lake Ontario.
Schooner M. I. Wilcox sprang a leak in the Straits.
Steam-barge D. W. Rust aground on Saint Clair Flats.
Schooner Mowry lost bowsprit and jib-boom by collision with schooner Nevada off Grand Haven.
Schooner H. C. Post ran ashore at Two Rivers; released.
28.—Schooner Elvina ashore on North Harbor Reef, Lake Ontario.
Steamer Antelope sprang a leak off Oswego.
Steamer Wave destroyed by fire off the Charities, Saginaw Bay.
Schooner Harrison sprang a leak on Lake Michigan.
Propeller Cuba ran into schooner Franklin and carried away schooner's rail and stanchions.
29.—Schooner J. H. Hazard damaged by colliding with a bridge at Toledo.
30.—Steamship Ketcham and schooner Belle Walbridge collided off Waukegan. Ketcham put into Racine leaking, and schooner returned to Chicago minus foremast, &c.
31.—Schooner Bertha Barnes damaged by colliding with a bridge at Toledo.
Schooners Lumberman, Milwaukee Belle, and H. C. Hegg, damaged by collision at Chicago.
Tug Dexter damaged by collision with schooner M. L. Collins at Milwaukee.
Schooner Argo sprang a leak and water-logged off Kewaunee, Lake Michigan.

SEPTEMBER.

1.—Tug Dexter damaged by collision with schooner M. L. Collins at Chicago.
Scow Seabird lost top-sail yard by collision at Chicago.
Schooner Harrison sprang a leak on Lake Michigan.
Schooner A. W. Lucky lost bowsprit, &c., by collision on Detroit River.
Propeller Peerless damaged rudder at Chicago.
Steamer Dove ran aground at Grosse Isle.
Schooner Celia lost bowsprit and jib-boom by collision with schooner at Sturgeon Bay
Propellers Minneapolis and China and schooner Lumberman damaged by storm on Lake Michigan.
Propeller Atlantic ran aground on Saint Clair Flats.
Steamer Northwest ran aground on Bois Blanc Island, Detroit River.
Scow Supply lost half her deck-load of lumber in storm on Lake Michigan.
Propellers Prussia and Wetmore grounded on Saint Clair Flats.
2.—Scow Ahnapee ran into raft on Lake Michigan, and damaged her stern.
Propeller Lowell smashed her furniture in a storm on Lake Michigan.
3.—Schooner Norman damaged by striking on pier at Racine, Lake Michigan.
Bark John Breden sprang a leak on Lake Michigan.
Schooner Lewis Day and tug Butler damaged by collision at Chicago.
Schooner Pulaski damaged by striking piers at Racine, Lake Michigan.
Scow W. H. Converse totally dismasted off Long Point, Lake Erie.
Schooner Fallowcraft grounded at Port Huron.
4.—Schooner Reindeer carried away her foremast in Milwaukee Harbor.
Schooner Typo ashore on Eagle Island, Green Bay.
Bark Unadilla lost main and mizzen topmasts by storm on Lake Michigan.
Schooner Chapman lost mainmast by collision with schooner Clipper City at Saint Joseph.
Schooner Lewis Day damaged by storm on Lake Michigan.
Bark Pathfinder ran on Colchester Reef, Lake Erie.
Steamer Alpena collided with schooner Transit off North Point, Milwaukee.
Schooner Kate Kelley struck a bridge at Toledo and sprang a leak.
Bark Burnside ran on rocks at Bois Blanc Island, Detroit River.
Schooner Sasco had her foremast carried away by collision on Saint Clair Flats.
5.—Schooner Brooklyn lost jib-boom by collision at Chicago.
Schooner Phœbe Catherine ran on rocks in Georgian Bay and became a total loss.
Samuel Hyde, deck-hand on steamer Northwest, drowned at Cleveland.
Scow Rush sunk in harbor at Dunkirk. Raised.
Propeller Lake Breeze broke her shoe at Saint Joseph.

Schooner H. C. Winslow sprang a leak on Lake Erie.
Barge Judd sprang a leak on Lake Erie.
Schooner E. Blake damaged by collision on Saint Clair River.
Schooner Troy ran ashore on Green Island, Lake Ontario.
Propeller Carrie Blood broke her wheel at Port Huron.
Scow Chapin carried away foremast on Lake Michigan.
Tug Resolute sunk an ice-barge at Detroit.

8.—Steamer James Davidson ran aground at Elk Island, Saint Clair River. Released with great difficulty.
Steam-yacht Idler broke machinery on Lake Michigan.
Schooner J. Magee lost jib-boom in Welland Canal.

10.—Steam-yacht George Wood damaged by fire at Detroit.
Steamer City of Dresden ran ashore at mouth of Bear Creek.
Propeller Arizona ran aground on Saint Clair Flats.

11.—Propeller Spartan and schooner Sumatra damaged by collision at Detroit.
Tug Mary Ann exploded her boiler in canal near Ottawa.
Bark William Jones ran aground near Port Huron.
Schooners Smith & Post and J. E. Bailey damaged by collision in Welland Canal.
Schooner Jason Parker damaged by striking pier on Lake Michigan.
Schooner Industry damaged by collision with schooner Mariner off Milwaukee.
Schooner Chenango damaged by collision with an unknown vessel on Lake Michigan.
Tug Anna struck a rock at Buffalo and sunk. Raised.
Scow J. P. Jones partially dismasted by collision on Detroit River.

14.—Barge Planet and schooner Evaline damaged by collision off Milwaukee.
Schooner James Couch damaged by collision on Lake Erie.
Schooner Centurion struck on Amherst Island, Lake Ontario; 20,000 feet lumber thrown overboard.

15.—Schooner Eliza Quinlan lost deck-load of shingles in a storm on Lake Ontario.

16.—Propeller Idaho grounded on Saint Clair Flats in a fog.
Propeller Roanoke and schooner Bay State damaged by collision at Chicago.
Propeller T. U. Bradbury caught fire and was scuttled near Lambton, Saint Clair River.
A deck-hand on propeller Wenona washed overboard and drowned in Lake Huron.

17.—Schooner Gipsey and barge Frankfort damaged by collision at Milwaukee.
Schooners Lewis Day and Ellen Blood damaged by collision at Chicago.
Propeller Champlain ran ashore on Peche Island, Lake Saint Clair. Released uninjured.

18.—Propeller Lake Breeze broke machinery in a storm on Lake Michigan.
Schooner J. S. Clark sprank a leak on Lake Ontario.
Tug Mary Ashton badly damaged by steam-barge Ellsworth on Lake Ontario.
Schooner Sweetheart put in to Detroit leaking.
Schooner Scotia lost maintop-mast by storm on Lake Michigan.
Schooner Trader water-logged on Lake Michigan.
Schooner Fayette Brown sprang a leak on Lake Michigan.
Schooner Clara Parker sprang a leak on Lake Michigan.
Propeller Brooklyn damaged cargo on Lake Huron.
Schooner E. P. Ryerse sunk off Dunkirk by collision with Bahama; a total loss.
Schooner C. Mears stranded in North Bay, Lake Michigan; released.
Propeller Mary Robertson sprang a leak on Lake Michigan.

19.—Schooner Ayr lost topmast in squall on Lake Erie.
Schooner Consuelo and tug Farragut damaged by collision at Toledo.
Schooner Mary Lyons lost center-board on Lake Huron.
Tug Wilcox ran ashore in Saint Clair River.
Bark Sardinia run into and sunk by propeller Roanoke at Chicago.
Schooner Denmark dismasted on Lake Michigan.
Schooner J. Maria Scott partially dismasted on Lake Michigan.
Schooner Richard Mott lost center-board on Lake Michigan.
Schooner Northwest and barge Active damaged by storm on Lake Michigan.
Tug Hewitt sunk at Chicago; raised.

20.—Schooner Caroline Marsh lost center-board on Lake Ontario.
Brig Powhatan sprang a leak on Lake Ontario.

21.—Brig E. Cohen damaged by a propeller at Erie.
Tug Carleton totally destroyed by fire at Montreal; loss $6,000.
Schooner Marengo lost foretop-mast on Lake Huron.
Schooners Monitor, John R. Noyes, and J. & A. Stronach damaged by storm on Lake Michigan.
Steamer Clyde burst her boiler at Toronto.
Scow I. M. struck pier at Manistee and stove a hole in her bow.
Barge Abercorn ran ashore at Port Colborne.

Steam-barge Vanderbilt arrived at Detroit leaking.
Schooner Mystic had her foresail split by heavy weather on Lake Michigan.
Schooner Taylor lost jib-boom on Lake Michigan.
22.—Bark Monarch foundered at Detour, Saint Mary's River and became a total loss.
25.—Schooner Consuelo ran ashore on Fighting Island, Detroit River.
Scow Maria sunk at Port Huron.
Schooner Norway sprang a bad leak on Lake Michigan.
Schooner B. F. Wade badly damaged by collision with schooner Philo Scoville on Lake Michigan.
Schooners Madison and Almira collided off Point Sauble.
Schooner R. P. Mason lost jib-boom by collision with schooner Richard Mott off Sheboygan.
Schooner Saveland struck on Peach Island, Lake Saint Clair, and Broke several planks in bow.
Schooner Melrose ran ashore at Sheboygan in a fog and become a total loss.
Schooner Bertha ashore at Sheboygan; released.
Schooner Gerritt Smith broke her center-board on Lake Ontairo.
Tug Gladiator broke her wheel at Buffalo.
Schooner Moorsoon lost jib-boom by collision with bridge at Chicago.
Steamer Cayuga broke her shaft on Lake Ontairo.
27.—Schooner Zach. Chandler lost canvas on Lake Erie.
Schooner St. Andrew stove a hole in her bow in Welland Canal.
28.—Propeller Lake Ontario ran ashore near Ecorse, Detroit River.
Schooners Flying Cloud and El Tempo collided at Chicago.
29.—Schooners Barbarian and Racine collided at Chicago.
30.—Schooners Taylor and Wollin damaged by collision at Chicago.
Schooner Driver sunk in Chicago River.
Barge Golden Harvest water-logged on Lake Michigan.
Steamer D. R. Van Allen broke her machinery on Lake Erie.
Schooner Alice stranded near Putneyville, Lake Ontario, and became a total loss.
Schooner Maid of the Mist lost deck-load on Lake Erie.
Schooners Sweetheart and Wend the Wave ran aground in Nebish Rapids.
Barge Wolverine struck by lightning at Zilwaukee, Michigan.
Scow Mayflower ashore at Black River.
Schooner J. V. Porter ashore at Fairport, Lake Erie.
Schooners Empire State, S. A. Wood, and scow Mountain Maid damaged at Cleveland.
Schooner Gazelle beached and scuttled at Cleveland.
Propeller Ontario broke her wheel on Lake Superior.
Schooner J. A. McDonald lost anchor off Long Point, Lake Erie.
Schooner Empire State ran into propeller Colorado at Cleveland.
John Lynn, mate of schooner Guiding Star, drowned on Lake Erie.
Jenkins Reese, mate of barge Weeks, drowned on Lake Saint Clair.

OCTOBER.

1.—Schooner I. N. Foster lost jib-boom on Lake Huron.
Schooner Sweepstakes broke her fore-boom at Oswego.
Schooner Mary Taylor broke her fore-gaff off Oswego.
Scow Mountain Maid lost small boat on Lake Erie.
Schooner News-Boy split mainsail on Lake Huron.
Steam-barge Yosemite ashore at Sandusky.
Propeller Frankfort burned at Saugatuck; a total loss.
2.—Enders Nelson, sailor on schooner Elbe, drowned off Chicago.
Bark Ogarita and schooner William Grandy sprang a leak on Lake Michigan.
Scow Mary Jane ran ashore near Port Clinton.
Schooners W. T. Greenwood and Marysbury damaged by storm on Lake Huron.
Schooner Minnie Williams lost canvas on Lake Ontario.
Sutherland, deck-hand on steamer Watertown, drowned near Kingston.
Schooner Gazelle beached, Waukegan. Got off.
Steam-barge Wm. Cowie broke her wheel in Welland Canal.
Schooner T. V. Avery ran ashore in Saint Lawrence River near Kingston, and filled with water. Released.
3.—Propeller Ira H. Owen sprang a leak on Lake Michigan.
Schooner Ellenwood stranded at White Lake, Michigan. Got off.
Sloop Cora lost part of deck-load of shingles on Lake Ontario.
Schooner Victor dismasted on Lake Ontario.
Yacht Saboth totally wrecked at Port Hope.
Barge Ontario's Queen sunk at Charlotte, Lake Ontario. Raised.

Steamer Cumberland ran on rocks at Nippegon River, Lake Superior, and was badly damaged.
Schooner James Couch lost canvas on Lake Huron.
Steamer Corona damaged by storm on Lake Michigan.
Barge Jessie Lynn sprang a leak on Lake Michigan.
4.—Schooners Sam Flint, Espanola, Golden West, and Horace Greeley damaged by storm on Lake Michigan.
Duncan McKenzie, mate of schooner H. P. Baldwin, drowned at Chicago.
Barge George King aground Elk Island, Saint Clair River.
Schooner Champion damaged by collision with propeller Mohawk at Detroit.
Schooner James C. King ran ashore at Point au Pelles and was badly damaged.
5.—Steamship James Davidson ran on bar at Chicago. Released with little injury.
Schooner J. W. Langmuir ran ashore on Galve Islands and became a total loss.
Steam-barge Mary Jarecki and barge M. R. Warner ran ashore near Rock Falls, Lake Huron.
7.—Steamer D. M. Wilson dismasted off Fairport by collision with wreck of schooner Board of Trade.
Captain Doyle of schooner Gilmore killed by main-boom of his vessel off Chicago.
Steamer Fessenden disabled rudder at Detroit.
Tug Ferry damaged by collision at Chicago.
Schooners Cynthia Gordon and Industry damaged at Benton Harbor, Lake Michigan.
Schooner Dan Marble ashore in Detroit River.
8.—Schooner A. G. Morey damaged her stern by collision on Saint Clair Flats.
Schooner Centurion sunk off Real Ducks, Lake Ontario. A total loss.
Propeller Thos. A. Scott ashore near Malden.
Schooner Hettie Taylor ran aground in Detroit River.
Schooner Wells Burt stranded in Nebish Rapids. Off.
9.—Propeller J. L. Hurd damaged by striking pier at Manitowoc.
10.—Light-ship at Bar Point, Lake Erie, driven ashore and sunk by severe storm.
11.—Bark Kate Darley and schooners Cortez and Cornelia Windiate damaged by collision on Saint Clair Flats.
Steamer Dove broke her crank-pin near Malden.
Scow Menominee lost canvas on Lake Michigan.
Schooner B. W. Folger ashore at South Bay Point, Lake Ontario.
Schooner Butcher Boy sprang her foremast on Lake Erie.
Scow M. N. Dunham lost jib-boom by collision at Chicago.
Schooner Mary E. Perew lost jib on Lake Michigan.
Schooner Jessie Hoyt ran on Peshtigo Reef. Jettisoned part of cargo and got off.
Steamer Keweenan broke portion of machinery on Lake Huron.
Schooner Pelican ran aground in Nebish Rapids.
Barge Clifton went to pieces on Lake Erie.
Schooner Union Jack ran aground in Bay of Quinte.
Scow C. C. Butts lost her maintopmast on Lake Michigan.
Robert Matthews, sailor, drowned in Welland Canal, at Thorold.
12.—Schooner Thistle lost jib-boom by collision with schooner W. B. Allen, at Chicago.
Schooner C. J. Roeder lost topmast on Lake Michigan.
Schooner Jason Parker ran ashore at Allison's Bay, Lake Michigan.
Tug J. L. Higgie had her stern badly damaged by collision at Chicago.
13.—Schooner John Breden damaged by collision at Chicago.
Propeller City of Duluth broke her wheel on Lake Superior.
14.—Schooner Boaz ran ashore at Port Washington. Released with little injury.
Schooner Thos. Parson ashore at North Manitou. Cargo a total loss. Schooner released.
Schooner H. M. Ballou ashore near Charlotte, Lake Ontario.
Steamer Phil. Sheridan collided with schooner Hutchinson at Cleveland.
Tug Douglas destroyed by fire off Wyandotte.
John Cassidy, fireman on tug Douglas, drowned while attempting to escape from fire.
Schooner Cuba ran ashore on Peshtigo Reef and filled with water.
William Benson, second mate of schooner Richard Winslow, killed at Cleveland.
William Riley, seaman on schooner Angus Smith, drowned at Milwaukee.
15.—Isaac Radcliffe, sailor, drowned in Welland Canal.
Schooner Cecillia Jeffrey ran ashore near the pier at Cleveland.
Schooner Westchester lost jib-boom at Muskegon by collision with schooner Catchpole.
E. Keys, wheelsman on tug L. L. Lyon, drowned off White Rock, Lake Huron.
16.—Scow C. L. Fick ran ashore in Detroit River.
William Taylor, sailor on schooner Marysburg, burned to death by upsetting a lamp in forecastle of the schooner at Toronto.

17.—Schooner Fostoria struck a rock and sunk, Saint Mary's River. Raised in a damaged condition.
Schooner Sea-Bird ran ashore on Sand Beach, Lake Huron.
Brig Roscius lost her fore-yard on Lake Huron.
Steamer Nahant and schooner P. S. Marsh grounded in Detroit River.
Propeller Milwaukee ran aground near Bois Blanc Island, Detroit River.
Propeller Cleveland struck a rock in Welland Canal and sunk at Port Colborne. Raised. Cargo badly damaged.
Scow Ferritt ran ashore at Black River and became a total loss.
Scow J. M. Enright struck pier at Black River, Lake Erie, and sank inside. Raised,
Propeller James Fisk grounded in Maumee Bay.
James McGuinie, sailor on barge Hayes, killed at Buffalo.
18.—Schooner Chas. Wall ashore at Put-in Bay, Lake Erie.
Scow Harmonia water-logged on Lake Michigan.
Schooners Halstead and City of Painesville collided off Ashtabula. The City of Painesville sank in 13 fathoms water and became a total loss.
Propeller Mohawk ran aground near Malden.
19.—Schooner Annie Mulvey stranded at Goderich. Released with little injury.
Schooner Wandered foundered near Long Point, Lake Erie. Vessel and cargo of corn a total loss. The entire crew of six were drowned.
20.—Schooner America, with 23,000 bushels wheat, stranded on Long Point, Lake Erie. Vessel saved, but cargo badly damaged.
22.—Schooner Lewis Day sprang a leak on Lake Michigan.
Propeller Brooklyn exploded her boiler in Detroit River and was totally wrecked. Fourteen persons were drowned or killed by the explosion.
23.—Thomas Gibson, mate of schooner Conrad Reid, drowned in Lake Saint Clair.
Mrs. Holland, passenger on Propeller Saint Albans, died on Lake Huron.
Schooner Minnie Williams sprang a leak on Lake Huron.
Schooner Nellie P. Williams seriously damaged by collision at Nepance.
Tug Stranger broke her wheel at Detroit.
24.—Thos. Fagan, watchman on propeller Bertchy, drowned at Manistee.
Schooner George Steele ran ashore at Hat. Island, Green Bay. Got off.
Barge H. H. Brown, wheat-laden, struck reef at Malden and sunk. Vessel raised; cargo a total loss.
25.—Propeller Vanderbilt ran ashore at Point au Barques, Lake Huron. Got off.
Schooner Richard Winslow grounded near Peach Island, Saint Clair River.
26.—Schooner Maria Martin stranded in the Straits.
Schooner Arab and Hippogriff lost canvas on Lake Michigan.
27.—Schooner J. D. Sawyer sprang a leak at Chicago and damaged 1,800 bushels of wheat.
28.—J. P. Condreas stranded at Evanston.
Steam-barge Alexdria sunk at Hurson's Island, Saint Clair River, by steam-barge Wm. Cowie. Raised and towed to Detroit.
Schooner Thos. S. Mott, wheat-laden, sunk at Clay Banks, Lake Erie. Vessel saved; cargo a total loss.
Schooner Thomas P. Sheldon, wheat-laden, sunk at Clay Banks, Lake Erie. Vessel saved; cargo a total loss.
Schooner Queen City ashore on Point au Pellee Reef. Released with cargo slightly damaged.
George McKindley, mate of schooner Montpelier, killed by breaking of main-boom near South Manitou Island, Lake Michigan.
Capt. John Coffin, of schooner Wm. Sanderson, lost overboard in the straits.
Scow C. C. Butts sprang a leak on Lake Michigan, and reached Manitowoc in a sinking condition.
29.—Barge Sherman water-logged and sank off Fairport. Vessel a total loss.
Barge J. S. Newhouse went to pieces at Grand Haven, Lake Michigan.
Schooner Guide arrived at Chicago in water-logged condition.
Steam-barge V. Swain and barge A. C. Maxwell stranded on Peach Island, Lake Saint Clair. Got off.
Steamer Lotta Bernard foundered on Lake Superior. Three lives lost.
Scow Ino, Canadian, ran ashore near Presque Isle, Lake Ontario. Vessel a total loss; cargo saved.
Steamer Cumberland badly damaged by storm on Lake Superior. 150 head of cattle thrown overboard, and steamer put into Prince Arthur's Landing and sank at dock.
30.—Schooner William Grandy ran on Racine Reef, Lake Michigan. Released with slight injury.
Schooner H. B. Moore stranded at Grand Haven.

Schooner Maple Leaf jettisoned deck-load of lumber and shingles on Lake Superior.
Propeller Ocean broke her machinery off Chicago.
Schooner *William Vanatta stranded* near Fairport, Lake Erie. Got off.
Scow Rough and Ready struck on Mewaugh Point, Lake Erie, and became a total loss.
Schooner John Webber blown ashore in Maumee River.
Tug Favorite capsized and sunk in Lake Erie, by schooner Willie Keller. Eliza Munroe, colored, drowned.
31.—Schooner Melvina ran ashore on Detroit Island. Got off in a damaged condition.
Brig Fashion and schooner W. H. Willard sprang leaks on Lake Michigan.
Schooners Jennie Mullen and Hartzell damaged by gale at Toledo.
Schooner Republic lost canvas on Lake Erie.
Schooner Magellan badly damaged by collision with steam-barge Mary Jarecki, near Marine City.
Schooner N. P. Goodell damaged by storm at Toledo.

NOVEMBER.

Propeller New York and barges Ketcham, Ryan, Orton, McGilvery, and Detroit ran ashore on Point Abino, Lake Erie. Four barges became a total loss. Barge *Ketcham and propeller New York* released.
Schooner Twin Sisters ran upon Tecumseh Reef, near Port Maitland, Lake Erie. Released.
Schooner S. S. Osborne ran on reef near Port Colborne and became a total loss.
Schooner John Webber stranded on Point Abino, Lake Erie. Vessel saved; cargo a total loss.
Schooner Uncle Tom stranded near Buffalo and went to pieces.
Tug Gibney ran upon Rose Reef, near Buffalo. Released.
Schooner Preble became water-logged on Lake Erie, and went to pieces.
Barge *in tow of Propeller* Antelope stranded on Long Point, Lake Erie. Released.
Schooner Bolivia ran ashore near Port Maitland. Got off with cargo badly damaged.
Steamship Davidson ran ashore on Charity Island, Saginaw Bay. Released.
Schooner Jamaica ran ashore on Pigeon Island, Lake Ontario.
Schooner Harriet Ross ran ashore near Buffalo. Got off in a damaged condition.
5.—Schooner Francis Palms stranded on Long Point, Lake Erie. Released. Cargo badly wet.
Schooner Miami stranded on Long Point. Vessel and cargo a total loss.
Schooner Clara Parker sprang a bad leak on Lake Michigan.
Schooner L. L. Lamb sprang a leak on Lake Erie and damaged cargo badly.
Tug Dexter broke her wheel at *Milwaukee.*
Propeller Dean Richmond ran upon middle ground at Point au Pellee. Released.
Tug James Ash broke her wheel at *Buffalo.*
Schooner Ontario struck on Long Point and sprang a leak.
Tug Frank Moffatt ran ashore at mouth of Detroit River. Released.
Steam-barge Lothair and consort, Corisande, ran ashore at Amherst Island, Lake Ontario. Released.
Schooner Ariel stranded on Indian Point, Lake Ontario, but got off.
Schooner Isabella Sands jammed her center-board off Chicago.
Schooner *Wild Rover stranded on Long Point, Lake Erie. Got off.*
Bark Sardinia stranded near Cathead Point, Traverse Bay, and went to pieces.
Tug Samson ran aground in Sarnia Bay, and had to be dredged out.
6.—Scow D. E. Williams ran aground in Detroit River.
Schooner Cheuango stranded on Graham Shoals, Straits of Mackinaw. Pulled off.
Schooner Montpelier stranded on Middle Island, Lake Huron. Got off.
Schooner *Hattie Johnson ran ashore on north point of Thunder Bay,* Lake Huron. Got off.
Schooner *S. J. King ran aground in Sarnia Bay.*
Schooner Helvetia ran ashore at Amherstberg, Detroit River.
Schooner Charm ran ashore on Amherst Island, Lake Ontario, and became a total loss.
Propeller W. R. Stanley and steam-barge Norman ran ashore on Gull Island Shoals, Lake Ontario. Released with little injury.
Schooner Walton ran ashore on South Bay Point, Lake Ontario.
Schooners Paragon and Sea Bird ran on Amherst Island, Lake Ontario. Got off.
Schooner Carleton C. Guthrie stranded in Bay of Quinte, Lake Ontario.
Schooner *Ballou stranded on Howe Island, Lake Ontario. Got off.*

Schooner Nimrod sunk in Lake Erie by collision with schooner Michigan. Vessel and cargo a total loss.
Schooner Anna Minnes lost mainmast on Lake Ontario.
7.—Schooner F. Morrell stranded on Grand Island, Lake Superior, and became a total loss.
Schooner Hattie Howard stranded on Sturgeon Point, Lake Erie. Got off.
Schooner Great Western lost deck-load on Lake Ontario.
Schooner Catchpole lost center-board on Lake Michigan.
Bark Fannie Campbell stranded at Cove Island, Georgian Bay, and was abandoned.
Propeller Merchant grounded on Belle Isle, Detroit River.
Schooners Antares, Fashion, Pauline, and Grantham, and propeller Favorite damaged by storm on Lake Michigan.
Schooner Czar stranded on Graham Shoals, Straits of Mackinaw. Jettisoned 1,000 bushels of grain and got off.
Steam-barge Tecumseh grounded between piers at Port Colborne. Lightered off.
Schooner Madeira ashore on Morgan's Point, near Gravelly Bay. Cargo badly damaged by water.
Schooners J. D. Sawyer and Lady Dufferin damaged by collision on Lake Erie.
Schooner N. C. West stranded on Long Point, Lake Erie.
Propeller J. Gould ran aground in Maumee Bay.
10.—Edward Powers, mate of schooner J. L. Quinby, lost overboard off Towac Point, Lake Huron.
Robert McGregor, waiter on steamer Dunlap, drowned at Alpena.
Steam-barge Mary Mills ran aground at Wyandotte.
Schooner Starling ran ashore near Port Dalhousie. Jettisoned 700 bushels of grain and got off.
Schooner Mary Lydia stranded at Port Bruce. Off.
Schooner George L. Seaver dismasted by collision with propeller Scotia.
Schooners Annie Tomine, Levi Grant, Seventh Ohio, and Belle Mitchell damaged in storm in Lake Michigan.
Bark Montgomery damaged by collision on Saint Clair Flats.
Schooner Berlin broke center-board on Lake Erie.
Scow Morning Lark partially dismasted by collision in Detroit River.
Steam-barge Abercorn ashore at Port Austin, Lake Huron.
Propeller Equinox grounded in Maumee Bay.
Barge George Kelley damaged by fire at Detroit.
Schooner Aurora lost center-board on Lake Ontario.
Steam-barge Bradbury grounded on Bois Blanc Island, Detroit River. Got off.
Schooner West Wind damaged by striking pier at Oswego.
Schooner Dauntless stranded at Oakville. Got off.
13.—Propeller Nebraska ran upon Racine Reef. Got off in a damaged condition.
Steam-barge W. S. Ireland stranded below Bayfield, Lake Huron. Got off.
Schooner J. H. Stevens damaged by collision on Lake Michigan.
Barge Mars stranded at Ludington. Got off.
Propeller Lake Breeze damaged by propeller Messenger at Ludington.
Schooner William Home stranded on Snake Island Reef, Lake Ontario. Got off.
Brig Orkney Lass stranded on Beaver Island, Lake Michigan. Got off.
Schooner Otonobee broke her center-board on Lake Huron.
Propeller Mayflower ran aground at Port Huron.
Scow Venus water-logged and capsized at Wyandotte, losing her deck-load.
Tug Keyes badly damaged and sunk at Bayfield, Lake Superior. Raised.
Tug Crusader broke her shaft on Bay of Quinte.
Schooner Russian badly damaged by collision at Oswego.
Propeller Norman shifted cargo and lost some of it overboard on Lake Michigan.
Schooners George L. Wren and Jessie Hoyt damaged by collision near Death's Door, Lake Michigan.
Steam-barge Crippen damaged by collision at Manistee.
17.—Schooner Saveland split canvas on Lake Michigan.
Schooner Montana stranded at Point au Pelee. Got off.
Schooner Atlanta lost, with all hands on board, on Lake Erie; Capt. Gordon Wilson, Charles Wilson and — Griffin, mates; Mrs. O'Neil, cook; Daniel McDonald, and four others lost.
Henry Schmelz burned to death on barge George Kelley, at Bay City.
Sailor named Johnson lost overboard from steam-barge Baldwin, at Escanaba.
Capt. John Doyle, of schooner Morning Star, lost overboard off Dunkirk.
Schooner James Platt ran ashore at North Manitou Island. Vessel and cargo a total loss.
Scow H. S. Hyde lost foremast and head-gear by collision with unknown vessel on Lake Erie.

Schooner L. Seaton sprang a leak on Lake Michigan.
Schooner Moorsoon damaged by collision at Chicago.
Steam-barge Ira H. Owen struck on rocks at Death's Door, Green Bay. Got off.
Schooner Negaunee ran ashore on Bois Blanc Island, Detroit River. Got off.
Propeller Montana ran ashore on Elk Island, Saint Clair River. Got off.
Propeller Waverley broke her wheel at Buffalo.
Propeller Atlantic grounded in Toledo Bay. Got off.
20.—Joseph Plant lost overboard from barge Rebecca, at Malden.
Tug Bella Chase ran aground south of Chicago. Got off.
Schooner A. C. Maxwell ran aground in Nebish Rapids, Saint Mary's River. Released.
Schooner Goshawk ran aground on Saint George's Flats. Released.
Steam-barge Henry Howard broke her shaft on Lake Erie.
Barge Hester sprang a leak on Lake Erie and was beached on Morgan's Point. Got off in a damaged condition.
Schooner S. T. Atwater arrived at Detroit leaking.
Schooner Rowena stranded at Michigan City, and was abandoned.
Schooner Napoleon damaged by storm on Lake Michigan.
Schooner Exchange ran ashore on Kelley's Island, Lake Erie. Vessel and cargo a total loss.
Schooner Consulo put into Detroit badly leaking.
Steam-barge Neptune totally destroyed by fire at East Saginaw.
Schooner Belle Mitchell lost jib-boom, &c., by storm on Lake Michigan.
Schooner Helvetia sprang a leak on Lake Michigan.
23.—Schooner F. L. Danforth lost canvas, shifted cargo, and sprang a leak on Lake Michigan.
Schooner Augustus Ford stranded at Port Maitland, Lake Erie, and became a total loss.
Capt. J. C. Reese, Chas. E. Hurd, and Thos. Brown, seamen, and Lizzie Sullivan, cook, frozen to death on wreck of schooner Augustus Ford, at Port Maitland.
George Shields, sailor on scow L. M. Hill, killed while loading timber at Manistee.
Schooner Express lost canvas on Lake Michigan.
Schooner New Dominion damaged by storm on Lake Erie.
Tug Crusader and propeller Waverley grounded at Port Huron. Got off.
25.—Scow Speed stranded at Forester, Lake Huron.
Schooner Live Oak sprang a leak on Lake Michigan.
Schooners Francis Palms and Cambria lost canvas on Lake Erie.
Schooner John Price lost her anchor off Long Point, Lake Erie.
Steam-barge City of Port Huron lost her rudder on Lake Erie; one man badly hurt.
Scow Laura broke from her moorings and was badly damaged at Windsor.
Schooner City of Tawas ran ashore at Port Maitland, Lake Erie. Got off.
27.—Schooner Selkirk lost canvas, anchors, and chains, on Lake Erie.
Schooner Dispatch struck harbor pier at Manitowoc and drifted on beach. A total loss.
Schooner Lady Dufferin lost canvas and sprang a leak on Lake Michigan; 1,000 bushels of grain wet.
Barney Hansen, sailor on schooner Lem Ellsworth, drowned in the straits.
Henry Elwell lost overboard from ferry-steamer Michigan at Windsor.
Schooner David A. Wells dismasted by storm on Lake Michigan.
Propeller Arabia struck on Limekiln Reef and sprang a leak. Cargo damaged.
Schooner Prince Alfred lost nearly all her canvas on Lake Michigan.
Barge Dictator beached in Pigeon Bay, Lake Erie. Released.
Tug U. S. Grant cut through by ice and narrowly escaped sinking in Green Bay.
Schooner A. G. Morey stranded near Chicago. Got off in a leaking condition.
Schooner Angus Smith lost both anchors and chains during storm on Lake Michigan.
Schooner Queen City lost most of her canvas on Lake Michigan.
Propeller Potomac arrived at Detroit badly leaking.
29.—Steam-barge H. B. Tuttle struck an obstruction on Lake Saint Clair and sprung a leak.
Schooner S. T. Atwater lost canvas, sprang a leak, and damaged cargo on Lake Erie.
Schooner Delos Wolf grounded at Port Huron. Got off.
Steamship James Davidson grounded in Saint Clair River. Got off.
Schooner J. V. Taylor damaged in canvas and other outfit on Lake Michigan.
Propeller Montgomery lost anchor and sprang a leak at Manitowoc.
Propeller S. D. Caldwell broke her engine on Lake Michigan.
Tug Young Lion totally destroyed by fire on Lake Ontario, near Port Dalhousie.

Schooner Lillie Pratt lost canvas on Lake Huron.
Steam canal-boat Cashier badly damaged by collision at Chicago.
Propeller Ocean sprang a leak on Lake Erie.
Scow Ella Doak struck pier at Sheboygan and water-logged. Towed inside.
Schooner Mystic sprang a leak on Lake Michigan.
Schooner Morning Star stranded at Walker's place, Green Bay. Got off.
Schooner Lucy Graham stranded on Summer Island, Green Bay. Got off.
Propeller City of New York arrived at Detroit leaking.
Schooner Celia sprang a leak on Green Bay by striking rock near Summer Island.
Schooner Light Guard stranded at Cleveland. Released with slight damage.
Schooner I. N. Foster stranded near Ashtabula. Got off.
An unknown fore-and-after sunk with all hands, nine in all, Lake Erie.
Schooner Reuben Doud lost center-board on Lake Erie.
Schooner W. H. Hinsdale and scow R. H. Baker damaged by collision near Plum Island, Lake Michigan.
Schooner Lem Ellsworth broke her anchor under Saint Helena, in the straits.
Schooner City of Green Bay damaged in outfit on Lake Michigan.
Propeller Menomonee stranded between Big and Little Sturgeon Bays, Green Bay. Got off.
Scow Pearl drifted ashore at Geneva, Ohio, in a water-logged condition. Vessel a total wreck, and entire crew lost. Bodies of a man and boy found on wreck.
Tug Major Dana broke her shaft off Oswego.
Propeller Columbia stranded off Ganonogue, Saint Lawrence River. Got off.
Steam-barge Chauncey Hurlburt stranded on Middle Bass Island, Lake Erie. Got off.
Schooner Sea Gem stranded at Ahnapee.
Schooner Monticello stranded near Thunder Bay, Lake Huron. Got off in a damaged condition: 10,000 bushels of her cargo ruined.
Schooner C. K. Nims disabled near Big Summer Island, Lake Michigan.
Schooner Wm. Sanderson went to pieces at Sleeping Bear Point, Lake Michigan. Capt. Chas. Brown and eight men drowned.
Sailor named George Clark lost overboard from schooner Topsey, off Milwaukee.
Propeller Arabia ran ashore at Bar Point, Lake Erie. Got off.
Schooner Ontario damaged by collision at Oswego.
Tug Gagnon got a log in her wheel at Two Rivers.
Schooner Kate Kelley ran upon Ford's Shoals, Lake Ontario. Got off.
Steamer Kincardine damaged by collision on Lake Erie.
Schooner Sea Gem ran ashore at Ahnapee, Lake Michigan, and became a total loss.

DECEMBER.

Bark C. K. Nims ashore near Death's Door, Green Bay.
Schooner Star, of Millpoint, broke her main boom off Oswego.
Propeller Rocket cut through by ice at Toledo.
Propeller Bruno ran ashore on Lake Saint Clair.
Schooner Waterloo ran ashore in Reed's Bay, Lake Ontario.
Schooner A. J. Mowry damaged by collision at Chicago.
Schooners Babineau and Gaudry stranded on Amherst Island, Lake Ontario.
Schooner Star stranded on Main Ducks, Lake Ontario. Vessel a total loss. Crew reported lost.
Schooner Maize struck on Hinckley's Point, near Cape Vincent.
Barge Eureka collided with schooner D. G. Fort at Oswego.
Schooner Pelican lost foresail and mainsail on Lake Erie.
Schooner F. B. Gardner broke center-board on Lake Michigan.
7.—Schooner Francis Palms lost canvas and foremast on Lake Michigan.
Tug Van Dalson sunk in Chicago River.
Schooner White Swan ran ashore near Pentwater.
Steam-barge Egyptian grounded on bar at Chicago.
Schooner H. M. Scove damaged by collision with schooner Hinsdale at Milwaukee.
Schooner White Fish struck a rock and sunk off Squaw Island, Green Bay. Crew saved.
Schooner Saint Lawrence lost deck-load on Lake Michigan.
Tug Golden City ran into and sunk by tug C. W. Jones at Buffalo.
Steamship Amazon ran on bar at Grand Haven. Got off without damage.
Propeller Minneapolis damaged cargo in storm on Lake Michigan.
Heavy storm on Lake Michigan.

JANUARY.

2.—Tow-barge Saginaw was cut through by ice and sunk at Detroit.
11.—Schooner Flora sprang a leak in ice and sunk at Oswego. About 7,000 bushels of wheat damaged.

12.—Steamer Amazon of Milwaukee and Grand Haven line frozen in at elevator at Milwaukee.
Propeller Bertschy sprang a leak in the ice at Milwaukee.
Steamers Maud and Pierrepont damaged by ice at Kingston.

FEBRUARY.

4.—Schooners Nevada, Bolivia, O. M. Bond, Cascade, E. R. Williams, E. Cohen, Willie Keller, Sea Gull, and Marie Melvin damaged by storm at Oswego.
7.—Schooner W. T. Greenwood sprang a leak at dock at Port Hope. Cargo of peas swelled and completely destroyed the deck and damaged hull of the schooner.
8.—Tug Thomas D. Tillinghast sunk at dock at Erie by storm.
Steamer Beauharnois sunk in Lachine Rapids.

MARCH.

10.—Schooner Moonlight sprang a leak at Milwaukee.
Tug Oconto damaged to the extent of $8,000 by fire at Oconto.
15.—Schooner Caledonian lost foremast at Racine.
Tug Charles Castle damaged by breaking up of ice at Cleveland.
Schooner Portland damaged by fire at Detroit.
21.—Steamer Bruce destroyed by fire at Toronto.
Ferry-steamer Grant broke her wheels in ice at Detroit.
Tug Crawford sprang a leak at Chicago.
Schooner Luna sprang a leak and sunk at Manitowoc.
22.—Ice in Lake Michigan reported to extend from shore to shore.
31.—Scow Jno. Bean, jr., sunk by ice at Chicago.
Milwaukee Harbor still closed by ice.

APRIL.

1.—Steam-scow Commerce had her side stove in by floating ice in Milwaukee River.
Tug Union damaged by collision at Chicago while in tow of tug Tom Brown.
Tug Morse swamped by ice at Oconto.
Schooner Fleetwing sprang a leak and put into Manitowoc.
3.—Small yacht, Tommy Wright, sunk by ice at Detroit.
6.—Steamers Hiawatha and Holt damaged by ice at Sarnia.
7.—Schooner Alvah Bradley sprang a leak and sank at Buffalo.
8.—Steam ferry-boat Wm. A. Thomson damaged by ice on Niagara River.
11.—Steamer Amazon passed through thirty miles of ice on Lake Michigan between Grand Haven and Milwaukee.
Ferry-steamer Detroit broke her rudder in Detroit River.
12.—Scow Alpena broke her center-board on Lake Erie.
Schooner C. North sprang a leak in the ice off Milwaukee and put in for repairs.
Schooner Julia B. Merrill broke her rudder on Lake Michigan. Towed to Manistee by propeller Bertschy.
Steam-barge Alpena grounded in Maumee Bay.
19.—Steamer C. Hickox damaged by collision with bridge at Cleveland.
20.—Schooner Queen of the West sprang a leak on Lake Michigan and put into Racine.
Schooner Warren sprang a leak on Lake Michigan, and arrived at Milwaukee with two feet of water in her hold.
21.—Steam-barge East Saginaw cut through by ice and sunk near Sturgeon Point, Lake Huron.
Peter Christianson, sailor on schooner Belle Brown, lost overboard during gale on Lake Michigan.
24.—Schooner J. A. Travis badly damaged by being run into by schooner S. J. Luff at Milwaukee.
Schooner St. Steven damaged by fire at Detroit to the extent of $5,000.
Schooner R. B. King stranded at Saint Joseph. Released with little injury.
Steam-barge R. Holland ran aground on Belle Isle, Detroit River. Released after twenty-four hours' delay.
Steam-barge Jacques Cartier ran aground on Elk Island.
Tug Cygnet damaged by fire on Saginaw River.
25.—Tug Red Eric sprang a leak and sunk at her dock at Algonac, Mich.
29.—Schooner Clara Bell wrecked in a gale off Leamington, Ontario, Capt. William Robison drowned.
Scow Growler damaged by gale off Cleveland.
Propeller Nebraska was thrown upon dock at Buffalo by a sudden rise of water.
Schooners Miami Bell, H. W. Hoag, and Wawanosh damaged by storm on Lake Erie.

Eleven fishermen drowned off Saint Joseph, Mich.
Schooner Evergreen was driven ashore near Toledo.
Schooner Gold Hunter ran asbore near Malden.
Steamer Wellington went ashore at Kingston.
Schooner Hunter sprang her foremast on Lake Erie.
30.—Schooner Odin damaged by storm on Lake Michigan and arrived at Muskegon water-logged.
Barge Brackett abandoned by tug Manning off Irondequoit Bay, Lake Ontario; barge lost, with Capt. M. D. Estes, Wm. Gorham, Wm. Andrews, and a passenger.

MAY.

1.—Schooner E. G. Gray ran ashore near Ahuapee, Lake Michigan. Will probably be abandoned.
Scow American Champion grounded below Saint Clair Flats. Released.
Steamer Chicago broke her crank-pin off Chicago, and was towed back by steamer Corona.
Schooner Pilgrim damaged by striking pier at Chicago.
Bark Alice and Scow Flora damaged by storm on Lake Michigan.
Tug Hercules ran on sunken pile and damaged machinery at Detroit.
Schooner L. L. Lamb sprang a leak at Oswego.
Schooner C. A. Martin damaged by storm at Oswego.
Steam-barge Coffinberry damaged by storm at Cleveland.
Ferry-steamer Hope broke her crank-pin on Detroit River.
Schooner Minnie Mitchell went to pieces near Leamington.
Barge Abigail lost deck-load on Lake Michigan.
Bark Alice Richards lost jibs on Lake Michigan.
Schooner City of Sheboygan arrived at Chicago leaking badly and minus main-boom, &c.
Schooner I. A. Gilmore stranded on Avon Point, Lake Erie. Released.
Twenty vessels arrived at Chicago leaking.
Schooner Consuelo sunk off Marblehead, Lake Erie, Capt. — Hauser, William Law, William Clary, Charles Pearson, and Amelia Schroder, cook, drowned.
Schooner Lydia Mac lost canvas on Lake Erie, and stranded at Morpeth's dock, Canada.
Schooner Gypsey and several others damaged at Clayton by breaking from their moorings.
Schooner E. R. Williams damaged by collision with bridge at Oswego.
Five barges in tow of steamer Coffinberry grounded near Windsor, Detroit River.
Steamer Dove ran into and damaged by barge McGregor at Amherstburg dock.
Tug William E. Rooney sunk at Toledo.
Scow Gondola driven up the river at Toledo and capsized by a severe gale.
Tug S. K. Kirby capsized at Port Austin.
Schooner Mary Ann lost canvas on Lake Ontario.
Schooner Beloit lost center-board off Racine and struck harbor pier while entering Racine.
Barge Coffinberry ran ashore in Saginaw River.
Scow Venus dragged ashore at Put-in-Bay and was abandoned.
Ferry-steamer Bertie Dhalka broke her wheel and bent her shaft at Saint Clair, Mich.
3.—Schooner A. Plugger damaged by striking pier at Saugatuck Harbor.
Damage to shipping at Sandusky, by gales, from April 29 to date, estimated at $5,000.
4.—Propeller Swallow run into and sunk by steam-barge Fred Kelley. Damage to vessel and cargo about $8,000.
Steam-barge M. Groh went ashore below Malden. Released.
Schooner Three Friends went ashore near Presque Isle Harbor, Lake Ontario, and went to pieces.
Schooner Helen Blood ran ashore near Waukegon in a fog.
Schooners Horace Greeley, Minerva, and Fashion, and scow Granger, sprang leaks on Lake Michigan.
Schooner Wawcosta driven back to Port Colborne by a gale.
Schooner Garibaldi lost maintop-mast at Racine.
5.—Schooner Lillian lost jib-boom by collision at Oswego.
Schooner Olivia broke main-boom by collision, at Oswego.
Schooner Midnight sprang a leak on Lake Michigan.
Propeller Equinox stove a hole in her bow and was beached at Mackinac. Repaired at Milwaukee.
6.—Steamer Athenian encountered ice and was driven on Point aux Trembles.
Scow Silver Cloud went ashore near Milwaukee.

Schooner Eliza Quintan had her jib-boom broken at Port Hope during gale.
Schooner Grantham broke her center-board on Lake Erie.
Sloop Gul driven ashore and wrecked near Five-Mile Point, Lake Ontario.
Schooner Rob Roy lost jib-boom at Chicago.
Schooner Woodstock ran ashore at Two Rivers, Lake Michigan. Released without injury.
Bark Manzanilla damaged head-gear by collision at Saginaw.
Tug Wetzel broke her wheel at Racine.
Schooner Margaret Dall lost jib-boom at Chicago.
8.—Schooner Topsey lost jib-boom and topmast by collision off Chicago in a gale.
Schooner Lumberman damaged rigging by storm on Lake Michigan.
Barge Ellen Williams and schooner Albatross arrived at Chicago leaking badly.
Propeller Benton broke her shaft on Lake Huron; towed to Bay City.
Schooner Ploughboy sprang a leak at dock at Conseeon; grain badly damaged.
Propeller Montgomery damaged by ice in the straits.
Schooner Light-Guard ran ashore on Amherst Island, Lake Ontario.
Schooner Industry lost a portion of her deck-load, on Lake Michigan, in a squall.
Scow Clara ran aground on Stag Island, Saint Clair River.
Barge "H. G." had her topmast shivered by lightning off the Charities, Lake Huron.
9.—Schooners Anna P. Grover and Montecello split canvas on Lake Ontario.
Schooner Conrad Reed ran ashore near Marblehead, Lake Erie.
Scow Ontario lost jib-boom by collision at Windsor.
Steamer Keweenaw ran ashore at Lime-Kiln Crossing, Detroit River.
10.—Steamer Huron ran aground at Black Lake, Lake Michigan.
Schooner Frank Perew ran aground at Green Bay.
11.—Schooners Fellowcraft, Active, M. W. Muir, and Antelope beached in Pigeon Bay, Lake Erie, during storm.
Schooner Dolphin lost jib-boom and bowsprit by collision with barge Eva Robinson off Minetka. Schooner was beached near Lincoln Park, and afterward towed to Chicago.
Propeller Depere damaged by collision at Escanaba.
Schooners C. C. Barnes, Windiate, Harvest Home, and Mary Lyon broke adrift from tug Gladiator, and went ashore at Bar Point, Lake Erie.
Brig Wauconia ran on harbor pier at Cleveland. Went to dry-dock for repairs.
Schooner J. R. Pelton struck pier at Black River, and stove a large hole in her bow.
Schooner Aldeming stranded at Leamington, Ontario.
Schooner Royal Oak stranded at Toronto.
Barge M. R. Warner ran ashore on East Sister Reef, Lake Erie.
Schooner Sarah Jane lost canvas and part of her deck-load, on Lake Huron.
12.—Schooner H. C. Albrecht damaged by collision with schooner Frederick, off Chicago, the latter losing jib-boom, &c.
Schooner D. G. Wright foundered and sank off South Haven, Lake Michigan, and afterward drifted ashore and went to pieces.
Captain Hauson, Henry Blackman, Frank Dye, and four others, drowned by foundering of schooner D. G. Wright, off South Haven.
Scow Cousin Mary beached five miles south of Holland, Lake Michigan.
Schooner Pierrepont went ashore at Point Monyean, Middle Bass Island, Lake Erie.
Barges City of Grand Rapids, Wolverine, and C. F. Allen lost deck-loads and became water-logged on Lake Michigan.
Schooners John Magee, Harvest Queen, Huron, and Anglo-Saxon damaged in rigging and canvas by storm on Lake Huron.
Scow Maria water-logged and sunk at Nine-Mile Point, Lake Erie.
Schooner H. C. Brown damaged by collision at Chicago.
Schooner Picton lost jib-boom in a squall off Oswego.
Schooner R. J. Gibbs ran ashore at Charlotte.
Propellor Colin Campbell grounded on Saint Clair Flats.
Scow Mary Amelia arrived at Sable River leaking.
Barge City of Port Huron lost both anchors, and barge Dictator went ashore, at Ossinnekee.
Schooner Cortez lost center-board in gale off Charlotte, Lake Ontario.
13.—Schooner Mocking-Bird missed the harbor and drifted ashore south of piers at Milwaukee.
Scow Sea Star beached near Holland, Lake Michigan.
Steam-barge Burlington got line in her wheel and lost tow on Lake Erie.
Scow Newell Hubbard lost jib-boom in a squall off Detroit.
14.—Schooner Emma sprang a leak on Lake Michigan and put into Manitowoc for repairs.

Schooners Active and G. Ellen arrived at Chicago leaking badly.
Schooner Dundee ran ashore at foot of Big Island, near Kingston. Released.
Schooner Netta Woodward damaged by striking pier at Charlotte.
Schooner Crozier lost center-board on Lake Ontario.
Schooner Australia damaged by striking bridge at Chicago.
Schooner Montpelier damaged by storm on Lake Erie.
Scow Saint Andrew ran ashore at Bar Point, Lake Erie.
Steamer Dominion damaged by schooner T. B. Rice at Detroit.
Tow-barge Welcome broke loose from barge Rose and drifted ashore near mouth of Saint Clair River.
Schooner Arcturus damaged by ice in Grand Traverse Bay, and arrived at Milwaukee leaking badly.
Bark Jane C. Woodruff damaged by collision with schooner Mary Battle on Georgian Bay.
Schooner George A. Seaver went ashore at Muskegon, and became a total loss.
Tug Beaver and tow of barges ran aground at Belle Isle, Detroit River.
Schooner James Couch struck an iceberg in the Straits and had her bobstay and piece of her stern carried away.

15.—Schooner Jason Parker lost jib-boom at Chicago.
Schooner Laura Belle ran ashore at Erie.
Schooner Ayr was driven on reef at Port Colbourne by a squall, and was scuttled.
Schooner J. S. Miner lost anchor on Lake Huron.

17.—Propeller Egyptian and schooner Pelican ran aground at Hurson's Island; schooner lost bowsprit and head-gear.
Schooner Grace lost both anchors in the Straits.

19.—Propeller G. J. Truesdell broke her shaft off Port Washington, and was towed back to Milwaukee.
Barge Hercules arrived at Port Huron in a water-logged condition.
Ferry-steamer General Grant badly damaged by collision with ferry-steamer Essex at Windsor.
Schooner Four Brothers ran ashore four miles north of Saugatuck.
Schooner Monitor grounded at mouth of Saginaw River.
Propeller Montgomery damaged by striking bridge at Chicago.

20.—Yacht Mattie capsized at Lime-Kiln Crossing; K. C. Barker, and three others, drowned.
Thomas Ryan, of schooner T. Y. Avery, washed overboard and drowned in Lake Erie.

21.—Steamship Cormorant damaged by fire to extent of $1,500, at Cleveland.
Schooners Scotia and Ontario collided in a fog near Forestville, Ontario losing jib-boom, bowsprit, and head-gear.

22.—Steam-barge Prairie State blew out her mud-pipe, and returned to Buffalo.
Schooner A. J. Mowry sunk by tug Clematis, of Racine; schooner sunk to decks. Was lashed to a barge, and towed to Milwaukee.
Schooner Australia damaged by collision, at Chicago.
Steam-barge Annie Laurie and schooners Speed and Mystic ran ashore near Chicago, in a heavy fog. Released without injury.
Propeller Sovereign ran on rocks in the Sault, and had to return to Detroit.
Scow William Morse ran into and sunk by canal-boat, at Chicago.
Barge Concord ran aground on Belle Isle.
Schooner Nevada had her fore-boom broken on Lake Michigan.
Schooner Jessie Brown driven ashore in South Bay.
Schooner Day Spring damaged by collision, at Chicago.
Scow H. A. Lamar damaged her stern-post on Lake Saint Clair.
Steamer Warrington damaged by collision with tow of propeller Araxes on Lake Saint Clair.
Schooner Millie Cook dismasted on Lake Ontario.
Schooner George Suffel sunk near Bath. Raised and repaired.
Schooners Higgie and Jones struck near Point au Pellee; damaged her hull, and sprang a leak.
Schooner Adriatic collided with barge in tow of propeller New Era, and had her bow stove in.
Adam Bell, colored sailor on scow Fearnought, drowned at Detroit.
Schooner Wm. B. Ogden and propeller D. R. Van Allen ran aground near Brockville, Canada.

23.—Steamer Falling Waters destroyed by fire, at Rochester; a man named Johnston badly burned, and drowned.
Schooner Monitor towed to Detroit in a water-logged condition.
Tug Fulton ran on Cataract Shoal, near Oswego, in a fog.
Schooner Thistle sprang a leak and ran aground near Oswego.

Schooner Tuscola sprang a leak on Lake Michigan.
Steam-barge Fred Kelley ran aground at Point Peninsula Reef, near Escanaba.
24.—Schooner Nina sprang a leak, and water-logged Lake Huron. Crew arrived safely at Goderich, after two days' exposure.
25.—Schooner Fleetwing lost jib-boom at Chicago.
Schooners *Montezuma* and McVea collided off Chicago.
Schooner Lumberman had her yawl crushed in a jam at Chicago.
Schooner J. R. Pelton ran foul of schooner Maid of the Mist and carried away her cathead, &c., at Milwaukee.
Lumber-barge Racine ran on reef at Buffalo by tug B. F. Bruce. Lightered off.
Tug Maythem had her cabin and pilot-house damaged by fire at Goderich.
Steam-yacht Tommy destroyed by fire at Goderich, and tug Nathan considerably damaged at same time.
Propeller City of St. Catherine's ran ashore on St. John's Island, St. Lawrence River.
Schooner Robert Gaskin ran aground in Bay of Quinte. Lightered off.
Schooner Eliza Gerlach ran aground near Wyandotte.
Steamship Persian grounded at Buffalo.
26.—Barge Northern Light slightly injured by fire at Bay City.
Schooner Agnes, of Montreal, ran into steamer Shannon on Bay of Quinte, near Belleville.
Schooner Camden ran on reef off Platt River, Michigan, during a fog. Jettisoned 600 bushels of grain and got off.
27.—Tug Kate Moffatt grounded at Port Huron.
Schooner A. B. Moore, in tow of tug Ransom, ran into bridge at Bay City.
Schooner Clipper City struck by lightning at Chicago; mainmast shivered.
Steam-barge Adventure ran ashore on Simcal Island in a fog.
A lighter alongside of steamer Davidson, on Saginaw Bay, filled with water and broke in two; 800 barrels of salt lost.
28.—Steamer Saginaw damaged by striking pier at Ludington, Mich.
Tug Wm. Livingstone ran aground on Belle Isle, Detroit River. Released.
Schooner Bertie damaged by squall on Lake Michigan.
Steam-barge Mary Jarecki ran aground on Hurson's Island.
Steam-barge Antelope broke her rudder-post in Niagara River.
Schooner H. M. Scowe damaged by squall on Lake Huron.
Schooner Lonie A. Barton lost maintop-mast by lightning at Chicago.
Tug Oneida damaged by collision with bridge at Oswego, losing smoke-stack, pilot-house, &c.
Schooner Lyman N. Davis had her jib-boom broken by collision on Lake Michigan.
29.—Schooner Thomas Gawn ran on Belle Isle, Detroit River.
Bark Favorite sprang a leak on Lake Huron, ran into False Presque Isle, struck a rock and sunk at the dock.
Schooner Four Brothers run into and damaged at Chicago.
Steam-barge Van Allen ran ashore and sunk near Brockville.
Scows Saint Stephen's, Saunders, Lizzie, and Rough and Ready ran aground in Saint Clair River.
Steamer Jaques Cartier damaged by fire at Ottawa.
James Dougherty, sailor on brig Baltimore, drowned off Charlotte, Ontario.
Steamer Keweenaw broke all the buckets of one wheel in ice at Ontonagon.
Scow Spray capsized by squall on Lake Michigan; three men drowned.
Propeller Elmira ran aground at Port Huron.
30.—Bark Wm. Jones lost foretop-mast on Lake Erie.
Schooner C. N. Johnson lost jib-boom by collision with bridge at Chicago.
Steam-barge Fay ran aground on Saint Clair Flats.
Propeller Saint Paul had her stern damaged by propeller Hurd while working through ice on Lake Superior.
31.—Tug William burned at Montreal; loss about $10,000.

JUNE.

1.—Schooner David Vance ran ashore near Sheboygan.
Tug H. F. Buse damaged by collision with schooner W. W. Brigham, at Milwaukee.
Steamer Flora damaged by striking bridge at Milwaukee.
Bark Favorite sunk to decks at dock at False Presque Isle, Lake Huron.
Scow Baltic broke from her moorings at Chicago and was driven across the river by a squall, losing foremast, jib-boom, and head-gear.
Bark Elizabeth Jones lost some spars at Chicago.
Schooner C. S. Davis ran ashore in a fog near Sheboygan.
Propeller Maine and schooners James C. King, J. P. Marsh, Northwest, Dan Lyons, and Geo. W. Case, damaged by a squall at Chicago.

Propeller Elmira and barge aground in Sarnia Bay.
Propeller New Era broke her crank off Chicago.
Schooner Wells Burt disabled her rudder on Lake Erie.
Bark Vanderbilt broke a truss on Lake Erie and returned to Buffalo.
Schooner H. C. Winslow lost mizzen and maintop mast by squall on Lake Erie.
Steamer Flora damaged by collision with steam-barge S. C. Baldwin, off Milwaukee.
2.—Barge Grimsby lost foretop-mast by lightning, at Milwaukee.
Barge Plymouth Rock had her anchor driven into her by barge Lillie May, off Bar Point, Lake Erie, and commenced to leak. Towed to Malden.
Schooner Maxwell lost jib-boom, bowsprit, &c., and steamship Persian damaged to extent of $800 by collision on Lake Huron.
Steam canal-boat Montauk had her bow stove in by collision at Chicago.
Scow J. F. Price driven ashore at Sand Beach, Lake Huron.
Steamship N. C. Fairbanks grounded in the river at Buffalo.
Scow Ellen Gerlow capsized at mouth of Detroit River.
Scow J. B. Prime ashore in a squall near Sand Beach. Released on the 6th by tug Quayle.
Schooners Belle Wallbridge and Hungarian damaged by collision on Saint Clair River.
Schooner H. C. Winslow lost mizzen-mast and was cut to the water's edge, and schooner S. V. R. Watson lost head-gear, &c., by collision on Lake Michigan.
Francis Sheridan, deck-hand on propeller Passaic, drowned at Green Bay.
3.—Schooner H. W. Hinsdale had her mainmast broken by gale on Lake Michigan.
Schooners West Side and Flying Cloud damaged by collision off Kenosha in a fog.
Scow Hugh Coyne sunk at Cleveland by collision with a scow.
Propeller Quebec ran on rocks at Waswagoning Bay, north shore of Lake Superior. Pulled off by propeller Asia.
Steam-barge Raleigh ran on rocks at Lime-Kiln Crossing and returned to Detroit.
Schooner William Hanna ran ashore at Sand Beach and had three feet of water in her hold.
Propeller Elmira struck an obstruction on Lake Huron and lost wheel and 18 feet of shaft.
4.—Schooner Spry lost jib-boom by collision with schooner Francis Berriman at Milwaukee.
Scow Venture damaged by collision with schooner Gen. Sigel off Milwaukee.
5.—Propeller Kershaw ran into bark Pesbtigo at Chicago, breaking rail and stanchions.
Scow Senator lost foremast, jib-boom, and bowsprit by collision with schooner Cambria on Lake Saint Clair.
Steam-barge Mary Jarecki grounded on Saint Clair Flats.
6.—Brig C. P. Williams, pounded hole in her bottom at Greenbush pier and waterlogged.
Brig Roscius collided with an unknown vessel off Fairport, Lake Erie, and lost rail, stanchions, and head-gear.
Thomas McAllister, sailor on schooner Starling, fell overboard and drowned at Port Dalhousie.
Steamer Flora broke her machinery off Pentwater and was towed to Milwaukee by propeller Bertschy. Damage about $4,000.
7.—Propeller Emma L. Thompson ran on Carrolton Bar, Saginaw River, and exploded her boiler. Charles Turner, engineer, and Nelson Lockwood, second engineer, killed by the explosion.
Schooner Great West damaged by collision at Chicago.
Schooner Wm. Jones lost fore-topmast on Lake Erie.
Schooner Dolphin arrived at Detroit minus bowsprit and cut-water, having lost them by collision outside.
James McCarty, deck-hand on propeller Buffalo, fell overboard and drowned on Lake Huron.
Fred. Frederickson, deck-hand on barge Alert, fell overboard and drowned off Jacksonport.
8.—Christopher Caspesen, sailor on schooner Fisher, fell overboard and drowned off Chicago.
10.—Schooner Tom Martin water-logged in Lake Erie. Towed back to Malden.
Schooner Emma C. Hutchinson while towing out of St. Clair River grounded on bar at Point Edward.
William Seward, sailor on barge Racine, fell overboard and drowned at Buffalo.
Schooner Josephine ran into by bark Nelson and lost everything above deck, masts, jib-booms, bowsprit, &c., on Lake Michigan.
Captain Jas. H. Hand, Engineer Edward Day, and a boy, name unknown, killed by explosion of tug Hefford at Buffalo.
Propeller Gordon Campbell broke a valve on Lake Erie.

Schooner Sea Bird and Rose Simmons damaged by collision at Chicago.
Steamer Chicora ran on dock at Silver Isle and damaged wheel.
Steam-yacht J. G. Hubbard ran aground at Port Austin.
11.—Bark Cleveland stranded on Plum Island, Green Bay, and became a total wreck.
Steam-yacht, Dwight Cutler, damaged by steamer Minneapolis at Grand Haven.
12.—Tug Annie L. Smith broke machinery off Chicago.
Steam-barge B. W. Jenness lost barges in a severe storm on Lake Erie, but recovered them.
Schooners Cornelia, Honest John, E. R. Blake, Cecelia, Sea Bird, S. V. R. Watson, and Game Cock damaged by collision off Chicago.
Tug Minnie Brown sunk in Sturgeon River, Lake Superior.
Schooner D. E. Bailey lost jib-boom by collision on Lake Michigan.
Scow Mary and Lucy ashore at Elk Island.
13.—Tug Ransom smashed her stern by collision with dock at Detroit.
14.—Schooner Enterprise lost jib-boom by collision at Chicago.
Scow Entre Nous carried away bowsprit, head-gear, &c., by striking dock at Detroit.
15.—Schooner Tuscola and scow Mary E. Packard damaged by collision at Chicago.
16.—Schooner Clara lost jib-boom by collision with schooner E. G. Parington at Chicago.
Schooner Brooklyn lost jib-boom by collision with schooner Crossthwaite at Chicago.
James Bolton, sailor on schooner H. C. Winslow, killed by fall from mast at Detroit.
17.—Foster Galbrath fell overboard and drowned from tug A. H. Hunter of Portsmouth.
Schooner Milan lost jib-boom at Chicago,
Schooner Annia Vought lost mizzen-sail off Forty-Mile Point, Lake Huron.
Tug Bartlett broke her stern bearings at Detroit.
18.—Scow Contest damaged to extent of $500 by collision with bridge at Chicago.
Tug Hercules sprang a leak and sunk in 11 feet of water at Erie.
Propeller Vanderbilt broke rail and stanchions of schooner Flora at Chicago.
Tug Burnside broke machinery on Lake Huron.
Jno. Hill drowned from a scow at Detroit.
19.—Propeller Columbia and steam-barge Salina ran aground near Mamajuda, Detroit River.
Schooner Cornelia lost fore and main topmasts on Lake Michigan.
Propeller City of Baltimore grounded on Saint Clair Flats.
20.—Frank Warren, fireman on tug Star, fell overboard and drowned in Saginaw River.
Steamer Alpena broke shaft off Manistee.
Steam-barge Egyptian and consort ran aground on Middle Island, Lake Huron.
Propeller Pacific disabled machinery on Lake Superior.
James Eagan, fireman on tug Annie L. Smith, drowned at Chicago.
21.—Schooner Mary McVea had her standing rigging carried away by scow Maria at Chicago,
Propeller Argyle and schooner Maggie McRea grounded at Port Huron.
Tug Farragut lost pilot-house by collision at Oswego.
Steamer Keweenaw damaged machinery on Lake Superior. Towed to Marquette.
Steamer City of Sandusky run into by barge Trader while at dock at Cleveland.
22.—Steamer Eighth Ohio broke shaft on Lake Erie.
Steam-barge Prindiville broke her shaft on Lake Erie.
Schooner Minnesota damaged rigging by collision at Chicago.
23.—Scow Louise Strom and schooners Libbie Nau and J. W. Brown damaged by squall off Chicago.
Schooner Alvin Bronson lost fore-topmast in squall off Chicago.
Propeller Persia ran aground near Nine-Mile Point, Lake Erie. Released without injury.
Schooners Goshawk and Saginaw ashore in Nebish Rapids.
Barge Manatee had her main-mast badly splintered by lightning at Peshtigo.
24.—Barks Christian Nilsson, and schooners Stampede, Nellie Reddington, Amsden, and S. F. Gale lost canvas by gale on Lake Erie.
Scow Myra lost on Lake Erie during squall. David Murdock and Albert and David Beckwith drowned.
Schooner Delaware lost fore and main gaffs by squall on Lake Erie.
Schooner J. G. Harrison lost canvas on Lake Erie in a squall.
Schooners Express and Minnie Mueller damaged by collision at Chicago.
Schooner Wells Burt grounded in Nebish Rapids, but got off with little injury.
Propeller Canisteo ashore on Portage Point, Green Bay. Released.
Alexander Queal drowned off Oswego by the capsizing of a sail-boat.
Schooner R. J. Gibbs lost main-sail in a squall off Point au Pelee.

25.—Tug Ransom ran aground near Wyandotte.
Tug Prindville had her bulwarks crushed by tug Union at Chicago.
Schooner Cuba lost part of her head-sails in a squall on Lake Saint Clair.
Propeller Havana grounded on Hurson's Island in a fog. Released without injury.
Schooner Sweepstakes damaged by gale on Lake Erie.
26.—Schooner Adams ran aground at mouth of Chicago River.
Schooner Jno. Rice lost nine stanchions on Lake Saint Clair by collision with a propeller.
Schooner Emaline badly damaged by collision with schooner Rouse Simmons off Grand Haven.
Tug Hector broke her crank-pin on Lake Huron.
Schooner Mary Merritt lost three jibs by rough weather on Lake Erie.
27.—Schooner Queen of the West damaged by being driven against schooner Hercules by a gale at Chicago.
Tug Clematis badly damaged by running foul of schooner G. W. Adams, aground on bar at Chicago.
Schooner Harvest Queen lost topmast, and scow Lime Rock lost fore-topmast, jib-stays, &c., by collision off Port Huron.
Knud Oleson, sailor on schooner Oconta, fell from mast and was killed, at Buffalo.
Propeller Cuba got a log in her wheel off the Manitous.
Scow Christie had her flying-jib blown to pieces by squall on Lake Michigan.
Schooner J. Duvall lost jib during squall on Lake Michigan.
Scow Magdalena lost jib-boom by collision with schooner Petrel off Chicago.
Barge Davidson blown against pier at Chicago.
Schooner Ataunto and bark Peshtigo damaged by squall on Lake Michigan.
Schooner Wm. Grandy lost canvas in a squall off Rond Eau, Lake Erie.
Tug Sprague ran foul of a scow at Tonawanda and broke her rudder, &c.
Steam-barge P. H. Brickhead ran ashore in Detroit River.
Barge Emmet water-logged on Lake Erie.
28.—Schooner Game Cock grounded on Peshtigo Reef. Released.
Alexander Henderson jumped overboard from propeller Asia, above Southampton, and drowned.
Schooner Seaton lost bowsprit and jib-boom by collision with schooner Morning Light off Point Albino, Lake Erie.
29.—Tug Crawford ran into schooner Ætna at Chicago and lost pilot-house, &c.
Schooner Bailey ran ashore on South Manitou Island.
Scow Hanna sprang a leak on Lake Michigan.
Scow Hugh Coyne lost deck-load of wood on Lake Huron.
Schooner Mineral State ran into and damaged by steamer City of Baltimore at Detroit.
Schooner Russian passed Port Huron minus her fore-topmast.
Steam-barge M. Groh damaged by storm on Lake Michigan.
Schooners Mediator and Lena Johnson fouled at Chicago and damaged rigging.
Barge Manatee, in tow of tug E. P. Ferry, collided with schooner E. Scoville on Lake Saint Clair and was severely damaged.
30.—Michael McCann, deck-hand on ferry-steamer Eagle, fell overboard and drowned at Put-in Bay.

Recapitulation of disasters on the lakes from July 1, 1874, to June 30, 1875.

	1874.						1875.						Total.
	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Sunk	16	7	7	12	5	3	2	2	2	6	20	7	89
Damaged, disabled, &c.	29	12	46	37	47	6	2	9	3	15	66	62	334
Ashore and aground	22	14	27	52	94	9	.....	.....	.....	7	74	33	332
Sprang a leak	11	15	12	10	20	.....	1	1	2	4	37	2	115
Collisions	38	27	28	16	15	4	.....	.....	.....	2	27	54	211
Damaged by fire	2	2	2	.....	1	.....	.....	.....	2	2	5	...	16
Destroyed by fire	.....	2	1	2	2	.....	.....	.....	1	.....	3	...	11
Water-logged	1	1	2	2	3	.....	.....	.....	.....	.....	7	3	19
Struck by lightning	2	3	1	.....	.....	.....	.....	.....	.....	.....	3	2	11
Dismasted	.....	.....	7	2	3	.....	.....	.....	.....	.....	1	...	13
Exploded boiler	.....	1	2	1	.....	.....	.....	.....	.....	.....	...	1	5
Lives lost	19	13	4	40	42	.....	.....	.....	.....	17	23	23	181

PAPER 35.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
Washington, D. C., June 21, 1875.

GENERAL: Having carried out my instructions in accordance with Special Orders No. 48, Office Chief Signal-Officer, I have the honor to hand you herewith my report upon the tornadoes of March 20 last in Georgia and the adjoining States. While I have endeavored to give as complete a history as possible of these storms, it will be observed that I have confined myself to a simple statement of facts in connection with them, together with such ideas as have naturally suggested themselves to me, leaving scientific deductions from the data given to others better qualified for the task.

Yours, respectfully,

HENRY CALVER,
Sergeant, Signal-Service, U. S. A.

Gen. A. J. MYER,
Chief Signal-Officer, U. S. A., Washington, D. C.

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE
BENEFIT OF COMMERCE AND AGRICULTURE.
Washington, D. C., March 30, 1875.

SERGEANT: The Chief Signal Officer directs that, in carrying out your instructions to collect information relative to the origin, movement, and effect of the recent tornadoes in the State of Georgia, you will use all due diligence consistent with a thorough investigation of the subject.

As it will be necessary for you to visit many of the localities lying in the path of the storm, and as transportation is only furnished you to Augusta, your actual expenses for transportation beyond that point will be refunded to you on your return, and you will, therefore, keep an itemized account of such expenditures for the information of the Office.

In pursuing your inquiries, you will pay especial attention to the points named in the following memorandum, keeping full notes of all particulars, in order that you may make a full report in writing to the Chief Signal-Officer after your return to this Office.

Should you be in doubt, at any time, what course to pursue, you are authorized to telegraph to the Chief Signal-Officer for instructions; but in this, and all other matters involving expenditure of money, the most rigid economy must be practiced.

MEMORANDUM.

ITEMS TO BE ESPECIALLY NOTED.

1. The exact minutes at which destructive winds or hail-storms occurred throughout the State during that day, in order that the consecutive march of the storms may be traced and their connection with each other understood.

2. The topography of the ground, that it may be understood what determines the formation of the gaps in the path of the tornado.

3. The collection of data showing the tracks of the numerous tornadoes that yearly pass over the State, so far as such collection can be made without interfering with or delaying other duties.

4. Determination of the dimensions of the black cloud marking the storm-center, by means of corresponding observations from opposite sides of the path.

5. Evidences of the existence of either up or down currents, and determination of their force by means of measurements of the materials elevated or depressed.

6. Determination of the force required to drive splinters of wood, pièces of iron, stones, and grains of sand into trees and other places where they were found embedded.

7. Determination of the extent of the area of destructive winds, as compared with the area of the central cloud.

8. Determination of the time, in seconds, occupied by the destructive portion of the tornado in passing over a given station.

9. Determination of the distance on either side of the center at which sensible winds were felt, together with the direction of these winds.

10. Determination of the temperature, humidity, and barometric pressure just before, during, and just after the passage of the destructive blast.

11. Determination of the connection, both as to time and place, between the wind-storm and attending rain and hail.

12. Special attention should be paid to the weather in the region between storm-tracks IV and V, on the chart herewith, in case it be found that these were nearly simultaneous.

13. By measurements, drawings, and photographs it should be sought to obtain definite, rather than general, information, and in this, as in many other respects, the report of Sergeant Mackintosh, in 1873, may serve as a model.

14. Especial examination of the mean directions in which the different layers of trees or other objects prostrated by the storm lie.

15. Especial examination in this regard at the points at which the tornado left the earth and at those at which it returned to it.

16. When two tornadoes were co-existent, a scrupulous examination of the intermediate region to determine the distance from each at which its influence was preponderating.

Very respectfully, &c.,

H. W. HOWGATE,

Second Lieut. and Brevet Captain U. S. A., Acting Signal-Officer, and Assistant.

Sergeant HENRY CALVER,
Signal-Service U. S. A., Washington, D. C.

THE TORNADOES OF MARCH 20, 1875, IN ALABAMA, GEORGIA, AND NORTH AND SOUTH CAROLINA.

GENERAL ATMOSPHERIC CONDITIONS.

A brief review of the general conditions of the atmosphere for a day or two immediately preceding the development of this remarkable series of tornadoes will be of interest here. Their initial cause is to be found in an irregularly-shaped area of low barometer, the movement of which we will first consider. The signal-service weather map, made up from observations taken at 7.35 a. m., March 18, shows that a slight barometric depression existed at that time in Kansas, Indian Territory, and Northern Texas. During the day an area of high pressure and low temperature moved southeastward from Dakota and Minnesota, causing the barometer to rise rapidly in Kansas and Indian Territory, with a corresponding fall of temperature, thus seemingly crowding the barometric depression southward into Texas.

On the morning of March 19, the area of lowest pressure was apparently central a little distance northwest of Galveston, Tex. A warm southeasterly wind, heavily laden with moisture, at this time prevailed on the Gulf coast, while at Corsicana, Tex., about two hundred miles north-northwest of Galveston, a strong "norther" was blowing, with a temperature of 37° Fahrenheit, or 29° lower than was reported from Galveston at the same time. Heavy rains had fallen in the Lower Mississippi Valley during the night, and threatening or rainy weather still continued throughout nearly the entire southern portion of the country. Thus a conflict between the cold, northerly, and moist, warm, southerly air-currents was at this time going on in Texas and Louisiana. Each was striving for the mastery, and the battle grew more severe during the day, as indicated by the afternoon reports, which gave a difference of 39° of temperature between Corsicana and Galveston.

At 11 p. m., on the 19th, a well-defined area of low barometer, much elongated in form, extended from Louisiana northeastward to Kentucky. Warm southeasterly winds prevailed in Alabama, Georgia, Florida, and the Carolinas, while cold northwesterly to northeasterly winds were blowing on the northwestern side of the depression or from Texas northeastward to Illinois. During the night the temperature fell rapidly west of and in the Lower Mississippi Valley, while the low barometer extended northeastward until, on the morning of the 20th, it was apparently central in Eastern Kentucky and the Upper Ohio Valley, as indicated by the isobars on the weather map for that date, reproduced herewith. Its progress during this memorable day was southeastward over Virginia and North Carolina into the Atlantic.

To the casual observer the passage of this storm-center would not have seemed, in itself, of remarkable interest, in contrast with many others which had preceded it during the winter and early spring, or with those of former years; but to the careful student of meteorological subjects many points of interest present themselves. The early movements of the depression were indefinite and sluggish; but as it moved eastward it rapidly increased in extent and in its progressive development, thus causing a more violent commingling of the opposing air-currents with a development of destructive tornadoes and local storms of great severity. The peculiar course and moderate movement of this depression from Indian Territory and Texas to Tennessee and Kentucky had combined to produce a continuation of southeasterly winds over Ala-

bama, Georgia, and the Carolinas for nearly forty-eight hours. These warm winds came, laden with moisture, from the Gulf or the Gulf Stream off the South Atlantic coast, and the approach of the cold northerly winds was consequently attended with more violent results than on any similar previous occasion. The superabundance of rain which had fallen over this section of the country during the two months previous doubtless had its effect, by overburdening the air with moisture, in enhancing the conditions favorable to the development of these remarkable storms.

THE NORTHERN TORNADO, NO. I.

Early in the forenoon of March 20, several black, angry-looking clouds were seen passing over Chambers, Lee, and Russell Counties, Alabama. Soon after 9 o'clock, at Opelika, in Lee County, the sky, already cloudy, became quite dark, and rain began, which by ten became extremely heavy, and was attended by lightning, thunder, and high winds. The extreme violence of the storm lasted about fifteen minutes. This storm I consider the initial effects of the first tornado; or perhaps, more properly speaking, the tornado developed from this severe thunder-storm. Opelika lies about fifteen miles west of the Chattahoochee River, and track No. I, on the accompanying map, would run very close to it if continued as far westward.

No damage of consequence occurred at this time in Alabama, and it was not until after the storm had crossed the river that it assumed the character of the terrible destroyer in which it tore through the States of Georgia and South Carolina. The first distinct traces of the tornado are to be found on the highlands east of the Chattahoochee River, about twelve miles south-southwest of Hamilton, Harris County, Georgia, and, as nearly as I could ascertain, occurred about 10.20 a. m., March 20. The damage at this point was slight, but the tornado seemed to have developed energy in its progress. First only a few fences were blown down, then an occasional tree yielded to the increasing force of the destroyer. It was on the plantation of Col. James Mobley, nine miles southwest of Hamilton, where it first struck the earth with full fury, scattering fences and out-buildings in all directions, and uprooting or twisting off the strongest trees. This place is about ten miles east of the Chattahoochee River, and just south of the Pine Mountains, a range of hills some ten or twelve hundred feet in height, running from southwest to northeast through Harris County.

The first point where I examined the path of the tornado was on the plantation of J. T. Johnson, three miles southwest of Hamilton. The dwelling-house, a two-story frame building, 20 by 40 feet, stood a little south of the center of the track. It was moved on its foundations 4 feet northward and 6 feet eastward. The roof was torn off and carried about 30 yards northeastward. The house was only partly destroyed; but the gin-house, standing about 100 yards northwest of the dwelling, and near the center of the storm-path, was totally demolished. Heavy timbers, varying from 10 to 16 inches square, and from 12 to 20 feet in length, were strewn for 100 yards or more, and some lighter pieces of boards, &c., were found more than half a mile distant. The roof of the gin-house was broken in two, one-half being carried about 25 yards northeastward, and the other portion nearly 60 yards eastward. A bale of cotton, 5½ feet in length, 3 feet wide, and 2 feet thick, weighing 550 pounds, was blown 50 yards eastward, but remained unbroken, and had not been removed at the time of my visit. A cotton-press, built of heavy timbers, was torn from its position and thrown 15 feet northward. Its corner posts had been planted about 2 feet deep in the ground. The screw and some other portions were of iron, and I estimated the weight at 12,000 pounds, and the surface exposed to the winds at 70 square feet. Several negro-houses were destroyed here, and much other damage was done. No lives were lost, but many only escaped with severe injuries.

As Mr. Johnson's family were all absent, I conversed with the negroes, whose descriptions of the tornado-cloud and effects during its passage were rather indefinite. They saw the threatening cloud approaching, which appeared to come rolling along upon the ground, attended by a violent boiling motion, its huge contortions at times extending several hundreds of yards above the earth. No distinct form was observed, and a steady roar like thunder accompanied it. Instantly it struck with a tremendous crash; a moment of midnight darkness, and almost as instantly it was gone. A strong westerly wind succeeded it for a few minutes. No rain or hail attended the tornado at this point, but a heavy rain, lasting for a few minutes, came up soon afterward.

Directly east of Johnson's house, a steep hill descends some 60 feet into a swamp, and down this, into the very bottom, the tornado rushed with full fury. Only a slight growth of saplings covered the swamp, and these, I was told, were bent to the ground, as though a mighty flood of water had swept over them. At the time of my visit, four weeks after the tornado, they had straightened up considerably, although still exhibiting strong evidences of the force which had crushed them to the earth. Their general inclination was eastward, or in the direction of the progress of the storm.

The next plantation lying in the path of the tornado is that of William Webster, two miles south of Hamilton. Mr. Webster stated that the tornado occurred between 10

and 11 o'clock a. m. Many of the citizens of Hamilton, from which place it was distinctly seen, gave the time of its passage at this, the nearest point to the town, at 10.30; and I have accordingly adopted this time as correct, and have dated the time of the first destruction, some ten miles west of this place, about as many minutes earlier.

Before reaching Webster's house, the tornado passed through a little valley, which was covered to its bottom with heavy timber, a large portion of which was blown down *toward the west*, thus showing that the inrushing winds in the front of the tornado were of the strongest character. On the northern side of the storm-path almost every tree lay toward the west; on the southern side most of them lay toward the north, while near the center they were thrown in various directions. Every out-building and negro cabin on Webster's plantation was destroyed, and two negroes were killed. His dwelling was unroofed and otherwise damaged; but, having been strongly built and standing some 40 yards south of the center of the storm-path, was not moved or blown down, although the trees with which it was surrounded were mostly uprooted. They probably broke the force of the wind somewhat, and thus saved the dwelling. The gin-house, standing in the southern edge of the track, was totally demolished, the timbers being mostly thrown northward. An oak log, 13 feet long, and averaging 2 feet in diameter, lying on the ground near the gin-house, was moved 40 yards northward. There was no track, and I could not tell whether it had been rolled or carried clear of the ground. The direct exposed surface was 26 feet, and the weight about 700 pounds. The passage of the tornado was described as almost instantaneous. A little hail attended it, but no rain, although torrents of rain fell a few moments later.

After passing Webster's house, the tornado crossed the public road and entered a fine piece of pine timber, which had been carefully preserved for building purposes. Through this it cut a well-marked path, half a mile or more in width. Large poplars, pines, and oaks, many of them from 2 to 3 feet in diameter, were uprooted or twisted off. Here, as to the westward of Webster's house, a majority of the trees were blown down by the easterly winds. Half a mile east of Webster's stood the residence of H. J. Pitts. It was a large two-story frame building, 36 by 40 feet, and was literally torn to pieces. Even the very sills were carried away by the relentless fury of the wind. The *débris* was all thrown westward, and many of the lighter timbers were still lying in the woods, at long distances from where the house stood, at the time of my visit. This is the only case with which I met, throughout the course of either tornado, where a house was destroyed by the easterly winds, and I found nowhere so much timber blown down toward the west as in this vicinity.

A negro, who was standing by the corn-crib with Mr. Pitts at the time of the passage of the tornado, was thrown some 20 yards northwestward, striking violently against a tree, breaking his arm and otherwise injuring him. He showed me where several members of Pitts's family, who were in the house when the tornado struck it, were afterward found. The distances varied from 50 to 100 yards from where the house stood, all westward. Two grown daughters were instantly killed, and a third so badly injured that she lived but a few days. Several other persons were badly wounded. All the negro houses and out-buildings were totally demolished by the same destructive easterly wind. A piano was carried 50 yards westward with the *débris* of the house. Even the ground was torn up by the fury of the wind, the dirt being thrown high up against the bodies of the broken trees which were left standing, where it still remained visible a month later. Large hail fell here for a moment as the tornado passed, and heavy rain occurred soon after.

The appearance of the tornado-cloud, as seen from Hamilton, two miles north, was that of a dense volume of black smoke, rolling along upon the ground, with a height of about 20° at that distance. At times it seemed to be whirling horizontally, and at other moments a boiling *inward and upward* motion predominated. Dr. Charles Biddell stated that to him it presented all the colors of the rainbow, sometimes with considerable yellow and again with the appearance of fire, and was altogether the grandest sight he ever witnessed. Several other persons corroborated Dr. Biddell's statement as to colors and fiery appearance. The accompanying noise was described as a heavy roar, heard for several minutes before the passage of the meteor, and upon its nearer approach a cracking sound was distinctly audible. This last-mentioned sound may have been caused by electric discharges, as it would hardly be possible to distinguish the noise caused by the breaking of trees, &c., at a distance of two miles or more.

A brisk northwesterly wind was felt at Hamilton during, and for a few moments after, the passage of the tornado, but it was not sufficiently strong to do any damage. The prevailing lower wind at this point was from the northwest during the day, and the state of the atmosphere was described as "cool." The upper clouds were moving briskly northward overhead, indicating the existence of a southerly upper current. At all other points along the routes of the tornadoes the day was described as oppressively close and warm preceding, and sometimes even after, the passage of these agents of destruction. This "cool" air felt in Harris County, near where the tornadoes first struck the earth, I regard as being peculiarly significant in indicating the place of meeting of the opposing currents and the consequent development of these destructive storms.

I did not pursue the track of the tornado in this vicinity farther eastward than Pitts's

plantation. I learned, however, that it continued its eastward course, through Harris County into Talbot, laying waste plantation and forest. The ranges of hills known as the Pine and Oak Mountains run parallel and nearly eastward into Talbot County, and between them the tornado passed. The breadth of the track throughout this section averages about half a mile; but in the vicinity of Flint Hill, in Talbot, I was informed that it spread out to a width of nearly two miles, with a corresponding decrease of destructive effects, which became gradually less until the trace was lost altogether. Since first striking the earth the tornado had pursued a path about twenty-five miles in length, and then it rose up, crossed the Flint River, and came down some fifteen miles farther eastward, in Upson County, near Thomaston.

The time of the arrival of the tornado in the vicinity of Thomaston, as nearly as I could determine, was about 11 a. m. The cloud passed directly over the village, but no damage was done until it had traveled nearly a mile farther eastward. I conversed with many persons in this place who saw the cloud, but could not learn that it assumed any definite form at this point.

All agreed that it seemed very low, and that from the north side it looked intensely black, while from the south side a lurid and even fiery appearance was generally remarked. Its aspect was strikingly grand as, agitated by a great internal tumult and rapid whirling, it passed rapidly by. From all sides lighter clouds were seen darting toward it with great rapidity. A heavy westerly wind was felt for a moment as the cloud passed over the village, and a little rain fell, but no hail. About three-quarters of an hour later a heavy rain and hail storm with a strong wind occurred, and at this time shingles, pine-tops, pieces of boards, &c., fell in great abundance. This must have been at the time of the passage of the lower tornado, (No. II,) about twelve or fourteen miles southward, and this *débris*, borne aloft in the vortex of that great whirl, was transported northward by the southerly upper current. A lady's new leghorn hat was picked up near the village. It was supposed to have been brought by the northern tornado from a store destroyed at Valley Plains, Harris County, nearly thirty miles west-southwest of Thomaston.

A resultant of the downward and progressive motions of the storm-cloud at this point would be an angle of inclination toward the earth, and this was the apparent manner in which the storm struck, blowing down a few fences and chimney-tops at first, and, farther on, leveling trees, houses, and other obstacles which came in its way. It was on the plantation of John Trayler, two and a half miles east of Thomaston, that such energy was first displayed. The track here is about 200 yards wide. Trayler's gin-house, standing a little south of the center of the track, was totally demolished, and the timbers scattered for 200 yards northeastward. Some of the planks were carried more than a quarter of a mile. A cotton-press, built of heavy timbers, was torn from the ground, in which the corner-posts were imbedded 2½ feet, and thrown 13 feet northeastward. The estimated weight of the press was 10,000 pounds, and the exposed surface 60 square feet. Trayler's dwelling stood in the northern edge of the storm-path. The main building was but little injured, but the additions were moved in the manner indicated by the dotted lines on Fig. 1 of the accompanying sketches. The western

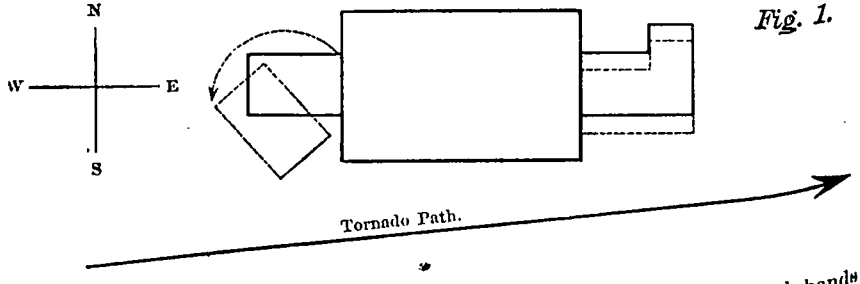


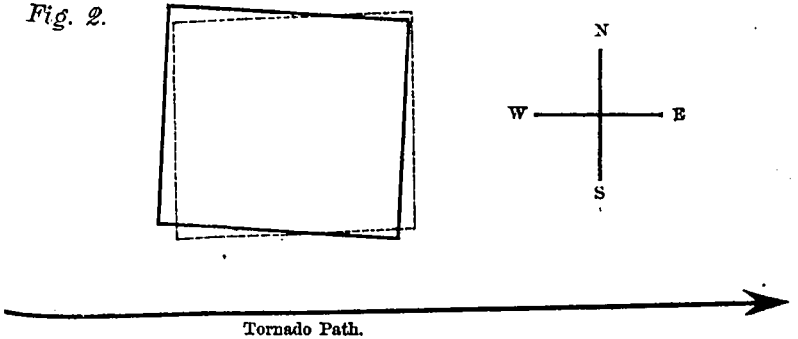
Fig. 1.

wing was twisted more than one-fourth round in a direction contrary to watch hands and the eastern addition was simply moved southward about 6 feet, neither portion having been thrown down. Mr. Trayler and his wife were both in the house at the time; but so quickly did the tornado pass they hardly noticed its noise, and were not aware of any damage to their premises until an examination revealed it.

I next examined the track on Frank McKinley's place, a quarter of a mile east of Trayler's. At this point the trees mostly lay toward the southeast on the northern side of the track, and toward the northeast on the southern side. At Oak Grove Academy, three miles east of Thomaston, I saw a huge oak nearly 3 feet in diameter, which stood on the northern side of the track, lying toward the northwest. The academy building, which also stood in the northern edge of the track, was twisted, as shown by the following diagram, (see Fig. 2,) its southwest corner having been moved 2 feet eastward, and its northwest corner 1 foot, giving the building a slight turn, as indicated by the dotted lines. The building was 25 feet square and 12 feet between joints,

allowing an exposed surface of 300 square feet on each side, exclusive of the roof, the slant of which was about 30°. I roughly estimated the weight of the whole structure at 35,000 pounds, the timbers being large and heavy.

Fig. 2.



Tornado Path.

Jonathan Reeves, four and a quarter miles east of Thomaston, was next interviewed. His house, located on rising ground, commanded a fine view of the country for ten or twelve miles westward. He watched the approaching tornado. The cloud was very black, with a reddish appearance beneath. Form, dome-shaped, with its base sweeping the ground. It was agitated by violent internal contortions, and approached with an undulatory motion, apparently rising and falling with the hills, and sometimes bursting upward, like dense, black smoke from a furnace. Mean diameter of cloud about 100 yards, and height two-thirds as great. Felt but little wind as tornado passed 150 yards south. No rain, hail, thunder, or lightning attended it, but a severe thunder-storm, with heavy rain and hail, occurred three-quarters of an hour afterward, and still later in the evening two other thunder-storms passed over this section.

I did not follow the tornado-track farther here, but learned that its width was about the same (from 250 to 300 yards) eastward into Monroe County. The greatest damage between Thomaston and Forsythe, Monroe County, was on the plantation of Early Cleveland, where nearly all of the out-buildings and negro cabins, together with a vast quantity of timber, were destroyed. The roof of his gin-house was carried a quarter of a mile.

At Barnesville, eight miles north of the tornado-path, heavy hail fell shortly after it passed. Some of the stones contained dust, particles of dead leaves, &c., showing that they had been formed in the vortex of the tornado, and thrown far to the northward.

F. F. Mathews, who witnessed the passage of the tornado from a point two miles south of its track and ten miles southwest of Forsythe, stated that the cloud was very black and funnel-shaped, reaching from the earth some 20° above the horizon from his point of view. No hail fell where he was. I found later that the hail-storms, as a rule, were confined to the northern sides of the tornadoes, and that the *débris* likewise fell to the northward, owing, probably, to the prevailing southerly upper current during the afternoon.

In Monroe County the tornado passed one and a half miles south of Forsythe at about 11.30 a. m. The cloud was seen by many of the inhabitants of the town. It changed its shape continually here, being at one moment hour-glass shaped, then nearly cylindrical, and again funnel-shaped. It was intensely black, and the whirling motion was observed by all. Shingles and other *débris* fell in great abundance in the town, and for more than a mile northward. Mr. Dumas, of Forsythe, who was within 150 yards of the northern edge of the track, described the cloud as fiery in appearance, throwing up, at times, what looked like tongues of flame. No damage of consequence was done east of Forsythe, and the tornado soon left the earth, the track becoming less and less distinct until it was lost altogether.

After making another transit through the air, this time for about twenty miles, the whirlwind again struck the earth in Jones County, some seven miles northwest of Clinton and eleven miles east of the Ocmulgee River. The descent of the tornado at this place was apparently gradual, as in Upson County. At first the track is narrow, and the energy exhibited comparatively slight; but the manifestation of power rapidly increased, and it had hardly progressed two miles before the force displayed was nearly equal to that shown in its previous career. The time of the storm's passage in the vicinity of Clinton was at 12 m., or perhaps a few minutes earlier, according to information gathered from the most reliable sources.

Dr. James F. Barrow, whose position of observation was about four miles northwest of Clinton, on Chestnut Ridge, the water-shed between the Ocmulgee and Oconee Rivers, and who had a fine opportunity to witness the descending storm-cloud, gave me, in

substance, the following description: "My attention was first drawn to a very black, peculiar-looking cloud approaching from the west. I could see other lighter masses of clouds rushing toward it from all directions with great rapidity. Flashes of lightning were seen, and a continuous roar, like thunder, was heard. In its progress eastward it came closer and closer to the earth, until it seemed to strike about three miles northwest of where I was. The whirling motion was plainly observed, and when it whirled most rapidly, it would apparently pause slightly in its progress, and then dart forward with almost lightning rapidity. Again, it looked like a vast volume of the blackest smoke, ascending spirally. The *débris* of the storm, visible in the whirling cloud, was carried aloft and thrown out by the centrifugal force. The cloud was very black above and reddish beneath. It was not clearly defined in outline, but its height was immense. It passed about two miles north of where I stood, and a strong westerly wind succeeded it for a few minutes. No hail attended the tornado, but a brisk rain fell for a few minutes afterward. This soon ceased, and the clouds cleared away."

The descriptions of many other persons in Clinton and vicinity corroborated the general statement of Dr. Barrow, and, as they contained nothing new, further mention is unnecessary. I copy below, from a Macon paper, portions of a letter which explains itself:

"CLINTON, GA., *March* 23, 1875.

"*Editors Telegraph and Messenger:*

"I have just returned from the upper part of this (Jones) County, where, on Saturday last, at 12 o'clock, passed a terrible tornado, spreading desolation along its fearful march, and making rapid and sweeping destruction of all that came within its reach. To say that houses and fences were swept from the very foundation, and forest trees of gigantic size were torn from their roots, whirled into fragments, and tossed in every direction, is but to give a faint idea of the desolation that is to-day to be seen along the track of the storm.

"The appearance of the approaching storm was a fearful sight. Up in the air it resembled the black, angry smoke that arises from a boiling caldron, while underneath it came rolling like the reflection of a terrific fire. The elements were filled with the broken fragments of tree-tops and every conceivable item of destroyed property."

* * * * * * *

The width of the storm-track through Jones County was from 100 to 400 yards, with a central track of complete destruction from 50 to 100 yards wide. The county is very thinly populated, but many persons were badly injured, and one killed. Continuing its east-northeastward course, the tornado passed into Putnam County. The following letter, written at Milledgeville, and sent to me at Augusta, gives the history of the storm in this section:

"DEAR SIR: As there has been but little published in regard to the tornado in Putnam County, I give you a few facts, which may aid you in locating the track of one of the tornadoes. The point of observation was between Cedar Creek and Little River, one and a half miles south of Whitehead's bridge, on Little River, and one mile northwest of Cedar Creek. The storm arrived about 12 m., and was but a few seconds in passing. The form of the cloud was that of an inverted cone, and its appearance luminous. It was attended or joined by a very black cloud, which appeared to have a rolling motion. The red cloud moved with such velocity that no motion, except the forward motion, was perceptible, and all objects immediately in its track were carried directly forward. Objects near this track were thrown every way; trees standing within a foot or two of each other frequently lying in opposite directions, but farther off, on either side, they were thrown toward the track, at a right angle with the course of the storm. The point of the cloud was generally from 4 to 20 feet above the ground, and at this point the trunks of the trees were snapped off so suddenly that the force seemed not to reach the ground, as the stumps and roots showed no sign of the shock. One point of interest is, that in its course through this county its direction appeared to be influenced somewhat by the formation of the ground, as it followed the valleys, and only crossed ridges in getting from one leading hollow to another, and *its greatest violence was exhibited in the bottoms of the deepest gorges.* It entered this county near its southwest corner, a mile or two north of Cedar Creek, and its course was nearly parallel with that stream until it reached Little River, where it rose above the trees, and passed on in the direction of Dennis Station, M. and E. R. R. The temperature of the air was mild before the storm. Rain quickly followed it, continuing for one and a half hours, when it was accompanied with hail. The breadth of the storm-track is from 50 to 200 yards.

"Respectfully,

"C. N. SNEAD."

The partiality of the tornado for valleys, as mentioned by Mr. Snead, I did not see manifested elsewhere, as in more instances the ridges or higher ground seemed to be preferred; but in either case little deviation was noticed, and after the tornado had struck the earth its course was usually direct, or nearly so. The severest effects in the hollows were, however, noticed elsewhere.

After rising above the surface of the earth, as indicated by the last writer, the whirlwind passed harmlessly overhead for nearly twenty-five miles, and next recommenced its destructive operations in Hancock County, on the plantation of Robert Simpson, seven miles northwest of Sparta.

Fig. 16.

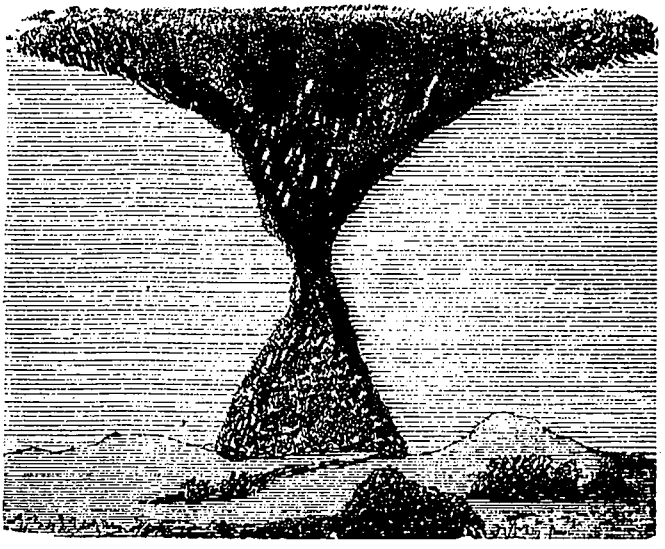
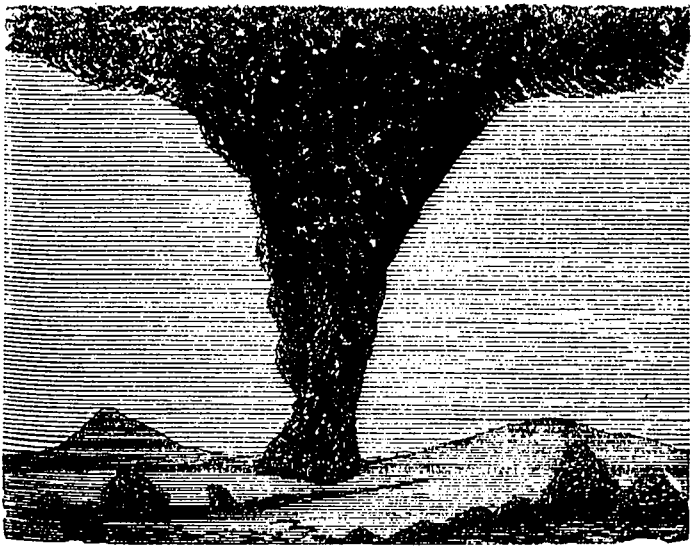


Fig. 17.



Mr. Simpson, who is an intelligent gentleman, and had formerly followed the seas for a livelihood, thus described the passage of the tornado: "The time was about noon, or perhaps a few minutes later. I heard a roaring in the air to the westward, and looking I saw a violent agitation in the clouds, attended by a rapid whirling. Instantly I noticed the formation of an hour-glass-shaped column, which, almost in a twinkling, changed to a funnel shape, with the point downward. (See Figures 16 and 17.) Now it darted quickly toward the earth, striking lightly in the woods some 200 yards west of my house, uprooting a few trees and twisting off the tops of a few

others. Rebounding, it rushed past me, demolishing my gin-house and throwing down several cabins and some fences. The roaring was deep and terrific, unlike anything I had ever heard before. Its passage was instantaneous. After it left my house it made a jump of about 400 yards, striking the farthest side of my plantation in the edge of a heavy pine forest. The cloud was intensely black as it formed, both in the hour-glass and funnel shapes, and caused a darkness almost like twilight. At the point where the tornado struck the fence, on the far side of my plantation, the rails were not only scattered in all directions, but were literally broken to pieces. Some of them were thrown backward, in a southwest direction, a distance of 40 or 50 yards. After striking the edge of the forest, the black column rose again and descended in the distance on the plantation of my neighbor, William Cox. No thunder, lightning, or hail attended the tornado, and but a slight sprinkling of rain. About three o'clock that afternoon the heaviest storm of rain and hail occurred that I ever saw. My plantation was literally flooded, and I estimated the rain-fall at 4 inches. I have witnessed storms at sea, in all parts of the world, but I never saw it rain so fast before."

I made a careful examination of the place in the edge of the pine forest where the tornado first struck heavily. Many of the trees were lying *toward the west*, thus showing that the inrushing front winds were sufficiently strong to uproot them. Many were twisted off and splinted in such a manner as to demonstrate the direction and effect of the whirl, but the larger part were thrown *eastward*, thus indicating that the progressive velocity of the meteor, together with the *after* winds, produced the most decided results. It is possible, however, that some of the trees broken off by the easterly winds were so quickly caught by the furious west winds that they were thrown eastward before they could fall to the ground under the effects of the winds which first struck them.

When the storm-cloud rose from this second point of its reaching the earth, it passed for about a mile over a dense forest, and, although its rotary motion was at some distance from the ground, the after-current was sufficiently strong to blow down many trees in a track 50 to 75 yards wide, thus plainly marking its course. These trees all lay toward the east. As it descended again, it seemed to do so in an oblique line, for the track gradually widens, and evidences of the destructive power of the tornado increase with its progress for about two miles, when its utmost fury was attained. This was on the plantation of William Cox, and from this point to the Savannah River, a distance of nearly sixty miles, a straight and continuous path of destruction, varying from 300 yards to a little more than one mile in width, marks its course. I located the track by the compass at many different points, and found its direction invariably east-northeast.

Throughout the plantation of Mr. Cox the demonstrations of the power of this terrific whirlwind are most abundant. Trees were hurled about as straws would be in the miniature whirlwinds of summer. Where it passed over fields the soil was, in some instances, blown away. Sand and gravel were found imbedded in the bodies of trees as though shot from a gun. In the tall stump of an old pine, which stood in a partly cleared field, I observed large quantities of gravel-stones, varying in size from the head of a pin to a hickory-nut, buried nearly their whole depth in the wood. From this same tree I plucked a "broom-straw," (a tough, wiry sort of grass,) which had been driven three-fourths of an inch into the wood by the force of the wind. By the simple pressure of the hand an indentation could hardly be made in the wood without breaking the straw. Across an open field I found the path of the axis of the tornado clearly marked by a well-defined track of stones and smaller *débris*, which had evidently been gathered from its outer edges and strewn along the line of the central whirl for a width of from 10 to 15 yards. Lying in this field I saw a pine log 25 feet in length, with an average diameter of 18 inches. It came from a forest nearly a quarter of a mile distant, having been twisted from its stump and almost entirely denuded of its branches.

Farther on the tornado again struck the forest, passing over a hill and across a small valley, through which ran a little creek. In this valley the timber was of various kinds—pine, oak, elm, hickory, and poplar. Nothing was spared. The toughest elms and hickories were twisted off by the terrific force of the whirlwind, leaving for their stumps, in many instances, nothing but huge bundles of fibers. The direction of the whirl was plainly shown to be contrary to watch-hands. On the *northern* side of the track, at one point, *all* of the trees lay with their tops toward the *west*, showing that the first onset of the whirl was sufficiently strong to throw them down. On the southern side of the track, at the same point, they mostly lay toward the east or northeast, while in the center they were thrown in various directions.

Here and on the hill, 50 yards farther eastward, many of the trees first hurled to the ground had been repeatedly lifted by the fury of the storm and dashed to the earth until they were literally broken to pieces. In many instances they were stripped of their bark, which, with all the smaller brush, had entirely disappeared. The pine leaves and twigs which had previously covered the ground were swept away, leaving the earth as bare as in the open fields.

The tornado next entered the plantation of George S. Carpenter, who was watching its approach. He distinctly saw the cloud dart downward three times, keeping close

RUINS OF S. D. MASSEY'S HOUSE,

Six miles N. W. of Sparta, Georgia, destroyed by tornado of March 20, 1875.

to the earth after having struck the third time. This *ricochet* motion corresponded with the skips as previously described on the plantations of Simpson and Cox; also with Simpson's description. There is nothing in the topography of the ground, different from what I found it in other places, that would indicate any reason for this peculiar motion, which, by the track, I found no manifestation of elsewhere. The character of the country is hilly, and in this respect it does not vary much in its entire course throughout the State. In some places in this vicinity the effects of the tornado were particularly severe in the hollows, while in others it touched them but lightly, or overleaped them altogether.

Carpenter observed a violent commotion in the clouds, a general rushing together with a whirl, developing a black, cylinder-shaped cloud, which approached with great velocity and passed with a terrific roar. Negro cabins were demolished and trees blown down around his house, which was slightly injured, but escaped destruction, as it stood in the northern edge of the track. A clock was overthrown, stopping at 12.22, thus indicating the time of the arrival of the tornado at this point. The width of the track here was about 400 yards, and evidences of the greatest fury were everywhere manifested. I found broom-straws and gravel-stones in the trees, as on Cox's plantation. Here also was seen a large rock, somewhat irregular in shape, but measuring about 10 feet in length, 4 feet in width, and 3 feet in thickness, which had been displaced and moved about 7 feet. Several trees were lying across it, and it may have been more the effect of the moving trees than the force of the wind directly, which moved the stone. Allowing 157 pounds to the cubic foot, the rock would weigh over 18,000 pounds.

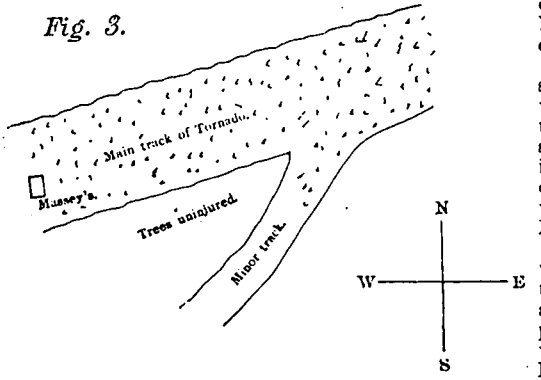
S. D. Massey was the next person who suffered from this terrible visitor. His house stood directly in its path, and he thus had a good front view of the approaching black cloud. Its apparent width was 200 yards, or half as wide as the track of destruction. Knowing the dangerous character of the storm, Mr. Massey made a frantic effort to get his family out of the house, but before he could do so it was upon them with a deafening roar and midnight darkness. The house was strongly built of heavy hewn timbers, dovetailed together at the corners, ceiled within and weather-boarded without. For a few seconds it resisted the fury of the storm. Mr. Massey stated that the southeast side of the house was first crushed in. Then the whole structure was moved 10 feet eastward and torn to fragments. The house was 31 by 40 feet, with an exposed surface of about 600 square feet on each side, including the roof, and 475 on each end. Nothing could be more complete than the picture of destruction at this place. I induced a photographer at Sparta to make some views, copies of which accompany this report. No. 1 shows the ruins of Massey's house as the tornado left them. No. 2 is taken from a point some 50 yards west of the house, and shows the effect of the tempest in the forest on the hill nearly a quarter of a mile distant. The field in the foreground contained a flourishing growth of wheat before the storm arrived, hardly a vestige of which remained when it had passed, and the ground was strewn with the ruins of the outbuildings as shown in the picture. The view is looking west. It will be observed that the belt of destruction is wider on the south side of the track, where the manifestation of force is greater than it is on the northern side, for reasons given on page —.

The gin-house, standing 100 yards southwest of the dwelling, was literally blown away, the timbers having been scattered for hundreds of yards eastward. The cotton-gin was torn into fragments, and the saws scattered in all directions, two of them having been hurled with such force against the trees, 200 yards eastward, as to remain sticking into the wood. Mr. Massey's wife, child, and a young lady cousin were instantly killed. The child, a boy of five or six years, was found about 30 yards east of the house, half covered with dirt, which had been blown up from the wheat-field. The young lady was thrown some 18 yards eastward among the branches of a fallen tree. Massey was buried beneath the timbers of the house, and was badly injured. His shoes, which he assured me were tight-fitting, were torn from his feet, as were also his stockings. The lower portions of his pantaloons were likewise carried away by the fury of the blast. Nearly the entire contents of the house suddenly took flight on the wings of the storm. The cotton mattresses from the beds were strewn upon the bushes and broken trees in the woods hundreds of yards eastward. The ground presented the appearance of having been swept by a rushing torrent of water. Even the bark was torn from the broken trees that remained. This looked more like the effect of the drift of the *débris* than the direct effect of the wind. I noticed sand and gravel-stones in the trunks and limbs of the trees in this vicinity as in other places. Dead chickens and quails, nearly stripped of their feathers, were found after the storm; also rats, cats, and rabbits, with nearly every bone broken. So terrific, indeed, was the force of the wind here, that nothing could live long when exposed to its fury. I am satisfied that Massey owed his life to the partial protection afforded by the timbers of his house, with which he was covered. Just before reaching Massey's house the tornado crossed a little valley, which it seemingly overleaped. This hollow is indistinctly shown between the wheat-field in the foreground, and the wooded hill in the background, on photograph No. 2. After passing the house, a minor track is found running toward the main track, as shown by the diagram in Fig. 3.

An iron hinge was found driven nearly 3 inches deep into a tree some 500 yards east

of Massey's house. Whether it was attached to any object at the time of its transit could not be ascertained. A beam, 10 by 12 inches, and 18 feet long, was carried 100 yards; exposed surface about 20 square feet, and estimated weight 560 pounds. The entire top of a huge pine lay near the house. It had evidently been brought from the wooded hill nearly a quarter of a mile distant. A large basket was found fourteen miles northeastward, which had been identified as coming from this vicinity. No hail or rain attended the tornado here, but a heavy rain and hail storm occurred about two hours later.

Fig. 3.



I did not follow the path of destruction farther at this point. I will continue the history of the tornado by giving portions of the statement of a person who was in it, about seven miles east-northeast of Massey's, and four miles west of Mayfield, taken from the Milledgeville Union and Recorder.

* * * * * "Dinner was announced at 12.30 p. m. By this time the heavens had assumed a fearful aspect. We decided to postpone dining until the storm was over. North and west of us lay a tremendous dark bank, like the awe-inspiring precipice of an encircling mountain with viewless summit. The northern wing seemed to be struggling for an approach against a brisk gale from the southwest, which was rapidly bringing the extreme western wing upon us. For a while the contest seemed doubtful. In a few moments, however, all was changed. We entered a shed-room on the west of the house, where we had a fine view of the southwest through the windows. All at once the cloud seemed to fold up its floating wings and dart for the earth, assuming the appearance of an imaginary conflagration on a prairie. The sight was new to us. There was something so terrific and yet so grand about it that we lingered almost beyond the bounds of safety to gaze with wonder and admiration upon the scene.

"Scarcely had we reached the adjoining sitting-room before it burst upon us with all the fury of a regular bombardment. Grape and canister could not have made a more fearful rattling than the objects which were hurled against the windows, weatherboarding, and shingles. Then came falling trees, flying timbers, tumbling bricks, darkness, and increased violence. Hope was now measured, and its limits passed. An expression, 'We are gone,' involuntarily sprang from our lips, and we passed to the rear of the room expecting, every moment, new impulses of the whirlwind to crush the roof down upon us. One of the doors was rent open, and a panel of it burst asunder by a brick. The store-room south of us was unroofed, and the timbers were hurled off with a tremendous crash. It was a critical moment. The violence seemed to be greater than the possible strength of the house. A moment more and an abatement was observed. My brother-in-law, looking around, exclaimed: 'Thank God, no lives are lost.' Our faces and hair, blackened with dirt and smut, were the only visible effects of the personal assault of this mighty destroyer.

"On leaving the room, a most awful scene of desolation presented itself. The beautiful grove about the yard, with the exception of one or two small trees, was lying in a mass upon the earth. The stable first, of the houses, claimed our attention. It was a large framed building, and it now lay a heap of ruins. Every building, the dwelling and one outhouse excepted, had been torn asunder and lay leveled to the earth. Two, almost new, framed negro-houses, kitchen, barn, carriage-house, crib, stables, ginhouse and screw, all were laid flat; smoke-house, stove-room, and part of the main building were unroofed. Fences, garden, orchard, and timber, for a space of half a mile across, were completely swept. My buggy was torn quite to pieces. * * *

"J. A. S."

It was at Elam church and vicinity, about eight miles east-northeast of the point of observation of the last witness, that I next examined the track of the tornado. Between fifty and sixty persons were in the building when the tornado reached it; and, although its destruction was complete, only one person was killed. Twenty-four were, however, more or less injured. From the Rev. J. W. Ellington, pastor of the church, I received the following description: "I was going down the aisle as I saw the approaching tornado through the windows and open door. The apparent height and width of the cloud was about half a mile. It presented a luminous form, with an intensely dark background, coming forward like a cylinder, end foremost, having its axis of revolution apparently nearly parallel to the surface of the earth. In a twinkling it was upon us, with a sound, or the commingling of a thousand sounds, that carried terror to the bravest heart. In the dim light I saw the western end of the building

A.W. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

EFFECTS OF TORNADO

Of March 20, 1875, on the plantation of S. D. Massey, six miles N. W. of Sparta, Hancock County, Georgia.

Devastated wheat-field and ruins of out-buildings in foreground. Pine forest on hill in background.

falling in upon us, and I knew no more until after the storm had passed. The pews, which partially supported the fallen timbers, probably saved many persons from instant death."

At the time of my visit, the ruins of the church lay nearly as the storm had left them, except such as had been removed in extricating the persons buried beneath them. Most of the timbers had been carried eastward by the wind, and some of the lighter portions of the building scattered over the fields for hundreds of yards. The mass of ruins, however, lay almost as they would have fallen had the structure been prostrated by some force sufficient to crush it over at a single blow without moving it on its foundations. I could discover no evidences of an explosive force. The day was warm, and the open doors and windows of the church would have permitted the escape of the expanding air without injury to the building. Mr. Ellington told me that he had observed his watch a few minutes before the arrival of the tornado. It then indicated 12.15 p. m., but this time must have been somewhat slow. From its passage at other points I should say that the storm must have struck Elam at 12.40 nearly. The direction of the whirl of the tornado, (contrary to watch-hands,) was very plainly evident in this vicinity, being best indicated by the twist given to the splintered trees. Most of the fallen trees lay toward the east, and many were thrown toward the center of the track, at various angles, but mostly inclined somewhat in the direction of the course of the storm.

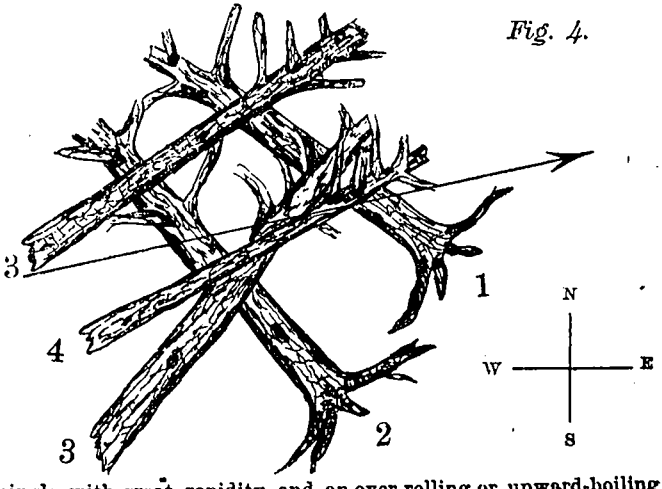
Dr. J. W. Pilcher, who was in the tornado at Elam, stated the time of its occurrence at 12.30. The apparent width of the black cloud was a quarter of a mile, while the extreme breadth of the track was somewhat more than half a mile. Thunder and lightning occurred before and after the tornado, and rain attended and followed it. No hail fell until nearly two hours later.

Mr. Ireland, two miles southwest of Elam and one mile south of the track, felt a strong southwest wind for a few moments as the tornado passed. The cloud looked intensely black in front, but white, like steam, in the rear, and went surging along, boiling up and rolling over in a fearful manner.

R. A. Hill, whose house stood in the northern edge of the storm-track, four miles east of Elam church and three miles north of Warrenton, testified that he experienced an unusually close and warm state of the atmosphere for some minutes previous to, and during the passage of, the tornado, so much so that his face was hot and flushed like one in a fever. Time, (probably somewhat slow,) 12.26 p. m. No thunder or lightning with tornado. "A little rain and considerable hail fell. Apparent width of cloud one-fourth mile, and width of track fully one mile, as indicated by mile-posts on the Warrenton road. Cloud reached from the ground to an indefinite height, was very black above, and presented a yellowish, copper-colored appearance beneath. Where only a portion of the forest was destroyed, the largest trees were broken or uprooted, while the smaller ones escaped by their suppleness. The track was somewhat wider here than at other places farther west or east, but the destruction was not so complete. Most of the trees lay toward the east. A pine tree, 6 feet in diameter, was twisted off, on Mr. Hill's plantation, and a fence-rail, 10 feet in length, was driven nearly 5 feet into the ground at an angle of about 45°. In this vicinity the tornado was most destructive in the *hollows*, as though its force had been confined by the obstruction of the surrounding hills.

A cousin of Mr. Hill, living six miles north of the path of the tornado, heard a noise and observed the cloud in the distance. He experienced a strong northerly wind for a few moments at the time of its passage. No rain or hail fell at the time, but a very severe thunder-storm occurred some two hours afterward.

Fig. 4.



At Warrenton, two miles south of the storm-path, a smart southwesterly breeze was felt when the tornado passed. The cloud was about 20° in height, from that distance, and exhibited, according to some observers, all the colors of the rainbow. Intensely black and very white clouds were seen to intermingle with great rapidity, and an over-rolling or upward-boiling motion predominated.

Four miles east-northeast of Hill's stood Camak, which, before the storm, was a thriving village of some forty houses. It lay directly in the path of the tornado, which swept over it, destroying partially or entirely every house except one—the residence of N. F. Norman, agent of the Georgia railroad. This building stood in the southern edge of the track, and was not exposed to the full fury of the destroyer. The railroad timepiece, buried beneath the ruins of the demolished depot, stopped at 12.45, thus indicating the exact time of the tornado. S. B. Fielding, telegraph-operator, watched the approaching storm. The cloud was of an inky blackness above and somewhat luminous beneath. Its apparent breadth was about two hundred and fifty yards, or one-third that of the track of destruction at this point. At the first onslaught of the tornado, the depot in which he was standing was knocked entirely flat, and he was blown some 80 yards distant, into a garden. The manner in which the hotel and other buildings were blown down also indicated that they were prostrated by the first blast of the storm. The larger portions of the buildings were generally moved but slightly eastward, almost where they must have fallen. Rails from the fences and smaller fragments of buildings, &c., were scattered over the fields for half a mile east of the village. From the statements of many persons, the storm passed in less than one minute, and the extreme duration of the winds could hardly have exceeded three minutes. No hail, thunder, or lightning attended its passage here, and only a little rain fell.

In the forest I found that a majority of the trees were blown down by the west or northwest winds, although a few fell in all other directions. The group represented by diagram, Figure 4, was found 500 yards northwest of the railroad-station, near the center of the track. Figure 5 shows a frame building which stood a little south of the center of the track. It was 18 by 30 feet, and 12 feet between joints. The northwest end was moved 40 feet, and the southeast end 25 feet northeastward. It seemed to have been carried clear off the ground, as no visible track remained. The floor was found nearly unbroken, but the rest of the building was blown to pieces. Five freight-cars were standing on the railroad-track when the tornado arrived. Two of them contained five tons each of guano. They were all thrown over northeastward, and a man who had sought shelter behind them was instantly crushed. A very remarkable example of the force of the wind is illustrated by Figure No. 6 of the accompanying sketches. It represents the section of a cedar telegraph-pole, 1 foot in diameter, which was pierced through and split by a piece of pine board. The section which entered the pole was closely broken off, remaining firmly fixed in the crevice. I endeavored to secure the memento for this office, according to instructions received, but was unable to do so. It was forwarded to New York by orders of the superintendent of the Western Union Telegraph Company, and is probably on exhibition at the office there.

Fig. 5.

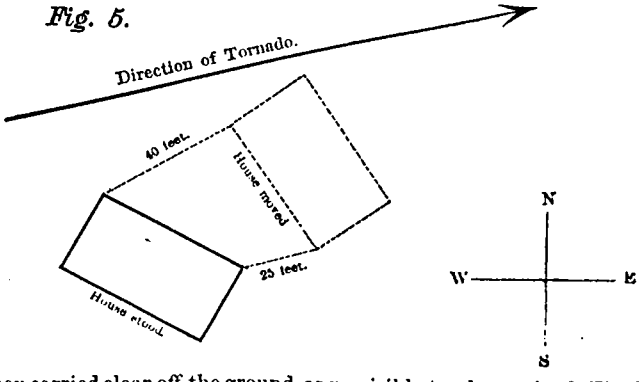
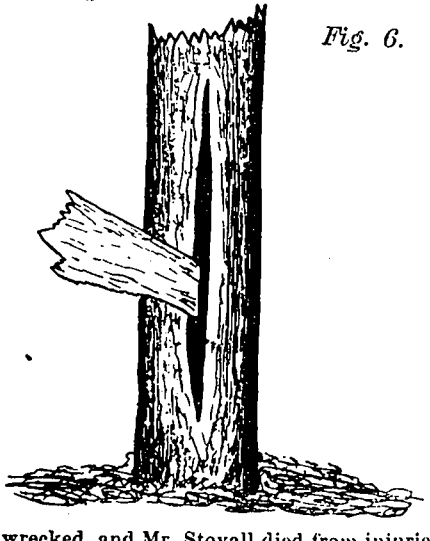


Fig. 6.



It was on the plantations of John T. Stovall and John W. Morgan, in McDuffie County, one and a half miles north of Thomson, that I made my next examinations of the storm-track. Its width here is about 200 yards, and where it passes through the forest is very sharply defined. Nearly every building on both plantations was totally wrecked, and Mr. Stovall died from injuries sustained. On both sides of the track the trees lie inward, nearly at right angles with the course of the storm. In the center

they form a completely tangled mass. The accompanying sketch (Figure No. 7) illustrates a group which I found a short distance northwest of Morgan's house. The timbers from this building were thrown northeastward, some of the lighter portions being

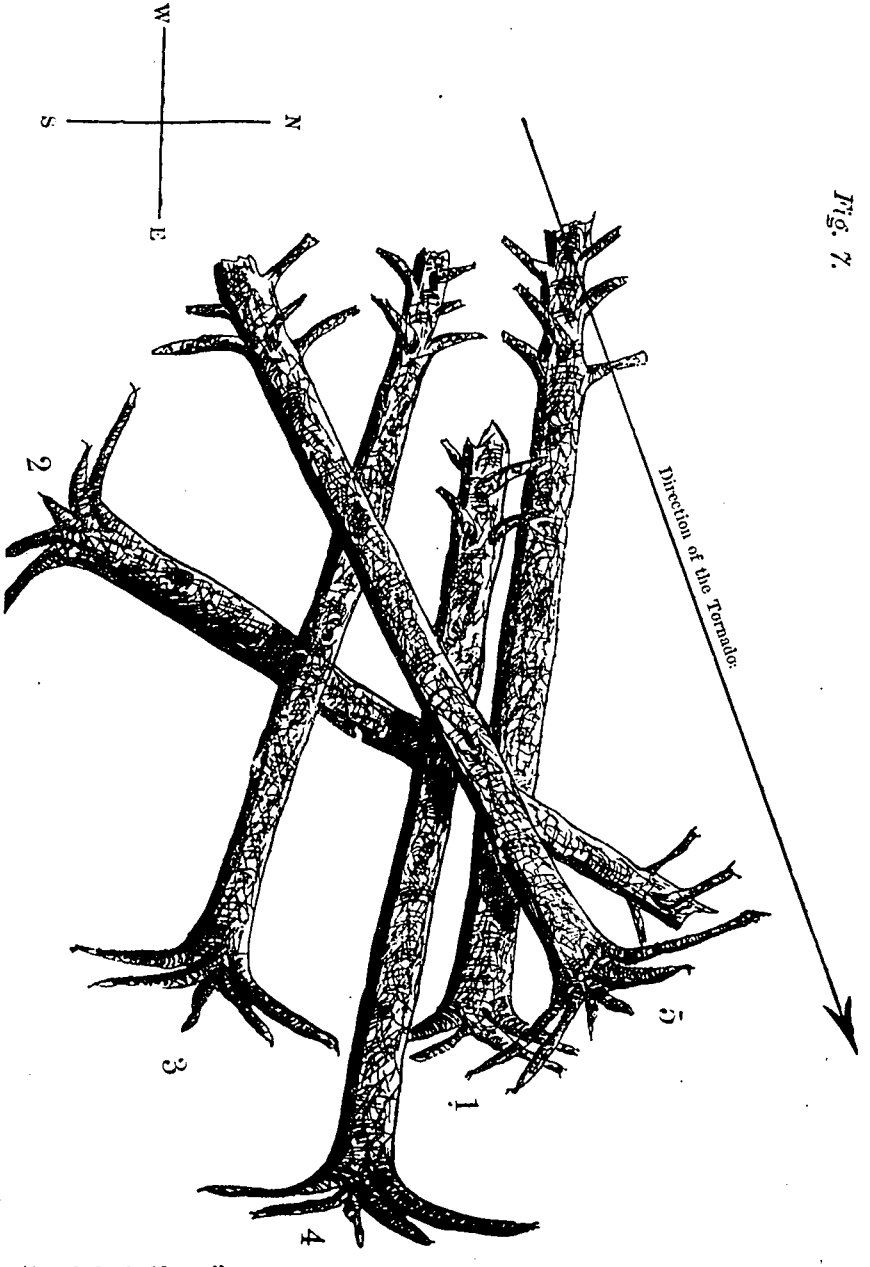


Fig. 7.

scattered for half a mile or more. Five persons were in the house when the tornado struck it, but only one was injured. In the pine forest in this vicinity only a few of the smaller and more supple of the trees remain standing, and these are nearly denuded of their branches, and, in some instances, even of their bark. A thicket of young pines in the storm-path, a short distance east of Morgan's house, presented the appearance

of having been scorched by a fiery blast. I noticed a similar appearance in numerous other places, and many persons with whom I conversed alluded to it. I was told that it was not until several days after the tornado that this effect was observed. Was it really produced by heat or by mechanical causes? Most persons who were in the tornado did not realize any unusual temperature, and, although abundant electricity was everywhere manifested, still it is hardly possible that electric heat was produced with sufficient intensity to scorch the foliage, for, if this was done, it would manifest itself at once. A violent whipping together of the branches might so bruise the leaves that they would die soon after, and this seems to me the more reasonable solution of the problem.

A colored man, living on Morgan's place, with whom I conversed, described the passage of the storm as instantaneous. He was seated at dinner with his family and heard the rumbling, but was not otherwise aware of the presence of the tornado until it struck his house, enveloping it in midnight darkness for a moment. With a terrific crash the house seemed to fly quite over their heads, leaving himself and family unharmed upon the unmoved floor. The effects in this case would indicate that the sudden expansion of the air in the house, caused by reduced pressure outside, may have thrown the sides of the building outward and the roof upward, and the ruins, being instantly seized by the wind, were hurled entirely over the heads of the inmates, thus leaving them free from personal injury. The extreme duration of the winds attending the tornado at this point could not have exceeded a minute or two at longest. According to many witnesses, a calm immediately preceded and soon followed its passage.

Edmund Bacon, one-fourth mile north of the tornado-track at Morgan's, experienced a sudden northerly wind for a moment or two only. A few rails were blown from his fences, but no serious damage was done. Central cloud appeared very black, with other lighter clouds rushing toward it. No thunder, lightning, or hail occurred at the time, and only a slight shower of rain fell.

Mr. Pascal, three-fourths mile south of tornado-track, near Thomson, obtained a fine view of the cloud, which he described as being like a dense black smoke, rolling upon the ground. Apparent height 40°, and width about a quarter of a mile. A little rain fell as tornado passed, and for a few minutes after. A strong southerly breeze blew for a few minutes, but not with sufficient force to do any damage. The roar of the tornado was terrific, resembling the noise which might be produced by a thousand locomotives racing across the country at full speed.

Mr. Hadley, who witnessed the passage of the tornado from the outskirts of Thomson, about one mile south of the track, said that he saw a bright column reaching from the ground to a height of nearly a hundred yards. This fiery column immediately preceded the black cloud, the height of which seemed about the same. The light was sufficient to illuminate the trunks of some dead trees in an adjoining forest until they appeared to glisten, and he remarked the peculiar effect to a neighbor standing near. A strong breeze was felt at the time; it blew first from the southeast, and gradually veered to the southwest and west, as the tornado went by. Starting immediately for the scene of destruction, he was caught in a smart shower, which he thought occurred about five minutes after the tornado had passed.

According to the most reliable concurrent testimony, the tornado swept by Thomson a few minutes before one o'clock p. m., arriving at Appling at one, and reaching the Savannah River not later than ten minutes after one. I will, therefore, omit further statements regarding the time of occurrence of the storm between this point and the river.

John E. Smith, three miles northeast of Thomson. House stands in southern edge of storm-track, and was partially destroyed. Saw approaching cloud, but not distinctly, as the forest westward obstructed the view. No hail, lightning, or thunder attended it, but the roar was terrific. A little rain fell as it passed. Felt no heat or anything unusual in the condition of the atmosphere. (Figure 8 represents a group of trees found on Smith's premises.) A heavy thunder-storm, with a terrific wind, came up about two and a half hours later.

Mrs. Reeves's house stands upon an eminence seven miles northeast of Thomson, and half a mile north of the storm-track. Several persons saw the black cloud whirling in its passage, but were too much frightened at the time to be able to give any accurate description of it. A brisk northwesterly wind was felt here, but its force was not sufficient to blow rails from the fences.

Mr. Reeves, son of the above-mentioned lady, was living exactly in the storm-track, south of his mother. His house was demolished, and himself and wife badly injured. They experienced nothing unusual in the condition of the atmosphere, but noted the sudden darkness.

William Finch, living in the edge of the tornado-track, six miles west of Appling, stated that the cloud appeared like an immense whirl of inky-black smoke with streaks of red in it, and it came rolling toward him like a wheel. In its passage, which seemed almost instantaneous, it destroyed his gin-house and some smaller buildings.

In a little valley, some 200 yards east of Finch's, stood a saw-mill with an adjoining pond about 75 yards wide, 200 yards long, and 10 or 12 feet deep. H. A. Faucett, miller,

stated that the water was nearly all whirled out of the pond, excepting in the central channel. He did not see the formation of any water-spout, but only noticed the empty pond after the tornado had passed. The mud was thrown from the bottom of the pond against the trees on the hill 200 to 300 yards distant. A very severe thunder-storm followed the tornado at an interval of about two hours.

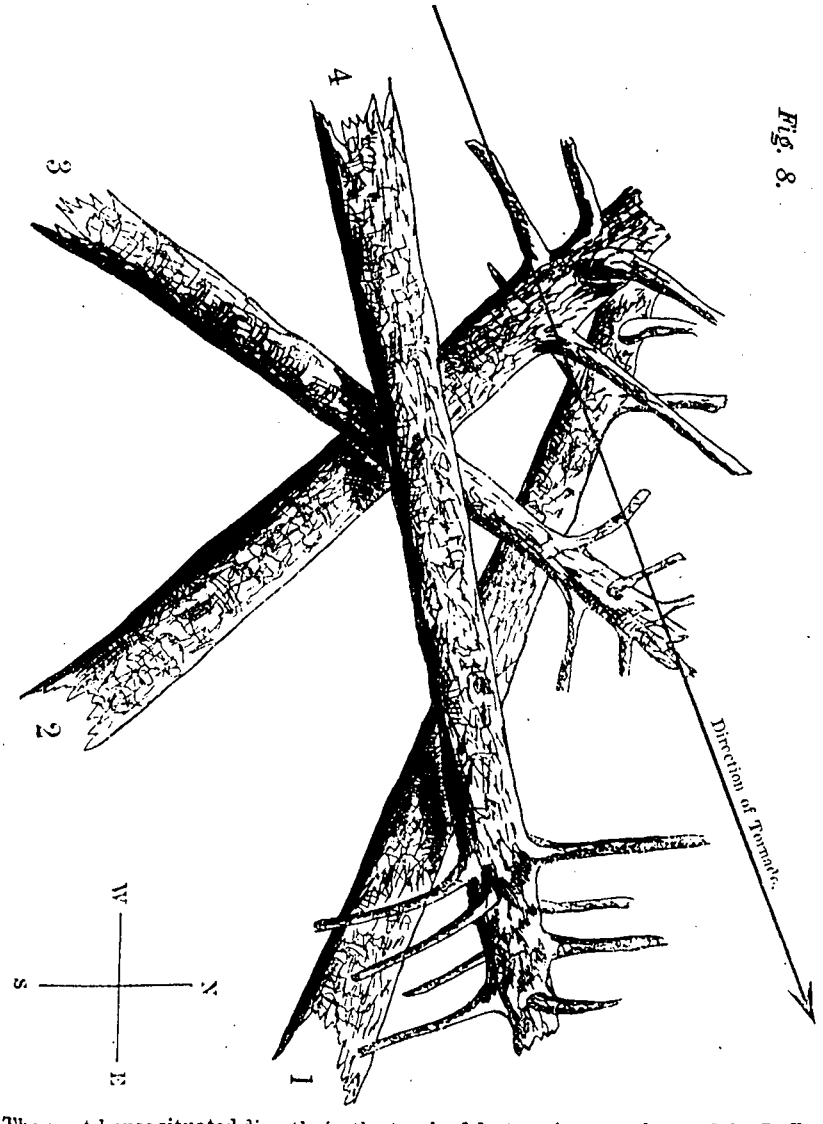


Fig. 8.

The next house situated directly in the track of destruction was that of John L. Bartlett. When Mr. B. saw the storm approaching he was coming toward his house in full view of the cloud, which towered up black and threatening, with a lurid light below, giving the effect of a stubble-field burning in the distance in the evening. His wife observed the light and exclaimed: "It is a fire coming, and we will all be burned up." Comprehending the situation, Bartlett took his whole family and hurried to an open field, where he caused them all to lie down. Instantly the tornado struck them with a stunning crash. A moment of midnight darkness succeeded, and they were in the midst of a shower of broken boughs, falling timbers, and other *débris*. One child was killed in Mr. Bartlett's arms, and he was badly injured himself. Attempting to rise, he was instantly thrown to the ground. They were all drenched and nearly

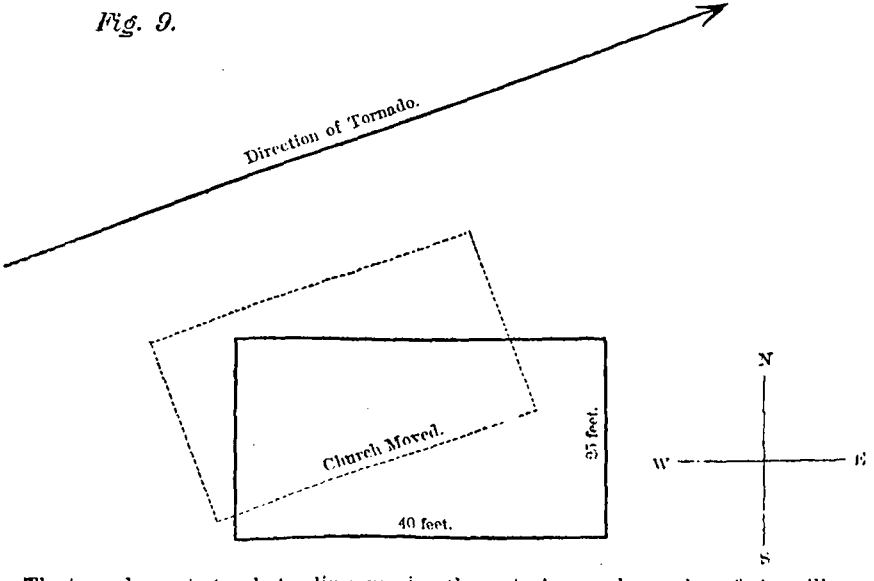
strangled by torrents of water, which seemed to be dashed over them by "barrel-fuls." This had evidently been brought up from the mill-pond previously alluded to, which was more than half a mile distant. The destruction here was complete, and Mr. Bartlett literally lost everything—house, out-buildings, furniture, clothes, provisions—all swept away in a moment.

Lewis Young, near Bartlett's, and 50 yards north of the storm-track, saw the cloud, which was very dark, advancing with a distinctly-observed whirl, and, at times, an apparent forward-rolling motion. He also observed the attending bright light. The wind blew hard for a few minutes only.

The tornado now plunged into a dense pine forest, tipping the trees over like nine-pins. It was in this vicinity that the cloud was described as rolling forward like a wheel or immense roller; and in this forest I noticed that nearly all the trees lay toward the east, directly across the road, which, at this point, runs north and south. The trees had not been removed, and it was with the utmost difficulty that I could pick my way through on horseback, being frequently obliged to make long detours on either side into the forest. The track here was nearly or quite half a mile in width.

The residence of Mrs Dorsey, two miles west of Appling, was next reached by the destroyer. The house was strongly built and neatly painted, and, before the tornado, the place was one of the prettiest in Columbia County; after its passage, "dread desolation reigned supreme." Rails from the fences, fragments of buildings, and broken trees were strewn about like jackstraws, covering the hill-side as far as the eye could reach. The out-buildings were entirely gone, and of the house, only a portion of the lower story remained standing. The house of George Gray, a short distance east of Dorsey's, was all blown away. I conversed with Mr. Gray, in Appling, and he told me that I would never be able to discover even the location of his house had I not previously known where it stood. This I found to be a fact, for I kept a sharp lookout on my return, but could not mark its position.

Fig. 9.



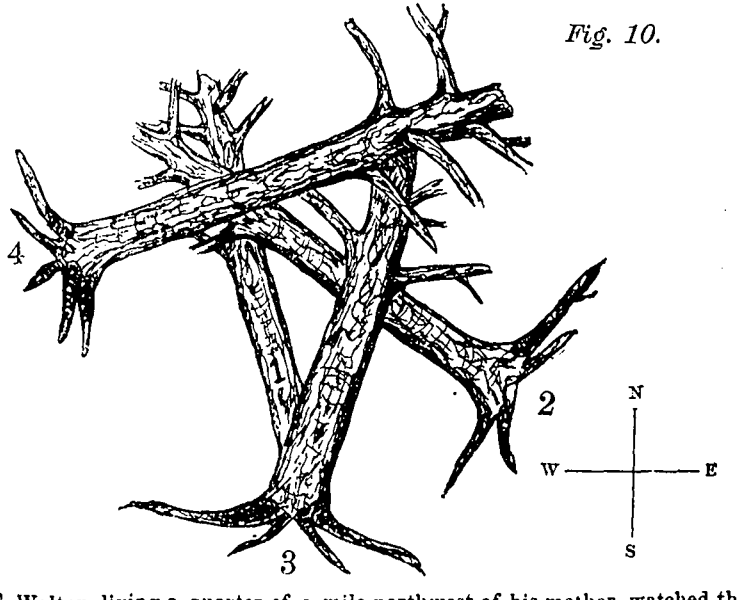
The tornado next struck Appling, passing through the northern edge of the village. Some twenty houses were destroyed, and four persons were killed, or so badly injured that they died soon afterward. A small hill, covered with a heavy pine and oak forest, stood in the path of the storm in such a way as to obscure its approach, and possibly to shield the village somewhat. I noticed here some curious facts. Where the tornado passed through a cotton-field, the old stalks were mown down almost as clean as could have been done by a scythe, and the path was so distinctly marked that 10 feet northward they remained standing, almost unbroken. The boards had been blown from the fence bordering this cotton-field and scattered far and wide over the adjoining hill. The posts, deeply set in the ground, to which they had been nailed, exhibited on their western sides a strange yellowish appearance that I could not account for, and indentations of gravel-stones in the wood were plainly to be seen.

James Wright, who lives near Appling, about two miles south of the tornado-track, was about the only person I could find who obtained a good view of the approaching storm-cloud. His house being situated on an eminence, commanding a fine prospect,

he was able to watch its progress for several miles. To him it appeared to be whirling like an immense top, its upper portion growing larger and larger until, apparently becoming top-heavy, it would fall over *backwards*, throwing its front *upwards*. It repeated this motion several times while within the range of his vision, and whenever it did so he could hear an unusual crashing among the trees. The lower portion of the cloud presented a glowing phosphorescent appearance. Strong winds were felt at his place, but no damage was done. A little rain fell directly after the passage of the tornado. The storm exhibited great violence everywhere in the neighborhood of Appling. A cow standing near the court-house was picked up by the wind and carried to a distance of some 20 yards. In the forest west of the village most of the trees fell eastward, although near the center of the track a few lay almost at right angles with the course of the storm, and, occasionally, one or two might be seen lying toward the west. A church situated in the southern edge of the storm-path was moved in the manner illustrated by Figure 9 in the accompanying diagram.

My next examination of the path of the tornado was made at Mrs. P. E. Walton's, eight miles east-northeast of Appling, four miles west of the Savannah River, and fifteen miles northwest of Augusta. Mrs. Walton described the storm-cloud as intensely black, and so close to the ground as to sweep the tops of the trees; could see no definite shape or tell height; extreme duration of storm one to one and a half minutes. The first blow was from the southeast, and the last and heaviest winds from the west; very warm in the morning, but cooler in the afternoon. No unusual heat was experienced during the passage of the tornado, but many of the persons wounded in this neighborhood were badly blistered, as though they had been burned. Forty houses, most of them occupied by negroes, were destroyed in this vicinity; four persons were killed, and twenty-five others more or less injured. Mrs. Walton's house stood a little south of the center of the track of the storm. It was unroofed and otherwise damaged. The dining-room, built separate from the house, was entirely destroyed. One of its doors was carried eight miles northeastward across the Savannah River into Merriwether Township, South Carolina, where it was afterward found and recognized as coming from this place. A mattress and other articles were also carried over the river. Another door of the dining-room was blown so far away that it had never been found. The gin-house still lay as the tornado left it, a shapeless mass of ruins. It stood a little south of the center of the track, and the timbers were thrown northeastward. A cotton-press near the gin-house was likewise thrown 10 feet northeastward, having been wrenched from the ground, into which the corner-posts were set 2 feet deep. The exposed surface of the cotton-press was about 60 square feet, and its weight could not have been less than 10,000 pounds, as it contained over 200 cubic feet of heavy (yellow) pine, besides nearly a ton of iron-work, including the massive screw. No rain, hail, thunder, or lightning attended the tornado here. A severe thunderstorm, with high winds and much hail, occurred between 3 and 4 o'clock.

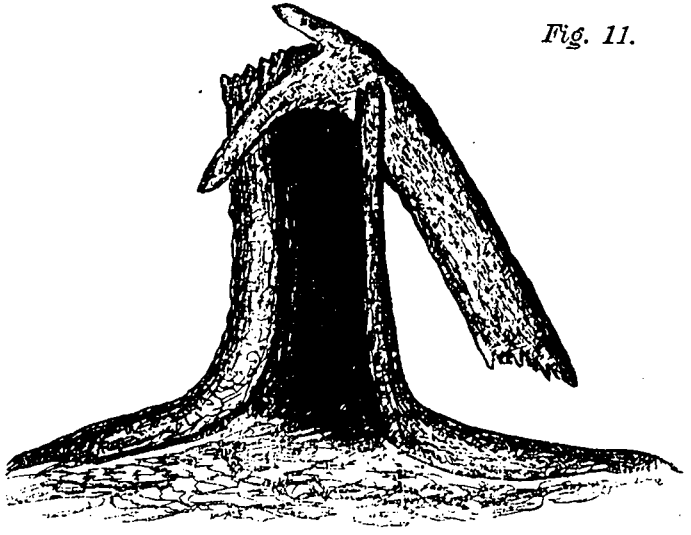
Fig. 10.



W. T. Walton, living a quarter of a mile northwest of his mother, watched the approach of the tornado. He estimated the width of the cloud to be from 300 to 400

yards, corresponding nearly to the width of the track of destruction at this point; could not judge of the height of the cloud, as the top seemed to commingle with other clouds above. It was violently agitated by whirling and upward-boiling motions. Figure 10 of the accompanying sketches shows the direction of prostrated trees in a group, found a little south of the center of the track west of Mrs. Walton's, and Figure 11 gives the appearance of an old hollow oak near by, which was broken in a singular manner.

Fig. 11.



Dr. J. T. Smith, living five miles south of Mrs. Walton's, heard a heavy rumbling, resembling distant thunder, about 1 o'clock p. m. It continued for several minutes. He did not notice the tornado-cloud, and felt no sensible winds. No hail fell during the afternoon, but a heavy blow, with torrents of rain, occurred between 3 and 4 p. m.

At Furies Ferry, where the tornado crossed the Savannah River, the track is about 300 yards wide. The effects of the storm here were comparatively light. Only a small portion of the timber was blown down, nearly all of which lay toward the east, as in other places where the destructive power of the tornado seemed somewhat modified. Across the river, in Edgefield County, South Carolina, considerable damage was done, and several persons were injured. At the point where the tornado crossed the Charlotte, Columbia and Augusta Railroad, some sixteen miles farther east, its effects were still lighter than at Furies Ferry, although of a similar character.

J. H. Carter, esq., residing six miles north of Edgefield Court-House, in Edgefield County, and about fifteen miles north of the tornado-track, forwarded me the following meteorological data for March 20:

Seven a. m., temperature 62°, cloudy; wind south.

Two p. m., temperature 70°, cloudy; wind southwest.

Nine p. m., temperature 64°, cloudy; wind west.

At 1 p. m., (nearly time of passage of tornado,) heavy rain; wind southwest, moderate, with heavy, dark clouds in the southwest.

At 5 p. m., heavy thunder-storms.

A very light track, which in some places entirely disappears, is all that is seen of the effects of the tornado the rest of the way through Edgefield, Aiken, and Lexington Counties, South Carolina. The damage reported from Aiken was the result of the thunder-storm that occurred about 5 o'clock. When the tornado arrived in the eastern portion of Lexington County, it swooped down again, about twelve miles southwest of Columbia, leaving a track some five miles long and 200 to 600 yards in width, in the vicinity of Congaree Creek. Two lives were lost here, twelve persons injured, and property to the amount of $25,000 destroyed. It was a little before 3 o'clock p. m. that this occurred. Continuing its course, the tornado crossed the Congaree River and the South Carolina Railroad about nine miles south of Columbia. Its effects where the railroad was crossed were barely discernible at the time of my visit, being only marked by an occasional broken or prostrated tree. Hail attended its passage over Richland County. It increased in size and quantity until it became a very severe hail-storm by the time it reached Sumter County. This was between 3 and 4 o'clock p. m. The Sumter Watchman says: "The hail-stones ranged from the size of a hen's-egg to that of a man's fist, some weighing from eight ounces to a pound. They were of various shapes,

some perforated, as it were, and beautifully scolloped, and others very much resembling cog-wheels."

The tornado again approached the earth and renewed its destructive operations near the center of Sumter County, running eastward through Darlington, Marion, and Horry Counties. At the point where it crossed the Wilmington, Columbia and Augusta Railroad, two miles south of Cartersville, the track is about 100 yards in width, and evidences of great fury were left behind it. The time of its arrival at this point could not be accurately ascertained, but was approximately stated at 3.30 p. m. Still going eastward, it crossed the Northeastern Railroad six miles south of Florence. The track is some 500 yards wide here, and the tornado arrived at about 3.45, as nearly as I could determine from the various and somewhat conflicting statements of different witnesses.

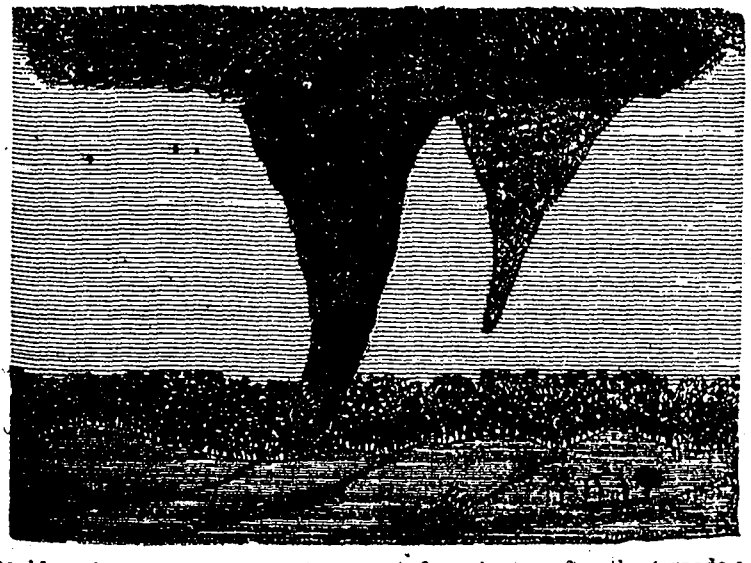
W. H. Roome, three miles south of Florence and about as far north of the track of the tornado, stated that lightning, thunder, rain, and hail occurred before, during, and for a few minutes after the passage of the tornado. The hail-stones were larger than hen's eggs, irregular in shape, and crystalline in formation. A strong westerly wind blew for nearly half an hour after the tornado.

J. J. McCown, two miles north of track and four miles south-southeast of Florence. Cloud very black, with a lurid appearance in its rear as it passed; could distinguish no definite shape or give size. It seemed to be rolling or boiling over, its upper edges outward and downward, and its upper edges upward and inward; it traveled eastward with great rapidity.

James Batch, five miles southeast of Florence, and one mile north of tornado-track. Did not see cloud, but heard roar. But little wind was felt as tornado passed; a heavy westerly wind, with rain, hail, thunder, and lightning, occurred about fifteen minutes later.

Dr. William N. McPherson, living three-quarters of a mile north of the tornado-path, and about seven miles southeast of Florence, gave me the following particulars: The passage of the tornado was preceded and attended by large hail, irregular in shape and of all sizes, up to that of a man's fist. Felt a brisk rush of air from the northwest as tornado went by, but it was not sufficiently strong to do any damage. The cloud was intensely black and funnel-shaped, with its apex sweeping the earth. Its mean diameter was apparently 300 yards. No definite outline was distinguishable at the top, as it intermingled with a general cloud covering the western and northern quadrants of the sky. The horizontal whirl, contrary to watch-hands, was plainly visible, together with a rolling motion, inward and upward, giving the appearance of dense volumes of black smoke ascending from a tar-kiln. Corruscations were observed shooting out on the right or south side of the cloud. A light, funnel-shaped cloud, looking much like white steam, immediately preceded the black cloud. (See Figure 12.) The tornado traveled with great velocity, and the duration of the fall of large

FIG. 12.



hail could not have exceeded two minutes. A few minutes after the tornado a smart shower of small hail fell, and, still later, heavy rains.

I examined the track where the tornado passed through a heavily-timbered section near Dr. McPherson's plantation. The track was fully a mile in width, with a central

track of complete destruction about half a mile broad. On the southern side of the track the trees lay directly toward the north, with the utmost regularity. Had the forest been a corn-field, and had a heavy roller been passed over it, the stalks could not have been prostrated with more regularity than the trees were for a long distance in this neighborhood. Near the center of the track they were frequently thrown in various directions; on the northern side many lay toward the west, but more toward the south and southeast. Figs. 13, 14, and 15 represent the arrangement of some groups of trees found in this vicinity.

Eighteen miles east of the place last described, and three miles south of Marion Court-House, I found the track only about 100 yards in width and the display of force comparatively light. I was told, however, that a few miles farther west or east from this point, the track was much wider and the destruction greater. The broken or prostrated trees here were mostly thrown eastward. I noticed, however, the broken top of one tree that had been hurled down, toward the *southwest*, with such force as to drive it into the ground. This was on the northern side of the track. From many of the citizens of Marion I learned that the tornado passed at 4 p. m., or perhaps a few minutes later The black storm-cloud, sweeping along low in the horizon, could be seen from the town, and its roar plainly heard. Its apparent height from this distance was not more than fifteen or twenty degrees, and I could not ascertain that any well-defined form was observed. A brisk northwesterly wind prevailed during and for a few minutes after the passage of the tornado, and hail fell for a little while, some ten or fifteen minutes later.

I. M. Coleman, residing nine miles southeast of Marion, and four miles south of the tornado-track, testified: Tornado passed at 4 p. m. Just before it arrived, a brisk southerly wind was blowing, which lulled completely on the approach of the tornado. A strong west wind blew for a few minutes after it had passed. A general cloud, of threatening aspect, covered the western and northern quadrants of the heavens before the tornado-cloud was visible. Suddenly the inky-black cloud was seen to burst through the other clouds, leaving an opening through which clear sky appeared.

Henry James, living one mile south of Coleman, also remarked the fall of the southerly wind, and the occurrence of the strong west wind, which followed the tornado. No rain or hail attended or immediately succeeded the tornado at this point, (on the south side,) but a heavy thunder-storm came up about two hours afterward.

Some curious freaks of the wind were related to me by J. W. Singletary, through whose plantation the tornado passed, about five miles southwest of Marion. His gin-house, which was a large building, three stories in height, or with two lofts above the usual horse-power space, was seized by the wind, lifted entirely clear from the ground, and overturned in such a manner that it executed a complete somersault upon its foundation, as the ruins were hardly moved from where the building had previously stood, but *the roof was underneath and the lower floors and timbers piled on top.* I did not see these effects as the timbers had been removed, but I have no reason to doubt the doctor's statement. In this case, the inward and upward easterly winds must first have lifted the building from the ground, probably carrying it somewhat westward; next it is likely it was caught in the westerly winds, which capsized and dashed it back to its former location, upside down.

I did not follow the track of the tornado farther. Its subsequent history is given in a letter recently received at this office from T. W. Beatty, esq., editor Horry News, Conwayborough, Horry County, South Carolina, portions of which I give below. Accompanying his letter is a map of the county, on which A indicates the point where the tornado entered, and D the point where it passed out of the county. He says:

"I have had the principal land-surveyor of the county visit the track of the tornado and determine its course and breadth. Tornado struck at A about 4.30 o'clock p. m., and passed out at D, I should say, in ten minutes from the time it struck at A. From some I get the report that it struck there about the same time it is reported to have occurred at A, while others fix it later. I mention this to show that it must have traveled very swiftly. From A to D is between fifteen and twenty miles. In this track, which is from 700 to 1,000 yards wide, the trees have fallen in nearly every direction, but *none* of the tops are turned *outward* from the center. After the tornado passed the North Carolina line a mile or so I cannot trace it farther; it seems then to have spread or lifted."

The time (4.30) given at which the tornado entered the county, is probably somewhat late—perhaps fifteen minutes—from the time at which it passed Marion. Nothing more is heard of it after its disappearance a mile or so east of the North Carolina line, and it seems to have passed harmlessly the rest of the way over Columbus and Brunswick Counties, losing itself in the bosom of the broad Atlantic.

THE SOUTHERN TORNADO.

The path of this is indicated by track No. II on the accompanying map. I find its earliest history in the Columbus (Ga.) *Enquirer-Sun*, of March 23, which, in an article on "Saturday's Storm," gives the following:

"A black cloud passed over this city on Saturday, (20th March,) about 11 a m.

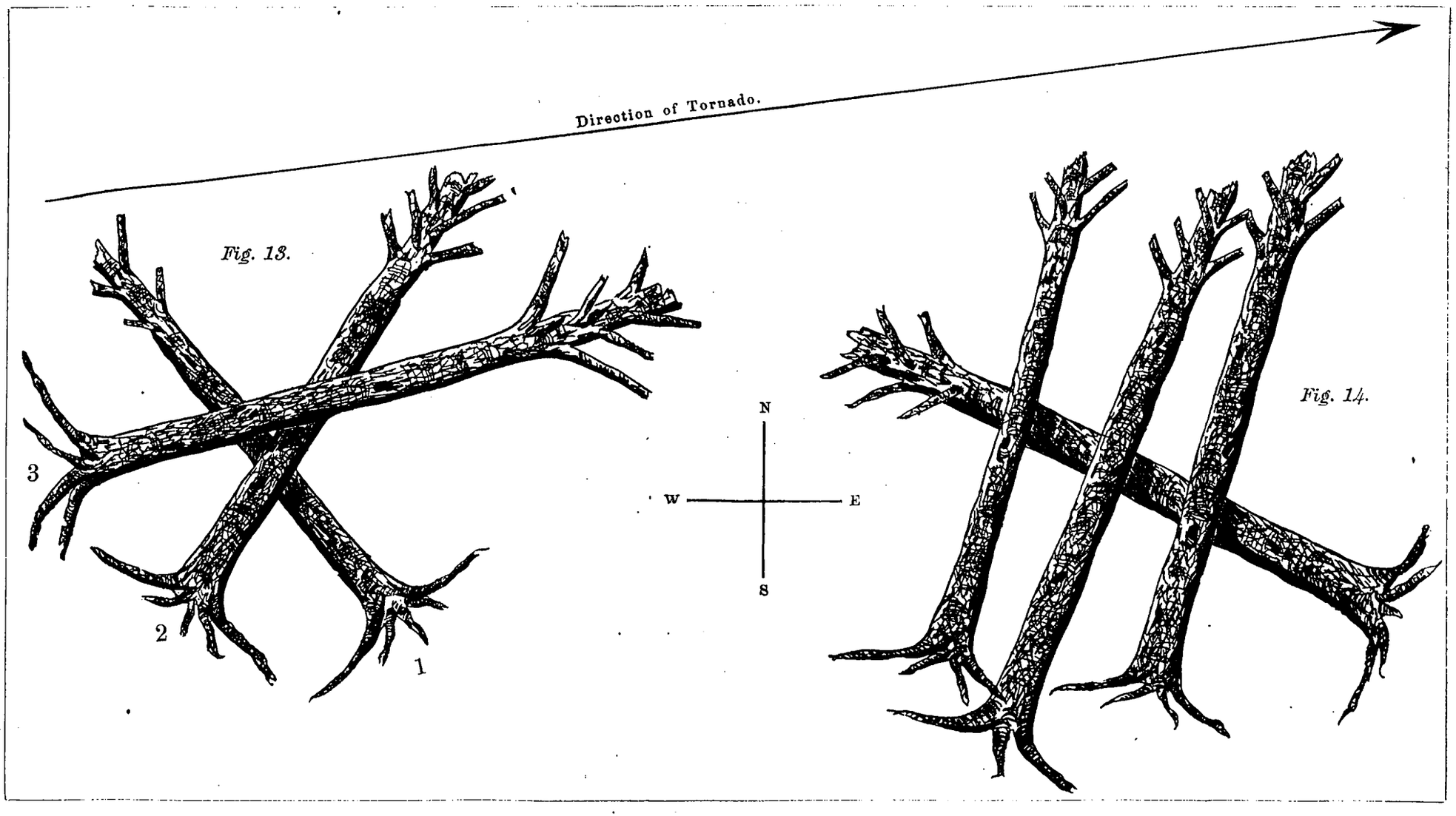


Fig. 13.

Fig. 14.

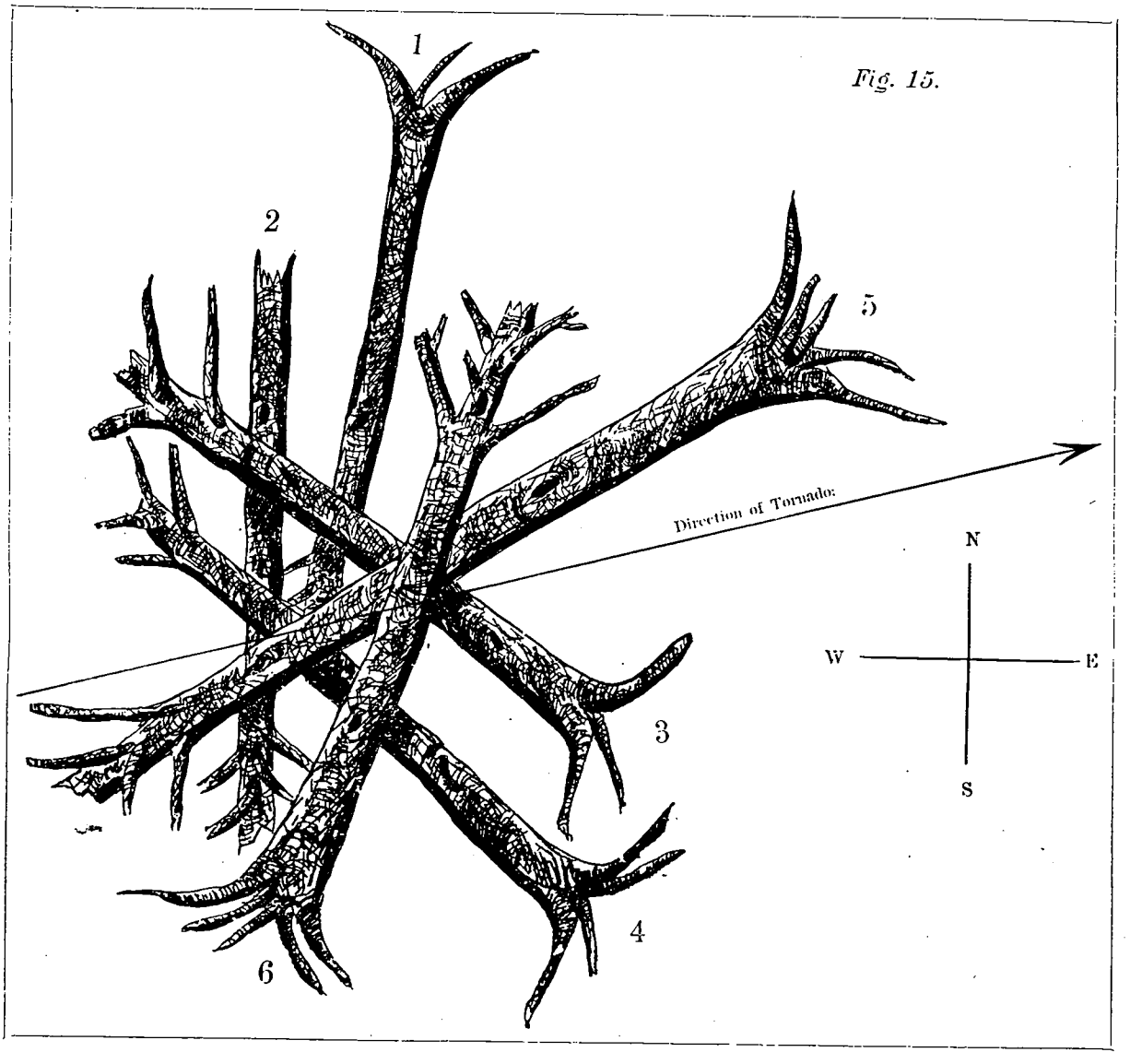


Fig. 15.

toward the northeast. It seemed to be racing in the heavens. Gentlemen who watched it saw it seemingly break and scatter when only a few miles off, and they predicted a heavy storm in that direction."

An examination of the map will show that Columbus lies almost in a line of the direction of the first portion of the track of this tornado. It was moving nearly due northeast when it first struck the earth, but it soon turned rather more toward the east, and its general course through Western and Central Georgia is east-northeast. Thus the cloud seen at Columbus must have contained the incipient tornado, gathering its forces in the disturbed elements from the intermingling of the cold northerly, and warm, vapor-laden southerly air-currents.

The tornado first approached the earth in Muscogee County, near the line of Harris County, eight miles northeast of Columbus. The time was about 11.30 a. m. Its first effects were comparatively light, and it was not until after it had passed some distance into Harris that it wrought much destruction. Developing energy as it advanced, or perhaps coming bodily near to the ground, it first struck the plantation of William Howard with sufficient destructive power to scatter fences, uproot trees, and demolish buildings. Next the plantation of M. L. Tidwell was reached. Mr. Tidwell described the cloud as intensely black, approaching with a terrific roar, and rolling upon the surface of the ground. Its apparent width was 100 yards, corresponding nearly with the track of destruction. No definite shape was distinguishable, and almost midnight darkness attended its passage. The duration of the destructive winds was seemingly not more than half a minute, and no rain or hail accompanied the tornado. Now the destroyer dashed through the farms of James Burdett and Daniel Phillips, scattering everything before it with an irresistible power. It next struck the prosperous village of Mount Airy, which, before the tornado, consisted of twenty-five or thirty houses, including church, academy, store, and several fine residences. Its location is eighteen miles northeast of Columbus and twelve miles west of Talbotton. An old gentleman here, Maj. G. N. Epps, who was noted for the great care with which he regulated his clock and watch, was able to give me the exact time of the occurrence of the tornado. Although his house, one of the finest in the place, was totally wrecked, and he himself somewhat injured, yet the tornado had hardly passed before he had the presence of mind to consult his watch, which then indicated 11.40 a. m.

The first building destroyed here was the residence of John H. Kennon, which was blown all to pieces. Even the floor and sills were carried away. The house stood a little south of the center of the track, and the *débris* was all carried east-northeastward. Six persons were instantly killed here—Mrs. Kennon and five children, three of whom were grown. Their bodies were found at distances varying from 100 to 150 yards from the site of the house, among its ruins. A board from the house was driven end foremost nearly 3 inches into the trunk of a pine-tree, which stood some 300 yards eastward, in such a manner as to cut the grain of the wood obliquely. The section represented by Fig. 18 of the accompanying drawings was cut from the tree and left with a party to be forwarded to this office. The tree was evidently standing when the board struck it, but it was subsequently blown down, toward the northeast. I was told that I would find here a large sill that had been driven quite through a huge hickory-tree. Such, however, was not the case. The sill in question was from Kennon's house, and had been carried about 200 yards and driven endways about 18 inches into the splintered stump of a large pine. The tree had evidently already been twisted off, leaving the stump but a loose mass of splinters when the sill struck it. Thus it met with comparatively little resistance. The combined strength of three or four persons was not sufficient to withdraw the sill.

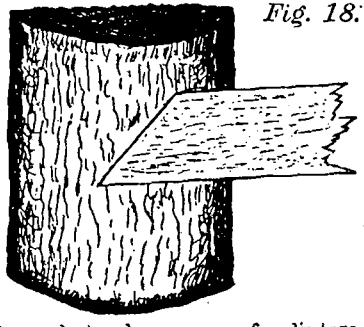


Fig. 18.

Prospect church, at this place, stood a little south of the center of the track. Its size was 30 by 40 feet, and height 12 feet between joints, or from the sill to the plate upon which the lower edge of the roof rested. It was hurled completely over endways toward the northeast by the terrific force of the tornado. This was proved from the position in which the timbers lay. A gentleman who was familiar with the building pointed out this fact to me, showing carefully that the southern and western timbers were thrown farthest away in the summersault of the building. The floor and sills remained almost unmoved.

The entire village presented a most complete picture of destruction at the time of my visit, four weeks after the tornado. A few small temporary buildings had been erected and some of the fencing put up, but otherwise the track of the destroyer remained unchanged. Fragments of buildings were strewn for hundreds of yards, and trees remained as prostrated by the winds. A few of these were lying toward the west or northwest, but more were inclined inward toward the center of the track, or

lay toward the east. The ruins of the buildings were universally blown eastward. These lighter materials may have been blown westward at first, in some cases, and afterward carried eastward by the stronger westerly winds. Persons caught in the tornado here could give but little idea of the storm-cloud, except that it was like dense, black smoke, exhibiting a multitude of electric sparks or small flashes. A frightful roar and midnight darkness attended its passage. The duration of the fury of the storm was generally estimated at one minute. No rain or hail accompanied it, but a heavy rain fell half an hour later.

W. H. McCullohs, Waverly Hall, four miles north of Mount Airy, witnessed the tornado; time, 11.30 a. m., nearly. Cloud was black and red, with an apparent height of ten or twelve degrees. A general dark cloud covered the sky in the west and north; felt a rush of wind from the north for a few moments as tornado passed. This breeze was strong enough to blow a few light rails from the fences. One heavy peal of thunder was heard, but no rain or hail fell at the time. Heavy rain-storm, with some hail, occurred about 3 p. m.; wind southwest during the day; heard roar of the northern tornado, which passed eight miles north, about an hour earlier, but felt no unusual wind at that time.

The tornado followed the road from Mount Airy to Talbotton for nine miles. The road then turns more toward the south, and the tornado passed to the left, going one and a half miles north of Talbotton. In this distance of nine miles, five churches, two academies, and a large number of other buildings were destroyed. The track averages 300 yards in width throughout this section. I give below the statements of various persons living on or near the line of the storm, locating them by their distances from Talbotton. It will be observed that the time given is generally somewhat earlier than Epps's, and should have been a little later; but, as it was usually indefinitely stated, I rely more on his.

Thomas J. Neal, eleven miles west-southwest of Talbotton. Tornado arrived a little after 11 o'clock; heard heavy roaring for five minutes previous; cloud appeared white on the south side, and black on the north. A few large hail-stones fell as tornado passed, and a little rain just afterward. A heavy rain occurred half an hour later. A negro boy was caught in the whirl of the storm here, and was carried a distance of 50 or 60 yards, in a manner illustrated by Fig. 19.

Fig. 19.

Cephus Brannon, ten and a half miles west-southwest of Talbotton. Tornado occurred about 11 o'clock. The cloud at one moment seemed to be funnel-shaped, whirling rapidly contrary to watch-hands, and at another moment looked like a vast volume of black smoke rolling upon the ground. It appeared luminous in front, was in northern edge of track, and it grew as dark as twilight as the tornado passed. The day was oppressively warm. Rain fell before and after the whirlwind. No hail was observed.

Dr. T R. Ashford, ten miles west of Talbotton, and one mile north of track. Cloud was funnel-shaped; apparent height 125 to 150 yards. A strong northwesterly wind blew for a moment as tornado went by. Heavy hail and some rain fell for a few minutes during and after its passage.

Dr. M. W. Peters, nine miles west-southwest of Talbotton. Time of tornado about 11 a. m.; cloud very black, with streaks of red; appeared like an inverted cone, with its apex sweeping the earth. The top was ill-defined, mingling with the mass of clouds above. A heavy and continuous roar was heard for some minutes before the tornado. It was nearly dark as night as the storm passed, the extreme duration of which was seemingly not more than one minute. Heavy rain and hail-stones, as large as a man's fist, fell just after; roof of house was carried 300 yards eastward; gin-house and other out-buildings entirely destroyed.

Nathan Baugh, Baughville, eight miles west of Talbotton. Cloud intensely black, and came whirling and rolling with great rapidity; no rain or hail with tornado, but heavy rain, and hail-stones as large as hen's eggs, about fifteen or twenty minutes afterwards. Some fifteen or twenty houses stood in this vicinity before the storm, the inhabitants of which, white and colored, to the number of twenty, sought refuge in Mr. Baugh's dwelling. It was a strongly-built two-story house, 18 by 36 feet, standing on the northern side of the tornado track. It was first moved 10 feet southward, and then literally torn to pieces; but, strange to relate, not one of its inmates was seriously injured. A hail-storm occurred a few minutes later, and the now defenseless persons were obliged to seek temporary shelter under boards, as not a roof remained to cover

them. A horse, which was standing in the stable when the tornado arrived, was found nearly half a mile eastward after it had passed. He was so tightly wedged between two trees that one of them had to be cut away in order to release him. He was but little injured, and soon recovered. Could he have been blown this distance with so little injury? I think it possible, as many persons who were carried long distances by the wind, assured me that they came down comparatively gently, as though they were partly buoyed up in their descent. I am inclined to think that such was the effect of the inrushing, and ascending air-currents. A bale of cotton at Mr. Baugh's, which was transported a quarter of a mile by the tornado, was found unbroken. This would indicate that it must have struck the earth with comparatively little force.

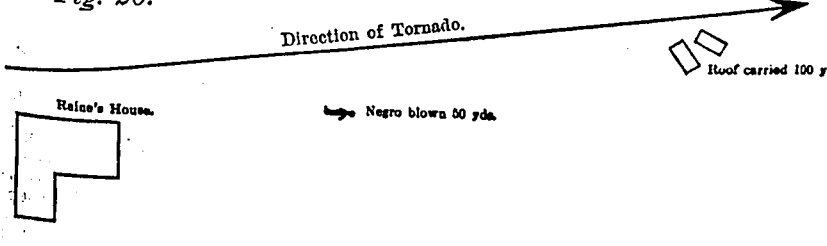
Prof. J. G. Calhoun, principal of boys' academy, near Baughville, eight miles west of Talbotton. Time of tornado, 11.30 a. m. The cloud was funnel-shaped and very black, having its front illuminated with balls of light, of a phosphorescent appearance. The height of the cloud was fifteen degrees, at a distance of one mile. Midnight darkness attended the passage of the storm. Its burst was instantaneous, and calm immediately succeeded it. The extreme duration of the winds could not have exceeded thirty seconds. The crashing of the trees was heard above the general roar of the storm. A sulphurous smell was noticed in its track, which could be observed for many days afterward.

As Professor Calhoun saw the coming storm, and became aware of its dangerous character, he sent all the boys, seventeen in number, into one room, which he considered the safest part of the building, and, to prevent them from exposing themselves to harm, locked them in. Stepping out to take an observation of the approaching tempest, he was almost instantly caught up by the wind and carried a distance of a hundred yards or more, into a little valley east of the academy. He was somewhat bruised, but received no serious injuries. Scrambling out of the hollow, he saw the building completely demolished, and most of the boys running about near where he had left them, unharmed. One boy was blown eastward into the same hollow near where Mr. Calhoun found himself. He was somewhat scratched and bruised, but no worse injuries resulted. The building had been moved 10 feet southeastward, and its ruins lay mostly eastward, many of the lighter boards and timbers being scattered for hundreds of yards. The boys were in the northwest corner-room. That this portion of the building sustained the first severe shock of the storm is proved by the fact of its having been moved southeastward before going to pieces. How did the boys escape being crushed beneath the sides of the house, which would seem to have fallen in upon them? I can only account for the remarkable preservation on the supposition of an explosion of the building from the sudden expansion of the air inside of it, induced by the great rarefaction which must, at that moment, have existed outside. The same effects are also indicated in the case of Mr. Baugh's house, previously alluded to, where the inmates also escaped unharmed. This pressure from within would have forced the walls outward against the opposing winds, which, in, turn, may have hurled them quite over the heads of the now unsheltered persons in such a manner as to leave them free from personal injury.

Isaac Lucas, six miles west of Talbotton. Out-buildings blown down, and house unroofed and otherwise damaged; cloud was very black, with electric flashes in it. It suddenly grew dark as night, when tornado passed; wind seemed first from south, and then from the north. Torrents of rain accompanied the tornado, and large hail fell in great abundance soon after; heard the roar for nearly fifteen minutes before the storm arrived.

W. J. Raines, five miles west of Talbotton. Was about two miles south when tornado passed; heard roar, but did not see cloud or feel effects of storm. Mrs. Raines was at home and witnessed the approaching storm-cloud, which she described as being much like black smoke, with threads of red running through it. It grew very dark when the tornado passed, and the roar was so terrific that she thought a cannon discharged in the chimney could not have been heard. The house stood in the southern edge of the tornado-track, which is about 125 yards wide here. The roof of the kitchen was lifted off and carried 100 yards northeastward, and a negro, who was a large, heavy man, was blown about 50 yards in the same direction. The following diagram, Fig. 20, represents the location of the house, with the objects moved.

Fig. 20.



The negroes asserted that the kitchen was filled with balls of fire after it was unroofed. Heavy rain came with the whirlwind, and hail, as large as partridge's eggs, fell immediately after.

On the plantation of Elisha Culpepper, four miles west of Talbotton, every house was blown down, and the destruction was complete in the track for a quarter of a mile in width. Mr. Culpepper was killed and his wife badly injured. Storm passed about 11.30. No thunder or lightning attended it, but heavy rain and hail followed closely after.

Two miles west of Talbotton the tornado passed through the forest, breaking off or uprooting the largest trees, but sparing many of the smaller ones. I saw several large oak and gum trees, some of them 4 feet in diameter, twisted off here, their huge splintered stumps standing as mementoes of the irresistible power which had wrenched their tops away. Many of the splintered trees plainly showed that the direction of the whirl was from right to left, or contrary to watch-hands. On the northern side of the track the trees lay mostly toward the southeast, and on the southern side toward the northeast.

Rev. S. Maxwell witnessed the passage of the tornado from a point one mile north-northwest of Talbotton, and 200 yards south of the track. The height of the cloud was fifteen degrees at a distance of one mile; apparent diameter 300 yards, or about the same as the breadth of the track here. It was inky black on its southern side, and luminous on the northern. It seemed to be rolling inward and upward, from both sides, toward the center. A smart shower closely followed it, and heavy rain and hail fell about half an hour later. No thunder or lightning was observed, but the roar of the storm was almost deafening. A strong southerly wind was felt for a moment as tornado passed.

The tornado was observed by many of the citizens of Talbotton, and the following description from the Talbotton Standard, of March 24, embraces the main points of the accounts related to me there:

"Last Saturday morning came upon this country with peculiar weather for this season of the year. The sky was overshadowed with dark clouds; occasionally distant thunder could be heard, and the atmosphere was damp and humid. Friday preceding was a real warm day, and brought forth frequent remarks from almost every one, yet no one thought that this circumstance was the precursor of a terrible calamity. Saturday morning the wind blew a somewhat steady gale until about half-past 11 o'clock. At this moment nearly every citizen in town was attracted by a distant roar. It was a terrible sound. Old men trembled and said they had never heard anything to equal it. Everybody in the stores of the town ran out on the streets to look and listen. Directly to the west of the town, and about a mile and a half north, a most appalling sight presented itself. The darkest clouds ever seen seemed to roll and tumble upon the earth like huge collections of the blackest smoke, and they were moving along with lightning rapidity, while the sound was enough to unstring the nerves of the bravest man in the community. In a moment, however, all became calm. Not long was it before couriers came flying in from east and west in search of medical assistance, and bringing details of the destruction to life and property." * * * *

The cloud was generally of indefinite shape, but W. N. Bacon, of Talbotton, assured me that he could at times distinguish a water-spout-like cloud, blacker than the rest, in the center of the dark mass. A strong southerly wind was felt in the town, for a minute or two only, as the destroyer swept past. The terrible meteor continued its work of destruction through Talbot County nearly to the Flint River, when it rose from the ground and passed through the air in a direct line a distance of nearly forty miles, next approaching the earth in Jones County, three and a half miles southeast of the village of Clinton.

Dr. J. F. Barrow, who witnessed the northern tornado, also saw the descent of this one from the same high point of land. Its first effects here were light, and it was not until it had passed some three miles farther eastward that any serious damage occurred. It struck in Jones County a few minutes before 1 o'clock, as nearly as I could ascertain, and traveled eastward into Baldwin County, reaching Milledgeville at 1.15 p. m. Observers in Jones County described the cloud as very black on the south side, and of a reddish, fiery appearance on the northern side. In this respect it was similar to the northern storm-cloud. A great tumult agitated the general mass of the clouds surrounding it. It seemed to be a common center, toward which they were all whirling with great violence. The roar of the storm in the air was heard for more than a quarter of an hour previous to its appearance. Very large hail fell at Clinton for a few minutes just after it had passed.

Through Baldwin County the average width of the track of destruction was 300 yards. Near Brown's Crossing, Macon and Augusta Railroad, ten miles west of Milledgeville, the damage was very great, and several persons were killed. Of the buildings destroyed, hardly one stick of timber remained upon another.

D. W. Brown, who observed the tornado from a point eight miles west of Milledgeville, and a quarter of a mile north of its track, said that the cloud was balloon-shaped,

with several small branches shooting out; felt a strong northwest wind for a moment as tornado passed. No rain, hail, thunder, or lightning attended it; but the black, cloud was luminous within itself, and occasionally presented the appearance of the upward-leaping flames from a burning building. At times the cloud appeared to burst and fly to pieces, and at other moments the gyratory motion was distinctly visible. A huge pine, nearly 2 feet in diameter and 40 feet in height, with a very heavy top, was twisted off and carried more than 150 yards high in the air, whirling like a top. It was afterward found nearly half a mile from its stump.

Three miles west of Milledgeville the tornado crossed a high, heavily-wooded ridge, some 300 feet above the town. Its track here is at least 400 yards wide, and a fine view of it can be obtained for six or eight miles. Its direction is east-northeast by east, and nearly straight, although slight variations, giving it a wavy appearance, may be noticed. This corresponds to a swaying motion that was observed in the cloud during its passage. In the track through the forest on the hill, the trees on the south side mostly lay toward the east, and, on the north side, toward the south. On the extreme northern edge, at one point, I saw many lying toward the west. The following diagram illustrates the general direction of the fallen trees, as noted here:

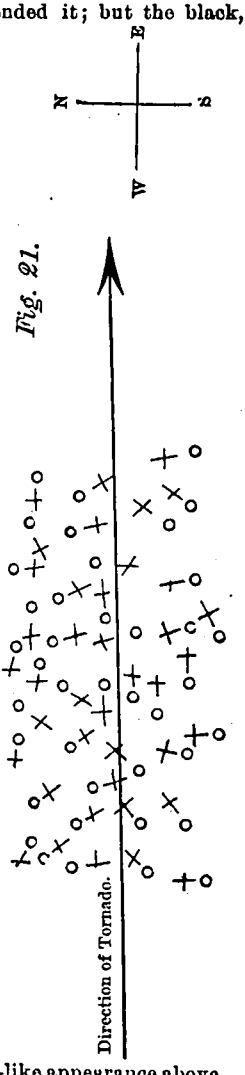


Fig. 21.

The dots indicate the roots and the crosses the tops of the trees. The effects and direction of the whirl are thus plainly shown.

Milledgeville Academy is situated one and a half miles southwest of the town, and in the southern edge of the tornado-path. Prof. Benjamin T. Hunter, principal, saw threatening clouds in the west a few minutes before tornado occurred, and a deep and heavy roar was heard. The professor said: "The windows rattled, and a trembling of the ground was plainly felt, resembling a slight earthquake shock. It was nearly or quite calm at the time, and continued so until the tornado was within 50 yards. The general color of the upper cloud was very dark, but the lower portion assumed different colors in passing from the forests to the fields, owing, probably, to the different materials mingled with it by the winds. Two large hailstones fell near, warning me to seek shelter in the house, which I had hardly reached when the tornado rushed past. The duration of the winds was only a few seconds, and a calm immediately succeeded. The cloud, as it rushed by, appeared like an immense spiral pillar, 50 to 75 yards in diameter, and some 75 yards in height. From its outspreading top issued, in rapid whirls, what seemed like volumes of dense smoke. The cloud-pillar leaned forward, and, in its advance, reminded me more of an immense giant stalking along with outstretched arms, dragging the clouds after him, than anything else I could think of."

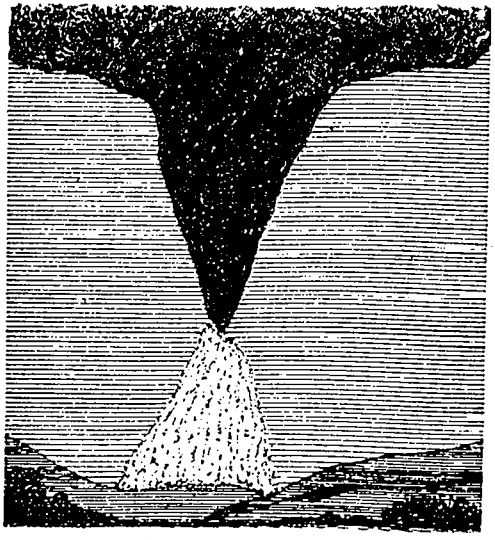
In the track near the academy the north side is sharply defined, while its southern edge is less distinct. The trees mostly lay inward, toward the center of the track, with various inclinations eastward.

As the tornado approached Milledgeville, with its black, smoke-like appearance above, and its lurid or fiery glow beneath, the impression was given that a vast conflagration had broken out, and the fire-bells were rung in consequence. I conversed with many persons who testified to this luminous effect, while others seemed not to have observed it at all. From the town the cloud was watched in its progress for five or six miles, and I append a few general statements among the many given me. The tornado passed half a mile south of the town, and these observations were consequently made from the north or northeast sides.

Captain Kinsley. Cloud very black above and lighter beneath. It assumed various forms while passing. At one moment it was hour-glass-shaped, and, again, funnel-shaped, with its top swaying irregularly forward, or from side to side like an unmanageable balloon. The hour-glass-shaped cloud would occasionally run together, forming a columnar cloud, and then, perhaps, separate in the middle, leaving two distinct whirling clouds, one above and the other beneath. Different objects could be seen revolving in the vortex; amongst others, a hapless buzzard was plainly descried. At times, an upward-rolling motion gave the cloud the appearance of smoke ascending from a vast locomotive.

William McKinley, esq., testified: A heavy thunder-cloud covered the western and northern quadrants of the heavens, and the tornado-cloud was observed bursting through and absorbing the general cloud. It assumed various shapes, and at one moment the hour-glass form was well defined. The color was pitchy black, and no luminous effect was seen. A terrific roar was heard, and buildings trembled as from an earthquake.

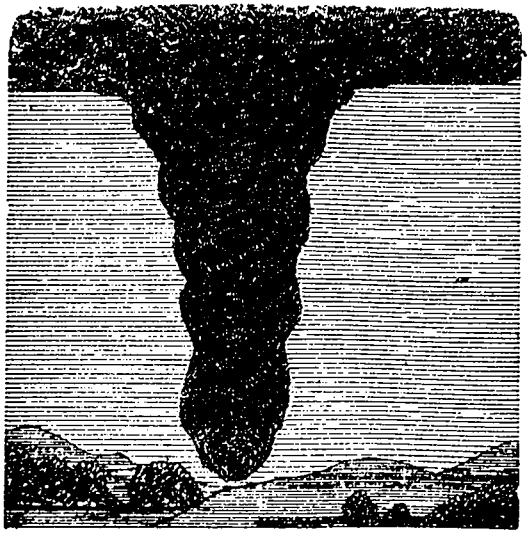
Capt. T. W. White saw the storm-cloud burst through the general curtain of clouds in the west. The hour-glass shape was noticed, the upper portion being very black and clearly defined, and the lower portion lighter and less distinctly marked. Apparent height of cloud 400 yards. A little rain fell as the tornado passed, and a brisk northwesterly wind blew for a few minutes. Heavy rain followed the tornado at an interval of one hour, accompanied by a high wind, which lasted for fifteen minutes. A crayon sketch of the tornado-cloud was kindly furnished me by this gentleman.



Tornado cloud at Milledgeville.

Judge Sandford watched the tornado from the west windows of the State-house, which commanded a fine view. He noticed the hour-glass shape as described by Captain White. When he could see the phenomenon no longer from the west windows he ran to the east portico, a distance of some 30 yards, but by the time he arrived there it had disappeared over the hill beyond the river, two miles away.

P. M. Compton. Cloud funnel-shaped and very black above but luminous beneath; thought it was fire at first; felt trembling of ground, and windows jarred so that he could hardly hold them. The roar was audible for a long time before tornado appeared. Trees and other objects were observed whirling in the vortex. A strong wind, directly toward the tornado, was felt for a few minutes.



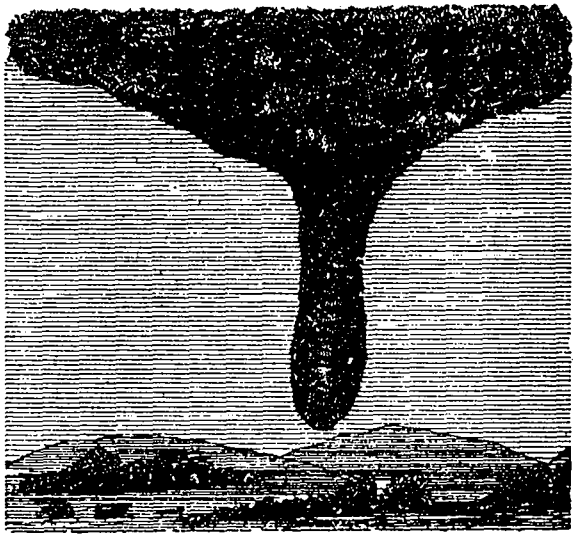
Tornado cloud at Milledgeville.

This gentleman had a good barometer in his store, the uncorrected reading of which was 28.68, half an hour after the passage of the storm.

Dr. J. S. Green, superintendent of the State Asylum for the Insane, observed the tornado from the southern side, and one and a half miles distant. Cloud hour-glass-shaped, very dark above, with a lurid appearance below. The gyratory motion was plainly seen. A heavy southwest wind blew for a few moments. It was sufficiently strong to prostrate some of the strongly-built fences around the asylum-grounds. No hail and but little rain during the afternoon.

Dr. Green has in his possession a very interesting memento of the tornado. It is an ordinary pine shingle about 18 inches long and 4 inches wide, which was found driven, sharp end foremost, nearly 2 inches deep into an oak sapling some 4 inches in diameter. I could not induce the doctor to part with his trophy, but I present a drawing of it herewith. (See Fig. 22.)

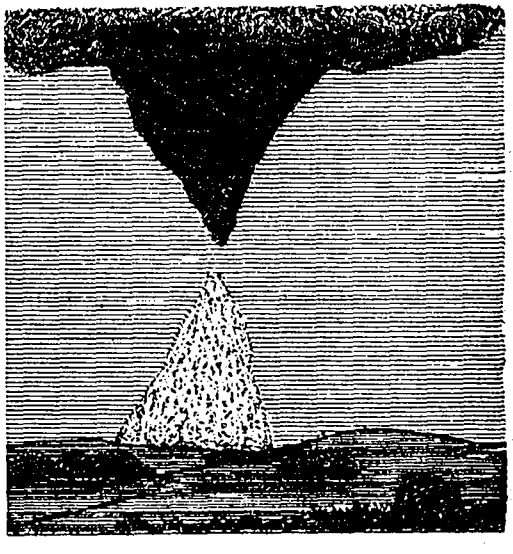
Among the incidents illustrative of the force of the wind related to me at Milledgeville, I note the following: A colored man named Charles Johnson, who was hauling a load of lumber, was caught in the storm. The horses and driver were carried some distance. The lumber and wagon were blown completely away, a portion of the latter being found over the river, a distance of more than a mile. Another negro, Richard Gonder, was killed by the flying timbers or boards. The top of his skull was knocked off, and was found nearly half a mile away several days afterwards. A negro child was taken up in the tornado, and at the time of my visit, three weeks later, had not been found.



Tornado cloud at Milledgeville.

To Colonel McAdoo, the gentlemanly and obliging editor of *Every Saturday*, I am greatly indebted for his efforts in assisting me in gathering information, particularly regarding the formation of the water-spout on the Oconee River. This fact was positively affirmed by Frank M. and George W. Fair, and a young man named Ferrell, all of whom witnessed the phenomenon. The height of the water-spout was estimated at 100 feet, but I could not ascertain its apparent diameter. These persons were all in the southern edge of the tornado, and noticed no light in the cloud, which, to them, appeared balloon-shaped and very black.

The formation of the water-spout was also witnessed by Hamilton Brown, an intelligent colored boy about sixteen years old. His point of observation was from the opposite or east bank of the river, 150 yards above where the tornado crossed. As the whirlwind approached the river the water was seen to leap up towards it, and the fully-developed water-spout he described as being like an immense auger, apparently boring the very bottom out of the river.



Tornado cloud at Milledgeville.

Henry Temples, a merchant of Milledgeville, examined the bluff on the eastern bank of the river the following Monday, and he informed me that the place where the water-spout broke and deluged the ground was then distinctly visible. Fishes were found in some instances at long distances from the river, and two beavers were reported to have been found on the bank some 75 feet above the water-level.

From the extra issue of *Every Saturday*, March 20, I quote the following:

"At 1.15 o'clock to-day a terrible whirlwind passed the southern suburbs of the city, extending across the corporation-line and embracing an area of about 300 yards in width in its passage. It twisted houses and trees and everything in its course from the face of the earth, dashing them with fury to the right and left, or carrying them for hundreds of yards directly up, almost into the very clouds,

it seemed; then dashing them away from the circle of its influence, the ponderous trees came crashing to the earth.

"The writer, with many others, was attracted by the roaring noise, which sounded like the rushing of many waters, and mounting a house watched the whirlwind as it approached through a tremendous forest. It was terribly grand to see the huge pines and massive oaks twisted off and hurled hither and thither as if they were but straws.

"About one hour after the storm, hail as large as a guinea-egg fell with great rapidity for about two minutes. Nothing like the occurrences of this day has ever been witnessed before in this section."

After crossing the Oconee River the tornado continued its work of destruction with unabated fury for four or five miles, when, I was informed, the track became much narrower and evinced a greatly diminished energy. It pursued its course through Baldwin and Hancock Counties into Washington, where I made my next examination, twenty-five miles east of Milledgeville. At this point I found barely evidences enough to mark the track, which was indicated by an occasional tree blown down toward the east, showing that the westerly winds, following in the wake of the disturbance, were strong enough to do some damage, while the whirl of the storm was entirely above the surface of the earth. The track was but ill-defined, and seemed to be not more than 50 yards in width. The noise caused by the commotion in the air attracted considerable attention at the time. Hail fell on the northern side of the track, for a width of four or five miles, half or three-quarters of an hour after the passage of the tornado. The county is very thinly settled here, and I did not see a single person of intelligence living sufficiently near to give any definite information.

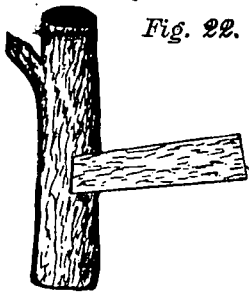


Fig. 22.

When within five miles of the Ogeechee River the tornado struck the earth with greater violence, uprooting trees and scattering fences for a width of nearly half a mile.

Many buildings were destroyed on two or three plantations and several persons badly injured. The terrible agent of destruction crossed the river near Curry's mill, about four miles below "The Shoals," entering Glascock County with an energy fully as great as it had shown at any previous time.

I give the statements of a few of the persons with whom I conversed in this county:

Benjamin Ivey, sheriff, Gibson: Tornado passed between 1 and 2 p. m. Was one and a half miles north, but noticed no wind at the time. No hail, rain, thunder or lightning attended it, but a severe hail-storm occurred about half or three-quarters of an hour afterward. The stones were flat and irregular in shape, being more like broken sheets of ice than like ordinary hail-stones. These pieces of ice were, in some instances, half as large as a man's hand, and small icicles projected from many of them. They fell so rapidly that the ground was nearly covered in a minute or two. The sky was overcast at the time of the tornado, very black clouds covering the western and northern portion of the heavens, and lighter clouds the southern and eastern. The tornado-cloud was intensely black, but no definite form or outline was observed. Eight persons were killed in the county and twenty-five or thirty others more or less injured.

John Williams, Gibson: Saw tornado approaching and had time to close store and go home (200 yards distant) before it passed. Time, between 1.30 and 2 p. m. Cloud very black and rolling along close to the earth, reaching up apparently 300 yards. Could mark no definite shape. Hail of large size and flat in form fell for about two minutes one hour after the tornado, nearly covering the ground. Belt of hail about four miles wide.

Richard Waldron: House stands in northern edge of track, one and a half miles south of Gibson. Time of tornado between 1.30 and 2 p. m. Mrs. Waldron was at home and observed the approaching cloud, the appearance of which was like dense black smoke, with an upward boiling and forward rolling motion. Trees and negro cabins were blown down all about the house. (The marks of the huge hail-stones were still plainly to be seen on the sides of buildings, &c., here, and these impressions showed conclusively that when they were described as being half as large as a man's hand their size had not been overestimated.)

Mrs. Thigpen, three miles southwest of Gibson and 200 yards south of track: Tornado passed at 1.50 p. m. by the clock. A few hail-stones fell at the time, and heavy hail about an hour later. No thunder or lightning. The roar of the storm was terrific and its appearance most appalling. The cloud rolled along on the ground and seemed but little higher than the tops of the trees. Fences on plantation nearly all blown down.

T. Dixon, one mile south of track and five miles southwest of Gibson: Felt a strong southwesterly wind when the tornado passed. No hail. Cloud indefinite in shape; rolling along upon the ground with great velocity.

Thomas Caldow, one mile north of tornado-track and four miles west of Gibson: Cloud intensely black and larger below than above, being somewhat dome-shaped.

Apparent mean diameter 50 yards, and height 300 yards. Hail and rain-storm, with strong westerly wind, about an hour after tornado.

Judge Henry Logue, Gibson: Tornado passed at 1.45 p. m. Felt but a slight breeze. Apparent height of cloud 20°, (distance, one and a half miles,) and diameter about same. Hail in the after-storm in large pieces like saucers.

The width of the track through Glascock varies from half a mile to a mile. The county is very thinly settled, and consequently the greater part of the devastation is in the forests. I found the same general features here as elsewhere, the trees mostly lying at right angles to the course of the storm and inward from both sides. Near the center they were thrown in all directions, and on the northern side of the track a few lay toward the west and southwest.

From Glascock the tornado entered Jefferson County, near Rocky Comfort Creek. The damage in the western part of this county was comparatively slight, and the whirlwind soon rose into the air and passed eastward some fifteen miles, next striking the ground in the eastern part of the county. I learned that its descent here, as in other places, was gradual; and, as it was inconvenient for me to make a personal examination of that portion of the track, I did not think it worth while to do so. The following letter, extracted from a Macon paper, gives its history here:

"STELLAVILLE, GA., *March* 21, 1875.

"EDITORS TELEGRAPH AND MESSENGER: Yesterday, the 20th, this part of Jefferson County was subjected to a most fearful gale of wind, the parallel of which, we think, never crossed this belt of country. Being on the south side of the storm I could see its fearful race. Language would fail to describe the fearful scene. Its first appearance was that of a smoke arising from some building enveloped in flames, continuing to grow and spread until the whole element became dark and terrible.

"Coming on from the southwest it struck J. R. Farmer's plantation, taking down trees, fences, and houses as it went. Just beyond his premises is Mount Moriah campground. On this ground were the church, a fine large arbor, and eighteen good, commodious tents. It is almost devastated. Passing on in the same direction it entered the plantation of James E. Daniel, sweeping everything in its route. Going on with increased force, the tornado entered a large belt of pine timber and left not a whole tree standing. At the last extreme of this belt of timber it passed into the plantation of A. G. Holley, very nearly leaving his settlement in a heap of ruins, some of his family narrowly escaping injury. A two-horse wagon was carried from near his house 200 yards. We found pieces of a table from 150 to 250 yards from his house. Rushing on at a fearful velocity it crossed Brier Creek, sweeping down every tree in its track, and, entering Burke County, left in ruins the premises and plantations of Wesley Parks. No lives were lost at any of these places, so far as heard from.

* * * * * * *

"JNO. W. BECKUM, JR."

I was informed that one of the doors of Mount Moriah church, referred to in the above letter, was afterward found seven miles northeastward. I give below some extracts from a private letter published in the Augusta *Chronicle and Sentinel*, describing the ravages of the tornado in Burke County:

"We had quite a hurricane through our vicinity on the 20th. I have never seen such destruction from a storm. It has rendered a good many farmers unable to make a crop. Thousands of acres of land that were prepared for culture will be thrown aside. Your place is utterly ruined. There is not a building or a panel of fence on the place. The top of the dwelling-house has never been found. * * * * You can imagine the severity of the storm when it killed birds and chickens, and even blew up the oats which had been planted on your place. * * *"

From Burke the tornado passed into Richmond County. I append extracts from a letter written by the Hon. A. C. Walker to the Relief Committee, Augusta, and published in the Chronicle and Sentinel of that city. It gives a graphic description of the tempest in the western part of this county:

"*The passage of the storm.*—The storm entered Richmond County from Burke at Fulcher's mill, on McBean Creek. Here Fulcher, and I think three other families, living near Daniels and Usher, sustained its fury. From Usher's it passed harmless, I believe, for a distance of two miles or more, until it reached a tenant of Cyrus Hudson's, about a mile and a half from my residence. It was from this place, in the one hundred and twenty-first district, to the Savannah River, that assistance from your contributions was rendered. The tornado advanced from due west, going a little south of east. The distance traversed in this county is about fifteen miles. About forty-one families were in its direct track, numbering, I suppose, some one hundred and sixty souls. The injury to property I judge to be $6,000 or $7,000. The destruction of timber, and the decrease from its effects in farm products, will probably bring up the whole loss in this county to $15,000. It is doubtful if it could have selected a route of the same distance where less damage would have been sustained. The occupants of several farms have abandoned them and their year's labor entirely. The fields are so obstructed with fallen timber as to render cultivation impossible.

"*The appearance and motion of the horror.*—The phenomenon, doubtless, bore a resemblance, in several respects, to the little whirlwinds which may be seen almost any summer-day careering over the fields or elsewhere; these have a gyratory or rotary motion—expand and contract at the base or summit, or even in the center, while again they assume the form of an upright column; they ascend from the earth and again descend; the force they exert seems to be that of suction, like that of the whirlpool, the latter being downward, and if this is so it would seem to imply a vacuum in the body of the moving cloud. The leaves or other light matter drawn in by these small whirlwinds are thrown out in different directions as they revolve. They vary their course, however, with every counter-current they meet, while in momentum and velocity the tornado was superior to any obstruction. Where it passed my residence the main column was about 300 yards in diameter; but a mile distant, where it crossed a thickly wooded small stream, I am told the limits are well-defined within a space of 50 yards. The fallen timber lies at every angle to the direct course of the column, and while its weight and velocity were terrible, I am inclined to think that it rather drew trees up by the roots and lifted houses from their foundations than forced them down by pressure. The wind was blowing at the time from southwest, nearly against the advance of the storm; a few drops of rain fell, very few, as it passed; but in from twenty to thirty minutes it was followed by a heavy rain, accompanied with thunder and lightning.

"*Its approach and effects.*—My bedroom windows, on the lower floor, look west and south. I saw nothing of its approach; its presence was announced to the eye by an instantaneous misty gloom, accompanied by a rush, a roar, a crash, and with unearthly shrieks and groans—

> "'As though all the fiends from heaven that fell
> Had pealed the banner-cry of hell.'

"A glance through the windows showed, amidst this gloom, the forest in a most terrible state of agitation; the trees were waving and swaying and plunging headlong to the earth, as though moved by some tremendous power of propulsion from beneath. Just at this moment the top limbs of a large pine crashed through the end window of the room, revealing the direction in which the trees were falling. To avoid the danger from this source, I seized the hands of my wife and little daughter and moved into the hall or passage; as we reached this, the rear hall-door flew open and displayed a sight that did not, like the Gorgon's head, turn into stone, but relaxed every fiber of the body and soul, and crushed out the little of life and hope that was left. While we were seeking to escape the danger in those few seconds the danger was past, and the storm-cloud a mile away. Where had stood the pleasant scene of groves and houses, of orchards, of fences and fields, upon which, for forty years, the eye had lingered with delight, there was now but an open plain. Even in these few seconds it had become calm, and looking over the scene, the very silence brought with it a sense of the presence of death.

* * * * * * *

"With great respect, your obedient servant,

"A. C. WALKER."

I examined the track of the tornado for some distance several miles east of Mr. Walker's place. I found its extreme breadth from 450 to 600 yards; but the central track, indicating the full force of the tornado, is hardly 50 yards wide. To this extent the destruction is complete, the ground being swept nearly clean of twigs and pine leaves, giving the ground the appearance of having been swept by a strong current of water. The course of the tornado was due east here, with some little spurs running out irregularly.

Mrs. Mary Gepfert, Mechanic's Hill, Richmond County, thirteen miles south of Augusta, five miles east of Mr. Walker and a half mile north of the track of the tornado, witnessed its passage. Time, between 2.30 and 3 p. m. Threatening thunder-clouds covered the western sky, but the tornado-cloud was distinct from the other clouds, having a whitish appearance like the smoke from burning straw. As it passed, its roar was almost deafening. Trees and other objects could be seen whirling in the air, in and above the cloud. The wind blew "all around" at her house, and was sufficiently strong to level fences. Hail fell in abundance during and after the passage of the tornado. It was of large size and irregular in shape. Some pieces were long like icicles, and others resembled rough pieces of snow coated with ice. It was generally soft and yielded readily to pressure. No less than four storms passed over during the afternoon and evening, two of which were attended by hail.

B. Granner was at Hollywood, ten miles south of Augusta and three miles north of the track, when tornado passed. It was immediately preceded and followed by hail. Time, 2.45 p. m. His house stands in the southern edge of the track. Bright sparks, like numerous ignited matches, illuminated the tornado-cloud. A boat, which was

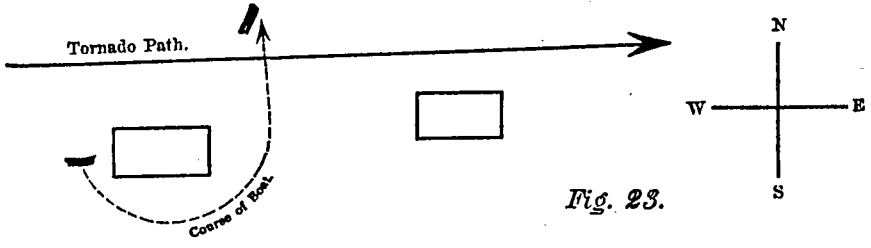


Fig. 23.

lying near his house, was carried more than a hundred yards and smashed to pieces, pursuing a course indicated by the following diagram:

It was seen by a negro as it passed between the two buildings.

Edward Clark witnessed the passage of the storm-cloud from McBean Station, one and a half miles south of track. Its appearance was terribly grand and its roar fearful. The pitchy black cloud, seemingly 300 yards in height, looked like the densest smoke from the stack of a locomotive. It whirled rapidly with a general upward motion, and occasionally portions could be seen darting quickly downward. No definite shape was observed. The time was 2.50 p. m., as indicated by the afternoon train from Savannah, which had just arrived at the station. No hail fell at McBean when tornado passed, but a severe rain and hail storm, with a heavy blow, occurred some two hours later.

Near this place I examined the ruins of a small negro church that had been destroyed. The boards and timbers were still lying as the tornado had left them. The building stood in the southern side of the track, and had been moved 6 feet northward, off its foundation-blocks. The positions of the boards indicated that the structure had burst outwards from the expansion of the air, as many lay both east and west of where they would have fallen had they only been acted upon by the same force that moved the building before it went to pieces. As this southerly wind did act upon them, to some extent, they were thrown neither directly west nor east by the explosion, but toward the northwest and the northeast on the west and east ends, respectively.

At the point where the tornado crossed the Central Railroad, (of Georgia,) eleven miles south of Augusta, the track is less than 100 yards in width, being much narrower than it is two or three miles farther west near Mr. Granner's. Passing on its course, it crossed the Savannah River half a mile further east and entered South Carolina, where it continued its destructive career for fifteen or twenty miles into Aiken and Barnwell Counties. The following extract is from a letter written me by H. A. Green, near Ellenton, Aiken County, South Carolina:

"The tornado crossed the river at Silver Bluff and the Port Royal Railroad at Jackson Station, where it blew down several houses. It passed through a number of plantations, scattering fences and buildings in all directions and uprooting or breaking off nearly every tree in its path. It reached our place about half past 3 and passed in about three minutes. It came with a whirl, rolling over and over. The wind-storm passed about half an hour before the hail and rain came. The hail-stones were the largest I ever heard of. Birds and fowls were killed by them. The track is quarter to half a mile, and, in one place, one mile wide."

The last damage done by the tornado in this part of the State was about twenty-five miles southeast of Augusta and seven or eight miles southwest of Windsor, in Barnwell County. Again it arose from the ground and crossed the South Carolina Railroad without leaving any trace. Nothing further was heard of it until it reached Orangeburgh County.

The town of Orangeburgh is about sixty miles from the Savannah River in a straight line. The time of the arrival of the tornado here was approximately stated at 5 p. m., or two hours after it had entered the State. The length of the track through the county is about twenty-five miles. For a distance of four or five miles a double path is plainly seen. The northern track is 50 to 60 yards in width, and for this space the destruction of timber through the forest is nearly complete. The southern track is from 150 to 200 yards in width, but is not quite so clearly marked as the northern, as only a part of the trees were broken off or uprooted. The intervening space between the two tracks is about 100 yards wide, and the traces of the storm are hardly perceptible here. Most of the fallen trees in both tracks lie toward the east, but with some inclination toward the center in either case. I conversed with many persons in this vicinity, without, however, being able to elicit anything new in regard to the general features of the storm except respecting the formation of the double track.

Col. A. D. Frederick, two and a half miles south of Orangeburgh, through whose plantation the destroyer swept, and whose house stood in the northern part, stated that he saw two distinct clouds, which appeared to meet as they approached. Neither cloud assumed any definite shape, but seemed like an angry mass of whirling, boiling, black smoke, rushing violently along close to the ground. A few large hail-stones, the

size of goose-eggs, fell just in advance of the tornado, and heavy rain attended its passage, continuing for a few minutes afterward. The hail here, as in many other places, seemed to be confined to the northern side of the storm-path, as persons living on the south side did not observe any.

G. H. Barnett, half a mile south of the track, felt a strong southwesterly wind for a few seconds as the tornado passed. Torrents of rain, but no hail, attended it.

In this section the tornado continued its work of destruction for some sixteen miles east of the town and through the county of Orangeburgh. I heard of only two persons who were killed, but many were injured. Negro cabins were swept away and orchards desolated. Before reaching the Santee River it again left the earth and passed harmlessly on its way toward the Atlantic. I made further efforts to find its track in the eastern portion of the State, and was rewarded by learning that some damage from a storm occurred March 20, near Indiantown, in the eastern part of Williamsburgh County, seventy miles east of Orangeburgh. This location lies directly in the line of the tornado, as last located by the compass in Orangeburgh County. I am thus induced to believe that it resulted from the same disturbance. The place being remote from the railroad, and transportation of any kind difficult to secure, I did not attempt to visit it. I ascertained, however, that the track was but short here, as it did not run nearly so far westward as the Northeastern Railroad, nor so far eastward as the Great Pee Dee River.

Before passing into the Atlantic the tornado made still another downward dip at Dogwood Neck, in the eastern portion of Horry County. The time that this occurred is indefinitely stated by Thomas W. Beaty, editor Horry News, at half past 6 or 7 o'clock p. m.; probably quite as late as the last-mentioned hour. The track was short, and but one house was reported destroyed. This was a frame building, and swept away to the floor.

If this damage at Indiantown and Dogwood Neck really resulted from the tornado, last heard of at Orangeburgh, and the time of its arrival at Dogwood Neck is correctly given, it must have traveled with a speed of nearly or quite sixty miles an hour from Orangeburgh, while, for the two hours previous, it had hardly exceeded thirty miles an hour. The data, however, lacking corroboration, I do not introduce it in my estimates of the progressive velocities of the tornado. (See p. 426.)

THE WHITESVILLE STORM.

The path of this tornado is indicated by track No. III on the accompanying map. It occurred between 1 and 2 o'clock p. m., March 20. I did not examine its path, but I learned that its entire length was not more than thirty-five or forty miles, through portions of Lee and Chambers Counties, Alabama, and Harris County, Georgia. In Harris County its track is nine miles north of No. II, running near the village of Whitesville. The same general features that characterized the other tornadoes also attended this. The following description of this storm was kindly forwarded me by an eye-witness. After referring briefly to the two tornadoes which had passed through the county (Harris) earlier in the day, he says:

"The tornado of which I write passed about 1.40 p. m., seven and a half miles north of Hamilton, and near the Troup County line. It entered the State from Alabama, crossing the Chattahoochee River some six or seven miles south of West Point, Ga. I live at Cochran's Cross-roads, about three miles south of the Troup County line, and two-thirds of a mile south of the track of the tornado, and was at home on the day of the storm. Those who were directly in its path say it was from two to five minutes in passing; from what I saw, I think it passed in a much shorter period—not exceeding one minute. A little hail and considerable rain had fallen here during the forenoon, attended by a light wind from the southwest. A heavy, dark, well-defined cloud rose from the northwest about 1 o'clock p. m., and was about 45° high at the time of the passage of the blast. A solitary cumulus mass (usually called by us a 'thunder-head') covered a space some 15° in diameter, and was certainly the germ of our tornado. It was noticed only ten or fifteen minutes before the storm was upon us. Lightning-flashes, followed by loud peals of thunder, darted downward in rapid succession from this 'thunder-head,' and long wisps of wiry-looking clouds shot out from or formed to the eastward of it. A very heavy rain soon set in, which, however, rather held up, when the awful deafening roar of the storm-cloud fell upon our ears. Seen at this time, the cloud appeared like the blackest smoke slowly rising in huge volumes from the surface of the earth, and whirling round and round with great rapidity. These volumes of smoke-looking clouds did not seem to move *forward* very fast, but others, of like appearance, rapidly and successively formed to the eastward of them. A few minutes after the storm passed, there was a very unnatural light in the atmosphere, as if the sun was about to shine out from behind some light, thin clouds, although at the time a heavy rain, accompanied by some small hail-stones, was falling, and the wind was blowing pretty hard. Half an hour afterward it began to clear up.

"The appearance of the cloud, after it passed, was funnel-shaped, vertical in position, opening upward and intensely black. It did not seem to be attached to any other cloud, but suspended, as it were, in mid-air, moving rapidly eastward, and whirling

round with great velocity. The end of the spout of the funnel appeared like the loose shreds of an untwisted rope, somewhat diverging or spread out. These shreds ascended and continued to form the body of the revolving funnel. As fast as one shred disappeared another was formed at the end of the spout, to follow the same action.

"The track of the tornado here was 300 yards wide. A mile farther eastward, where it was more destructive, it is only 150 yards in width. The effects of this storm, so far as I have examined, are least severe where the path is widest, and *vice versa*. The temperature was much the same all day (warm) until 3 p. m., when it grew sensibly cooler. The force of the wind was sufficient to blow down all of the large and much of the small timber; fences, houses, &c., shared the general destruction. At its narrowest places it blew off the surface of the ground. The manner in which the timber was left indicates the whirling motion. The storm passed one mile north in progressing five miles eastward.

"Our county was visited on the 10th instant (April) by another tornado, similar in all respects to those of the 20th ultimo. Not so much loss of life, as it struck but few houses. Its track varies from 125 to 400 yards in width. In traveling five miles it passed one and a half miles north of east. It passed south of us, and its nearest point to us was about midway between the one that ran near Hamilton and the one I have attempted to describe. * * * * * * * * *

"Respectfully yours,

"W. W. SMITH."

THE FOURTH TORNADO

occurred in Scriven County, Georgia, late in the evening. Its track is short, as it does not run as far westward as the Central (Augusta and Savannah) Railroad, in the western part of the county, nor as far eastward as the Port Royal Railroad, just east of the Savannah River. The following account, published in an Augusta paper, is, in fact, the only information which I have received concerning it, although I made diligent inquiries elsewhere:

"SYLVANIA, SCRIVEN COUNTY, GA., *March* 24, 1875.

"*Editors Chronicle and Sentinel:*

"GENTLEMEN: Permit me a small space in the columns of your valuable journal to give a brief account of a terrible storm—tornado—that passed about fifteen miles southwest of this place on Saturday night, the 20th of March, between the hours of 7 and 9 o'clock p. m., leveling trees, fences, and in some places buildings, and leaving wreck and ruin in its track. The main current of the storm was not more than a few hundred yards wide, in which it swept with a besom of destruction.

"In passing over the plantation of Hon. W. Hobby, of this place, it seemed to have spent its utmost fury. Not only fences, trees, gardens, &c., laid prostrate, but his gin-house, stables, wagon, well-shelters, and eight negro cabins were completely demolished. A large two-horse wagon was taken up and carried several hundred yards, and with all, strange to say, not an individual was hurt. The storm was the most terrific within the memory of the oldest inhabitants of the village. All this destruction was the work of a few moments, after which the clouds passed away, and the moon shone forth in all its glory, shedding its placid light upon the wreck of a ruined farmer. * *"

TORNADO NO. V,

on the accompanying map, occurred between 5 and 6 o'clock in the evening, or about an hour after No. I had passed some twelve or fourteen miles north. The extreme length of its track is hardly ten miles, commencing one and a half miles east of the Little Pee Dee River, and running eastward. The character of this storm is described as being somewhat less severe than its northern neighbor, but still very destructive. Straws and other light objects fell near Conwayborough, about fifteen miles to the southeastward, but they may have come northward from the southern tornado, (No. II,) the course of which ran somewhat nearer.

THE NORTH CAROLINA TORNADOES.

These are represented by tracks Nos. VI and VII on the accompanying map. No. VI occurred at 11 a. m., March 20. Its track is about 400 yards wide, and three and a half miles long, and its direction from southwest to northeast, running some three miles north of the town of Statesville, Iredell County.

The following notes concerning it were furnished by I. A. Allison, of Statesville:

"Noticed a very black cloud in the west. Shortly I heard a rumbling noise like a train of cars passing through a deep cut. The cloud, as it approached, appeared in great commotion. Was three and a half miles north of Statesville, and storm passed 400 yards behind me, over the tops of the trees. It gathered force for the next three miles, when it struck Blacock's farm, where it spent its fury, cutting an avenue nearly a quarter of a mile wide through the forest, and blowing down every house on the place, except the dwelling, which is damaged considerably. Provisions and fodder were scattered in all directions. The timber was thrown in every conceivable position, as by a whirlwind. It continued its course half a mile farther, to the South

Yadkin River, when it rose above the tops of the trees, assuming the character of a very severe gale, three or four miles south of Mocksville, in Davie County. There was considerable electricity manifested, and torrents of rain attended the storm. There was no hail. At 3 p. m., a thunder-storm of considerable violence came up from the west. The tornado of to-day followed very nearly one of less violence that occurred April 20, 1871. The northern limit of the last tornado was the southern limit of that of 1871 at this place."

No. VII seems to have passed almost due east over the northern portions of Lincoln and Mecklenburgh Counties to Cabarras County, and thence probably northeastward to Chatham and Wake Counties. The following notes are all the information yet received concerning it:

From postmaster at Lincolnton, Lincoln County, North Carolina.—"The destructive portion of the storm commenced at Little Mountain, nine miles northeast of this place, between 3 and 4 o'clock p. m., March 20. It became very dark at the time. The storm traveled east. The width of the track is two and a half miles. Trees were uprooted, and fences and buildings blown down."

"MOUNT PLEASANT, CABARRAS COUNTY, NORTH CAROLINA.

"On the 20th, at 4.15 p. m., there passed over this place one of the most severe storms that has visited this section of the country for many years. In the more destructive track of the storm, trees were uprooted or snapped off. About one-quarter of the roof of the south wing of the college was carried away, and nearly all the chimneys blown from the main building. The width of the track was about 200 yards, having a direction due east. On the south side of the track the wind was west-southwest, while on the north side it was north of west, as was indicated by the fallen timber, and the direction in which light material had been drifted, I do not think that the violent part of the storm continued more than two or three minutes. It was accompanied by rain and hail.

"T. J. LUDWICK."

The above is from the Volunteer Observer's Report for March, 1875. The following is extracted from a Raleigh paper:

"*Pittsborough, N. C.*—The tornado came from a westerly direction. It was preceded by a fearful stillness, soon followed by a loud roaring as of distant and continuous cannonading. It lasted for a space of two minutes, and was accompanied by a waterspout, which broke over the town, deluging everything. Great damage was also done at Morrisville and Wake Forest."

It will be observed that the time of the occurrence of the tornado in this vicinity (Chatham and Wake Counties) is not given. Its connection, therefore, with the storm last heard of in Cabarras County is hypothetical, being indicated only by the proximity and direction of that storm.

OTHER STORMS OF MARCH 20.

Besides these destructive tornadoes, many other local storms of great severity occurred in Georgia and the Carolinas on this day. In some sections three or four of these passed over during the afternoon, as is noted in the various statements previously given. In the vicinity of the tornado-tracks in Eastern Georgia, one of these storms, some thirty or forty miles in width, occurred between 3 and 5 o'clock p. m. It was described as "the most terrible storm for years," or the "worst ever seen." Large quantities of hail fell, and trees and other objects were blown down—all by a westerly wind. Had not its destruction been altogether overshadowed by its frightful predecessors, it would, doubtless, long have been held in remembrance. It was this storm that extended into Western South Carolina, doing considerable damage in the vicinity of Aiken.

Another of these severe storms passed over Central North Carolina, between 3 and 5 p. m., sweeping an extent of country some fifty miles in width. Considerable damage was done in the neighborhood at Raleigh, and probably the tornado indicated by track No. VI was engendered by it.

As the general barometric depression, referred to in the earlier pages of this paper, approached the Atlantic, it turned its course toward the southeast under the influence of the higher pressure crowding down from the north, which thus developed a series of local storms on its northern side. One of these passed over Louisburgh, N. C., and is thus described by the postmaster of that town:

"No whirlwind visited this place, but a severe storm about 5 p. m., March 20. The cloud was a strange mixture of black and red, its outer edges resembling huge banks of red snow rolling over each other. It traveled a little west of south. Prostrated trees fell in the direction of the storm, or toward the south. The cloud did not rest continuously on the ground, but leaped along like a cannon-ball thrown obliquely against a hard surface. The extreme duration of the storm was about fifteen minutes."

Into the very bosom of the Atlantic, and probably far out to sea, these storms attended the general depression. At 4.35 p. m., a southwest gale was reported from the

Signal-Service station at Cape Hatteras, the velocity of the wind at that time being forty-one miles per hour.

Thus passed from our notice what will long be remembered as the most remarkable meteorological disturbance of the season—remarkable for its prodigious effects, while it is comparatively insignificant on the weather-maps as an area of low barometer.

SIMILAR CHARACTERS OF THE TORNADOES.

That these various tornadoes were of the same general character—that of a terrific whirlwind—is plainly and abundantly proved, both from their effects and the concurrent testimony of numerous witnesses. Of the two principal tornadoes, I was frequently interrogated as to which had been the most severe; and I could only say that in this, as in all other respects, they were so nearly alike that one might have been a continuation of the other, so far as their general character was manifest. Long gaps were left in the tracks of each, but altogether No. I wrought more destruction, as the path was more continuous.

THEIR PROGRESSIVE VELOCITIES.

This can be ascertained with considerable accuracy in the cases of Nos. I and II, as the great distance traversed by both of them gives good opportunities for such calculations. No. I traveled from near Hamilton, in Harris County, to the Savannah River, a distance of one hundred and seventy-six miles, in two hours and a half, giving a velocity, in round numbers, of seventy miles an hour for this portion of its track. From the Savannah River to Marion Court-House, S. C., it occupied three hours, nearly, giving a velocity of fifty-five miles per hour for its passage through this part of South Carolina, the distance being one hundred and sixty-five miles. No diminution of speed occurred until after it crossed the Savannah River.

The southern tornado (No. II) consumed three and a quarter hours in traversing the country from Mount Airy, Harris County, Georgia, eastward to the South Carolina line. The distance is one hundred and eighty-five miles, demonstrating a speed of fifty-seven miles per hour. Nearly or quite two hours were occupied by the same tornado in traveling about sixty miles, from the Savannah River to Orangeburgh, S. C., thus reducing its progressive velocity to thirty miles per hour in this portion of its track. In these calculations no allowance has been made for difference in local time, which, however, would not be sufficient to change the general results.

To what cause can we assign this retarded motion in the movement of both tornadoes? To answer this question, perhaps a consideration of the topography of the country will be necessary. Both tornadoes commenced their work of destruction in Western Georgia, in a more hilly section of country than any other which I visited, except, perhaps, in Jones County. Two ranges of hills, known respectively as the Pine and Oak Mountains, extend through this section. They are the southwestern extremities of the great Appalachian Range, and their highest points in Harris County, near where the tornadoes first struck the earth, attain an elevation of 1,200 feet above sea-level, or 900 feet above Columbus, on the Chattahoochee River. Throughout Central Georgia—the section traversed by both tornadoes—the general character of the ground is rolling or hilly, and I am informed that this portion of the State is somewhat higher than the section lying a little distance northward, and decidedly more elevated and broken than the country farther southward. In South Carolina the southern tornado runs entirely in a flat section, as also does the northern one after reaching a point some twenty-five or thirty miles east of the Savannah River. These facts strongly indicate that the tornadoes preferred the higher ridges of country, and traveled most rapidly where the character of the ground was the roughest.

In every instance in the State of Georgia where the tornadoes seemed to exhibit a diminished energy, or where they left the earth altogether, I found (with one exception) that the country became more even, and in some instances quite level, while, on the contrary, (in this State,) the surface of the earth was rolling or hilly where it recommenced its work of destruction. It was not that the level ground was so much lower that the tornado, in pursuing a right line through the air, would necessarily pass over it. Instead of doing so, it seemed rather to rise bodily above. That the tornado did not travel straight through the air is proved from the fact that its effects were frequently more severe in the hollows and valleys, and also by the testimony of many eye-witnesses, who described its motion as undulating, or rising and falling.

Assuming the tornado to be the result, directly or indirectly, of electrical action, it may also be assumed that, in a measure, electricity was likewise its locomotive power. The incipient tornado, charged with electricity, is attracted by the higher ridges of country over which it may be passing. It descends to the ground, and, by its friction in traversing the rough surface, develops more electricity, which, in turn, gives it a high velocity. Coming to a smoother section of country, it meets with less resistance, develops less electricity, and, consequently, diminishes in energy or leaves the earth altogether. The facts as given seem to sustain this hypothesis.

In the air the velocity of the tornadoes was apparently less than on the ground, and for the reasons given above. Thus the southern tornado, in the track of which I

found large gaps, traveled much slower than the northern one, and both moved with greatly reduced speed over South Carolina, where a large portion of the distance was traversed overhead.

Again, many persons described the front of the cloud as luminous, either with a diffuse light or from the sparkling effect of multitudes of small flashes likened to "a million of ignited matches." Other witnesses made mention of a pillar or ball, of a light or fiery appearance, which preceded the black cloud. Could this have been a volume of electricity, moving bodily through the air, producing, in some way, an intense rarefaction, which, in turn, induced the black cloud, the inrushing winds, and the consequent whirl?

If the tornado had been attracted by moisture, as its necessary fuel, rather than driven forward by electricity, it ought to have traveled more rapidly through South Carolina. There the flat and wooded character of the country, and the immense marshes and river swamps, in some of which the water at that time was from 5 to 10 or 12 feet deep, greatly augmented the humidity of the air. Heavy and almost incessant rains had fallen for several weeks through Georgia and the Carolinas, but Georgia, from its hilly character, had shed the water more rapidly, and was thus necessarily covered with a somewhat less humid atmosphere than existed at the same time in South Carolina.

Notwithstanding the abundant display of electricity in the tornadoes, it was but seldom that it was manifest to the sense of feeling, or by any lasting effects produced. Among the many persons caught in the fearful cloud of whom I inquired, "Did you feel any heat or realize anything unusual in the condition of the atmosphere at the time?" not more than three or four answered in the affirmative. It was stated in the newspaper accounts that the cloud blackened the faces, in an unaccountable manner, of those with whom it came in contact, and that this blackness could not be removed for several days. I made diligent inquiries on this point, without, however, being able to establish the fact. The dust, and in some instances mud, with which the cloud was freighted, necessarily produced an effect similar to that mentioned, but I could not learn that it was in any way permanent. The blistering effect mentioned on page 429 may have been owing to electrical action.

THE WIDTH OF THE TRACK OF DESTRUCTION.

This varied continually at different points in the same path, ranging from 40 or 50 yards to over a mile; in one instance the tornado, before it left the ground, appeared to spread out, with a corresponding decrease of force, to a width of nearly two miles. The average width of both tracks was, however, about a quarter of a mile.

The black cloud marking the storm-center seems also to have varied constantly in its real size as well as in its proportions to the width of the track. Most observers asserted that its breadth corresponded nearly with that of the storm-path, while others stated that it was not more than one-third or one-half as wide. Of course only those who were nearly or directly in its path could really see it from the front or rear, and as such persons were generally greatly demoralized by fear or injury, they were but poorly able to judge, in any accurate manner, of its form or size.

Its height, too, as described by different observers, varied greatly, but almost all agreed that its base swept the ground. From the estimated angles given, I find that the height would have varied all the way from one hundred yards to over a mile.

THE DIRECTION OF THE WHIRL.

The unanimous testimony of all observers establishes the fact beyond a doubt that both tornadoes revolved in the same direction, from right to left, or contrary to the movements of the hands of a watch. The relative positions of fallen trees, as given in some of the accompanying sketches, would seem to indicate a different direction. In such cases they must have been prostrated irregularly whenever the wind which struck them, from whatever direction it came, was sufficiently strong to uproot or break them off. In many cases tough hickory, ash, and other kinds of trees were observed twisted and their tops thrown to the ground, without entirely severing their trunks. These frequently exhibited a spiral appearance, which plainly indicated the direction of the whirl, and this was everywhere the same—from right to left.

I noticed in numerous cases that the belt of destruction was much wider on the right or southern side of the apparent path of the axis of revolution of the storm than on the left or northern side. This can easily be accounted for. The winds on the right side of the track were increased by the progressive motion of the tornado, while on the opposite side they were just as much diminished. This would have the effect of increasing the breadth of destructive winds on the right side and diminishing it on the left, corresponding exactly to the facts.

DISTANCES OF SENSIBLE WINDS.

The greatest distance on either side of the tracks of the tornadoes at which the inrushing winds were felt was from four to six miles; but in many cases I could not learn of any appreciable effects more than one or two miles from the edge of the storm-

path. In front of the tornado an almost perfect calm prevailed until the arrival of the storm, which suddenly burst with all its fury. Succeeding the tornado a strong westerly wind blew for a period of time, varying from one to ten or fifteen minutes.

DURATION OF THE TORNADO.

The time occupied by the tornadoes in passing over a given point was variously estimated from ten seconds to five minutes. The usual estimates were from one-half to one minute. The storms being circular in shape, and having an average diameter of a quarter of a mile, moving with an average velocity of a mile a minute, their mean duration, at any one point, must have been about fifteen seconds. To terror-stricken persons, exposed to their fury, the time must have seemed much longer than it really was.

THE VELOCITY OF THE WINDS.

I found it almost impossible to get any reliable data upon which to base calculations that would give accurate results, showing the full force of the winds. In the track, where the storm raged in its full fury, everything was completely swept away, and it was only in the edges of the storm-path that I could find such objects as buildings, &c., moved without being torn to pieces. I collate below a few examples of the force of the wind given in the foregoing pages:

1. A house exposing 700 square feet of surface, and weighing probably 50,000 pounds, was moved six feet.
2. A bale of cotton exposing 18 square feet, and weighing 550 pounds, was carried 50 yards.
3. Cotton-press exposing 70 square feet to the winds, and weighing 12,000 pounds, was torn from its foundation and thrown 15 feet.
4. Oak log weighing 700 pounds, and exposing 26 square feet, was moved 40 yards.
5. Cotton-press thrown 13 feet. Weight 10,000 pounds, surface 60 square feet.
6. West wing of Traylor's house, surface 160 square feet, weight 10,000 pounds. Twisted round.
7. Academy, weighing 35,000 pounds; greatest exposure in any one direction, (including roof,) 600 square feet. (Hypotenuse of square of 25 feet=35.3 feet × 12 + roof =600 square feet.) Building moved.
8. Gravel-stones driven into trees.
9. Pine log weighing 1,200 pounds, exposing a surface of 37 square feet, carried quarter of a mile.
10. Rock weighing 18,000 pounds, moved 7 feet. Greatest exposed surface 35 square feet.
11. Massey's house moved 10 feet. Weight estimated at 60,000 pounds, and greatest exposed surface at 750 square feet.
12. Timber carried 100 yards. Weight 560 pounds, and surface 20 square feet.
13. Five freight-cars were overthrown at Camak.
14. Pine board was driven through a telegraph-pole.
15. Cow carried twenty yards.
16. Gin-house executes a somersault under the influence of the wind.
17. Pine board driven 3 inches into the trunk of a pine tree, cutting the grain of the wood.
18. Church thrown over endways.
19. Horse blown half a mile.
20. Bale of cotton weighing 500 pounds, and exposing 16 square feet, carried a quarter of a mile.
21. Horses carried away. Part of a wagon carried a mile.
22. A pine shingle was driven 2 inches into an oak sapling.

Many other similar examples are given which it is unnecessary to recapitulate. In many of these cases it will readily be seen that an upward as well as a horizontal current operated on the objects. In the following examples, if we estimate the static friction at one-third the weight of the buildings, we get the following results as to horizontal velocities:

1. Pressure per square foot, 95.2 pounds. Velocity, 139.9 miles per hour.
6. Pressure, 83.3 pounds. Velocity, 129 miles.
7. Pressure, 77.7 pounds. Velocity, 124.6 miles.
11. Pressure, 114.2 pounds. Velocity, 151.1 miles.
19. Pressure, 685 pounds. Velocity, 370 miles.

This last instance was near the center of the storm. The others were near its edges. In the following cases only a force sufficient to balance the attraction of gravitation is considered. Of course a much greater power was necessary at first to lift the bodies from the ground. The figures, therefore, represent a force less than the minimum:

2. Pressure, 30.5 pounds. Velocity, 78.1 miles.
4. Pressure, 26.9 pounds. Velocity, 73.3 miles.

9. Pressure, 32.4 pounds. Velocity, 80.4 miles.
12. Pressure, 28 pounds. Velocity, 78.4 miles.
20. Pressure, 31.2 pounds. Velocity, 79 miles.

But what can be said in regard to examples 8, 14, 17, and 22? Here an incalculable force was exerted. A velocity of wind sufficient to produce such results could not have been much less than that of a cannon-ball, or somewhere between six and eight hundred miles per hour.

RAIN AND HAIL STORMS.

From the accounts previously given, it will be seen that rain and hail attended the passage of the tornado in some instances, but that throughout the larger portion of their courses the wind-storms preceded the rain and hail storms. The interval between the two was, in some instances, from two to three hours—a period too long to establish a connection between them. The succeeding storms in these cases must, therefore, be regarded as quite independent of the tornadoes, but due to the same general disturbance. The hail which fell with or soon after the tornadoes was generally confined to belts varying from three to ten miles in width, and lying almost exclusively on the northern side of the storm-paths. This was probably due to the prevailing southerly upper currents, and the *débris* of the storm fell to the northward for the same reason.

FORMATION OF GAPS.

I ascertained by observation and careful inquiry that, both at the points where the tornadoes left the earth and returned to it again, they did so with such a great progressive motion that the *dip* seemed to be gradual. There was but one exception to these general effects, and that was on the plantations of Simpson and Cox, near Sparta, Ga., as previously described. In all cases where only slight damage ensued, trees and other objects were blown toward the east, indicating that only the westerly winds were destructive. This was almost the universal effect at the beginnings and endings of the storm-tracks.

EXPLOSIVE EFFECTS.

The only direct evidences of the outward bursting of a building is that referred to on pages and . In many other instances facts seemed to point to such effects. In two or three different cases I heard uneducated persons speak of the bursting of buildings during storms of this character. It was also stated to me that in these sections, where tornadoes are so frequent, it was deemed prudent to throw open doors and windows on their approach, to prevent the destruction of buildings from the expansion of the air within them.

DISTANCES TO WHICH OBJECTS WERE CARRIED.

Many instances are given in the foregoing pages where objects were indisputably carried for immense distances, a few of which, with some others, I will give here:

1. A bonnet was brought from a distance of thirty miles.
2. Shingles and pine-tops fell after passage of tornado twelve miles south.
3. Basket carried fourteen miles.
4. Door of dining-room carried eight miles northeastward.
5. Negro child blown away, and never found.
6. Door of church carried seven miles.
7. At Crawfordville, on the premises of Hon. Alex. H. Stephens, a portion of a mattress and other light objects, such as leaves, pieces of bark, &c., were found. The northern tornado-track runs about thirteen miles south of this place, at the nearest point.
8. In the vicinity of Warrenton, ten miles north of the track of the southern tornado through Glascock County, pine-tops and branches, *loaded with ice*, were picked up soon after the passage of the storm.
9. A boy's composition was carried from Calhoun Academy, in Harris County, nearly forty miles northeastward into Upson County.
10. A letter was found on the premises of H. T. Wright, six miles from Edgefield Court-House, S. C., which came from near Thomson, Ga., fifty-five miles distant in a direct line.

UPWARD AND DOWNWARD CURRENTS.

The vast distances to which objects were removed proves, beyond doubt, the existence of powerful upward currents. The concurrent testimony of numerous witnesses also proves the same fact. In the vortex of the tornado, spectators could frequently see the upward movements of many bodies, as in the draught of an immense chimney, being thrown outward at the top, either by the spreading effect of the storm aloft, or by the centrifugal force engendered by its revolution.

The evidence of downward currents is not so well established. If the tornado really progressed with its axis of revolution parallel to the surface of the earth, as described by a few observers, both upward and downward currents would necessarily result. This motion may, however, have been only apparent from the rolling motion of its frontal clouds, and not real. In some instances, I found objects driven into the ground,

in such a manner as to indicate a greater force than could be attributed to gravity, unless they had fallen from immense heights, which, in some instances, was not the case. The top of the pine tree referred to on p. , driven into the ground toward the southwest, was not removed twenty feet from its broken trunk.

Professor Hunter, near Milledgeville, found a branch of a tree some 3 feet long and 7 inches in diameter driven 10 inches into the ground; it may, however, have been attached to some heavier object when this occurred. On Mr. Hill's plantation, (p. ,). a fence-rail was driven nearly 5 feet in the ground, at an angle of some 45°. This would indicate a downward current, or a descent from an immense height.

In the descriptions of many witnesses, a rapid downward darting of portions of the tornado-cloud was mentioned. This, also, would indicate, at times, small descending currents.

CASUALTIES AND LOSSES.

As is frequently the case under similar circumstances, the loss of life and property was greatly exaggerated by the first newspaper reports of the tornadoes. For example, it was stated that thirty-five victims had been buried in one day in Glascock County, while only eight deaths resulted there in all. The actual number of persons killed, or who died from injuries inflicted by the two principal tornadoes in Georgia and South Carolina, so far as I have been able to ascertain, amount to ninety-three. The number of wounded was several hundred. Fortunately the tornadoes all avoided the larger towns, although passing very near to several, and only two or three small villages lay directly in their paths, otherwise the loss of life and property would have been much greater.

The loss of property in Baldwin County was very carefully computed by a committee of citizens, who placed the entire damage there at $50,000. Taking their calculations as a basis, I have made an estimate of the damage in other sections in proportion to the severity of the storm and the character of the country desolated, and I place the entire damage to the State of Georgia (including the destruction of timber) at a little less than half a million dollars. The loss to the State of South Carolina by the same storms is not far from $150,000.

OTHER TORNADOES.

Of the tornadoes of former years, that of the 4th of April, 1804, seems to have been by far the most noteworthy. It was generally admitted that nothing had since equaled it in destructiveness until the present year. Whether it traversed the entire State or not I could not learn; but I ascertained that it passed through Jones, Baldwin, Hancock, Warren, McDuffie, and Columbia Counties, in a direction nearly parallel to tracks Nos. 1 and 2, and about half-way between them. The track is still distinguishable at some points, both from decayed logs lying in its path, and the different growth of timber which has since sprung up. I observed these effects myself, and heard it remarked by others. I was informed that some six or seven miles south of Warrenton, in Warren County, a huge branch of a tree was driven into the ground, by the roadside, at the time of this fearful storm, with such force that it had remained there ever since—a monument to its devastating fury. It had been undisturbed for generations, and tradition gives this as its history.

Hon. Alex. H. Stephens told me that, when a young man, he had frequently traveled over portions of the track of this tornado. At the village of Devereux, in Hancock County, he was once moved by curiosity to interrogate an old gentleman in regard to the storm which had wrought the devastation which was then still unobliterated by the hand of time. The old man's description was, in substance, as follows:

"I was watching the approach of a dense, angry-looking cloud, when I remarked to a person standing near that an unusually severe storm was coming, and we had better look out for it. The cloud was as black as the smoke from burning tar or lightwood, but its front glimmered with a strange light. The storm struck us in its full fury without any premonitory winds. I had barely time to turn toward my store, to see the roof fly off on the wings of the wind, and in another instant the whole structure was completely swept away. It was Saturday afternoon, and an unusually large number of persons were in the building, but, strange to say, no one was badly hurt. The roar of the storm was frightful, and a midnight darkness attended its passage."

This description would indicate that the character of this tornado corresponded closely with those whose history is given in the preceding pages. I also heard of tornadoes on the following dates:

In 1818, in Jones County; track four miles north of No. 1.

In 1870, (April 20,) through Jones County.

In 1874, near Barnesville, Pike County. It pursued a northwestward course to Jasper County, when it turned northward into Newton.

At Milledgeville I was informed that A. H. Hansell, esq., of Thomasville, was a person who had been much interested in the tornadoes of Georgia, and could give me more particulars concerning their history than any one else in the State. I immediately wrote to Mr. Hansell, requesting such information, and he promised to furnish me a paper on the subject as soon as leisure permitted. I hoped to receive it in time to present it with this report, but it has not arrived.

A tornado of considerable consequence also occurred on Monday, March 15, five days in advance of its more destructive successors. I crossed its track several times in Monroe and Jefferson Counties. Its greatest width at any point that I visited was about one hundred yards. The effects of the wind all indicated that the storm was of the same character, but less furious, than those which followed it. Its path ran in nearly the same direction, (east-northeastward,) and was interrupted by many gaps.

On Saturday, April 10, just three weeks after the great series of tornadoes, Harris County, Georgia, was again visited by a tornado, which left a track four miles in length and from one hundred to two hundred yards in width. It followed the northern side of the ridge known as Pine Mountain, its direction being from southwest to northeast. Only two persons were injured. (See p. .)

On the 1st of May, while I was yet pursuing my investigations, another series of furious tornadoes again desolated Middle Georgia. So far as I could learn by the newspaper reports, there were at least three distinct storms. Their tracks, in some instances, ran very near those of March 20, but one of them pursued an almost direct northeast course, thus going much farther northward in the eastern portion of the State. They came from Alabama, and extended some distance into South Carolina.

My thanks are due to a large number of persons whom I cannot mention here, for efficient assistance rendered me in my investigations. I was everywhere received with that universal kindness and hospitality for which the southern people are noted. To the editors of the Augusta *Chronicle* and *Sentinel and Constitutionalist* I am under much obligation for the publication of a series of questions, which greatly facilitated my work in many ways.

HENRY CALVER,
Sergeant, Signal-Service, U. S. A.

PAPER 36.

THE DETROIT TORNADO OF JUNE 27, 1875, WITH CHART, BY SERGEANT W. FINN, SIGNAL-SERVICE, U. S. A.

A destructive tornado passed over the western portion of Detroit on the evening of June 27, a few minutes after 6 o'clock. During the day the weather was hot and very oppressive, as it had been for the four preceding days, and was decidedly threatening at different times.

At 3 p. m. a light shower fell, after which it cleared partially, but again became overcast and more threatening, until 5 o'clock p. m., when it suddenly poured down heavy rain, which lasted until 6.15 p. m. There were a few flashes of lightning, with thunder, at the commencement of the rain.

A few minutes past 6 o'clock the tornado was seen to touch the earth at the place marked on the accompanying chart of its track, Ash street, between Maybury and Sullivan avenues. At this point several fences were blown down and large branches torn off a tree, and thrown in the direction of the course, which at this point was north-northeast.

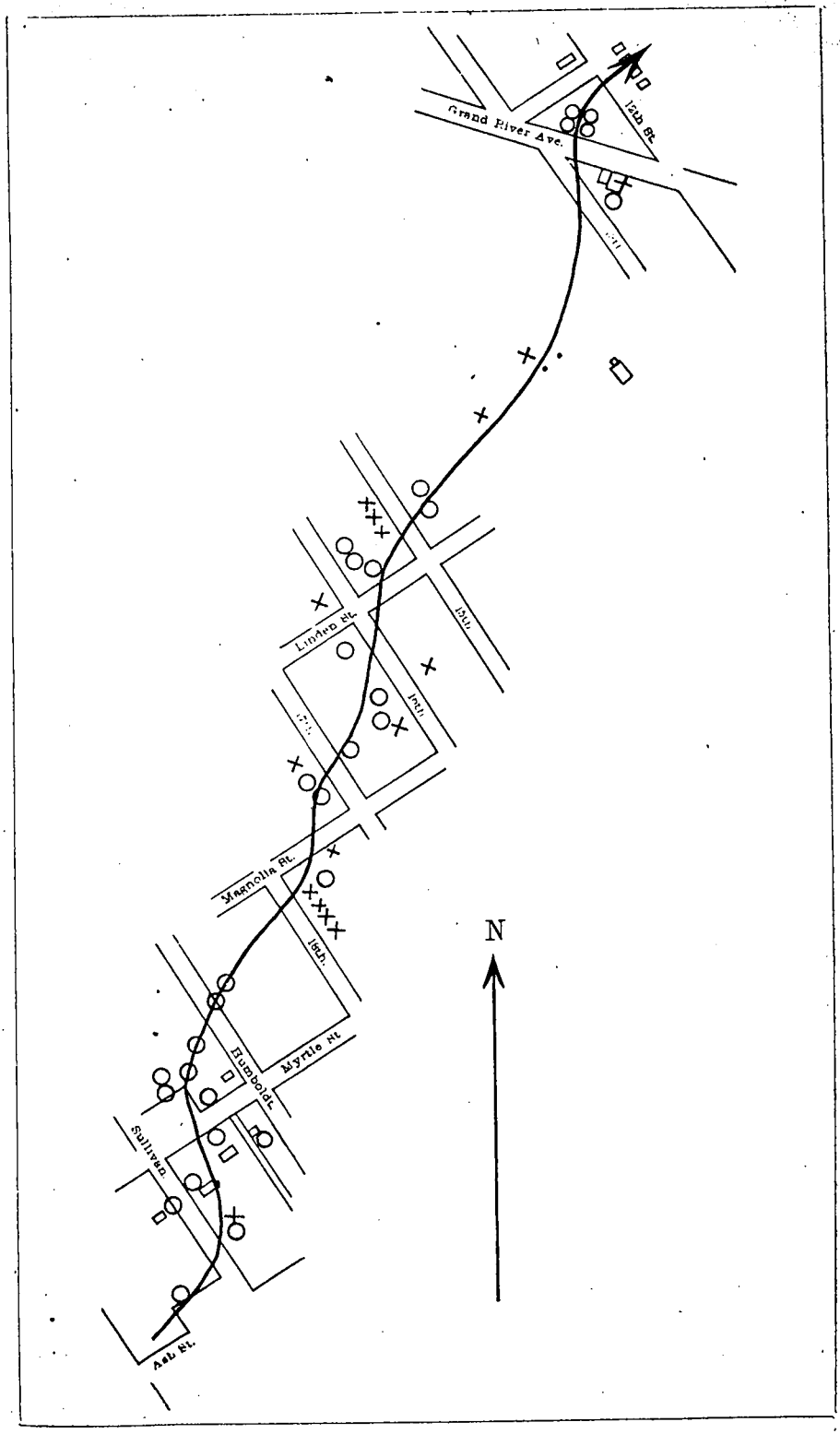
Little damage was done, until reaching Humboldt avenue, beyond tearing down some fences and unroofing a few old sheds. These seem to have been drawn upward, as other places more exposed to the direct force escaped without damage.

A shed, north of Myrtle street, between Sullivan and Humboldt avenues, was torn to pieces, while a house a short distance to the east remained undisturbed.

On Humboldt avenue, between Myrtle and Magnolia streets, a new frame building had its roof swept off and landed in a potato-field on the opposite side of the street, having been hurled about 100 feet in a direction at right angles to the forward course of the center. The house itself was wrenched out of shape, and the front fence and sidewalk carried off. Opposite, on the east side of the street, was a cottage, of which nothing was left but the floor on the foundation, all above that being torn into fragments, and, with the contents, scattered far and near. Here it turned slightly to the east, and evidently became contracted, as the path seems narrower here, and its destructiveness increased. It crossed Eighteenth street a little to the south of Magnolia street, displacing a house on the corner, from which it tore a sheet of zinc that covered the ridge of the roof, and twisted the lightning-rod like a vine.

The next building south of this had the portion of the lightning-rod projecting above the roof snapped off, and the owner of the house, who rushed to the garden in rear, was caught up and pitched about 50 feet distant. The next building south of this was undisturbed, while one still farther from the center was considerably damaged.

The roof of a house on Magnolia street was lifted up 6 inches with no other damage. On Seventeenth street, where the work of devastation began in earnest, a two-story frame building, unoccupied, was lifted into the air and thrown upon another, making a wreck of the latter, which also, fortunately, was unoccupied. A house to the north of this had several holes made through it by flying timbers, and one of the occupants received a bad cut from the same source. The house next north of this was unroofed and drawn toward the vortex. A house on the opposite side of the street was unroofed and moved off its site.


Grand River Ave.
15th St.
Linden St.
Magnolia St.
Myrtle St.
Humboldt
Sullivan
Ash St.
N

Here it turned slightly to the north to Sixteenth and Linden streets, where it committed the greatest destruction, because of the loss of life and injuries to the residents. In one house, containing a family of four persons, a child was killed, and the other members of the family severely injured; house was blown from its foundation and fell in ruins. A man and wife were borne up into the air with their house, but escaped uninjured, although the house was completely shattered. Several trees were blown down here; one split through the middle and twisted like a rope; another was completely stripped of its bark. A large horse was taken up like a toy, blown about 80 or 90 feet, and whirled off a distance of 200 feet and dashed to the ground, dead.

A house at the same point was drawn off its foundation about 3 feet toward the vortex, whirled half around, and unroofed. Here the course of the tornado bent slightly to the east, striking Fifteenth street above Linden, where it took a house, which, after being carried 40 feet, was shattered beyond all recognition, the occupants escaping with slight injuries. A child at play on the common was lifted about 50 feet and dashed into the branches of a tree 200 feet distant, from which it dropped lifeless, leaving part of its clothing in the branches.

At this point two large elms were broken down, one of them being about 2 feet in diameter. The bark was nearly all stripped off one of these trees. Considerably to the east of this, and apparently not in the track of the storm, is a house from which the occupants, startled by the noise, rushed out of doors for safety, and were caught by the passing meteor; two men were carried up in the air and dashed to the ground, receiving but slight injuries. One hundred and fifty feet distant, a woman was thrown headforemost into a pool of water, from which she was drawn more frightened than injured. Here it turned to the north, crossing Grand River street near Thirteenth. There are two houses on the southeast corner of these streets, one a two-story brick and the other a two-story frame building. The lower portion of the brick building was used as a store, and extended back 12 or 15 feet from the upper story. On this extension was a summer-kitchen of which there was not a vestige left; nothing of the contents, including a heavy cook-stove, could be found afterward. The roofs of both houses were taken off to the westward about 200 feet, and a barn in the rear of these buildings was lifted from its foundation. On crossing Grand River street the meteor turned sharply to the east, destroying almost every house in its track. One house was carried about 100 feet and then crushed to pieces, the sides falling outward and the roof inward upon the occupants, none of whom were severely injured. A farm-wagon in the rear of this building was carried 200 feet and fell unbroken. A buggy, in a barn that was completely demolished, had its axles twisted off, the boxes carried in one direction and the wheels in another, being found afterward about 100 feet from the site of the barn. Here two horses were lifted out of a barn; one, with the manger to which he was tied, was taken over 40 feet high and dropped, fatally injured, in an adjoining field about 200 feet distant; the other horse was found dead, having been carried about 80 or 90 feet into the air. A heavy eave-trough was taken from this place and found afterward about a mile distant. On Twelfth street a number of cottages were more or less damaged, and to the north of this point is a wood, where its final act of destruction was committed in snapping off the tops of some trees. In these woods a dog was found impaled on the limb of an elm tree, which, entering at the chest, came out at the flank, passing through the whole length of the body. On entering the woods the meteor was seen to rise above the tops of the trees, after which it could be tracked for miles by the falling ruins of houses and furniture. The whirling motion of the cloud and its contents could be seen for more than a mile very plainly, after which some persons state that it seemed to break up and disappear, while others say that it maintained its characteristic appearance within the range of vision. The latter is most probably correct, especially if there is a possibility of establishing its identity with that of a tornado reported in Illinois, Wisconsin, and Iowa the following day. It seems well established that this city was not the first scene of its ravages, as, about an hour before it struck Detroit, Jackson, a town seventy-seven miles west of this place, had a similar visitor, although but little damage was done, as it passed outside of the city limits; from this point later reports show that it passed in an easterly direction, doing considerable damage. The cloud at Jackson was seen by a representative of the Daily Post at Detroit, and his description accords with its appearance here.

It was first seen (at Detroit) in the southwest, as an exceedingly dark mask, with a violent whirling motion, and a funnel suspended from it of the color of coal-smoke, and not inky-black. This funnel is described as resembling an elephant's trunk in motion, swinging from side to side, but always appearing to drag behind. It curled and twisted as if it had life, moving forward, not with a steady, uniform motion, but in jumps until it touched the earth.

It is stated by some that they saw very distinctly *two* funnels, one longer than the other, semi-opaque, and inclined toward the shorter one. This is well attested and confirmed by a witness who states that he saw a funnel similar to the one moving along the ground dissipated like smoke, near the place marked Fifteenth street on the map.

This was, no doubt, the shrinking up of the semi-opaque funnel, as it appeared to do so at several times.

The whirling motion was from right to left, and screw-like in action; and the greatest amount of damage was done on the left of the center. This was probably owing to the fact that there happened to be more material for destruction on that side, as its most violent effects were shown on the right of the center.

Contrary opinions prevail in reference to attendant winds; some state that before its approach they felt violent winds blowing toward it, and contrary winds after its passage. Others state they felt no winds. One reliable witness says his first warning of anything unusual was by the change in the direction and force of the wind. On looking at the trees in the garden he saw them bend before a strong easterly wind, while the next instant they were thrashed to the ground by a strong westerly gale. Contrary opinions prevail also in reference to precipitation, some asserting it rained heavily, while others saw no rain; but the weight of evidence seems to be in favor of rain, as it rained heavily in the heart of the city at the time, and it cleared up in rear of the storm-track, which may have given rise to the opinion that it had not rained. It is certain that it rained heavily at one point on its course, when it tore off the roof of a house and flooded the interior the next instant.

There is no evidence of any electrical phenomena attending it. Its rate of progress was irregular, sometimes appearing to stand still, and again moving with great velocity. Its time of duration is estimated to be from three to five minutes; the length of its track a little over a mile, and its width 150 feet. Its noise was terrific, roaring and hissing with a rumbling sound resembling that produced by a heavy train of cars crossing a bridge, varied from time to time by the crash of timbers, as it did its work of destruction.

The loss of property is estimated at $15.000; two lives were lost, and about twenty-five persons more or less dangerously injured.

MEMORANDUM A.

SIGNAL-SERVICE, UNITED STATES ARMY.

Instructions for the construction and management of permanent telegraph-lines.

MATERIALS OF LINES.

POLES.

The supports of a line should be poles or sticks of the most durable timber procurable, preferably of red cedar, black locust, or heart of yellow (or pitch) pine, either of which may be expected to last for thirty or more years. Should these not be procurable, or procurable only at a cost too great to be sustained, recourse may be had to other kinds of timber, such as white or post oak, chestnut, sassafras, white cedar, yellow cypress, tamarack, (larch,) spruce, and others, from which good service may be expected for terms of years varying from ten to twenty.

DIMENSIONS.

These poles should not be less than 22 feet long, nor less than 5 inches in diameter at the top (or small) end; but it may be necessary to vary these dimensions somewhat, and, if the best varieties of timber be used, a diameter of 4 inches may properly be used, while a length of 24 feet should be preferred to one of 22, if the greater length be procurable, especially if it is probable that a second wire will ever be required upon the line, or if the ground in which they are to be set be such as to require deep setting, namely, sand or light loam.

NUMBER TO MILE.

If the country to be traversed by the line be hilly or rolling, the poles should be set 60 yards apart, which would require twenty-nine to the mile; but if the route be level, and the poles 24 feet long, the distance may be increased to 80 yards, or twenty-two to the mile. A greater distance than 80 yards between supports is not advisable, although it may be exceeded in special cases, such as the crossing of streams or ravines.

DEPTH IN GROUND.

The depth to which poles should be set depends upon the character of the soil in which they are placed. In rock or in stiff clay a depth of 3 or 3½ feet is sufficient, while in light loam or sand, it may be necessary to increase the depth to 4 or even 5 feet.

PROTECTION AGAINST LIGHTNING.

Upon prairies (or wherever in danger from atmospheric electricity) lightning-rods, consisting of ordinary line-wire, attached to the side of the pole by staples, and extending from end to end thereof continuously, should be affixed to say one-sixth of the poles, at equal distances apart, to facilitate atmospheric discharges and prevent the splintering of the poles thereby.

PREPARATION OF POLES.

When at all practicable, poles should be cut, the bark removed, and the timber allowed to season before they are placed in line; such preparation largely facilitating (by reducing the labor of) transportation and erection in line, and considerably increasing the durability of most kinds of poles. Should it at any time become necessary to make use of timber quickly destructible by decay, willow, cottonwood, or other, it is desirable to prepare it by saturation with some solution having the effect to coagulate the albumen of the wood, to tan it, as it were, which may be done at no very great cost, and add greatly to the durability of the pole. It is not necessary or practicable at this time to describe the process, which may be found described by Noad or Da La Rive.

INSULATORS.

The experience of American telegraphers is, that the common "bracket and glass" is, all things considered, the best insulation, and it is recommended. Various patented insulators have value for special uses, but a well-seasoned oaken bracket and a hard-glass cap, put together with a screw, holds the first place.

WIRE.

No. 9 iron wire, drawn from charcoal-rods and coated with zinc by deposition, (galvanized,) is the proper wire for ordinary lines, and may be assumed to be the "standard" wire. It should be jointed in half-mile coils and the joints soldered, and weigh about three hundred and twenty pounds to the mile. If a line is specially exposed to violence, or if it be desired to work long circuits, a larger wire, say No. 8, is recommended for its greater strength and superior conductivity. Cheap (or low-priced) wire cannot be recommended, as its use involves danger of frequent breakages, and its conductivity is always low.

INSTRUMENTS.

For each office in a line there are required a relay, a sounder, a key, a cut-out switch, and a lightning-arrester. Offices in which more than one circuit terminates should be equipped with automatic repeaters, in order that the whole line may be worked as one, or disconnected and used in separate parts. It is unnecessary to specify the instruments of any particular maker, as good instruments of the kind can be made by any manufacturer of electrical apparatus. In addition, the person or persons in charge of the line should be furnished with galvanometers and artificial resistances, to enable him or them to test the condition of the lines and direct concerning the repairs thereof.

BATTERIES.

Some adaptation of the Daniell's zinc-copper pair is best adapted, by reason of the simplicity of its construction and the little care necessary in its management for lines of one or two wires. As has been said of instruments, it is unnecessary to indicate any particular form or maker, but the "Eagle's" leaden cup, already in use by the Signal Office, is effective, not liable to be broken, (as when a glass or earthen vessel is used,) and easily cared for. This form answers for the whole service, local as well as main.

TOOLS.

Each office requires to be equipped with pulleys and rope, file, pliers, climbers, and hatchet, and supplied with wire, insulators, and nails, for purposes of repairs. If repairers other than operators are employed, they should be similarly equipped.

ERECTION OF LINE.

SURVEYING.

The route of the line having been decided, and the materials prepared or procured, a competent person proceeds to measure the distances, and indicate by pegs or otherwise the position of the poles. When the line follows highways or other defined routes, he will necessarily be governed by the bounds of such route, and has only to place his line within those bounds, so as to avoid, as far as possible, danger to it from passing vehicles; to cross it (when it shall be necessary or advisable to do so) at proper elevation, and to select the side of such highway which offers the fewest obstructions to the work. When building upon open (unfenced) country, he can proceed in right lines from point to point, deviating only as the geography of the region may compel him.

DIGGING HOLES.

Following the surveyor should come a foreman (or officer) with a sufficient number of men, equipped with cutting-bars and spoons, or, where the soil will admit of their use, with post augers, who will dig the holes for the reception of the posts at the places indicated by the surveyor. If there be a sod, one of his men should be equipped with an ordinary spade, with which to cut and remove the sod, indicating the size of the hole to be dug, and facilitating the work by performing a part thereof, for which the bars and spoons are not well adapted. The foreman (or officer) should see, personally, that the holes are put down to the proper depth and are of the same size at bottom and top, and have, of course, direction of the force, and be held responsible for good service.

DELIVERY OF POLES.

The poles should be delivered as soon as practicable after the holes are dug, one at each, with the butt of the pole over the mouth of the hole and the top in the direction from which the raising party will come. No equipment is necessary for this labor except the means used for the transportation of the poles and stout staves upon which to carry the poles, if it be necessary so to move them to reach the holes.

ATTACHING INSULATORS.

As soon as the poles are delivered, and before they are erected, the insulators should also be distributed, and a man, (or men, as may be needed,) equipped with a hatchet and supplied with nails, should proceed to attach the insulators, cutting a plane seat for the bracket upon the side of the pole and at such a distance from its top that the top of the insulator, when in place, shall not extend beyond the top of the pole, and nailing the bracket firmly to the pole. One ten-penny nail at the point and one twenty-penny nail at the shoulder of the bracket will be required.

LIGHTNING-RODS.

The same man or men who perform the labor of attaching the insulators, should also attach the wire lightning-rods, and for that purpose must be supplied with the rods and with the staples for attaching them.

RAISING POLES.

As soon as the insulators are attached the poles should be erected in line and a sufficient number of men, (the number depending upon the weight of the poles,) equipped with pikes, a cant-hook, and rammers, and directed by a foreman, (or officer,) will erect the poles in the holes, turn the pole so that the insulator shall occupy its proper position, and ram the earth solidly about the foot of the pole, filling the hole, and raising the surface of the ground about the pole so as to shed water away from it. The poles should be placed perpendicularly, except that in an angle or curve the pole or poles contained therein may be inclined slightly in a direction opposite to the strain of the wire.

HANGING THE WIRE.

To complete the line, it is only necessary to place the wire. The force for this purpose consists of a wire-man and assistant and a number of climbers, together with a wagon or other means for the transportation of the wire. The wire-man is equipped with tools for connecting the coils, as file and pliers or joint-tools, and should have also a hatchet and a few insulators to replace any which may have been broken in erecting the poles. The men for climbers are equipped with climbing-spurs and pliers, and furnished with tie-wires, which are short pieces of the line-wire, or of wire specially procured for the purpose, cut, annealed, and formed on an insulator, so that it (the wire) embraces the insulator, and the ends project parallel to each other two or three inches beyond the line-wire. The wagon contains wire enough for the day's work, and a reel, (for description of which see Manual of Signals.)

A coil of wire is placed upon the reel, the binding wires removed, the end of the wire led out and attached to the starting point, and the wagon moves along the line, as near the line of poles as possible—the wire-man maintains such a check upon the reel as allows the wire to run out straight and prevents too much from being drawn off—the climbers, all at the same time, ascend the poles, carrying the wire which has been extended. Upon reaching the top of the pole, and so securing his position that his hands are free, each climber places a tie-wire upon the insulator with its points from the pole, places the line-wire against the insulator above the tie-wire, and bends the ends of the tie-wire upward, so as to sustain the line-wire. The wire-man then strains the line-wire, either by the motion of the wagon or the labor of men, as may be advisable, until the deflection in the center of a sixty-yard span shall not exceed one foot, when the climbers, using their pliers, give each point of the tie-wire one and

one-half snug turns about the line-wire, leaving the points of the tie-wire toward the insulator, which secures the line-wire and completes the work. The whole must be under charge of an officer or foreman who will see that each man performs his duty promptly and well, will order "up" when the wire is ready and the climbers in place at the pole-foot, "haul," when the climbers have reached the top of the pole and placed the wire in position, and "bind," when the wire is sufficiently strained, and who is responsible for the whole.

CLEARING AND TRIMMING.

In forests or groves, especially such as are dense or choked with undergrowth, axmen must precede all others, except the surveyor, and clear the way for the work. When the line has been erected, they must follow and remove any branches or twigs which may be in contact with or liable to be thrown in contact with the wire, clearing back for a space of four to six feet, and removing also any dead branches, no matter what their distance, which might be thrown down by high winds, and, falling, endanger the line. It is not practicable to instruct more definitely in this matter, but the work cannot be too thoroughly done.

OFFICES.

For instructions as to setting up and connecting the instruments in an office, reference may be had to Pope's Manual of Telegraphy. At terminal offices the iron line-wire should be carried to an insulator attached to the wall of the building in which the office is to be and there secured. From the line-wire an insulated office-wire passes through the wall to the screw-post of the switch, or that of the lightning-arrester. This wire should come from below to the passage through the wall, in order that rain-water may not follow it into the opening. At way-offices break the continuity of the line-wire by inserting any non-conductor, such as a broken glass insulator or a piece of dry wood, and run the insulated wire from either side of the non-conductor to the lightning-arrester, as in the case of the terminal office. All connections between copper and iron wire should be soldered, to prevent galvanic action and consequent formation of non-conducting oxides.

GROUND-WIRES.

At the termini of lines or circuits good ground-connections are necessary, and may be prepared by burying a copper plate, 2 or 3 feet square, to which a stout copper wire is securely soldered, in moist earth, and carrying the wire to the office or battery-room. At way-offices a sufficiently good ground-wire may be made by burying the end of a copper wire to the length of 3 or 4 feet in moist earth, and carrying the free end to the lightning-arrester.

RIVER-CROSSINGS.

Where navigable streams cross the route of a line, it is usually the better plan to use cables; but if this method is, for any reason, impracticable, elevated supports must be found or constructed, and the wire suspended above danger from passing vessels. Natural supports, such as trees well rooted in safe positions, if such be found of sufficient height, may be used; or masts erected and securely stayed with wire or wire-rope guys. If the span between supports be not more than 500 feet, the line-wire can be used, care being taken to select a length without joints, or with joints, if any, very carefully secured. For larger spans, a steel (or compound wire having a steel core) wire is necessary, with which spans of 2,000 feet can be made, provided the points of support are high enough to allow of a proportionately deep curve to the wire. Extreme care must be given to such crossings, and too great strain avoided. The supports, whether natural or artificial, should be protected by lightning-rods. Cables should always be protected against atmospheric discharges by arresters.

WET AND SANDY SOIL.

In wet and loose sandy soils or upon sea-coasts a cylinder of galvanized iron can be used to advantage in sinking the holes to the proper depth. This cylinder will be made of sheet-iron, one-sixteenth of an inch in thickness, 5 feet in length and 14 inches in diameter, and be divided longitudinally into two halves, hinged together so as to open and shut easily. At the upper end it will be provided with two handles. The whole weight of the cylinder will not exceed 50 pounds, and it can easily be carried from pole to pole by two men, by passing a pike through its center. In using it the hole will be first dug as deep as possible with a shovel, and large enough to admit the cylinder, which will then be forced down into the hole as far as it will go. The sand will then be taken out of the inside with the telegraph-spoon, and a board placed over the cylinder, on which two men will stand and force it down again as far as pos-

sible. This process will be repeated until the top of the cylinder is level with the surface of the ground, and the sand or earth removed from its interior. The pole will then be raised and placed in the hole, and the cylinder drawn up by means of the handles, unfastened and removed from the pole. To prevent the handles of the shovels from being worn out by friction, a small piece of wood should be fastened to the upper rim of the cylinder, for the handles to work against. Poles set in this manner, with the earth rammed solidly around the pole, will usually stand without bracing, but in very light soil, or in spongy, wet ground, it may be found necessary to brace the poles on each side in the direction of the line, and sometimes on all sides. In such cases, care will be taken to secure the foot of each brace firmly against a piece of board or stake driven into the ground. When other material for braces cannot be found, such poles as are unfit for erection may properly be used; but good poles should never be cut for this purpose unless absolutely necessary.

CABLES.

In laying a cable across an inlet, stream, or other body of water, it will be laid, whenever practicable, directly from the reel on which it is received from the manufacturer, as it will then run out easily and lie smoothly on the bottom. The reel will be rigged on a horizontal axle, in the stern of a large row-boat or small vessel when the weight of cable is too great for a boat, and payed out as steadily and regularly as possible. Both shore-ends of the cable should be buried deep enough in trenches to protect them thoroughly from exposure to the air, and should be covered with stones or rocks of sufficient weight to prevent the earth from being washed away. Lightning-arresters will be used at both extremities of a cable, and placed in the cable-boxes. These boxes will be made of well-seasoned pine plank, 2 inches thick, dovetailed together firmly, eight inches square inside, and lined with woolen cloth. The door will be hung with strong hinges, and the whole box must be water-tight when closed. In connecting the line-wire with the cable, a hole large enough to admit the cable is bored in the bottom of the box, and a smaller hole, to admit the line-wire, is bored in the side of the box. This latter hole will have a considerable inclination from the inside downward, to prevent the rain from coming in. The line will be brought down from the top of the pole to which the box is attached to the side of the box, and the end passed to the inside through a gutta-percha tube, and then bent over to prevent it from being pulled out. This line-wire is then connected, by a piece of insulated wire, with the lightning-arresters on one side, and the copper wires of the cable are fastened to the binding-screw on the other. The horizontal plate between the points will then be connected on both sides with the outside or armor wires of the cable, which will form an excellent ground. Care should be taken to test the lightning-arresters before putting them in the boxes, as the points are sometimes in contact with the plates. The door of the box should be provided with a strong lock, and kept fastened, except when opened for the purpose of examining the arresters after every thunder-storm, and at other times by authorized persons. The cable, from the ground to the cable-box, will be encased in a wooden box to protect it from injury.

UNIFORMITY OF CONSTRUCTION.

All telegraph-lines constructed by the Signal-Service should be uniform in size and kind of wire, instruments, and equipments. In general, the several parts of lines constructed should be interchangeable, and of the size and style of models deposited in the Signal-Office at Washington.

MEMORANDUM B.

WAR DEPARTMENT, SIGNAL-SERVICE, UNITED STATES ARMY.

Rules for the government of the telegraph-lines.

RECEIVING-DEPARTMENT.

1. The telegraph is only to be used for public business when such is too urgent to bear the delay of the mails.

2. No telegrams will be sent free except those specially authorized by competent authority and those on public business. When official messages are filed, which have to pass also over the wires of a private company to reach their destination, the officer or agent filing such telegrams will mark them "Official Business," and sign his name under these words as a certificate that such messages are official.

3. Telegrams should be as concise as possible.

4. All telegrams, public or private, will be credited to the ne.

5. A competent person to receive messages from the public must be in attendance from 8 o'clock a. m. until 8 o'clock p. m., or such other times as may be directed.

6. Messages for transmission must be written upon blank No. 2. If a case should occur in which this would be impossible, the receiver will apply some paste to one side of said blank, and require the person presenting the message to attach the same permanently to the face of said blank.

7. All messages presented for transmission should first be carefully read, and every letter clearly understood by the receiver. The address should be examined, and if not deemed sufficient a more complete one requested, and anything likely to be misunderstood or liable to occasion error in transmission must be made perfectly plain before being passed into the hands of the operator for transmission.

8. Whenever the address of a person presenting a message is not well known, care should be taken to obtain it, and the same should be noted, either in a book kept for that purpose, or upon the message to be sent. As a proper precaution, this should be done whether the message requires an answer or not.

9. The date and time at which the message is received for transmission should, in all cases, be indicated by the receiver conspicuously upon the margin of the communication.

10. In counting the words, in all messages, the following rules will be observed:

Names of cities and places, when used to designate such cities or places, will be counted as one word; for example: New Orleans, New York, West Troy.

Words connected by a hyphen, as found in Webster's Dictionary, to be counted as one word. Examples: To-day, rail-road, head-quarters, aid-de-camp.

Names of persons and places, when given to things, must be counted according to the number of distinct words in each. Examples: Names of steamers—Isaac Newton, two words; Maid of the Mist, four words. Names of hotels—Burnett House, two words; United States Hotel, three words.

When there are prefixes to surnames, such as "Van," "Mac," or "Mc," "Saint," or "St.," "O," "De," as in Van Rensselaer, McGregor, Saint Nicholas, O'Connor, DeWitt, the whole name is to be regarded as one word.

11. No message must be telegraphed from dictation, or otherwise than from legible copy, which copy must be filed for future reference.

12. Every message telegraphed, whether "free," "paid," or "collect," must be checked at the end with the number of words it contains, and "O. B.," (if on Government business,) "free," "paid," or "collect," written out in full. If "paid," or "collect," the amount must be stated in the check, with the name or signal letter of the office where paid or to be collected. Thus, on a message paid in Prescott, the check should be: "10 P. 50 paid." If to be collected in Prescott, "10 P. 50 collect," or whatever the signal for the office may be.

13. If a part of the tariff is for "other lines," the amount for "this line" should be first stated, and then the amount for "other lines."

14. Whenever more than one signature is attached to commercial messages, count all initials and names, except the last signature, as a part of the body of the message All words are to be charged for except the date, address, and name of the signer. This rule applies to all titular affixes, such as "agent," "superintendent," &c. The address and signature must always be counted in Government messages.

15. Where messages contain amounts or numbers, require the customer, in every instance, to write them in words, as no figures in the body of a message will be transmitted by this, or connecting lines.

16. Cipher messages, composed of simple English words in ordinary use, will be transmitted at usual tariff-rates. All other messages in cipher, whether composed wholly or in part of figures, or arbitrary combinations of letters, or words of any foreign language, when used as a cipher, will be estimated by counting each letter or figure as a word, and charging accordingly.

17. No message on the business of the person sending it must ever be taken unless prepaid.

18. If the sender of a message desires to know whether it has been delivered to his correspondent, the required information may be telegraphed direct to him by the operator of the office to which the message is transmitted. In such cases the request must be made and the additional sum of one-half the cost of a ten-word message paid at the time of sending the original message. The receiver will then add the signal "34," and include the extra tariff in the check, and the delivering-office will thus be notified to telegraph the necessary information promptly.

19. Messages containing profane or obscene language will not be received for transmission over the wires of this line.

20. Messages may be exhibited to the senders or receivers upon personal application, or to a third person upon their written order, and they may be allowed to make copies of the messages; but, in all cases, the sender or receiver, or the signature to the order, must be well known or fully identified. All complaints or claims regarding error or delay in messages must be made by the sender, in writing, stating facts and grounds

of claim, and the operator will forward the same to the officer in charge, accompanied by his own statement and copies of the messages.

21. No message of any kind shall be taken to send "collect," unless guaranteed by a responsible party, except the same is known to be a reply to a message requiring an answer.

22. Care must be taken in preserving and filing away messages which have been transmitted, in order to make reference thereto easy and expeditious. Each day's business should be kept separate; every message therein filed with a number corresponding to its entry on the record-book. At the close of the month, each day's business, plainly marked, should be inclosed together, and the same properly labeled. These packages must be retained at least two years, after which they will be disposed of as the officer in charge may direct.

23. The operator in charge of an office is held accountable for and is responsible to the Government for all property and supplies whatsoever in or belonging to his office, for all money received, and for all transactions involving the payment of money in the regular and legitimate business of the office. No operator is authorized, but, on the contrary, is prohibited from contracting any debts or obligations on account of the Government, except when authorized by competent authority.

24. Operators are expected and required to prevent loss and waste of stationery, office-supplies, line-repair material, fuel, lights, &c., and to exercise the same care of office-furniture and other property in their charge, and the same rigid economy in management, as would be expected of a prudent business man in conducting his private affairs.

25. Operators may, upon receiving a deposit of money sufficient to cover all expenses, undertake to have messages delivered by a special messenger from any office on this line. There will be free delivery of messages within the limits of the town in which an office is located.

OPERATING DEPARTMENT.

26. Operators and other employés will conform to such rules and regulations respecting working-hours, meal-times, &c., as may be deemed most conducive to the prompt transmission of business.

27. At offices where more than one operator is employed, meal-hours will be so arranged as to have at least one-half the force on hand during meal-time. Absence from duty, without special permission from the officer in charge, will not be allowed.

28. The chief operator, at all terminal points, will test wires and ascertain the location of any interruption to the circuit, and give directions for making temporary repairs. Operators at intermediate offices will report to and promptly obey any instructions from him, and are expected to use diligence in doing anything required to place wires in working order in the shortest possible space of time.

29. The chief operator will be held strictly responsible for the good condition of the main batteries at all times. They will never be wholly taken down, but cleaned and renewed by sections.

30. It will be the duty of the chief operator, or his assistant, at all main terminal or repeating offices, to keep a daily record of all difficulties, interruptions, or incidents occurring in the working of the line.

31. All messages must be transmitted as they are received. No abbreviations must be used, except in office communications. When periods or other punctuation marks are used, care must be taken to transmit them precisely as contained in the original. A period after the address, dividing the same from the body of the message, must always be inserted. When obscure or difficult words appear in messages, the transmission must be slow and distinct, and if an error is likely to occur, the obscure sentence or difficult word must be repeated after the check.

32. Operators will use extra caution in the transmission of proper names. Write the names slowly, and make double the usual space between the initials.

33. Words containing spaced letters, like C, O, R, Z, &c., should be transmitted with caution. Make such letters plain, separate, and distinct.

34. Before opening the key, adjust the relay carefully, particularly in wet weather, to make sure that some other office is not using the line.

35. Before commencing to send a message to an office which receives by register-paper, always make a few dots, to enable the receiving-operator to adjust his instrument.

36. In working with inexperienced operators, write slowly and plainly, and be sure that the message is understood.

37. Operators must never guess at a word; better have it repeated many times than make a mistake.

38. No message will be considered as having been properly received, and no operator will allow a message to pass through his hands, without first counting the words, comparing the check, and otherwise satisfying himself it is correct.

39. Whenever a message has been received in which an error is supposed to have

occurred in the transmission—the number of words not corresponding with the check, or otherwise—the chief operator may, at his discretion, cause the message to be delivered to the party addressed, with a notation thereon stating that the message is thus delivered, subject to correction afterward. In such cases a copy of the message must be retained, and the utmost dispatch used in securing correction. When the delay is only temporary, and not affecting the value of the message, it will not be delivered until corrected.

40. Great care must be taken to avoid the duplication of a message. In all cases of the delivery of the duplicate copy of the message, the word "duplicate" must be distinctly written across the face.

41. Messages on Government business will have precedence over all others. Office-messages relating to correction, loss, or anything affecting the value of a message, will have preference over any other private business, and in no case must an office-message be destroyed or willfully delayed in transmission. When office-messages are needlessly sent or unnecessarily worded, the same will be reported to the officer in charge.

42. The transmission of messages will include the number of the message and the day of the month. The time of the receipt must be noted by the receiving-operator. The name of the place from which the message originates, and its destination, must be written out in full, whether passing through a repeating-office or not. The name of the State must accompany the name of place in address, in all cases, except the names of the leading commercial cities in the United States, such as New York, Philadelphia, Boston, Cincinnati, Chicago, Saint Louis, San Francisco.

43. Extraordinary care must be exercised in sending and receiving repeated messages. The original message should be plainly written, and the operator sending it must be certain that it is read correctly when transmitted. The operator who receives it must copy it plainly, and then repeat it back over the same circuit before doing any other business. If the message is to be forwarded beyond the circuit on which it originates, the operator who receives the message (after being satisfied of its entire accuracy) will himself transmit the message over the next circuit, and will not be relieved from the responsibility of such message till repeated back from the office to which he transmits it. A memorandum of the time and circumstances attending the receiving, transmission, and repeating back should be written upon the margin by the operator, and properly filed for reference. This repetition is required to prevent loss or error, and it is not intended to be repeated back from the place of destination to the point at which it originates for the information of the customer.

44. Whenever a "repeated" message, in course of transmission, is stopped at a repeating-office in consequence of the interruption of a wire over which it must pass to reach its destination, and the delay is likely to be of long duration, the office from which it was originally sent should be promptly notified of the fact.

45. No persons not directly connected with the operating department will be allowed within the operating-room. Operators should recognize the necessity of rigid enforcement of this rule, so far as not to invite their friends inside the office; *and strict privacy of all messages must be observed.*

46. Inasmuch as errors, if any, in messages are almost always made by the receiving-operator, he will, as a rule, be held responsible for all such errors. He will, therefore, see the necessity of extreme care; and in all cases where he has any doubt, use the means in his power to remove it.

47. When calling an office, the office calling will sign the office-signal at short intervals.

48. When leaving the office temporarily, or for the night, the main line must be cut off from the instrument. This, however, should never be done without examining the switch or cut-off, to make sure that circuit is complete through it.

49. The ground-wire at intermediate offices must never be used except in cases of breaks in the wire, and then only long enough to enable an office to do the business in hand, after which it must be instantly removed, first notifying the end office.

50. The ground-wire must never be used as a protection against lightning. During heavy storms, the main wires should be securely cut off from the instruments.

FREE MESSAGES.

51. The official correspondence over the wires between operators and other employés of the lines must be limited to matters of an urgent nature, and that will not bear the delay of the mails. Use the mail for all matter that will not suffer by the delay.

52. When any message entitled to be transmitted free of charge is to be sent, the reason for being free should be stated in words following the checks, unless the same be well known. When this requirement is not observed, or when the reason for being sent free is deemed insufficient, the receiver will be held responsible for the usual tariff-charges on such messages. The number of words contained in a free message will be transmitted in the check.

53. The value of every free message *sent* will be computed at the ordinary tariff-rates

the same as if it were a paid message. This check is not to be entered in the regular accounts of the office, but a statement is to be forwarded to the officer in charge, at the close of each month, showing the number of free messages sent by each person and their aggregate value, computed as above directed. The original messages will accompany the statement as vouchers. Copies of all received free messages will also be forwarded at the same time.

DELIVERY OF MESSAGES.

54. A copy of the message to be delivered must in all cases be retained in the office, except when otherwise ordered by the officer in charge.

55. All messages received for delivery should be carefully read, to ascertain if an answer is required, and if requiring an answer, diligent effort should be made to obtain it. The word "answer" or "reply" must be plainly marked upon the envelope, and the messenger be required either to obtain the answer or return to the office a sufficient reason in writing for not obtaining it. If no answer is returned, the operator will write the reason therefor in the delivery-register for future reference. Messengers must in all cases be supplied with blanks No. 2, on which answers can be written.

56. A receipt must be obtained for every message delivered, which must be carefully kept for future reference, and the time of delivery entered thereon. In case the person addressed cannot be found, the reason in writing must be given by the messenger, and the facts investigated by the operator. The messenger must in no case be allowed to enter messages in the delivery-book, nor to write the reason for non-delivery upon the message itself; this must be done by the operator.

57. In order to facilitate the delivery of messages after business-hours, business-men and others likely to have messages should be requested to name in writing the place at which they wish their messages delivered, other than at their place of business. Whenever messages cannot be delivered, in addition to notifying the office from which it was sent, notice should be sent through the post-office to the person addressed; but the message itself should be retained in the office until the close of the month, when copies of all undelivered messages, whether paid or collect, will be made and sent to the officer in charge with monthly report.

58. In all cases, follow strictly the direction in messages as to place of delivery. If, however, a message addressed to a person at his place of business is received after such place of business is closed, it may be delivered to him at his residence; but, unless delivered to him personally, a duplicate of the message shall be delivered at his place of business the next day. In case of non-delivery, or where an answer cannot be obtained to a "44" message, the reason, in writing, must be given by the messenger to the operator, who will notify the office from which the message is received, and will also make a record of the same upon the envelope of the undelivered message.

59. Where prompt answers are not obtained to messages it proves, in nine cases out of ten, to be the fault of the party to whom the message is addressed, and it is not proper that the line thereby be subjected to the expense of office correspondence. Therefore, when the lines are in their usual good working order to the place where the messages are addressed, and the sender desires any information relative to delivery or answers, they are to be charged ordinary commercial rates for office messages. It is desirable that the customers should send the message of inquiry in their own names, either to their correspondents or the agents of this line. If it is ascertained that the line has been in fault, the entire tariff paid for the original message and subsequent correspondence relative thereto will be refunded; provided, however, that the line is not to be considered as in fault, if the parties to whom messages are addressed cannot be found.

60. Prepaid undelivered messages must be inclosed separately, having indorsed upon each the reason for non-delivery and plainly marked "dead messages" upon the wrapper, with the name of the place from which sent, and retained at the office for reference, unless otherwise ordered.

61. Undelivered "collect" messages will be inclosed with monthly reports as vouchers, indorsed with the reason for non-delivery.

GENERAL RULES.

62. For information in relation to rates of tariff and other matters not fairly understood, operators will apply to the officer in charge.

63. A careful estimate of articles required for the succeeding quarter must be made with the report for the last month in the quarter for which the office has been supplied; and, accompanying the same report, an inventory of all the property of the office belonging to the Government, including office-supplies.

64. Operators are prohibited from purchasing stationery and other ordinary supplies, except when specially authorized by the officer in charge. All such articles will be furnished by the officer in charge on proper requisition.

65. All instruments, relays, keys, switches, or parts of the same not in use, and all

refuse zinc and copper from main or local batteries, and other property not in use, must be reported to the officer in charge quarterly, at the time of making requisitions for supplies, stating number, kind, and quantity of each.

66. Transfer of any article belonging to the Government must not be made from one office to another. Nor must any article be sold or disposed of by any operator or other person without specific directions from proper authority.

67. It is indispensably necessary that there should be uniformity in the mode of making out monthly reports. The receipts and expenditures must be carefully classified and entered under the proper heads on the face of the report.

68. The tariff-rates should be observed in entering messages in the Record-Book, and not the amount stated in check when it varies from printed tariff.

69. At the end of each day, all messages sent or received by telegraph must be carefully sorted, placing those sent to or received from each office together, and then register those for each office by themselves, in alphabetical order, and foot the amount of each office by itself.

70. The amount paid or received at the office keeping the Record-Book will be entered in the column headed "Local cash." The same sum will be entered in the column "Other offices check this." The amount paid or to be collected at other offices will be entered in the columns "This office checks other offices."

71. At the foot of each day's business in the Record-Book will be entered the sum-total "For this line" and "For other lines" paid at the office keeping the Record-Book.

72. A monthly report of the business of the office must be made up by the operator at the close of each month, and forwarded to the officer in charge, not later than the third day of the next succeeding month, accompanied by vouchers for authorized expenditures. Such report will contain an account-current, and such other information as may be required by the blank forms of report which will be furnished. Operators will also, at the same time, forward a monthly check report, showing in detail the amount charged to their office by other offices, and the amount charged by them against other offices.

73. At the end of each month the checks must be footed and entered in the monthly report of checks, against the name of each office, and the same sent to the officer in charge. Thus if, according to Tucson report, Yuma should check Tucson "for this line, $40; for other lines, $20," and Yuma checks Tucson the same, it may be presumed they are right.

74. In addition to the receipts for telegraphing, debit the office in the monthly report with all money received during the month, and state from whom received.

75. No credit will be allowed in the monthly report for any expenditure which has not been actually paid.

76. No operator is allowed to adjudicate or pay claims for damages arising from the failure or error in the transmission of a message, nor to refund the tolls thereon. Nor can the Government recognize claims for damages, except to refund the money paid for messages, where the line is at fault.

77. When collection of charges upon any "collect" message cannot be made, the office from which it was sent must be promptly notified by telegraph, and a copy of the message made and sent by mail to the operator of the office, with the reason for being uncollectable indorsed thereon. The office returning a message will in no case request that it be not checked, but the message must be entered upon the books, both at starting-point and destination, precisely the same as if collection had been made, credit for the amount at the receiving-office being taken in the "account current," with which the message, or a copy, with reasons for being uncollectable, will be inclosed as a voucher. The data upon which notice by telegraph was given to the office from which sent must be stated. The office receiving the notice will, if possible, collect the amount from the sender of the message; in which case the amount collected should be entered upon the debit side of "account current" as received from "guaranteed messages," and the copy of the message inclosed therewith. In case collection cannot be made of the sender, the message, indorsed with the reason, should also be inclosed with monthly report, but no account otherwise will be made of it. Uncollected press-reports will be treated in the same manner, except that a copy of the report need not be forwarded to the office at which the report originated.

78. If the message originated at any point not on this line, the connecting office, or the office at which it first reached this line, as well as the office from which it was originally sent, must be promptly notified by telegraph, in order that collection may be made from "other lines." The copy by mail, in such cases, will only be sent to the connecting or repeating office.

79. Messages must be held sacred, and the books, files, and papers of the line must never be permitted to be examined by persons not having proper authority to do so.

80. The printed blank forms of this line should be used only for the purpose for which they are especially designed. In no case, and under no pretense whatsoever, will Number-one blanks or delivery-envelopes be given out to persons not entitled to them.

81. Information must in no case be given to persons not clearly entitled to receive it concerning any message passed or designed to pass over the wires.

82. Operators are prohibited from giving copies of sent messages, or written statements relating thereto. All such cases should be referred to the officer in charge.

83. Vouchers for pay of enlisted men on duty as operators will be forwarded monthly to the Chief Signal-Officer of the Army, Washington, D. C., in time to reach there by the 20th day of each month, except the pay-accounts of civilian operators, who will send them to the officer in charge of the line.

84. Bills for office-rent, fuel, &c., will be sent to the officer in charge at the end of each month.

PAPER 37.—(Form 31.)

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

Report of observations on temperature of water at Toledo, Ohio, for the week ending Saturday, June 26, 1875.

Day and date.	Time of observation.	Temperature of air.	Temperature of water at surface.	Temperature of water at bottom.	Depth of water.
					Feet.
Sunday, June 20, 1875	3 p. m.	72	74	74	11
Monday, June 21, 1875	3 p. m.	76	76	75	11
Tuesday, June 22, 1875	3 p. m.	79	74	74	10
Wednesday, June 23, 1875	3 p. m.	84	75	75	10
Thursday, June 24, 1875	3 p. m.	85	78	78	11
Friday, June 25, 1875	3 p. m.	79	81	80	11
Saturday, June 26, 1875	3 p. m.	83	80	80	10

NOTE.—Observations taken from wharf at King's elevator.

JOSEPH E. COOK,
Sergeant, Signal Service, U. S. A.

PAPER 38.—(Form 38.)

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

Record of river observations made at Hermann, Mo., during the week ending Saturday, June 26, 1875.

Day and date.	Time of observation.	Depth of water above bench-mark.		Depth of water below bench-mark.		Change in twenty-four hours.				Amount of rain or melted snow.
						Rise.		Fall.		
		Feet.	Inches.	Feet.	Inches.	Feet.	Inches.	Feet.	Inches.	
Sunday, June 20, 1875	3 p. m.	11	8	.....	.....	1	10	.....	.....	.....
Monday, June 21, 1875	3 p. m.	11	5	.....	.....	.....	.....	.....	3	.....
Tuesday, June 22, 1875	3 p. m.	10	10	.....	.....	.....	.....	.....	7	.....
Wednesday, June 23, 1875	3 p. m.	11	3	.....	.....	.....	5	.....	.....	.....
Thursday, June 24, 1875	3 p. m.	12	1	.....	.....	.....	10	.....	.....	.....
Friday, June 25, 1875	3 p. m.	12	3	.....	.....	.....	2	.....	.....	.....
Saturday, June 26, 1875	3 p. m.	12	3	.....	.....	.....	.....	.....	.....	1.78

NOTE 1.—The bench-mark or point of reference from which all measurements are made will be the *one in common use by steamboatmen at the station making the report.*

NOTE 2.—Under the head of "Remarks" will be noted all unusual occurrences connected with the stage of water in the river, such as the presence of floating ice, timber, &c.; formation and breaking up of ice-gorges and other obstructions; time of opening and closing of navigation; accidents to gauge, &c., &c.

ED. KEHR,
Observer, Signal Service, U. S. A.

PAPER 39.—(Form 15.)

[This official report is furnished the press with the explicit understanding that it shall not be altered or garbled, and that any paper using it at all *will follow the precise wording given below the line.* There is danger that incorrect or altered reports may greatly mislead the public, and bring discredit upon the service. Editors are requested to insist upon the accurate *following of the copy.*]

WAR DEPARTMENT, OFFICE OF THE CHIEF SIGNAL-OFFICER,
Washington, D. C., Wednesday, December 9, 1874—7.30 *p. m.*

SYNOPSIS FOR THE PAST TWENTY-FOUR HOURS.

The temperature has fallen decidedly in the Northwest and Upper Lake region, with increased pressure, brisk northwesterly winds, partly cloudy weather, and areas of light snow. The temperature has risen in New England, the Middle States, and the Lower Lake region, *with brisks outh or west winds, less pressure, increased cloudiness,* and light snow, except on the coast. Clear weather continues in the Southern States, where the temperature has risen slightly, with light or gentle winds and high barometer. The rivers have fallen at Cairo and Pittsburgh.

PROBABILITIES.

For the Northwest colder weather will prevail, with areas of snow, northwest or southwest winds, and high barometer. For the Lake region colder and cloudy weather, with areas of snow, *southwest to northwest winds, and rising barometer.* For New England and the Middle States, partly cloudy weather, and light snow in Northern New England and Northern New York, with southwest or northwest winds, stationary or falling temperature and rising barometer during Thursday. For Tennessee and the Ohio Valley, increasing cloudiness and colder weather, with north or west winds and stationary or rising barometer. For the South Atlantic and Gulf States, clear or fair weather, northerly or westerly winds, high barometer, slight changes in temperature east of the Lower Mississippi River, and lower temperature in the Southwest, probably followed by a norther on the Texas coast. For the canal regions of New York, Pennsylvania, and *Ohio, the temperature will fall below freezing during* Thursday night.

PAPER 40.

Bulletin of international meteorological observations, taken simultaneously on April 11, 1875.

7.35 a. m. Washington 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.
2.18 p. m. *Athens mean time.*
2.39 p. m. Constantinople mean time.
2.44 p. m. St. Petersburg mean time.

ALGERIAN SERIES.

[Furnished by the co-operation of M. le Général Farre, Commandant Supérieur du Génie en Algérie.]

Stations.	Barometer.				Temperature of the air.		Relative humidity.	Wind.				Clouds.				Rain-fall in 24 hours.		Weather.	Observer.
	Corrected for instrumental errors.		Reduced to sea-level.					Direction.	Velocity.		Force.	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.		
Nemours	.....	.....	30.04	763.0	65.7	18.7	...	NNE.	...	...	5	.....	6	.....	.....	0	0	.....	Charnot.
Algiers	.....	.....	29.94	760.4	61.2	16.2	69	NW.	...	...	1	.....	4	.....	.....	0	0	.....	Peter.
La Calle	.....	.....	.....	.....	.....	.....	...	.....	...	...	...	.....	.....	.....	.....	.....	.....	.....	Knutz.
Tunis	.....	.....	29.97	761.3	68.0	20.0	64	ESE.	...	...	4	.....	10	.....	.....	0	0	.....	Jacques.
Sfax	.....	.....	.....	.....	.....	.....	...	.....	...	...	...	.....	.....	.....	.....	.....	.....	.....	Chauvey.
Saïda	.....	.....	29.95	760.7	58.8	14.9	...	WNW.	...	...	2	.....	2	.....	.....	0.079	2.0	.....	Grosjean.
Tebassa	.....	.....	29.85	758.1	59.4	15.2	...	NW.	...	...	5	.....	9	.....	.....	0	0	.....	Colin.
Geriville	.....	.....	29.92	759.9	53.4	11.9	...	NNW.	...	...	2	.....	2	.....	.....	0	0	.....	Bernadach.
Laghouat	.....	.....	29.87	758.6	57.2	14.0	47	NNW.	...	...	4	.....	2	.....	.....	0.158	4.0	Rain	Poinsignon.
Biskra	.....	.....	29.92	760.0	58.5	14.7	...	NW.	...	...	5	.....	6	.....	.....	0	0	.....	Coulon.
.....	.....	.....	.....	.....	.....	.....	...	.....	...	...	...	.....	.....	.....	.....	.....	.....	.....	
.....	.....	.....	.....	.....	.....	.....	...	.....	...	...	...	.....	.....	.....	.....	.....	.....	.....	
.....	.....	.....	.....	.....	.....	.....	...	.....	...	...	...	.....	.....	.....	.....	.....	.....	.....	

AUSTRIAN SERIES.

[Furnished by the co-operation of Professor Carl Jelinek, director of the Imperial and Royal Central Meteorological Institute at Vienna.]

Agram			30.04	762.9	67.6	19.8	41	NE.			3		2			0	0		Prof. Ivan Stozir.
Buda-Pesth																			I. R. Cen. M. I., Hungary.
Cracow			30.12	765.0	54.5	12.5	58	NE.			1		6			0.028	0.7		I. R. Observatory.
Epenies			30.02	762.6	59.0	15.0	48	NW.			2		3k			0.130	3.31		Julius Mikolik.
Gratz			30.06	763.4	64.0	17.8	48	SSW.			2		2			0	0		Andreas Rospini.
Hermanstadt			30.00	762.0	59.7	15.4	40	NW.			2		5			0	0		Prof. Reissenberger.
Kremsmünster			30.10	764.6	56.7	13.7	60	NW.			1					0	0		Prof. C. Wagner.
Lemberg			29.98	761.6	51.4	10.8	73	NW.			4		4			0.232	5 9		Dr. T. Stanecki.
Nyiregyhaza			30.06	763.5	61.9	16.6	56	NE.			1		1			0	0		Habzsuda Daniel.
Pola			30.11	764.7	51.8	11.0	90	WNW.			2		6ks			0.016	0.41		I. R. Hydrographic Office.
Szegedin			30.03	762.7	62.6	17.0	60	S.			1		9			0	0		Karl Stancel.
Trieste			30.14	765.6	53.8	12.1	91	NW.			1		8			0	0	Fog	Prof. V. Farolfi.
Vienna			30.08	764.0	60.1	15.6	52	NNE.			2		1			0	0		I. R. Central Institute.

NOTE.—The originals give the force of wind on a scale of 0 to 10, and occasionally the weather by the Vienna symbols. No distinction is made between upper and lower clouds. It is not always certain that the weather-remarks refer to the exact moment of observation.

BELGIAN SERIES.

[Furnished by the co-operation of Professor E. Quetelet, director of the Royal Observatory at Brussels.]

Brussels	29.92	759.9			57.4	14.1	64	E.			1		5		SE.	0	0		Royal Observatory.

NOTE.—The originals give the wind-pressure in kilograms per square foot; the weather in general notes. No distinction is made between upper and lower clouds. It is assumed that the barometer is not reduced to sea-level; its altitude is 56.56 meters, or 183.9 feet.

Bulletin of international meteorological observations, &c.—Continued.

BRITISH SERIES.

[Furnished by the co-operation of Robert H. Scott, esq., director of the Meteorological Office, London.]

Stations.	Barometer.				Temperature of the air.		Relative humidity.	Wind.				Clouds.				Rain-fall in 24 hours.		Weather.	Observer.
	Corrected for instrumental errors.		Reduced to sea-level.					Direction.	Velocity.		Force.	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.		
Aberdeen			30.41	772.4	45.6	7.6		N.	16	7.2			8			0	0		William Boswell.
Annanhill																			
Ardrossan																			William McNeil.
Armagh Observatory			30.33	770.4	53.0	11.7		NNE.	11	4.9			0						S. Call, for Dr. Robinson.
Banbridge																			
Barnstaple																			
Battersea, St. John's Col																			
Bidston, Liverpool Obs			30.25	768.3	46.9	8.3		NE.			1		10						John Hartnup, jr.
Birr Castle, (Parsonstown)			30.26	768.6	56.1	13.4		ENE.			1		2						J. Dreyer, for L'd Rosse.
Bradford																			J. Mc. Landsborough.
Bridgetown, (Barbadoes)																			T. H. Hunt.
Bywell																			
Cambridge Observatory			30.18	766.6	47.2	8.4		NE.			2		10						H. Todd.
Cape Town, (Cape Colony)			29.98	761.5	68.2	20.1		SE.			3		7						Sgt. D. E. Hunt.
Cape Good Hope Obs	30.01	762.2			66.4	19.1	71	S.	13	5.8			6						The Staff, for E. J. Stone.
Cardington			30.19	766.8	47.0	8.3		NE.					10						John McLaren.
Carlisle			30.32	770.1	47.3	8.5		NE.					6			0	0		T. Bell, for J. Cartmell.
Chatham, School M. E			30.12	765.0	46.4	8.0		NE.			3		10					Mist	Q. M. Sergt. J. Conroy.
Colombo, (Ceylon)			29.86	758.4	81.0	27.2		SE.			2		3						Sgt. W. F. Hopkins.
Dartmoor			30.20	767.1	39.2	4.0		NE.			2		10						R. E. Power.
Donaghadee			30.31	769.9	52	11.1		NE.			3		0						J. Mac Gowan, jr.
Dover			30.10	764.5	48	8.9		ENE.			4		7						J. Costello.
Dublin																			
Durham Observatory																			G. D. Goldney.
Eccles, (near Manchester)			30.26	768.6	47.0	8.3		E	7.8	3.5			10						Thomas Mackereth.
Falmouth Observatory			30.13	765.3	47.1	8.4		N.	8	3.8			10						The Staff.

Fort Napier, (Natal)			*29.76*	*755.9*	*81.5*	*27.5*	*NE.*			*3*	*3*						Pvt G. Salmon.
Freetown, (Sierra Leone)																	
Galway, Queen's College			30.25	768.3	54	12.2	NE.			3	1						B.G.Clare, for Prof. Curtis.
Gibraltar, (Mediterranean)			30.02	762.5	62	16.7	W.			4	0						Sergt. E. G. Baker.
Glasgow Observatory			30.34	770.6	52.9	11.6	ENE.			2	5						James Gray.
Great Yarmouth			30.18	766.6	45	7.2	NNE.			4	3					Haze	G. T. Watson.
Greenwich Royal Obs			30.13	765.3	51.3	10.7	ENE.			4	10			Blank	Blank		The Staff, for G. B. Airy.
Guernsey			30.06	763.5	46.0	7.8	NE.			2	10					Rain	Dr. S. E. Hoskins.
Halifax, Moorside Obs							NE.				10						F.J.Page, for L.J.Crossley.
Halifax, (Nova Scotia)			29.77	756.1	33.9	1.1	N.			3	8						Corp'l J. Y. Thompson.
Helston			30.08	764.0	51	10.6	ENE.			4	10						Dr. W. B. Moyle.
Holyhead			30.25	768.3	48	8.9	NNE.			3	3						John Tilston.
Hull Park																	
Kew Observatory			30.14	765.5	49.2	9.6	NE.	17	7.6		10						The Staff.
Kingstown			30.31	769.9	46	7.8	NE.			3	7						George Mitchell.
Lampeter																	
Leicester Museum			30.24	768.1	44.6	7.0	NE.			3	10						William J. Harrison.
Llandudno			30.24	768.1	46.5	8.2	NE.			1	10						Dr. James Nicol.
Malta, (Mediterranean)			29.90	759.4	64.0	17.8	SE.			3	10k						Lt. Sergt. E. Dowling.
Markree Castle																	
Marlborough College																	
Moville																	
Nairn			30.42	772.7	46	7.8	E.			1	8						William D. Penny.
Nassau, (Bahamas)			30.10	764.5	74.9	23.8	SE.			3	3						Surg. Maj. J. Jameson.
North Shields																	John Wm. Irvine.
Nottingham			29.25	742.9	46.2	7.9	NE.			4	10ks		NNE.				E. J. Lowe.
Osborne, New Barn Cottage																	
Oscott, St. Mary's College			30.21	767.3	43.3	6.3	NNE.			5	10						Rev. Stephen Whitty.
Oxford, Radcliffe Obs.			30.15	765.8	43	6.1	NE.			2	10					Mist	J. Lucas, for R. Main.
Plymouth			30.11	764.8	49	9.4	NE.			3	10					Mist	John Merrifield.
Portishead																	
Prospect, (Bermuda)																	
Pwllheli, Cochy foel																	
Roche's Point			30.21	767.3	52	11.1	E.			4	8						W. Kennedy.
Saint Ann's Head																	John C. Walker.
Saint Helier, (Jersey)			30.03	762.7	47.5	8.6	E.			1	10					Rain	A. P. Amy.
Sandwick Manse, (Orkneys)			30.47	773.7	45.0	7.2	NE.	10	4.5		3						Rev. C. Clouston.
Scarborough																	F. Shaw.
Scutari, (Turkey)			30.01	762.2	62.0	16.7	S.			1	2						Sergt. W. H. Lyne.
Sheffield			30.24	768.1	45.9	7.7	ENE.			3	10			0	0		W. F. Cooper.
Sidmouth																	
Silloth Rectory			30.28	769.1	51.5	10.8	NE.			5	10			0	0		Rev. Francis Redford.
Somerleyton, (Lowestoft)			30.24	768.1	47.0	8.3	ENE.			2	10						Rev. C. J. Steward.
Stonyhurst Observatory			30.24	768.1	48.2	9.0	E.			3	6						The Staff.
Stornoway, Lews C., (Hebr.)			30.41	772.4	50	10.0	NE.			3	1						John Smith.
Strathfield Turgiss			30.16	766.1	45.6	7.6	NE.			1	10					Mist	Rev. Charles H. Griffith.
Streatley Vicarage			30.17	766.3	44.0	6.7	NE.			5	10						Rev. John Slatter.
Sumburgh Head, (Shetland)			30.42	772.7	49	9.4	NE.			4	5						William Lawrence.
Taunton College																	
Thurso			30.45	773.4	45	7.2	Calm.			0	8						John Trotter.

Bulletin of international meteorological observations, &c.—Continued.

BRITISH SERIES.

[Furnished by the co-operation of Robert H. Scott, esq., director of the Meteorological Office, London.]

Stations.	Barometer.				Temperature of the air.		Relative humidity.	Wind.			Clouds.				Rain-fall in 24 hours.		Weather.	Observer.
	Corrected for instrumental errors.		Reduced to sea-level.					Direction.	Velocity.		Amount.		Direction.					
										Force.	Upper	Lower.	Upper.	Lower.				
	Inches.	Millimeters.	Inches.	Millimeters.	Fahrenheit.	Centigrade.	Per cent.	From—	Miles per hour	Meters per second.	0—10.	0—10.	From—	From—	Inches.	Millimeters.		
Truro, Royal Institution	.....	.....	30.07	763.8	49	9.4	...	NE.	...	...	4	.....	19	.....	.....	.....	.....	W. Newcombe.
Valencia Observatory	.....	.....	30.03	762.7	54.7	12.6	.....	NNE.	17	7.6	...	.....	5	.....	.....	.....	.....	The Staff.
Wick	.....	.....	.....	.....	.....	.....	.....	.....	...	...	.....	.....	.....	.....	.....	.....	.....	
Wisbeach	.....	.....	.....	.....	.....	.....	.....	.....	...	...	.....	.....	.....	.....	.....	.....	.....	
Worthing	.....	.....	.....	.....	.....	.....	.....	.....	...	...	.....	.....	.....	.....	.....	.....	.....	William J. Harris.
York	.....	.....	.....	.....	.....	.....	.....	.....	...	...	.....	.....	.....	.....	.....	.....	.....	

NOTE.—The originals generally omit the relative humidity, and, except in a few cases, they give the wind-force on the scale 0–12, the wind-direction to 32 *points*, and the weather in the Beaufort notation. No distinction is made between the upper and lower clouds. The rain-fall is measured at 10 a. m. at Aberdeen. Occasionally the barometer has been reduced to sea-level and the observed wind-pressures reduced to the scale of force 0–10 by the editor. The elevation of the Cape of Good Hope observatory is unknown.

DANISH SERIES.

[Furnished by the co-operation of Captain N. Hoffmeyer, director of the Royal Danish Meteorological Institute at Copenhagen.]

Copenhagen	.....	.....	30.21	767.3	48.9	9.4	54	SE.	...	...	2	.....	6	.....	.....	.....	.....	.....
Fanöe	.....	.....	30.23	767.9	51.1	10.6	72	W.	...	...	4	.....	9	.....	.....	.....	.....	.....
Godthaab, (Greenland)	.....	.....	30.20	767.2	33.3	0.7	...	SE.	...	...	2	.....	8	.....	.....	.....	.....	.....
Stykkisholm, (Iceland)	.....	.....	30.54	775.6	38.5	3.6	92	Calm.	...	...	0	.....	10	.....	.....	.....	.....	.....
Thorshavn, (Faröe)	.....	.....	30.51	774.9	45.1	7.3	87	Calm.	...	...	0	.....	10	.....	.....	.....	.....	.....
Vestervig	.....	.....	30.16	766.1	50.0	10.0	87	SSW.	...	...	2	.....	0	.....	.....	.....	.....	.....

NOTE.—The originals give the force of the wind on a scale of 0 to 6 and the weather in the Vienna symbols. No distinction is made between the upper and lower clouds.

FRENCH SERIES.

[Furnished by the co-operation of His Excellency U. J. Le Verrier, director of the Paris Observatory, and the respective observers.]

Ajaccio	.....	.....	29.92	759.9	55.8	13.2	88	.....	.....	.....	.....	.....	1cs	.....	.....	.....	.....	.....	Normal School.
Alençon	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Normal School.
Amiens	.....	.....	30.06	763.4	64.0	17.8	74	ENE.	.....	.....	2	.....	2	.....	.....	0	0	.....	Normal School.
Beaumette, (near Angers)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Beaumette Observatory.
Beauvais	.....	.....	30.08	763.9	58.5	14.7	53	S.	.....	.....	3	.....	8	.....	SE.	0.008	0.2	.....	Normal School.
Besançon	.....	.....	30.09	764.4	60.9	15.9	51	E.	.....	.....	2	.....	2	.....	SW.	0.028	0.7	.....	Normal School.
Bourges	.....	.....	29.98	761.4	57.6	14.2	62	SE.	.....	.....	1	.....	2	.....	SE.	0.020	0.5	.....	Normal School.
Brest	.....	.....	30.01	762.2	48.7	9.3	78	NNE.	.....	.....	3	.....	10	.....	NE.	0	0	.....	Naval Observatory.
Caen	.....	.....	29.99	761.7	49.5	9.7	76	NE.	.....	.....	2	.....	10	.....	NE.	0.079	2.0	.....	Normal School.
Carcassonne	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Chartres	.....	.....	30.04	762.9	56.8	13.8	...	S.	.....	.....	1	.....	8	.....	SW.	0	0	.....	Normal School.
Chaumont	.....	.....	30.07	763.8	58.5	14.7	...	SSE.	.....	.....	4	.....	0	.....	.....	0	0	.....	Normal School.
Le Mans	.....	.....	30.09	764.4	53.8	12.1	78	SE.	.....	.....	2	.....	8	.....	SE.	0	0	.....	Normal School.
Mirecourt	.....	.....	30.06	764.4	55.4	13.0	42	SE.	.....	.....	2	.....	1	.....	NW.	0	0	.....	Normal School.
Orleans	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Normal School.
Paris	.....	.....	30.01	763.5	57.7	14.3	...	S.	.....	.....	3	.....	5	.....	S.	0	0	.....	National Observatory.
Parthenay	.....	.....	29.98	761.0	53.6	12.0	58	NE.	.....	.....	2	.....	5	.....	SE.	0	0	.....	Normal School.
La Roche sur Yon	.....	.....	30.03	762.5	57.9	14.4	69	NE.	.....	.....	2	.....	5	.....	SW.	0.264	6.7	.....	Normal School.
Rouen	.....	.....	30.03	762.8	55.6	13.1	61	SSE.	.....	.....	2	.....	10	.....	E.	0.028	0.7	.....	Normal School.
Saint Lo	.....	.....	30.04	763.1	51.8	11.0	86	NE.	.....	.....	2	.....	10	.....	NE.	0.020	0.5	.....	Normal School.
Villefranche	.....	.....	30.04	763.1	64.6	18.1	84	S.	.....	.....	6	.....	2	.....	ESE.	0	0	.....	Normal School.

FRENCH SUB-SERIES.

Gorée, (Senegambia)	.....	.....	.....	.....	.....	.....	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Père Pascall.
Mont-Louis	24.72	027.9	.....	.....	42.6	5.9	64	SSW.	7.4	3.3	.....	.....	8	.....	SSE.	0.020	0.5	.....	—. Falgnère.
Montsouris, (near Paris)	.....	.....	30.05	763.3	57.0	14.2	50	E.	2.0	0.9	.....	.....	8k	.....	S.	0	0	.....	Marié Davy.
Perpignan	29.86	758.4	.....	.....	59.2	15.1	72	ESE.	13.0	5.8	.....	.....	5	.....	SW.	0	0	.....	Dr. Fines.
Saint Maur, (near Paris)	.....	.....	30.06	763.4	61.2	16.2	44	S.	...	...	1	.....	4	.....	.....	0.012	0.3	.....	E. Renou.
Saint Pierre, (Martinique)	.....	.....	.....	.....	.....	.....	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Tours	.....	.....	30.02	762.4	57.7	14.3	57	SSE.	...	...	1	.....	5	.....	S.	0.035	0.9	.....	C. Marquet.
Versailles, (near Paris)	.....	.....	30.05	763.2	58.6	14.8	52	S.	...	...	3	.....	8	.....	.....	0.023	0.59	.....	Dr. A. Bérigny.
Zi-Ka-Wei, (near Shanghai)	.....	.....	30.16	766.1	47.3	8.5	81	SE.	6.9	3.1	.....	.....	0	.....	.....	0	0	.....	H. Le Lec., S. J.
.....	.....	.....	.....	.....	.....	.....	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	

NOTE.—The originals give the wind-force on a scale of 0 to 7, and the weather in general terms. The wind-velocity is given by Montsouris in kilometers per hour, but by Beaumette, Mont-Louis, and Perpignan in meters per second. No distinction is generally made between upper and lower clouds. The rain-fall is generally measured at 7 a. m. or 9 a. m., local time. The altitude of Mont-Louis is 1,586.40 meters, or 5,204.8 feet, and of Perpignan 40 meters, or 131 feet.

Bulletin of international meteorological observations, &c.—Continued.

GERMAN SERIES.

[Furnished by the co-operation of Prof. Carl Bruhns, director of the Royal Observatory, Leipsic.]

Stations.	Barometer.				Temperature of the air.		Relative humidity.	Winds.			Clouds.				Rain-fall in 24 hours.		Weather.	Observer.
	Corrected for instrumental errors.		Reduced to sea-level.					Direction.	Velocity.		Amount.		Direction.					
										Force.	Upper.	Lower.	Upper.	Lower.				
	Inches.	Millimeters.	Inches.	Millimeters.	Fahrenheit.	Centigrade.	Per cent.	From—	Miles per hour.	Meters per second.	0—10.	0—10.	From—	From—	Inches.	Millimeters.		
Bamberg			30.06	763.4	56.1	13.4	55	NE.		2		2			0	0		Prof. Hoh.
Berlin			30.23	767.7	57.6	14.2	76	N.		2		4			0	0		Prof. Arndt.
Breslau			30.22	767.6	52.9	11.6	61	NW.		2		9			0	0		Dr. P. Neugebauer.
Carlsruhe			30.09	764.2	61.9	16.6	37	E.		2		0			0.016	0.4		A. Senz.
Cassel			30.14	765.6	61.9	16.6	57	NE.		2		1			0	0		Dr. H. Möhl.
Cologne			30.15	765.8	64.6	18.1	59	S.		3		3			0	0		Dr. Garthe.
Emden			30.20	767.1	59.2	15.1	59	Calm.		0		0			0	0		Prof. Prestel.
Frankfort-on-the-Main			30.13	765.4	62.6	17.0	42	N.		1		1			0	0		Physical Society.
Friedrichshafen			30.11	764.7	54.5	12.5	54	W.				0			0	0		M. Wilhelm.
Hamburg			30.24	768.1	54.5	12.5	72	SE.		2		3			0	0		W. Reinert.
Kiel			30.31	769.8	50.9	10.5	42	NNE.		3		0			0	0		Prof. G. Karsten.
Königsberg			30.13	765.2	39.6	4.2	52	N.		1		1			0	0		Prof. E. Luther.
Köslin			30.30	769.6	47.7	8.7		N.		2		2			0	0		Dr. Tagert.
Leipsic			30.21	767.4	55.4	13.0	66	NNE.		2		8			0	0		Prof. Bruhns.
Münster			30.08	764.0	62.6	17.0	85	SE.		2		0			0	0		Prof. E. Heis.
Posen			30.16	766.0	66.3	13.5	59	SW.		1		1			0.016	0.4		Dr. Magener.
Strassburg, (in Alsace)			30.12	765.0	58.8	14.9	36	NE.				0			0	0		Hartwig and Tülk.
Stuttgart			30.10	764.6	60.4	15.8	45	NE.				0			0	0		Mr. Würth.
Thorn			30.09	764.4	55.8	13.2	70	N.		4		6			0.012	0.3		Dr. Harenbalg.
Treves, (Trier)			30.09	764.3	59.0	15.0	45	E.		2		1			0	0		Prof Flesch.
Wustrow			30.23	767.9	47.3	8.5	73	WNW.		2		7			0	0		E. F. Schütz.

NOTE.—The originals give the force of the wind on a scale of 0 to 10. No distinction is made between upper and lower clouds. It is not quite certain that the remarks in the weather column refer to the moment of observation.

ITALIAN SERIES.

[Furnished by the co-operation of his excellency the minister of agriculture, industry, and commerce, and the respective observers.]

Moncalieri			30.09	764.3	55.9	13.3	53	SSE.	1.3	0.6			7			0	0	
Mondovi			30.14	765.5	51.3	10.7	49	NW.			4		7	S.		0	0	
Genoa			30.05	763.3	58.8	14.9	49	N.	7.4	3.3			10	S.		0	0	
Pavia			30.12	765.0	57.6	14.2	48	NE.			2		8			0	0	
Verona			30.16	766.1	61.3	16.3	64	E.			1		0			0	0	
Padua			30.10	764.6	57.4	14.1	65	ESE.	1.8	0.8			4	ESE.		0	0	
Parma																		
Bologna			30.11	764.7	58.6	14.8	37	W.			4		5	E.		0	0	
Livorno			30.02	762.6	64.8	18.2	52	ENE.	10.5	4.7			9			0	0	
Urbino			30.12	765.1	49.5	9.7	97	NE.			2		10			0.079	2.0	
Ancona			30.13	765.4	52.2	11.2	80	NW.			2		10			0.098	2.5	
Siena			30.02	762.4	58.8	14.9	64	ENE.	3.8	1.7			10	E.		0.024	0.6	Rain
Rome			29.98	761.6	64.4	18.0	68	NNE.	2.5	1.1			10	SW.		0	0	
Naples, O. U			30.02	762.5	68.0	20.0	62	WSW.			2		10	SW.		0	0	
Lecce			30.12	765.0	63.7	17.6	72	ENE.	6.9	3.1			6			0	0	
Coseaza			30.11	764.8	64.9	18.3	66	N.			2		10			0	0	
Catania, (Sicily)			30.06	762.5	60.4	15.8	79	ESE.			4		8	SE.		0	0	
Riposto																		
Palermo			29.80	756.8	70.2	21.2	40	E.			4		9			0	0	
Subseries.																		
Naples, S. R	29.50	749.2			64.8	18.2	71	SW.			2-4		k	SW.		0	0	Prof. F. Brioschi.

NOTE.—The originals give the force of the wind on a scale of *0 to 4*, and, *in some cases, the velocity in kilometers per hour*; the cloudiness is occasionally given on a scale of 0 to 4, and generally without distinguishing between upper and lower clouds; the weather is given in various general terms. The altitude of Naples, S. R., is 149.0 meters, or 488.8 feet.

NETHERLANDS SERIES.

[Furnished by the co-operation of Prof. Buys Ballot, director of the Royal Meteorological Institute of the Netherlands, at Utrecht.]

Flushing			30.15	765.7	54.7	12.6	....	SE.			3							
Groningen			30.14	765.6	56.3	13.5	....	ESE.			2							
Helder			30.17	766.3	48.9	9.4	....	NE.			2							
Utrecht			30.10	764.6	60.8	16.0	....	SE.			3		5					

NOTE.—The originals give the pressure of the wind in *kilograms per square meter, and the cloudiness on a scale of 0 to 10, without distinguishing* between upper and lower clouds. It is assumed that the barometer-readings have been reduced to sea-level.

Bulletin of international meteorological observations, &c.—Continued.

NORWEGIAN SERIES.

[Furnished by the co-operation of Prof. H. Mohn, director of the Royal Norwegian Meteorological Institute, at Christiania.]

Stations.	Barometer.				Temperature of the air.		Relative humidity.	Winds			Clouds.				Rain-fall in 24 hours.		Weather.	Observer.
	Corrected for instrumental errors.		Reduced to sea-level.					Direction.	Velocity.		Amount.		Direction.					
										Force.	Upper	Lower	Upper	Lower				
	Inches.	Millimeters.	Inches.	Millimeters.	Fahrenheit.	Centigrade.	Per cent.	From—	Miles per hour.	Meters per second.	0—10.	0—10.	From—	From—	Inches.	Millimeters.		
Bergen	.....	.....	30.21	767.3	54.1	12.3	49	NNW.	17.9	8.0	.....	.....	0	.....	.....	0	0	.....	.....
Christiania	.....	.....	30.18	766.5	47.8	8.8	50	SW.	7.8	3.5	.....	.....	0	.....	.....	0	0	.....	.....
Tromsö	.....	.....	29.78	756.5	32.0	0.0	96	W.	.....	.....	2	.....	10	.....	.....	0.244	6.2	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NOTE.—The originals give the velocity of the wind in meters per second, and its force on a scale of 0 to 6; the cloudiness on a scale of 0 to 10, without distinguishing between upper and lower clouds, and the weather in general terms. The cloudiness and the weather at Bergen refer to 2h. 0m. p. m., local time.

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.]

Lisbon	29.74	755.3	.....	.....	56.8	13.8	38	WNW.	19.9	8.9	.....	.....	3	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
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NOTE.—The originals give the velocity of the wind in kilometers per hour, the weather in the Vienna symbols, and the cloudiness on a scale of 0 to 10, without distinguishing between upper and lower clouds. It is assumed that the barometer is not reduced to sea-level; its altitude is 102.3 meters, or 335.5 feet.

RUSSIAN SERIES.

[Furnished by the co-operation of Prof. H. Wild, director of the Imperial Central Physical Observatory of Russia, at St. Petersburg.]

Warsaw			30.02	762.6	56.8	13.8	53	W.	13	6			10					Astronomical Obs.
Wilna			29.94	760.5	43.7	6.5	46	NW.	10	4.5			2					Astronomical Obs.
Dorpat			29.82	757.5	37.6	3.1	59	WNW.	13	6			1					Physical Cabinet.
St. Petersburg			29.55	750.5	37.6	3.1	64	NW.	18	8			10					Central Physical Obs.
Kieff			29.89	759.3	46.4	8.0	71	NW.	9	4			10					Physical Cabinet.
Nikolaiev			29.99	761.8	59.2	15.1	48	WSW.	10	4.5			7					
Kertch			29.95	760.8	49.5	9.7	69	ESE.	8	3.5			6					Lagorio.
Moscow			29.49	749.1	35.1	1.7	55	NW.	13	6			6					Meteorological Obs.
Lugan			29.75	755.6	45.9	7.7	52	SW.	20	9			5					Meteorological Obs.
Archangel			29.08	738.5	30.2	— 1.0	84	NW.	17	7.5			3					Ogorodnikof.
Tiflis			29.90	759.6	61.9	16.6	36	SE.	4	2			9					Physical Obs.
Astrakhan			29.97	761.1	53.4	11.9	54	WSW.	10	4.5			3					Sebastianof.
Kasan			29.28	743.8	40.3	4.6	62	SW.	13	6			8					Physical Cabinet.
Orenburg			29.69	754.1	37.0	2.8	89	SW.	8	3.5			10				Rain	Tschernischef.
Ekaterinburg			29.58	751.2	38.5	3.6	77	S.	13	6			10					Meteorological Obs.
Kasaly																		Bobrof.
Tashkend																		Michelson.
Barnaul			29.88	759.0	4.9	5.5	81	Calm	0	0			4					Meteorological Obs.
Yeniseisk			29.61	752.1	36.0	2.2	61	N.	8	3.5			0					Marks.
Irkutsk																		Usolzef.
Oorga			29.78	756.5	26.0	2.2	75	Calm	0	0			5					Mossin.
Peking, (China)			29.84	758.1	52.9	11.6	41	S.	8	3.5			1					Physical Observatory.
Nertchinsk			29.95	760.6	19.0	— 7.2	69	Calm	0	0			0					Meteorological Obs.
Vladivostock																		
Nikolaievsk, on the Amoor																		Kurdakof.
Kuopio																		

NOTE.—The originals give the velocity of the wind in meters per second, the cloudiness on a scale of 0 to 10, without distinguishing between upper and lower clouds, and the weather according to the Vienna system of symbols.

SPANISH SERIES.

[Furnished by the co-operation of Antonio Aguilar, director of the Royal Observatory at Madrid, and of Don Cecilio Pujason, captain R. N., director of the Naval Observatory at San Fernando.]

Madrid			29.90	759.4	53.4	11.9	50	SW.	9.6	4.3		1	5	SE.		0.004	0.1		Royal Observatory.
San Fernando																			The Naval Observatory.

NOTE.—The originals give the velocity of the wind in kilometers per hour, the cloudiness from 0 to 10, with a distinction between upper and lower clouds, the rain-fall for the previous 8 hours, and weather in general terms.

Bulletin of international meteorological observations, &c.—Continued.

SWEDISH SERIES.

[Furnished by the co-operation of Prof. R. Rubenson, director of the Royal Swedish Meteorological Institute at Stockholm, and Dr. H. H. Hildebrandsson, chief of the Meteorological Division of the Upsala Observatory.]

Stations.	Barometer.				Temperature of the air.		Relative humidity.	Wind.				Clouds.				Rain-fall in 24 hours.		Weather.	
	Corrected for instrumental errors.		Reduced to sea-level.					Direction.	Velocity.		Force.	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.		
Umea			29.86	758.4	40.6	4.8	48	NW.			5		10			0	0		
Hernosand			29.93	760.2	41.0	5.0	36	NW.			7		6			0.20	5.1		
Stockholm			30.04	763.1	40.3	4.6	50	W.			5		4			0	0		
Wisby			30.14	765.6	36.7	2.6	72	NW.			2		0			0	0		
Sub-series.																			
Upsala			30.03	762.8	43.9	6.6	48	W.			4		1						Dr. Hildebrandsson.

NOTE.—The originals give the wind-force on a scale of 0 to 6, and the cloudiness without distinguishing between upper and lower clouds. The rain-fall is measured at 8 a. m., local time, at Umea, Hernosand, Stockholm, and Wisby.

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.]

Geneva	28.65	727.6			52.7	11.3	57	NNE.			2		3			0	0	Mist	The observatory.
Zurich	28.43	722.0			59.2	15.1	40	NE.			1		1			0	0		The observatory.

NOTE.—For Geneva, the corresponding departures from the normal values are: Barometer, + 3.4 mm.; thermometer, + 0°.9 C.; relative humidity, — 1 per cent.

NOTE.—The originals give the force of the wind on a scale of 0 to 4, the cloudiness from 0 to 10, without distinguishing between the upper and lower clouds, and the weather in general terms. The altitude of Geneva is 408 meters, or 1,339 feet, and that of Zurich is 470 meters, or 1,542 feet.

TURKISH SERIES.

[Furnished by the co-operation of A. Coumbary, Effendi, director of the Central Observatory at Constantinople.]

Beirut, (Syria)																	
Constantinople			30.06	763.5	64.0	17.6	72	SW.	9	4			5		W.	0	0
Fao, (Persian Gulf)			29.98	761.5	68.0	20.0		SE.			3		0				
Salonica			29.98	761.6	65.1	18.4		SE.			1		0				
Valona			30.07	763.8	72.9	22.7		SW.			1		2				
Varna			30.08	764.0	53.6	12.0		E.			2		10				

NOTE.—The originals give the wind-force on scales of 0 to 7 and 0 to 12, the weather and cloudiness are given in general terms, and it is assumed that the barometer is reduced to sea-level. No distinction is made between upper and lower clouds.

GREEK SERIES.

[Furnished by the co-operation of Prof. Dr. J. F. Julius Schmidt, director of the Royal Observatory at Athens.]

Athens																	

NOTE.—Reports commence October 1, 1875.

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.]

Brockville, Ontario			30.05	763.3	45	7.2		SW.	2	0.9		0	0			0	0
Chatham, New Brunswick			29.84	757.9	32	0.0	79	N.	10	4.5		8k	2ks	N.	N.	0.17	4.3
Charlottetown, Prince Edward Island			29.73	755.1	31	— 0.6	87	W.	8	3.6			10s			0.23	5.8
Fort Garry, Manitoba			30.32	770.1	25	— 3.9	98	N.	4	1.8		0	0			0	0
Halifax, Nova Scotia			29.73	755.1	34	1.1	81	N.	8	3.6		0	2ks		NW.	0.10	2.5
Kingston, Ontario			30.04	763.0	41	5.0	75	Calm.	0	0		0	0			0	0
Montreal, Quebec			29.96	761.0	40	4.4	54	N.	11	4.9		0	0			0	0
Ottawa, Ontario			30.00	762.0	38	3.3	65	N.	1	0.4		2c	0	NW		0	0
Parry Sound, Ontario			30.03	762.7	35	1.7	65	NE.	1	0.4		0	0			0	0
Port Dover, Ontario			29.99	761.7	39	3.	64	NE.	6	2.7		2k	0	NW		0	0
Port Stanley, Ontario			29.96	761.0	41	5.0	60	E.	10	4.5		5k	0	SW		0	0
Quebec, Quebec			29.95	760.7	32	0.0	79	Calm.	0	0		5k	2ks			0.02	0.5
Saugeen, Ontario			30.00	762.0	28	— 2.2	72	NE.	4	1.8		2ks	0			0	0
Stayner, Ontario																	

Bulletin of international meteorological observations, &c.—Continued.

CANADIAN SERIES—Continued.

Stations.	Barometer. Corrected for instrumental errors. Inches.	Barometer. Corrected for instrumental errors. 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.	Winds. Direction. From—	Winds. Velocity. Miles per hour.	Winds. Velocity. Meters per second.	Winds. Force. 0—10.	Clouds. Amount. Upper. 0—10.	Clouds. Amount. Lower. 0—10.	Clouds. Direction. Upper. From—	Clouds. Direction. Lower. From—	Rain-fall in 24 hours. Inches.	Rain-fall in 24 hours. Millimeters.	Weather.	Observer.
Sydney, C. B.			29.82	757.4	30	— 1.1	92	SE.	8	3.6			10n			0.21	5.3	Hvy. snow	
Toronto, Ontario			30.04	762.5	42	5.6	50	NE.	4	1.8		2cs	0			0	0		

NOTE.—The originals give the cloudiness on a scale of 0 to 4.

UNITED STATES SERIES.

[Furnished by the co-operation of Bvt. Brig. Gen. Albert J. Meyer, Chief Signal-Officer, U. S. A.]

Albany, N. Y.			29.94	760.5	47	8.3	69	N.	1	0		0	0			0	0		
Alpena, Mich			30.02	762.5	38	3.3	46	NE.	10	4.5		0	5ks			0	0		
Atlantic City, N. J			29.98	761.5	46	7.8	92	Calm.	0	0		10cs	0	SW		0	0		
Augusta, Ga			29.88	758.9	64	17.8	89	N.	2	0.9			10s			0.69	17.5		
Baltimore, Md			29.97	761.2	52	11.1	79	Calm.	0	0			10s			0	0		
Barnegat, N. J			29.96	761.0	57	11.7	68	SE.	1	0.4			10s			0	0		
Benton, Mont			30.31	769.9	31	— 0.6	79	N.	2	0.9			10s			0	0		
Bismarck, Dak			30.08	764.0	24	— 4.4	74	N.	12	5.4			8k			0.07	1.8		
Boston, Mass			29.90	759.4	48	8.9	53	NW.	6	2.7		0	0			0	0		
Breckenridge, Minn			30.08	764.0	32	0.0	89	N.	4	1.8			10s			0.03	0.8		
Buffalo, N. Y			29.98	761.5	42	5.6	50	E.	4	1.8		2cs	Su'e			0	0		
Burlington, Vt			29.70	754.4	40	4.4	73	N.	3	1.3			10s			0	0		
Cairo, Ill			29.93	759.4	44	6.7	76	W.	8	3.6			10ks			0	0		
Cape Hatteras, N. C			29.89	759.2	59	15.0	94	Calm.	0	0			10ks		W.	0.32	8.1		
Cape Henry, Va			29.95	760.7	49	9.4	85	SE.	14	6.3			10n			0.08	2.0	Lt. rain	
Cape May, N. J			29.98	761.5	49	9.4	77	S.	4	1.8			10s		W.	0	0		
Charleston, S. C			29.94	760.5	68	20.0	87	SW.	8	3.6		8ck	Haze			0	0		
Cheyenne, Wyo			29.92	760.0	14	—10.0	100	N.	36	16.1			10n			0.02	0.5	Hvy. snow	

Chicago, Ill			29.74	755.4	40	4.4	91	NE.	20	8.9			10n			0.01	0.3	Lt. rain
Cincinnati, Ohio			29.76	754.4	55	12.8	74	Calm.	0	0			10ks			0.59	15.0	
Cleveland, Ohio			29.83	757.7	52	11.1	81	SE	6	2.7			10ks		SE.	0	0	
Colorado Springs, Colo			29.94	760.5	25	— 3.9	87	SE.	2	0.9			10n			0.01	0.3	Lt. snow
Corsicana, Tex			29.5	749.8	43	6.1	83	W.	2	0.9		0	0			0	0	
Davenport, Iowa			29.87	758.7	35	1.7	100	N.	8	3.6			10n			0.60	15.2	Lt. rain
Denver, Colo			30.03	762.7	25	— 3.9	62	E.	8	3.6			10n			0.08	2.0	Lt. snow
Detroit, Mich			29.85	758.2	44	6.7	59	NE.	15	6.7			10s			0	0	
Dodge City, Kans			29.70	755.9	29	— 1.7	77	NW.	24	10.7		5k	0	N.		0	0	
Dubuque, Iowa			29.93	760.2	33	0.6	89	NE.	6	2.7			10n			0.14	3.5	Hvy. snow
Duluth, Minn			30.14	765.5	37	2.8	62	NE.	12	5.4		4cs	0	NE.		0.01	0.3	
Eastport, Me			29.86	758.4	35	1.7	81	NE.	8	3.6		*10k*	*0*	N.		0	0	
Erie, Pa			29.91	759.7	46	7.8	54	E.	8	3.6		2c	Haze	E.		0	0	
Escanaba, Mich			30.02	763.3	*30*	— 1.1	78	N.	14	6.3		*5ck*	*Haze*	N.		0	0	
Fort Gibson, Ind. T			29.97	761.2	42	5.6	75	NW.	15	6.7		5cs	0	W.		0.23	5.8	
Fort Saint Michael, Alaska																		
Fort Sully, Dak			30.16	766.1	35	1.7	81	N.	22	9.8			5s			0.05	1.3	
Galveston, Tex			29.95	760.7	54	12.2	73	NE.	25	11.2		0	0			0.05	1.3	
Grand Haven, Mich			29.85	758.2	44	6.7	45	E.	10	4.5		8k	0	E.		0	0	
Indianapolis, Ind			29.66	753.4	49	9.4	93	E.	4	1.8			10n			0.29	7.4	Lt. rain
Indianola, Tex			29.96	761.0	56	13.3	62	NE.	20	13.4		1c	5s	W.		0.16	4.1	
Jacksonville, Fla			29.98	761.5	70	21.1	84	S.	16	7.2		9k	0	SW.		0	0	
Keokuk, Iowa			29.79	756.7	43	6.1	75	Calm.	0	0		0	*2ks*			0	0	
Key West, Fla			30.03	762.7	75.5	24.1	64	SE.	13	5.8		8cs	Haze			0	0	
Kittyhawk, N. C			29.91	759.7	50	10.0	96	NE.	6	2.7			10s		S.	0.71	18.0	
Knoxville, Tenn			29.75	756.4	54	12.8	93	NE.	2	0.9			10s			0.46	11.7	
La Crosse, Wis			29.94	760.5	40	4.4	73	Calm.	0	0			10n			0.03	0.8	Lt. rain
Leavenworth, Kans			29.88	758.9	35	1.7	80	NW.	10	4.5			10s			0.01	0.3	
Lexington, Ky			29.72	754.9	60	15.6	55	W.	7	3.1		8k	0	W.		0.02	0.5	
Long Branch, N. J			29.97	761.2	55	12.8	68	SW.	2	0.9		2c	0	SW.		0	0	
Louisville, Ky			29.71	754.0	53	11.7	80	SW.	12	5.4			10s		SW.	0.26	6.0	
Lynchburg, Va			29.93	760.2	52	11.1	93	NE.	3	1.3			*10n*			0.35	8.9	Lt. rain
Malone, N. Y																		
Marquette, Mich			30.10	764.5	33	0.6	70	NW.	12	5.4		*0*	*0*			0	0	
Memphis, Tenn			29.93	760.2	46	7.8	85	W.	3	1.3		3k	0	NW.		0.12	3.0	
Milwaukee, Wis			29.87	758.7	35	1.7	90	NE.	23	10.3			10s			0	0	Threat'g
Mobile, Ala			29.82	757.4	68	20.0	94	SW.	5	2.2			10n			0.16	4.1	Hvy. rain
Montgomery, Ala			29.80	756.9	68	20.0	90	S.	2	0.9			10n			0.05	1.3	Hvy. rain
Morgantown, W. Va			29.79	756.7	57	13.9	62	NE.	2	0.9			10s			0	0	
Mount Washington, N. H			29.79	756.7	16	— 8.9	100	NW.	10	17.9			Fog			0	0	Fog
Nashville, Tenn			29.84	757.9	51	10.6	78	W.	11	4.9		10k	0	NW.		0.32	8.1	
New Haven, Conn			29.95	760.7	52	11.1	53	N.	1	0.4		3cs	0	NW.		0	0	
New London, Conn			29.95	760.7	50	*10.0*	65	NW.	*1*	*0.4*		2c	*Haze*	W.		*0*	*0*	
New Orleans, La			29.83	757.7	66.5	19.2	81	NW.	14	6.3			10ks		NW.	0.15	3.8	
Newport, R. I																		
New York, N. Y			29.97	761.3	48	8.9	70	Calm.	0	0		0	Fog			0	0	
Norfolk, Va			29.96	761.0	52	11.1	78	SE.	6	2.7			10n			0.12	3.0	Lt. rain
North Platte, Nebr			29.74	755.4	26	— 3.8	75	NW.	18	8.0		10cs	2s	W.		0	0	
Omaha, Nebr			29.92	760.0	31	— 0.6	84	N.	8	3.6			10n			0	0	Lt. snow
Oswego, N. Y			30.01	762.5	38.8	3.8	67	W.	2	0.9		Haze	Haze			0	0	
Peck's Beach			29.99	761.7	47	8.3	92	Calm.	0	0			10s			0	0	
Pembina, Dak			30.29	769.4	24	— 4.4	80	NE.	4	1.8		5c	0			0.05	1.3	

Bulletin of international meteorological observations, &c.—Continued.

UNITED STATES SERIES—Continued.

Stations.	Barometer. Corrected for instrumental errors. Inches.	Barometer. Corrected for instrumental errors. 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 seconds.	Force. 0–10.	Clouds. Amount. Upper 0–10.	Clouds. Amount. Lower 0–10.	Clouds. Direction. Upper. From—	Clouds. Direction. Lower. From—	Rain-fall in 24 hours. Inches.	Rain-fall in 24 hours. Millimeters.	Weather.	Observer.
Philadelphia, Pa	.....	.....	29.98	761.5	49	9.4	71	SW.	1	0.4	...	2ck	2s	W.	.....	0	0	.....	
Pike's Peak, Colo	.....	.....	29.59	751.6	— 4	—20.0	100	NW.	36	16.1	...	.....	10n	.....	SW.	0.08	2.0	Lt. snow	
Pittsburgh, Pa	.....	.....	29.85	758.2	52	11.1	47	E	1	0.4	...	.....	10s	.....	.....	0	0	.....	
Port Huron, Mich	.....	.....	29.95	760.7	39	3.9	72	NE.	12	5.4	...	.....	P's	.....	.....	0	0	.....	
Portland, Me	.....	.....	29.90	759.4	41	5.0	65	NW.	2	0.9	...	10ck	0	NW.	.....	0	0	.....	
Portland, Oreg	.....	.....	30.39	771.9	45	7.2	92	SW.	1	0.4	...	.....	Fog	.....	.....	0	0	.....	
Punta Rassa, Fla	.....	.....	30.04	763.0	72	22.2	76	SE.	17	7.6	...	2c	1ks	SW.	.....	0	0	.....	
Rochester, N. Y	.....	.....	29.99	761.7	42	5.6	58	NW.	5	2.2	...	Haze	0	.....	.....	0	0	.....	
Salt Lake City, Utah	.....	.....	30.14	765.5	37	2.8	71	Calm.	0	0	...	5c	5s	.....	.....	0	0	.....	
Sandy Hook, N. J	.....	.....	29.96	761.0	46	7.8	85	SW.	6	2.7	...	5c	Haze	W.	.....	0	0	.....	
San Diego, Cal	.....	.....	30.02	762.5	53	11.7	48	E.	4	1.8	...	0	0	.....	.....	0	0	.....	
San Francisco, Cal	.....	.....	30.09	764.3	57	13.9	75	Calm.	0	0	...	Haze	Sm'e	.....	.....	0	0	.....	
Santa Fé, N. Mex	.....	.....	29.63	752.6	29	— 1.7	45	N.	6	2.7	...	0	0	.....	.....	0	0	.....	
Savannah, Ga	.....	.....	29.92	760.0	69	20.6	75	S.	12	5.4	...	.....	10ks	.....	SW.	0	0	.....	
Shreveport, La	.....	.....	29.99	761.7	49	9.4	93	Calm.	0	0	...	2c	0	W.	.....	0.01	0.3	.....	
Springfield, Mass	.....	.....	29.92	760.0	51	10.6	40	NW.	8	3.6	...	2c	0	W.	.....	0	0	.....	
Saint Louis, Mo	.....	.....	29.89	759.2	40	4.4	81	NW.	9	4.0	...	.....	10s	.....	.....	0.67	17.0	.....	
Saint Mark's, Fla	.....	.....	29.91	759.7	71	21.7	90	S.	20	8.9	...	.....	10s	.....	.....	0	0	.....	
Saint Paul, Minn	.....	.....	29.94	760.5	30	— 1.1	78	N.	8	3.6	...	8c	2s	.....	.....	0.06	1.5	.....	
Saint Paul's Island, Alaska	.....	.....	30.22	767.6	20	— 6.7	70	NNE.	13	5.8	...	0	2k	.....	.....	0	0	.....	
Squan Beach, N. J	.....	.....	29.96	761.0	50	10.0	71	W.	2	0.9	...	5k	0	.....	.....	0	0	.....	
Toledo, Ohio	.....	.....	29.84	757.9	44	6.7	67	NE.	16	7.2	...	.....	10n	.....	.....	0	0	Threat'g	
Tybee Island, Ga	.....	.....	29.94	760.5	66	18.9	94	S.	10	4.5	...	.....	10n	.....	.....	0	0	Lt. rain	
Vicksburgh, Miss	.....	.....	29.99	761.7	53	11.7	73	N.	8	3.6	...	2k	0	SE.	.....	0.98	24.9	.....	
Virginia City, Mont	.....	.....	29.94	760.5	35	1.7	52	Calm.	0	0	...	Haze	0	.....	.....	0	0	.....	
Washington, D. C	.....	.....	29.96	761.6	52	11.1	76	Calm.	0	0	...	.....	10s	.....	.....	0	0	.....	
Wilmington, N. C	.....	.....	29.92	760.0	65	18.3	89	SW.	6	2.7	...	.....	10s	.....	.....	0.32	8.1	.....	
Wood's Hole, Mass	.....	.....	29.92	760.0	49	9.4	57	W.	8	3.6	...	2c	0	NW.	.....	0	0	.....	
Wytheville, Va	.....	.....	29.66	753.4	50	10.0	86	E.	4	1.8	...	.....	10s	.....	.....	0.36	9.1	.....	
Yankton, Dak	.....	.....	30.06	763.5	27	— 2.8	88	N.	12	4.4	...	.....	10n	.....	.....	0.04	1.0	Lt. snow	

Bridgetown, Barbadoes, W. I	.....	.....	30. 10	764. 5	84	28. 9	....	NE.	5	2. 2	....	5c	5ks	E.	.....	0	0	.....	E. Racker.
Pointe-à Pitre, Guadaloupe, W. I.	.....	.....	30. 00	762. 0	76	24. 4	....	NE.	.....		....	5k	5n	NE.	.....	0	0	Hazy	L. V. Bigard.
Havana, Cuba, W. I	.....	.....	29. 81	757. 2	74	23. 3	71	SE.	3. 6	1. 6	....	10c	0	SE.	.....	0	0	.....	Charles Hasselbrink.
Kingston, Jamaica, W. I	.....	.....	30. 21	767. 3	76	24. 4	....	S.	1	0. 4	....	2ck	0	E.	.....	0. 02	0. 5	.....	James Gall.
St. Thomas, St. Thomas, W. I	30. 28	769. 1	.....	.....	75	23. 9	....	E.	9	4. 0	....	0	1k	.....	.....	0	0	.....	W. S. Cameron.
Santiago de Cuba, W. I	.....	.....	29. 87	758. 7	74	23. 3	72	Calm	0	0	....	0	0	.....	.....	Blank	Blank	.....	Robert Mason.
St. Georges, Bermudas	.....	.....	30. 00	762. 0	68. 0	20. 0	90	W.	5	2. 2	....	2ks	0	.....	.....	0	0	.....	C. F. Allen.
Honolulu, Oahu, S. I	.....	.....	30. 11	764. 8	64	17. 8	68	NE.	.....		2	0	2ks	.....	.....	0	0	.....	E. P. Church.
Makawao, Maui, S. I	.....	.....	30. 10	764. 5	61. 5	16. 4	77	NE.	3. 6	1. 6	....	0	5ks	.....	NE.	0	0	.....	F. L. Clarke.
Cumberland, B. A	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Fort Chippewyan, B. A	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Fort McPherson, B. A	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Fort Simpson, B. A	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
York Factory, B. A	.....	.....	30. 30	769. 6	14. 0	—10. 0	100	N.	12	5. 4	....	.....	10s	.....	.....	0. 01	0. 3	.....	J. Fortescue.
Clifton, Jamaica, W. I	.....	.....	30. 04	763. 5	60	15. 6	93	N.	0. 5	0. 2	....	2c	0	E.	.....	0	0	.....	C. Partridge.
St. John's, Newfoundland	.....	.....	30. 18	766. 6	28. 5	- 1. 9	72	SE.	.....		....	2c	5s	.....	.....	0	0	.....	John Delaney.
St. John's, Porto Rico, W. I	.....	.....	30. 15	765. 8	78. 8	26. 0	44	E.	.....		4	3k	0	.....	.....	0	0	.....	Leon M. Acuña.
Ellyria, Ohio	.....	.....	29. 82	757. 4	50	10. 0	37	NE.	12	5. 4	....	.....	10s	.....	.....	0	0	.....	H. M. Redington.
Indianola, Iowa	29. 01	736. 8	.....	.....	36	2. 2	....	NW.	.....		....	.....	10n	.....	.....	0	0	.....	G. C. Carpenter.

NOTE.—The altitude of the barometer at Makawao is 2,205 feet, or 672.1 meters; those of St. Thomas, W. I., and Indianola are unknown. The temperatures at York Factory, when below —40° Fahrenheit, are as given by a spirit thermometer. The altitude of the barometer at Clifton, Jamaica, W. I., is about 2,895 feet, or 882 meters above sea-level. The rain-fall at St. John's, Porto Rico, is measured at 5.25 p. m. on the same day.

NOTE.—The originals generally give the cloudiness on a scale of 0 to 4.

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.

ALBERT J. MYER,

Brigadier-General, (Brevet Assigned,) Chief Signal-Officer, U. S. A.

(Form E.)

WAR DEPARTMENT, SIGNAL-SERVICE UNITED STATES ARMY,

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

Meteorological record for the month of ——, 187—.

Date.	Time of observation.	BAROMETER.				THERMOMETER.				HYGROMETER.		Relative humidity.	WIND.			LOWER CLOUDS.		UPPER CLOUDS.			RAIN OR SNOW.		Amount of rain or melted snow.	Weather.
		Observed reading.	Corrected for temperature and instrumental error.	Corrected also for elevation.	Daily mean.	Attached to barometer.	Exposed, (open air.)	Maximum and minimum	Daily mean.	Dry bulb.	Wet bulb.		Direction from which it blows.	Force.	Daily velocity.	Kind.	Amount, scale 0 to 10.	Kind.	Amount, scale 0 to 10.	Direction, (moving from—)	Time commenced.	Time ended.		
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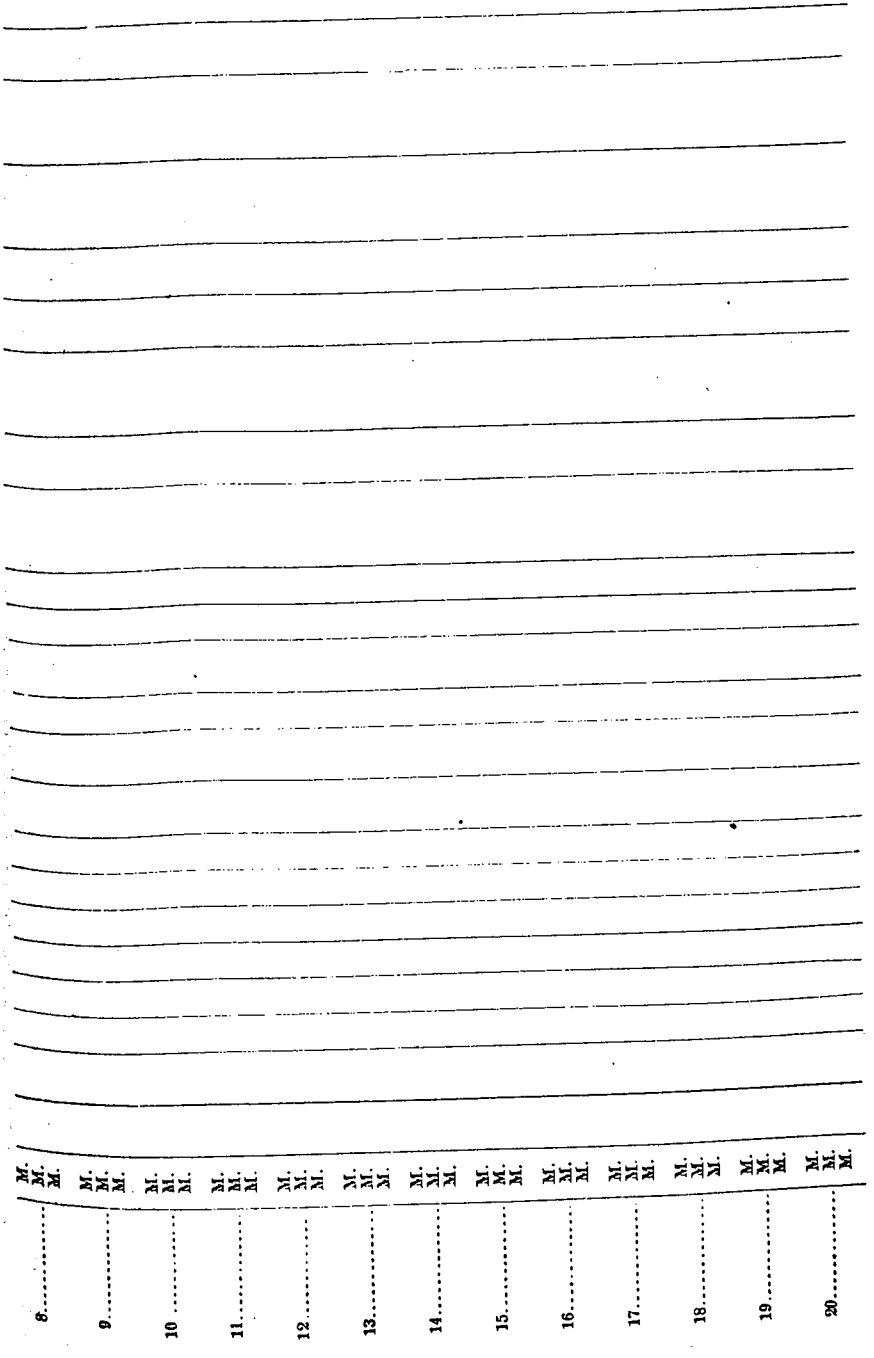
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M. M. M.
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M. M. M.
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Meteorological record for the month of ——, 187—. —Continued.

Date.	Time of observation.	BAROMETER.				THERMOMETER.				HYGROMETER.		WIND.			LOWER CLOUDS.		UPPER CLOUDS.			RAIN OR SNOW.		Amount of rain or melted snow.	Weather.
		Observed reading.	Corrected for temperature and instrumental error.	Corrected also for elevation.	Daily mean.	Attached to barometer.	Exposed, (open air.)	Maximum and minimum.	Daily mean.	Dry bulb.	Wet bulb.	Relative humidity.	Direction from which it blows.	Force.	Daily velocity.	Kind.	Amount, scale 0 to 10.	Kind.	Amount, scale 0 to 10.	Direction, (moving from—.)	Time commenced.	Time ended.		
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29	M. M. M.																			
30	M. M. M.																			
31	M. M. M.																			
	M. M. M.																			
Monthly means																				

Station, ——.
Latitude, ——.
Longitude, ——.

Elevation of surface of mercury in cistern of barometer above sea-level, —— feet.
Instrumental error of barometer used, ——.
Maker and number of barometer used, ——.
Kind of rain-gauge, ——.

Maker and number of exposed thermometer used, ——
Maker and number of maximum thermometer used, ——.
Maker and number of minimum thermometer used, ——.
Maker and number of hygrometer used, ——.

—— *Observer.*
—— *Post-office,*
—— *County,*
—— *State.*

30 SIG

EXPLANATION OF THE COLUMNS.

TIME OF OBSERVATION.

The Chief Signal-Officer requests that, wherever practicable, observers will make their observations *correspond in local time with those taken* at the regular signal-service stations, viz: 7.35 a. m., 4.35 p. m., and 11 p. m., Washington mean time. If it is found impracticable to take *all* of the observations at these hours, it is suggested that at least *one* may be taken without inconvenience, and, in this case, that at 7.35 a. m. (Washington time) is preferred. Otherwise the observations will be taken at 7 a. m., 2 p. m., and 9 p. m., local time. For stations west of Washington the local time of former is slower (that is earlier) than the local time of latter by (4) four minutes for every degree of longitude—for stations east of Washington it is faster, (that is later.) When it is 7.35 a. m. at Washington, at places ten degrees (10°) to the westward it is $6^h\ 55^m$ a. m.; at places *thirty-five and one-half degrees* (35.5°) to the westward it is $5^h\ 13^m$ a. m.; at places forty-seven and three-quarters degrees (47.75°) to the westward it is $4^h\ 24^m$ a. m., &c. In entering the time of observation the local time of the station must be given.

BAROMETER.

Observed reading.—This column is intended for the record of observations taken at least three times daily.

Corrected for temperature and instrumental error.—For the observations reduced to 32° Fahrenheit by means of a table furnished by the Signal-Office; also corrected for the instrumental error, where this is known; but if not known, that portion of the heading should be ruled out.

Corrected also for elevation.—For the observations corrected for temperature and instrumental error, and then for elevation above the sea-level, when the latter is accurately known.

Daily mean.—For the means for each day, obtained from the corrected reading.

THERMOMETER.

Attached to barometer.—For the records of the thermometer attached to the barometer, observations of which are necessary to correct the barometer for variations in height of the mercury on account of difference of temperature. It must be read before the barometer itself.

Exposed.—For the register of the thermometer exposed in the open air on the north side of a building, but sheltered from the direct or reflected rays of the sun. A few days' practice will enable observers to read their thermometers to tenths of degrees, which should be recorded thus: 46°.5, 37°.3, 10°.1; when the temperature is below zero a minus sign (—) is placed before the figures, viz: —10°.0, —30°.8, &c.

Maximum and minimum.—Those observers having self-registering maximum and minimum thermometers will enter their readings, taken once daily, at the 9 p. m. or last observation.

Daily mean.—Obtained by dividing the sum of the maximum and minimum readings by two; or, by adding the 7 a. m., 2 p. m., and twice the 9 p. m. observation together and dividing the sum by four; or, where the readings are taken at different hours, divide the sum of the readings by the number of the same.

HYGROMETER.

In these columns are entered the records of the dry and wet bulb thermometers, from which the "relative humidity" is obtained by means of tables furnished by this Office.

RELATIVE HUMIDITY, OR FRACTION OF SATURATION.

The quantity of water in a state of vapor which a given space can contain depends on the temperature. When a given space has as much water as it can hold at a given temperature, it is said to be saturated with vapor. If the temperature be lowered, a portion of the vapor will be condensed into water, but the space will still be saturated. If the temperature be raised and no more vapor be admitted, the space will only be partially saturated. The numbers under the head of "Relative humidity," therefore, denote the percentage of saturation—full saturation being indicated by 100, and half saturation by 50.

WIND.

Direction.—The point of the compass from which it is blowing at the time of the observation must be entered, viz: N., N.E., E., S.E., S., S.W., W., N.W.

Force.—Is estimated and registered by the figures from 0 to 10, as in the first column of the following table. The figures in the last column, expressing the number of miles per hour, *are not to be used in the register*. A few days' practice will be sufficient to allow observers to make use of the figures in the first column, corresponding to light, gentle, fresh, strong, high, gale, &c., with accuracy, and it is very important that such should be the case to make the records reliable.

0. Calm.
1. Very light breeze, varies between 1 and 2 miles per hour.
2. Gentle breeze, varies between 3 and 5 miles per hour.
3. Fresh breeze, varies between 6 and 14 miles per hour.
4. Strong wind, varies between 15 and 29 miles per hour.
5. High wind, varies between 30 and 39 miles per hour.
6. Gale, varies between 40 and 59 miles per hour.
7. Strong gale, varies between 60 and 69 miles per hour.
8. Violent gale, varies between 70 and 79 miles per hour.
9. Hurricane, varies between 80 and 99 miles per hour.
10. Most violent hurricane, varies from 100 upward.

Observers having anemometers from which they can obtain the velocity of the wind in miles per hour should record the latter in the column for "Force."

Daily velocity.—This column is intended for observers having anemometers from which they can obtain the number of miles traveled by the wind during the twenty-four hours, and between the observations nearest to noon.

CLOUDS.

Amount.—Designated by figures 0 to 10—0, entire clearness; 5, half cloudiness; 10, entire cloudiness, &c. When they cannot be seen, the word *Hidden* is entered.

Kind, lower.—Use following abbreviation: S., stratus; K. S., cumulo-stratus; N., nimbus, (rain clouds.) When haze, fog, or smoke prevent an observation of the clouds they must be entered in place of the clouds.

Kind, upper.—Enter: C., cirrus; K., cumulus; C. K., cirro-cumulus; C. S., cirro-stratus. Should hazy weather prevent an observation of the clouds, the word *Haze* is entered.

RAIN AND SNOW.

Under this head are entered the time of beginning and ending of the fall of rain or snow, and the amount, in inches and hundredths, of rain and melted snow collected in a gauge at the surface of the ground. Rain to be indicated by R. and snow by S. When there is no rain or snow, mark 0. Amount of rain or melted snow in gauge should be recorded in inches, tenths, and hundredths, thus: 1.25, 0.03, 0.01, &c.

STATE OF WEATHER.

In this column will be given the state of the weather at each observation, viz: clear, foggy, fair, cloudy, clearing, threatening, (storm,) light rain, heavy rain, light snow, heavy snow, hail or sleet.

GENERAL REMARKS AND DIRECTIONS.

PRESSURE OF THE ATMOSPHERE.

The barometer may be conveniently placed within doors, in a room not subjected to sudden changes of temperature, in a good light, but shaded from the direct rays of the sun. It should be secured in a vertical position by means of a plumb-line applied to the front and side. Its height above the surface of the ground, and also above the level of the sea, ought to be ascertained.

To observe the barometer, first note the degree of the attached thermometer, because the heat of the body may affect this. Next, adjust the cistern until the mercury just touches the ivory point. Then gently tap the case so as to lessen the adhesion of the mercury to the tube, and measure the height of the column. To do this, lower the

vernier until the plane passing through the two lower opposite edges of it is exactly tangent to the surface of the convex top of the column. Lastly, read the vernier and enter the results in the proper column.

TEMPERATURE.

Heat of all kinds readily passes through the air, and, as all bodies are continually radiating it, a thermometer exposed to a clear sky, which reflects back no rays, will fall several degrees below the temperature of the air; hence, when the object of meteorologists is to obtain the temperature of the air, the thermometer ought not to be exposed to any portion of the sky. Also from the fact that heat of low intensity does not radiate through glass, the thermometer may be placed on the outside of a double window without being materially affected by the heat within.

MOISTURE.

Another important meteorological element is the amount of moisture in the air. This with the amount and distribution of heat are elements most essential to the agriculturist, since they principally determine the capability of different districts for the production of vegetable life.

Different views have been entertained as to the manner in which moisture is contained in the air. According to Saussure and the older meteorologists, it was considered as dissolved in the atmosphere, and that the solvent power of the latter for the former increased with the temperature. According, however, to later meteorologists, the vapor in the atmosphere exists in an independent state. Dalton, who first advanced this hypothesis, proved conclusively that water in a vacuum gives off a new portion of vapor, which is forced into the same space at every increase of heat, and that, consequently, the density and elastic force of vapor in free space depend entirely on the temperature to which the water is submitted.

RAIN AND SNOW.

Another and very important element of meteorology is the amount of rain which falls on different parts of the earth. The simplest method of determining this would be to expose a cylindrical or square vessel freely to the rain, and to measure the depth of the water which is caught in it after each storm or shower. Greater precision, however, is obtained by employing a rain-gauge, which consists of a circular or square funnel with a jug below to receive the water, and a measuring-vessel to estimate the quantity. If the area of the orifice of the funnel be one hundred times that of the measuring-vessel, each inch of the latter will indicate a hundredth of an inch of rain falling on the earth adjacent. The gauge should be placed so that it may not be sheltered in any direction by buildings or trees from the oblique descent of the rain. The whole apparatus should be sunk in the earth in a cask provided with a wooden cover, with the mouth of the funnel a few inches above the surface of the ground. Care should be taken that the rain does not rebound from the surface into the funnel; to prevent this, the surrounding space may be covered with old carpet or cloth.

To ascertain the amount of water produced from snow, a column of the depth of the fall of snow, and of the same diameter as the amount of the gauge, should be melted and measured as so much rain. As a general average, it will be found that about 10 inches of snow will make one of water, but varies accordingly as the snow is wet or dry.

CONCLUSION.

The above directions are applicable to full sets of standard instruments. The observer ought to render his results as accurate as possible, and not to consider them of little value, even though they should fall far below his ideal standard of perfection. Though the barometer may not give the absolute pressure of the atmosphere, yet it may serve to indicate the time of maximum and minimum pressure, and its oscillations may be comparable with each other, and thus be of value in ascertaining the law of transmission of atmospheric waves. So, also, the thermometer, though its scale may not be entirely correct in every part, yet the probability is that, in the course of the year, the errors will compensate each other, and the mean temperature of the place be made known. This may also be the case, although the instrument has sometimes indicated too high and sometimes too low a temperature, on account of its proximity to buildings or other large objects less liable to be suddenly affected by heat or cold. The instruments used should be described once every year, and at other times when changes and additions are made. In case of failure to make observations, the corresponding space in the form must be left blank.

CASUAL PHENOMENA.

Note observations of the following:

Thunder-storms.—Time of occurrence and direction of motion. *Tornadoes.*—Time of occurrence, width and direction of path, effects produced, and whether attended by electricity or hail. *Lightning at a distance.*—Time of occurrence, direction from observer, whether zigzag, forked, or diffuse. Objects struck by lightning, as trees, buildings, &c. *Hail-storms.*—Time of occurrence, direction and width of path, size and quantity of stones, and amount of injury. *Aurora borealis.*—Time of appearance and disappearance, time of the formation of arch, beams, and corona, and whether there is a dark cloud below the arch. Direction and time of occurrence of *meteors, shooting-stars, solar and lunar halos, parhelia, paraselenes.* Time of early and late *frosts*, particularly first and last. *Depth of ground frozen*, in feet and inches; disappearance of frost from the ground. Time of closing and opening of *rivers, lakes, canals*, and *streams*, and their extreme rise and fall. *Temperature* of wells and springs at least once each season. *Earthquakes.*—Time of occurrence, direction of impulse, number of shocks, and effects produced. *Hazy or smoky appearance of the atmosphere.*—Time of occurrence, and intensity. *High winds, gales, hurricanes*, unusually *heavy rains*, or remarkable changes in the *temperature*, between the regular hours of observations—date, time, and duration.

(Form H.

[To be filled up, and sent on the first of each month in an envelope addressed to "The Chief Signal-Officer, United States Army, Washington, D. C."]

WAR DEPARTMENT, SIGNAL SERVICE UNITED STATES ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

Place of observation, ——, county of ——, State of ——; latitude, ——; longitude, ——; height above the sea, —— feet.
Name and post-office address of observer, ——

Meteorological record for the month of ——, 187 .

Day of month.	THERMOMETER IN THE OPEN AIR.				RAIN AND SNOW.				CLOUDS.												WINDS.						Day of month.
									7 a. m.						2 p. m.				9 p. m.				7 a. m.		2 p. m.		9 p. m.		
									Upper clouds.			Lower clouds.			Upper clouds.			Lower clouds.										
	7 a. m.	2 p. m.	9 p. m.	Mean.	Time of beginning of rain or snow.	Time of ending of rain or snow.	Amount of rain and melted snow in gauge, in inches.	Depth of snow in inches.	Kind.	Amount.	Direction, (moving from.)	Kind.	Amount.	Kind.	Amount.	Direction, (moving from.)	Kind.	Amount.	Kind.	Amount.	Direction, (moving from.)	Kind.	Amount.	Direction.	Force.	Direction.	Force.	Direction.	Force.	
1																													1
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Sums.
Means.

The object of these observations is to enable the Chief Signal-Officer, United States Army, to prepare a series of maps to illustrate the face of the sky, &c., over the United States, for each day in the year, and thus to study the rise, progress, and course of American storms. Observers who have a barometer, psychrometer, &c., will be supplied with other blanks, and also full directions for using all the instruments, on application to the Chief Signal-Officer, Washington, D. C.

EXPLANATION OF THE ABOVE COLUMNS.

THERMOMETER IN THE OPEN AIR.

This is intended for the register of the thermometer, and for the daily mean or average of the three observations. Fractions of degrees should be recorded in tenths, thus: 46°.5, 37°.3, 72°.1, &c.

RAIN AND SNOW.

Under this head are entered the time of beginning and ending of the fall of rain or snow, and the amount, in inches and hundredths, of rain or melted snow collected in a gauge at the surface of the ground; also the depth of the snow. Rain to be indicated by R. and snow by S. When there is no rain or snow, mark 0. Amount of rain or melted snow in gauge should be recorded in inches, tenths, and hundredths, thus: 1.25, 6.03, 0.01, &c.

CLOUDS.

Under this general head are entered three daily observations on the aspect of the sky, &c.: 1st. The "amount of cloudiness," designated by figures, 10 being entire cloudiness; 5 half cloudiness; 0 entire clearness; and intermediate numbers in proportion. 2d. "Motion of higher clouds," which pass directly over the head of the observer, as given to eight points of the compass. The direction *from* which they move are to be given. *This observation is important, as the course of the higher clouds* is sometimes different from that of the *surface wind*, which is given in another column. 3d. The "velocity," or rate of motion, 10 being *the highest, and 0 apparent rest.* 4th. The description or "kind of clouds," to be entered by means of the following abbreviations: *S.* = Stratus; *Cu.* = Cumulus; *C.* = Cirrus; *N.* = Nimbus; *C. s.* = *Cirro-stratus*; *Cu. s.* = Cumulo-stratus; *C. cu.* = Cirro-cumulus.

WINDS.

This is for the record of the direction *from* which the wind is blowing as indicated by a vane, *and its force* by estimation. The direction is entered in eight points of the compass: N., NE., E., SE., S., SW., W., NW. The force is to be estimated and registered by figures *from 1 to 10, as in the first column* of the following table. The figures in the last column, expressing the number of miles per hour, are *not to be used* in the register. A little practice will enable observers *to make use of the figures* in the first column, corresponding to light, gentle, fresh, strong, &c., with accuracy, and it is very important that such should be the case, to make the record reliable:

0. Calm.
1. Very light breeze, varies between 1 and 2 miles per hour.
2. Gentle breeze, varies between 3 and 5 miles per hour.
3. Fresh breeze, varies between 6 and 14 miles per hour.
4. Strong wind, varies between 15 and 29 miles per hour.
5. High wind, varies between 30 and 39 miles per hour.
6. Gale, varies between 40 and 59 miles per hour.
7. Strong gale, varies between 60 and 69 miles per hour.
8. Violent gale, varies between 70 and 79 miles per hour.
9. Hurricane, varies between *80 and 99 miles per hour.*
10. Most violent hurricane, varies from 100 upward.

CASUAL PHENOMENA.

Note observations of the following:

Thunder-storms.—Time of occurrence and direction of motion. *Tornadoes.*—Time of occurrence, width and direction of path, effects produced, and whether attended by electricity or hail. *Lightning at a distance.*—Time of occurrence, direction from

observer, whether zigzag, forked, or diffuse. Objects struck by lightning, as trees, buildings, &c. *Hail-storms.*—Time of occurrence, direction and width of path, size and quantity of stones, and amount of injury. *Aurora Borealis.*—Time of appearance and disappearance; time of the formation of arch, beams, and corona, and whether there is a dark cloud below the arch. Direction and time of occurrence of *meteors, shooting-stars, solar and lunar halos, parhelia,* and *paraselenes.* Time of early and late *frosts,* particularly first and last. *Depth of ground frozen,* in feet and inches; disappearance of frost from the ground. Time of closing and opening of *rivers, lakes, canals,* and *streams,* and their extreme rise and fall. Temperature of wells and springs at least once each season. *Earthquakes.*—Time of occurrence, direction of impulse, number of shocks, and effects produced. *Hazy or smoky appearance of the atmosphere.*—Time of occurrence and intensity. *High winds, gales, hurricanes, unusually heavy rains,* or remarkable *changes in temperature* between the regular hours of observation, viz: 7 a. m., 2 p. m., and 9 p. m.; date, time, and duration.

METEOROLOGICAL REGISTER

Station, ——. *Latitude,* ——. *Longitude,* ——. *Altitude of barometer above sea,* —— *feet.*

187—. Month.	Thermometer.				Self-registering thermometer.			Movements of atmosphere.									Amount of cloudiness.			Rain and melted snow.			Remarks.
								7 a. m.			2 p. m.			9 p. m.									
	7 a. m.	2 p. m.	9 p. m.	Daily mean.	Maximum.	Minimum.	Mean.	Winds. D.	Winds. F.	Motion of clouds.	Winds. D.	Winds. F.	Motion of clouds.	Winds. D.	Winds. F.	Motion of clouds.	7 a. m.	2 p. m.	9 p. m.	Began.	Ended.	Quantity.	

SUMMARIES OF WINDS AND WEATHER.

N.		N. E.		E.		S. E.		S.		S. W.		W.		N. W.	
Number.	Force.	Number.	Force.	Number.	Force.	Number.	Force.	Number.	Force.	Number.	Force.	Number.	Force.	Number.	Force.

Average cloudiness. } Number of days of rain and hail. } Number of days of snow. }

—— ——, *Surgeon U. S. Army.*

METEOROLOGICAL REGISTER—Continued.

187—.	Dry and wet bulb thermometer,												
Month.	7 a. m.		2 p. m.		9 p. m.		Month.	7 a. m.		2 p. m.		9 p. m.		Remarks.
	Dry-bulb.	Wet-bulb.	Dry-bulb.	Wet-bulb.	Dry-bulb.	Wet-bulb.		Dry-bulb.	Wet-bulb.	Dry-bulb.	Wet-bulb.	Dry-bulb.	Wet-bulb.	
1							17							
2							18							
3							19							
4							20							
5							21							
6							22							
7							23							
8							24							
9							25							
10							26							
11							27							
12							28							
13							29							
14							30							
15							31							
16														
Monthly mean														

187—.	Barometer and thermometer attached.						Remarks.
Month.	7 a. m.		2 p. m.		9 p. m.		
	Bar.	Ther.	Bar.	Ther.	Bar.	Ther.	
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							

Station ——. Meteorological register for the month of ——, 187—. Transmitted by —— ——
Surgeon U. S. Army.

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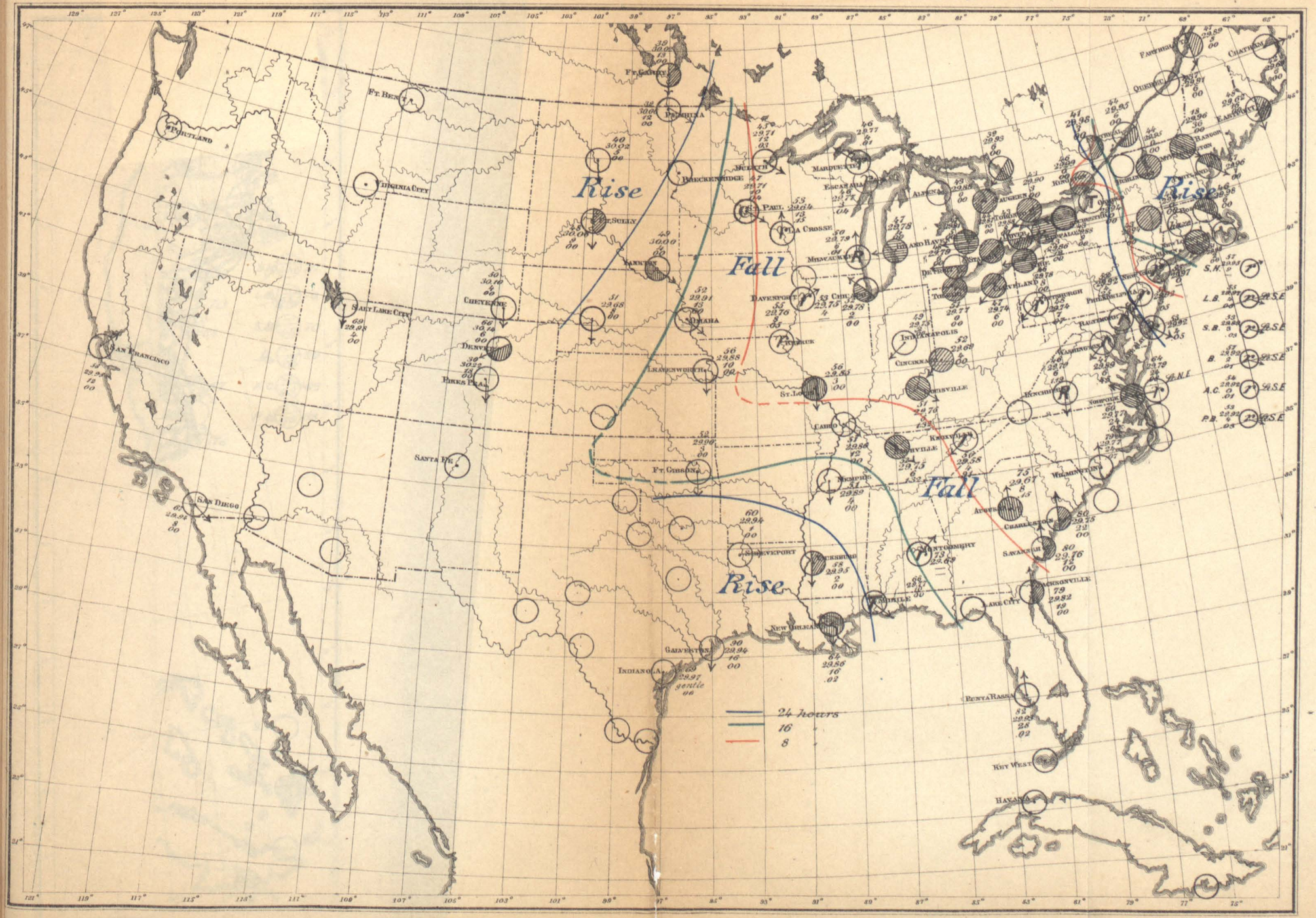
WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U.S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

Washington, September 18th 1875 III Barometer.

Chart of lines of no barometric variations during previous twenty four, sixteen and eight hours.



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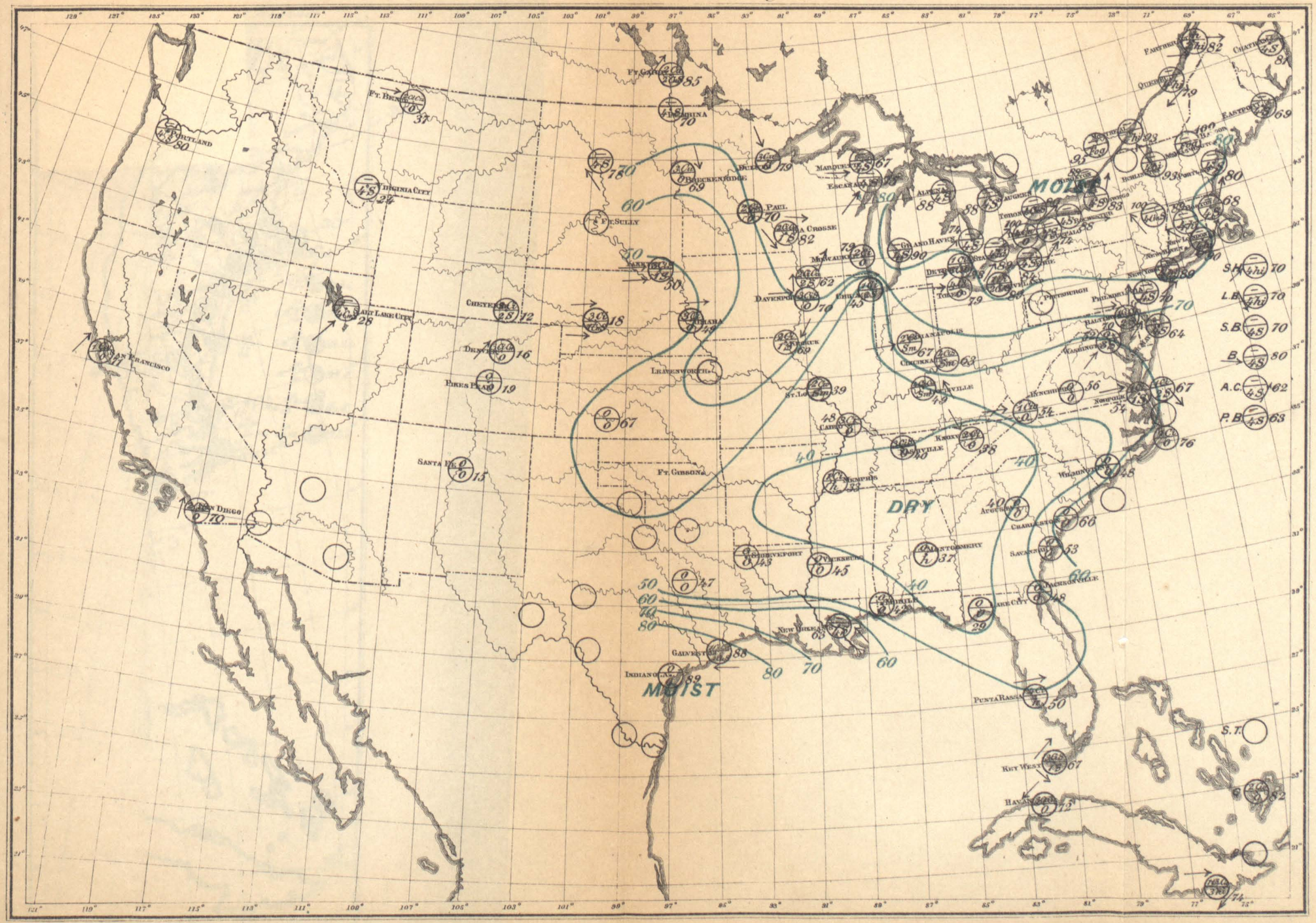
WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U.S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

Tuesday, December 1st 1874. 4.35 P.M.

Clouds and Humidity.



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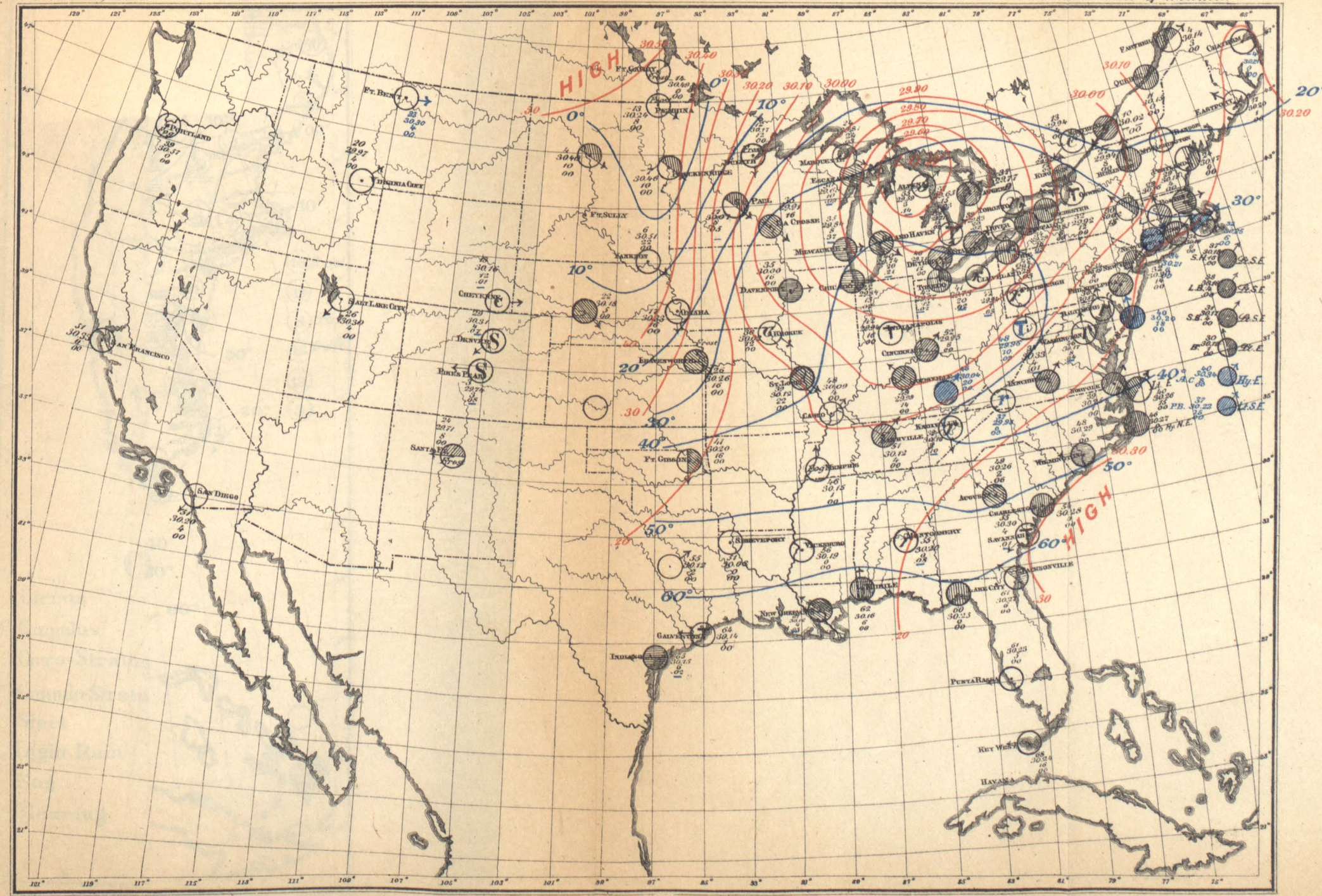
WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U.S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

Isobaric, Isothermal - lines — *Wednesday, December 16th 1874 11 P.M.* — *and state of weather.*



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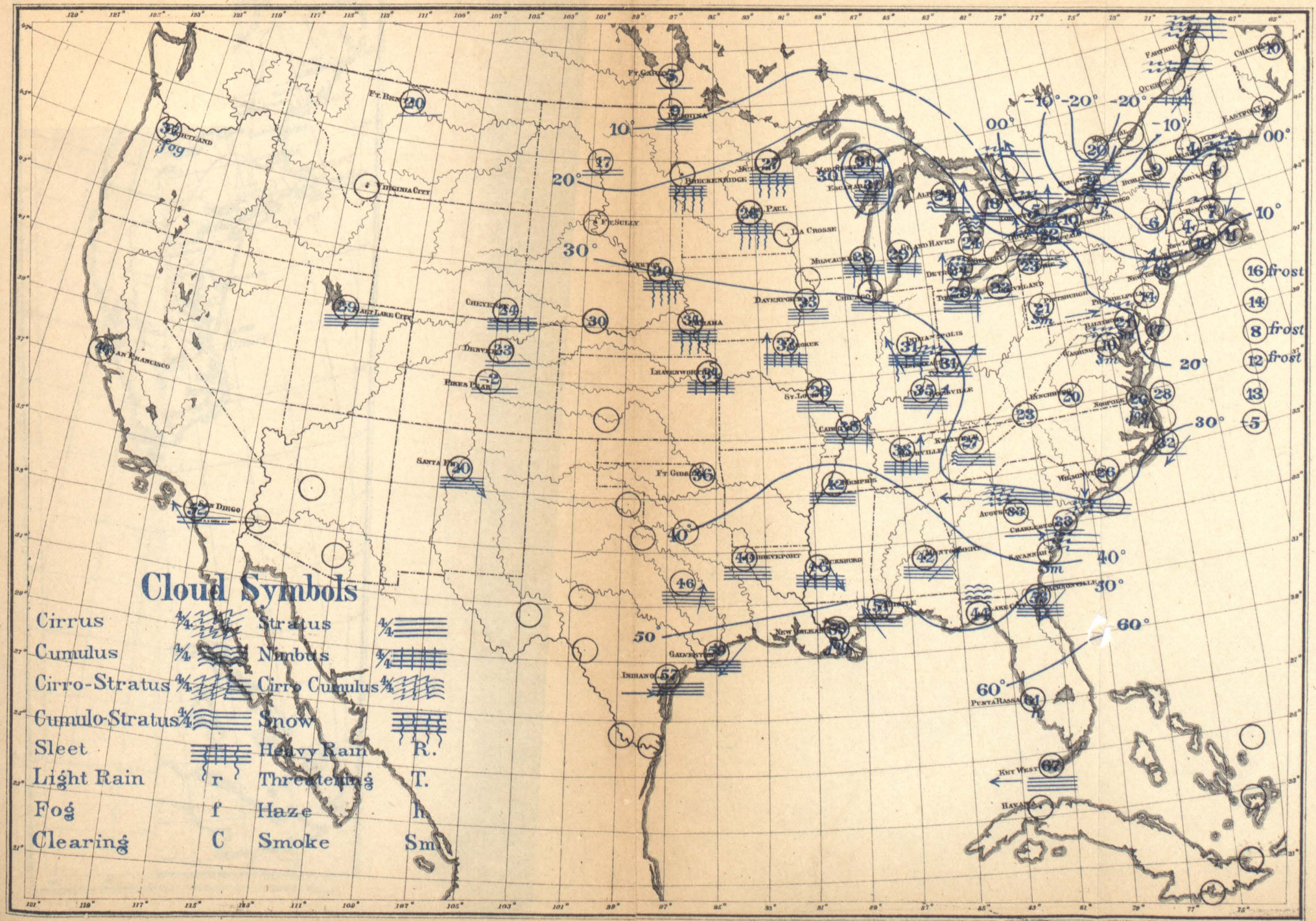
WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U.S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

Wednesday, December 16th 1874 7.35 A.M.

Cloud Symbols.



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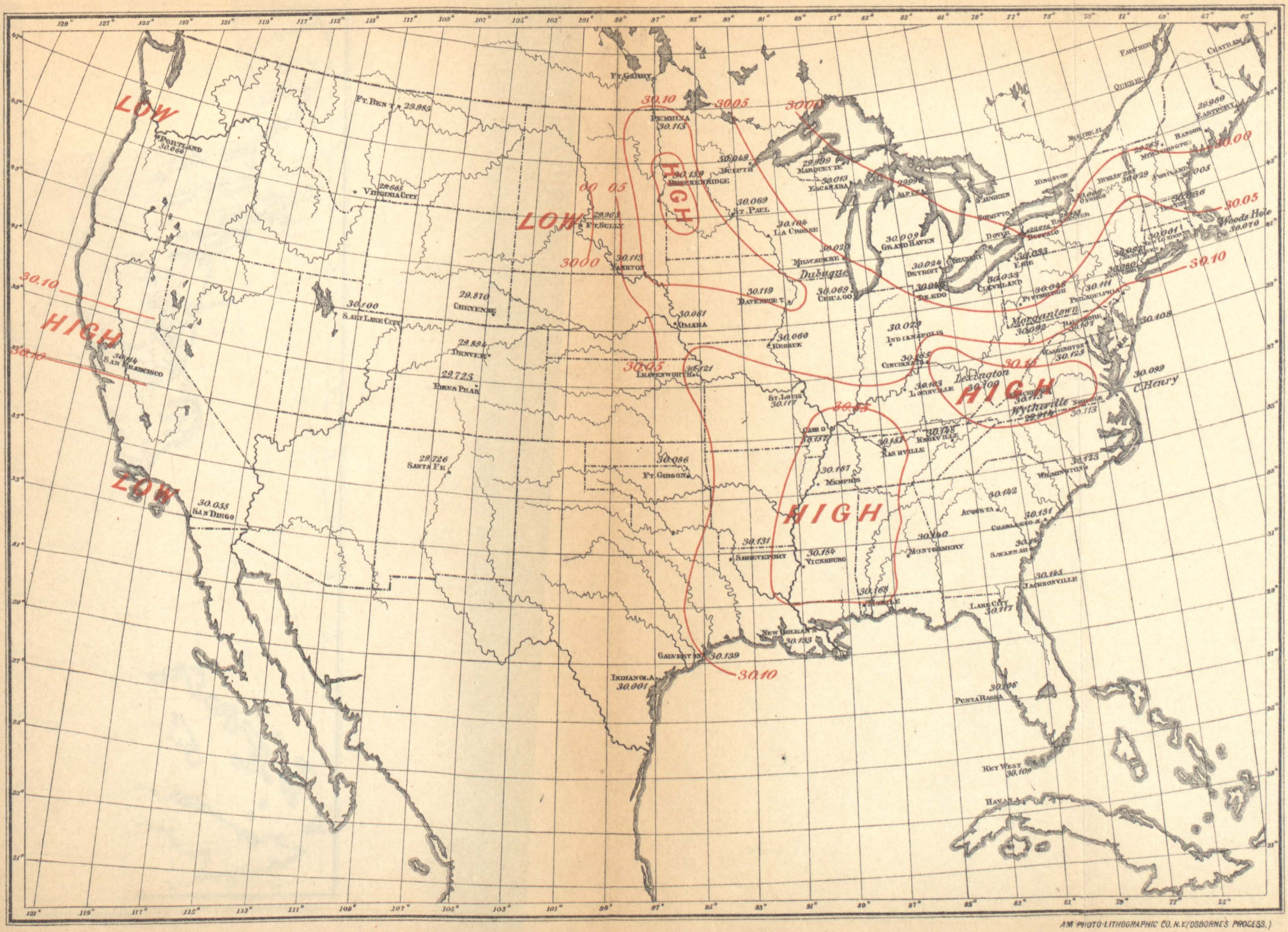
January, 4,35 P.M.



A.M. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

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Telegraphic Barometric Means for January, 7.35 A. M.

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January, 11 P.M.

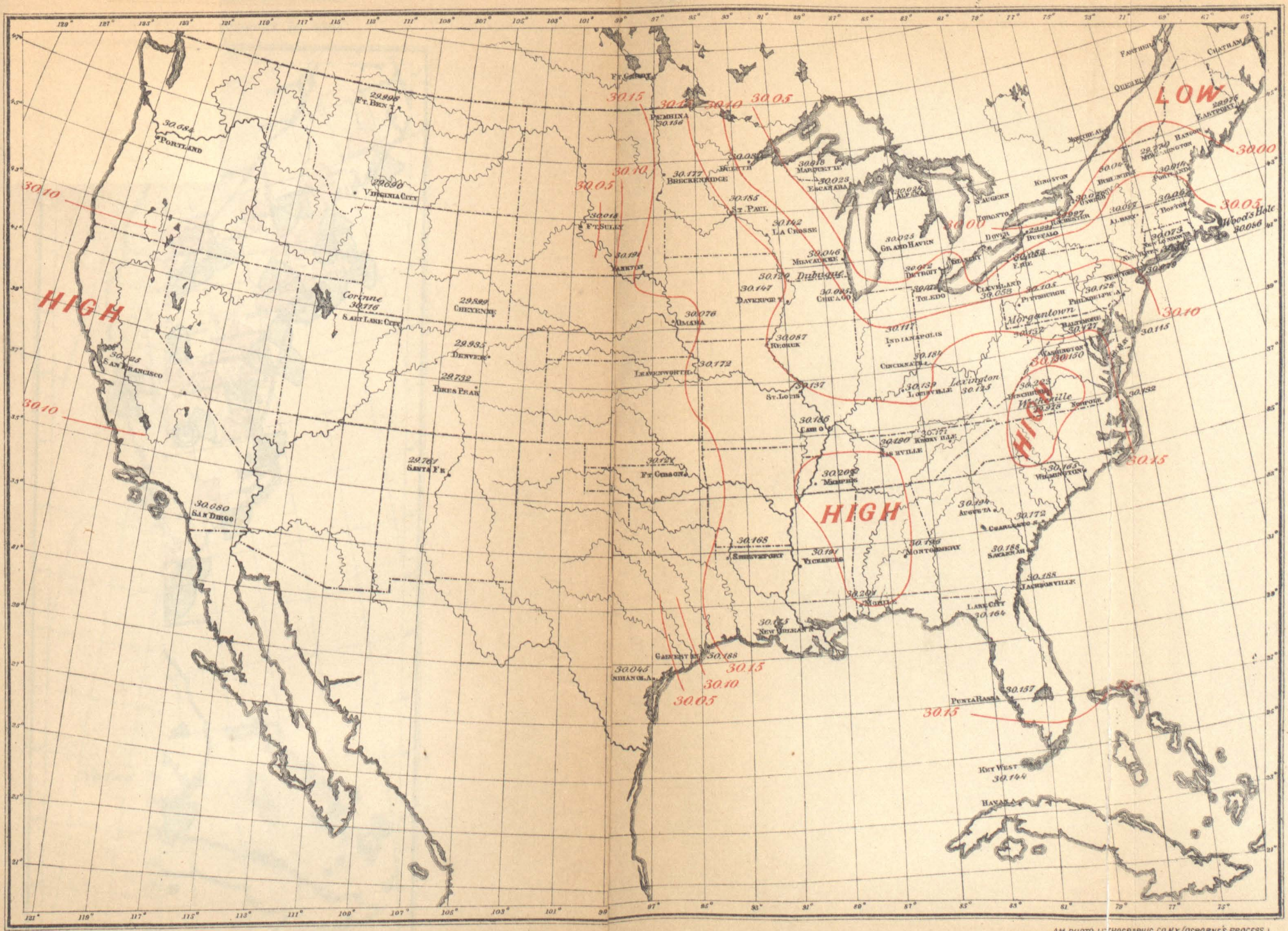

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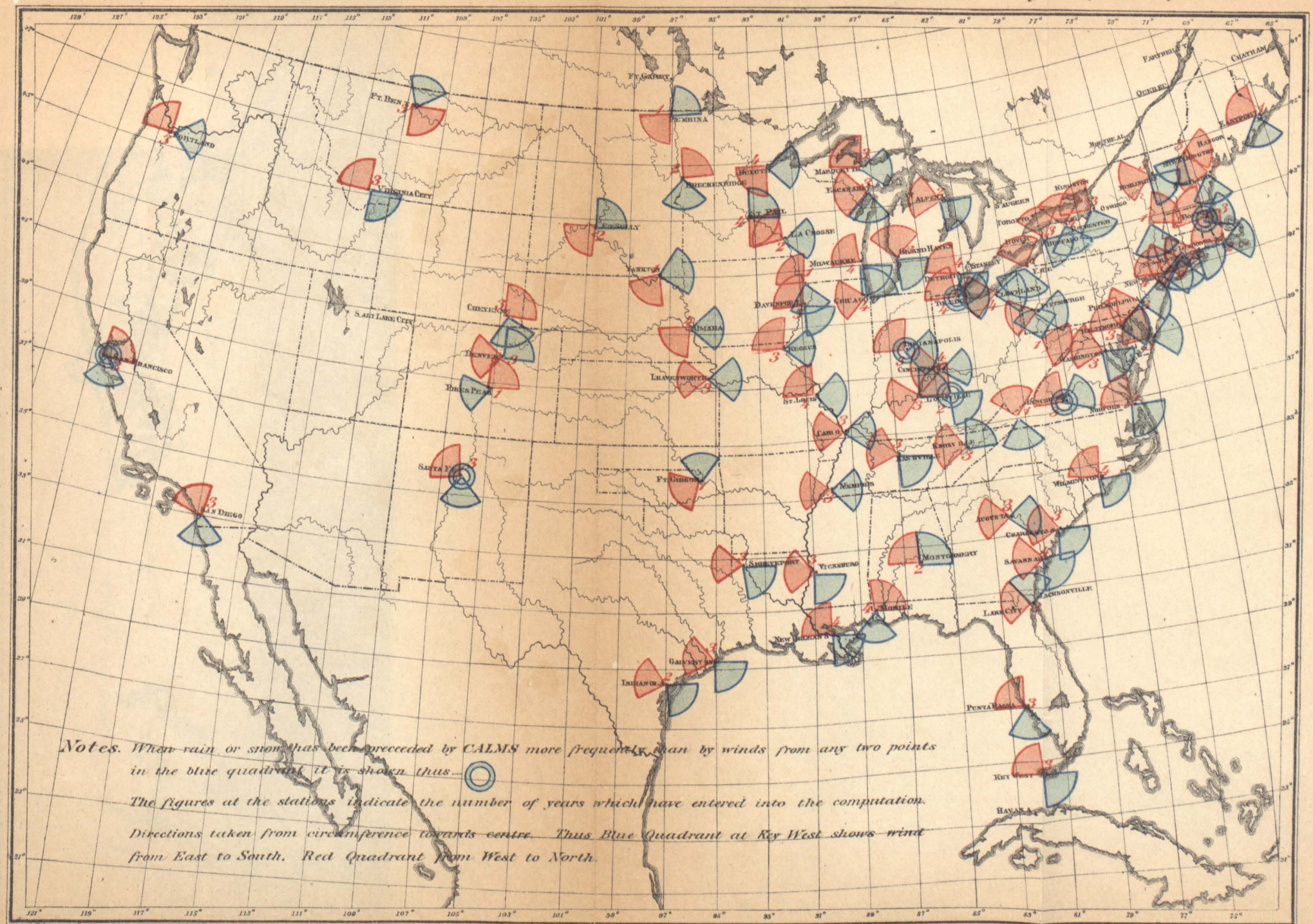
Chart for January.

Quadrants in blue show wind direction in which winds noticed at the several **Stations** *are found most likely to be followed by rain.*

Quadrants in red show wind direction in which winds noticed at the several **Stations** *are found least likely to be followed by rain.*



Notes. *When rain or snow has been preceded by CALMS more frequently than by winds from any two points in the blue quadrant it is shown thus.* ◎

The figures at the stations indicate the number of years which have entered into the computation.

Directions taken from circumference towards centre. Thus Blue Quadrant at Key West shows wind from East to South. Red Quadrant from West to North.

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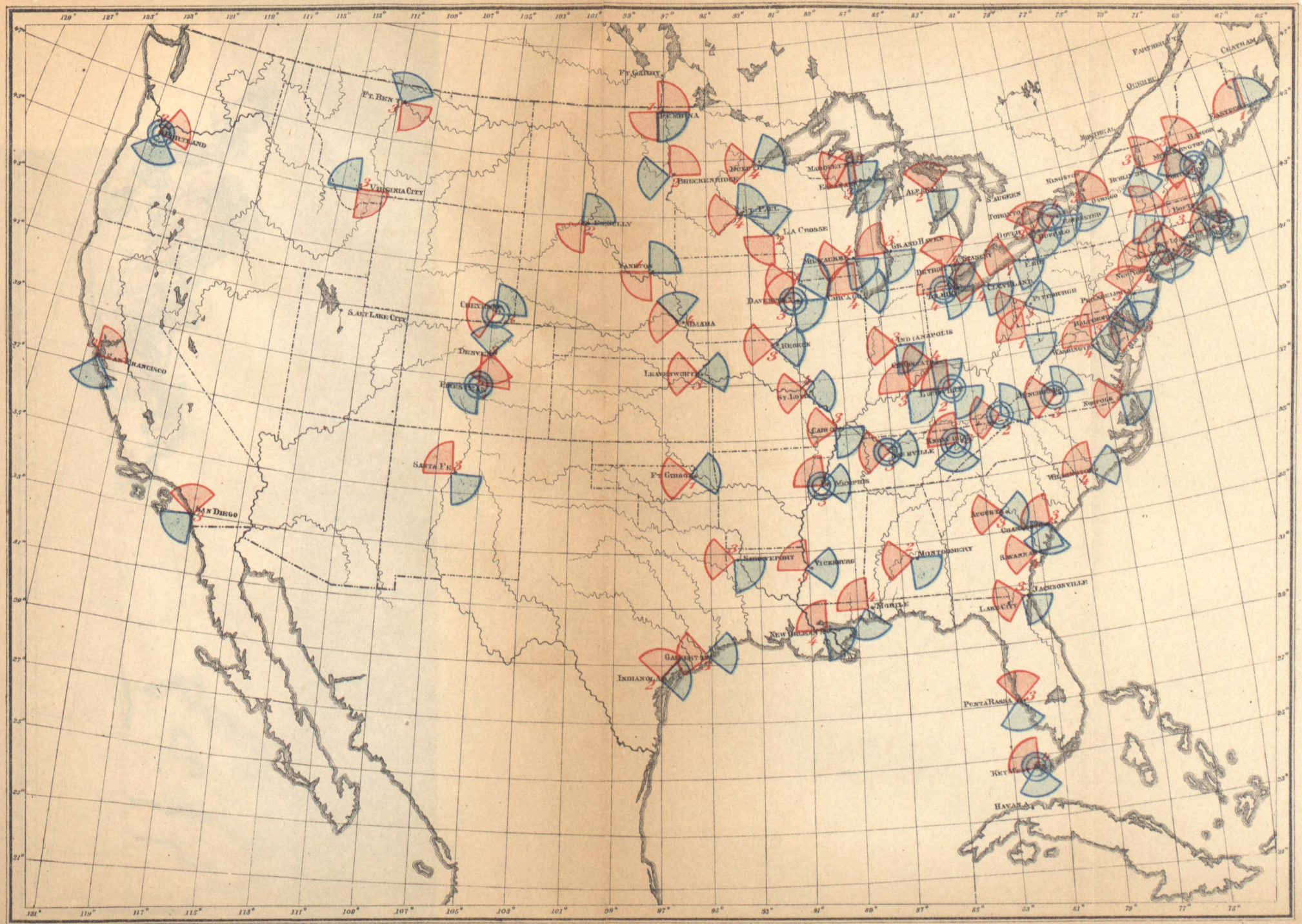
Chart for February.



AM PHOTO LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

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Chart for March.

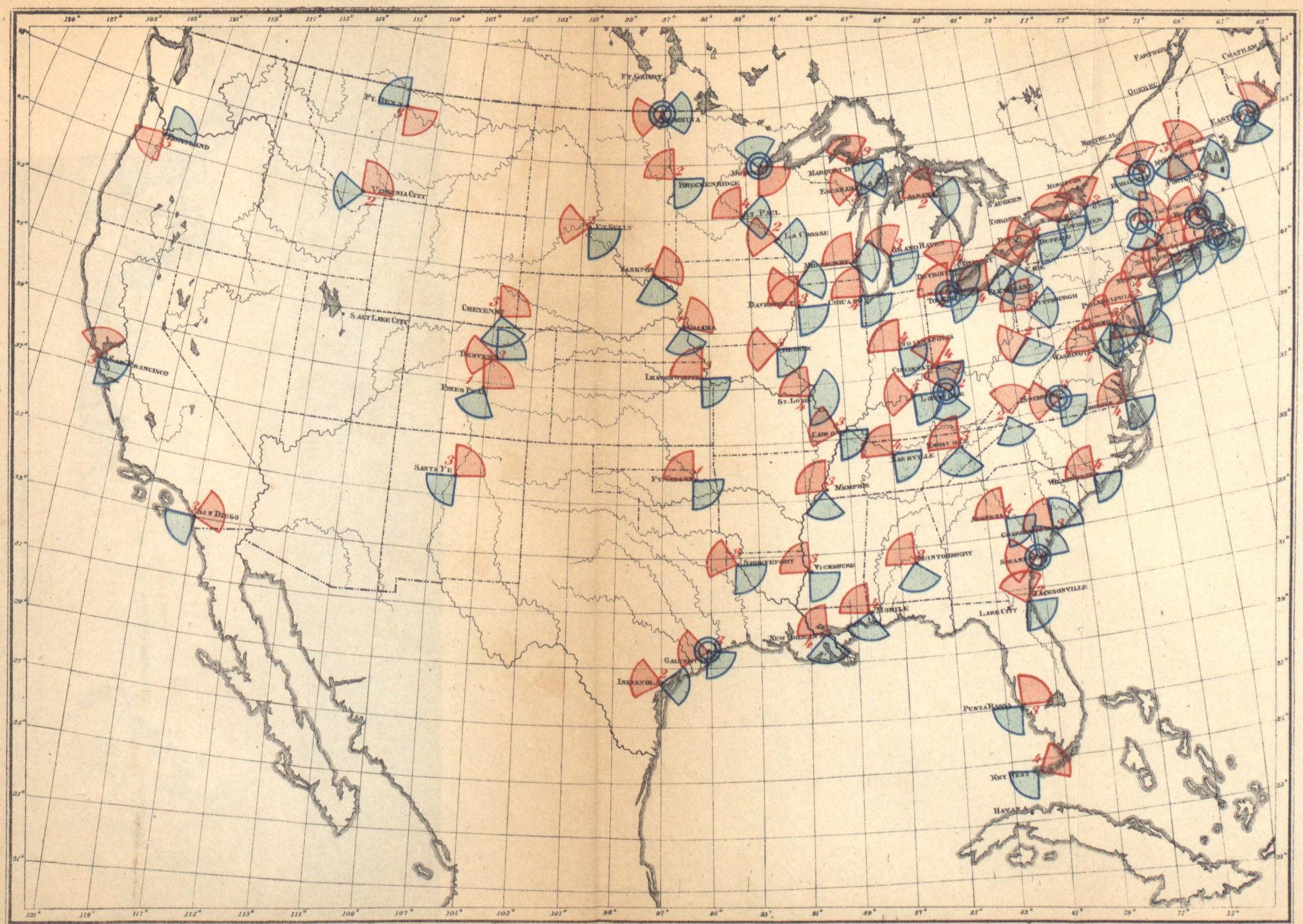

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Chart for April.

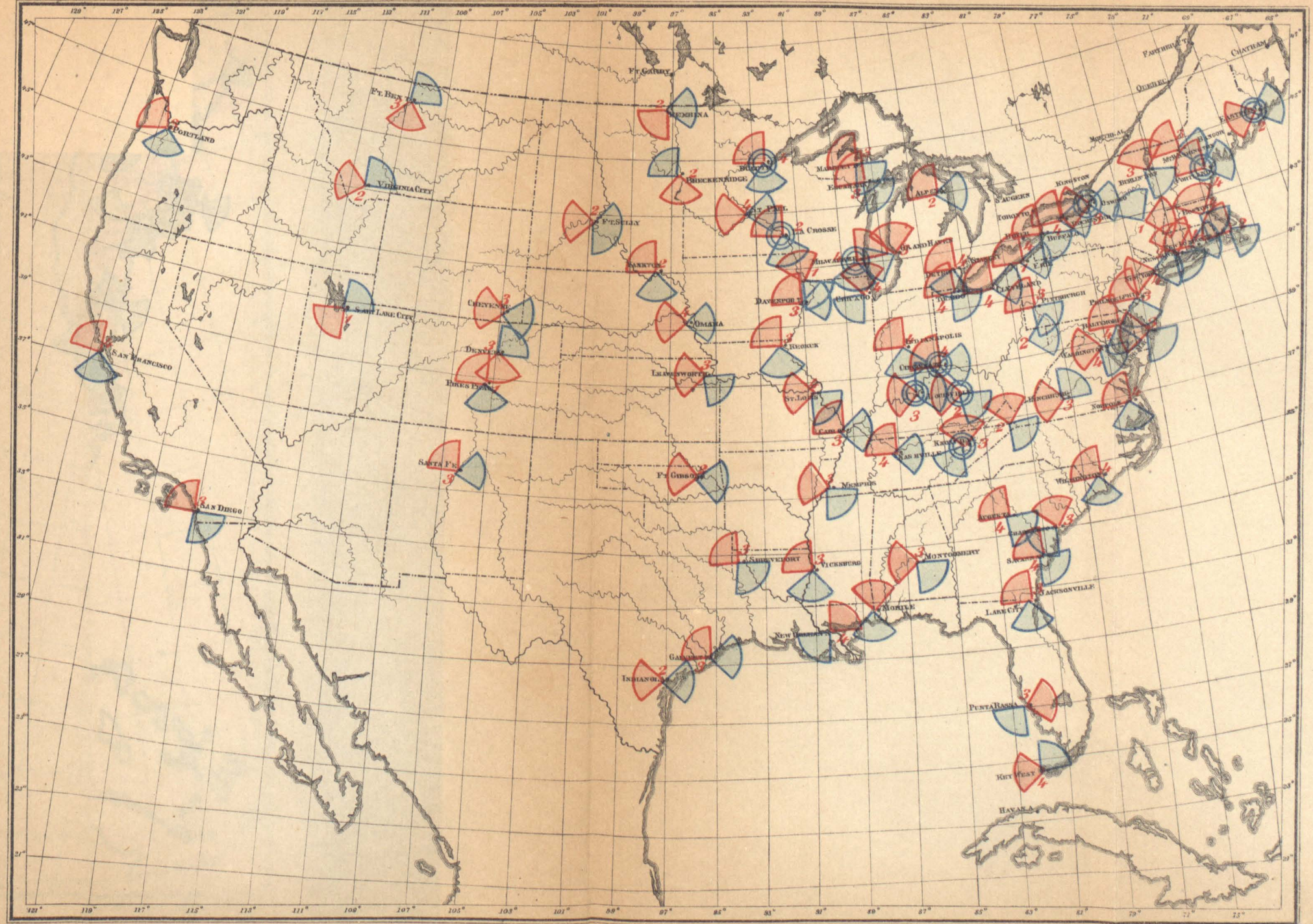

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Chart for May.

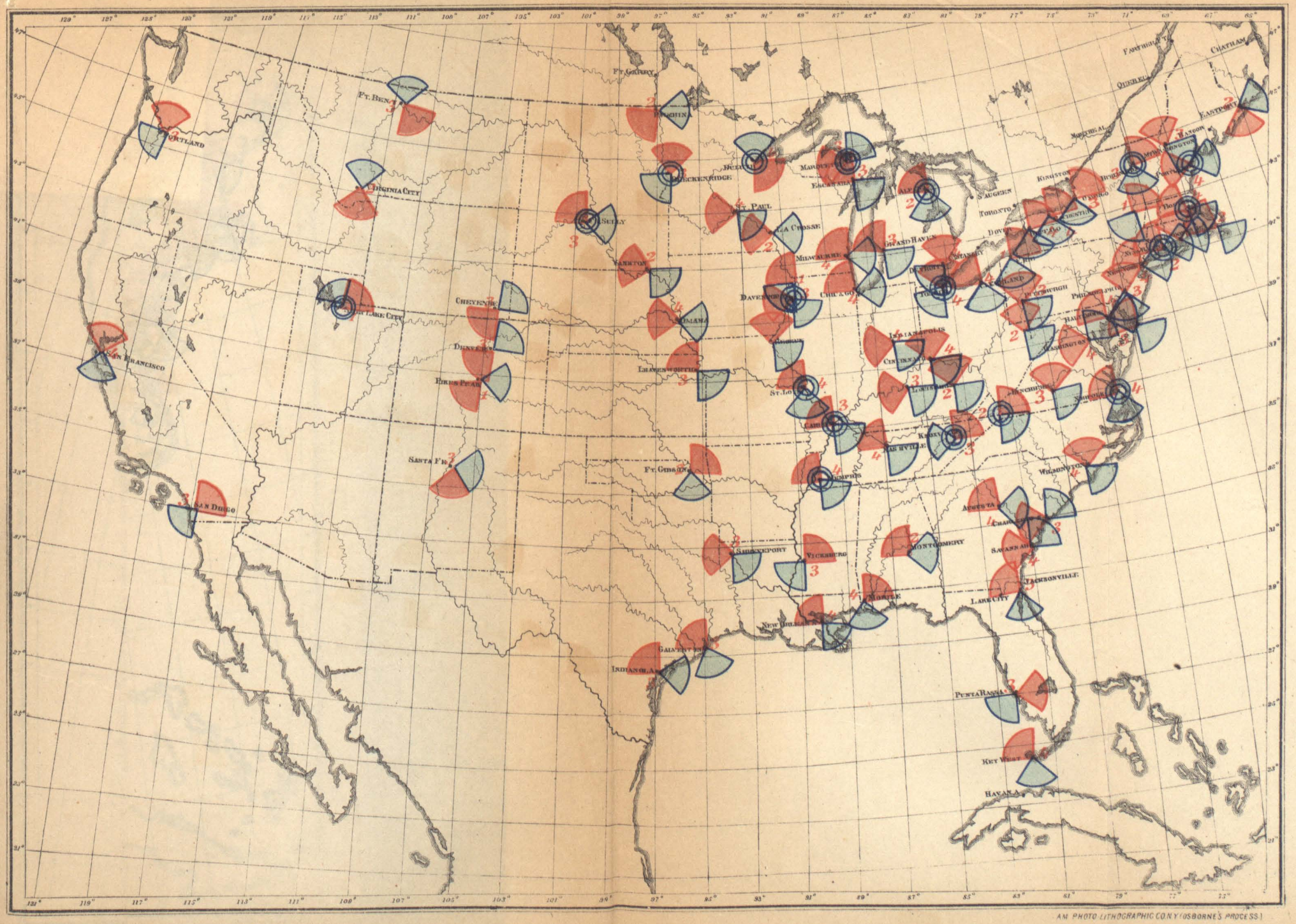

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Chart for June.

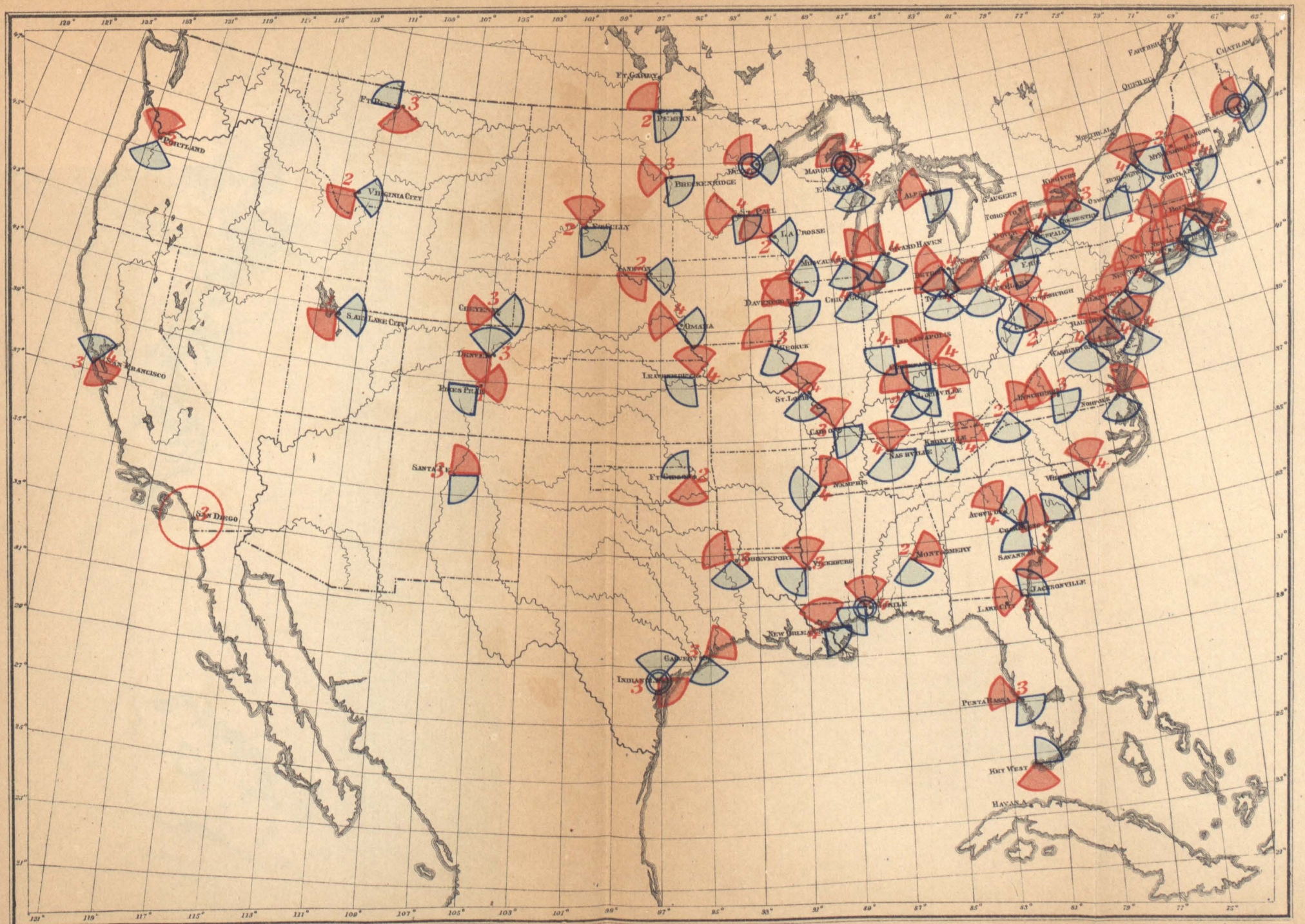

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Chart for July.

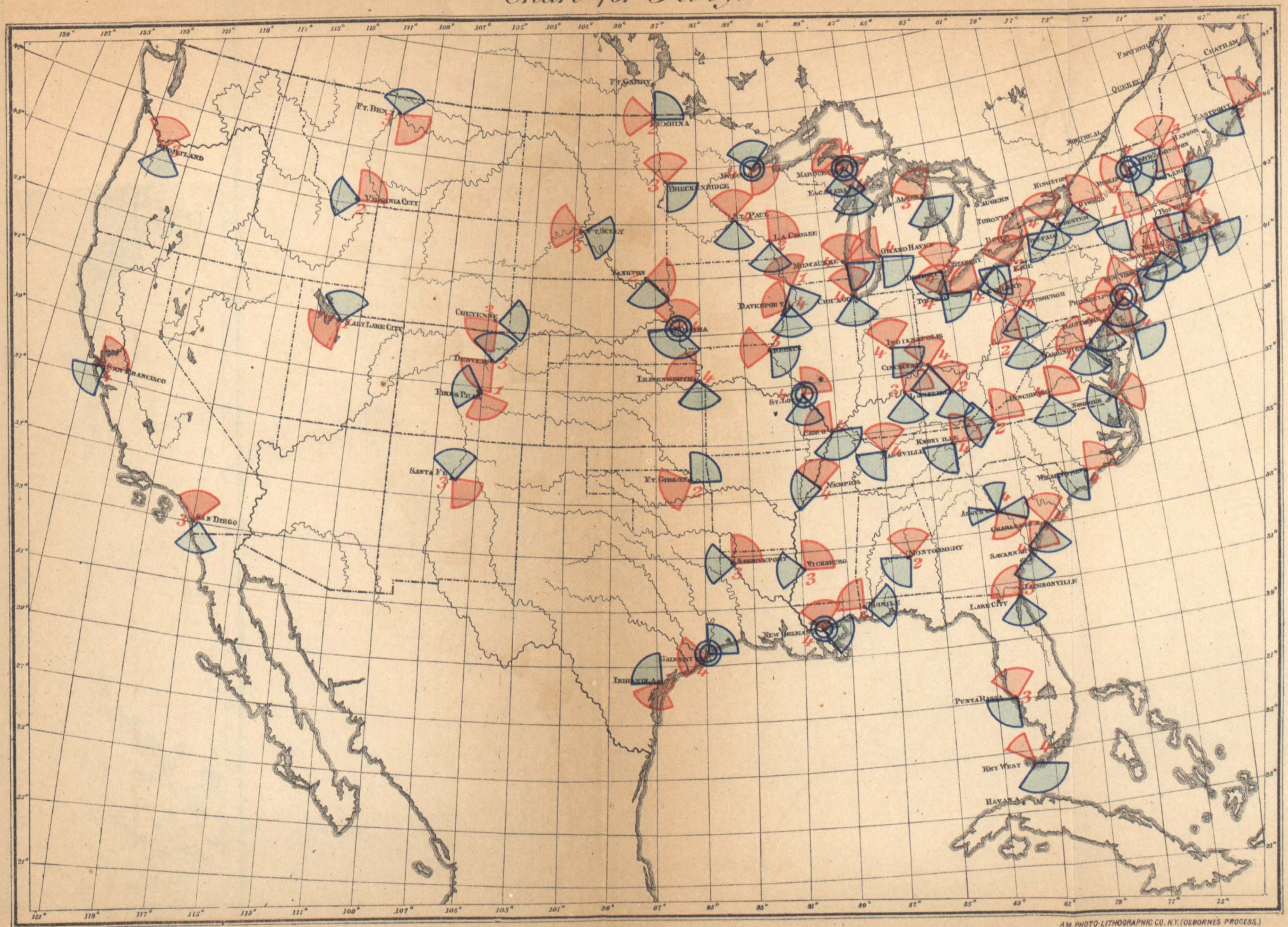

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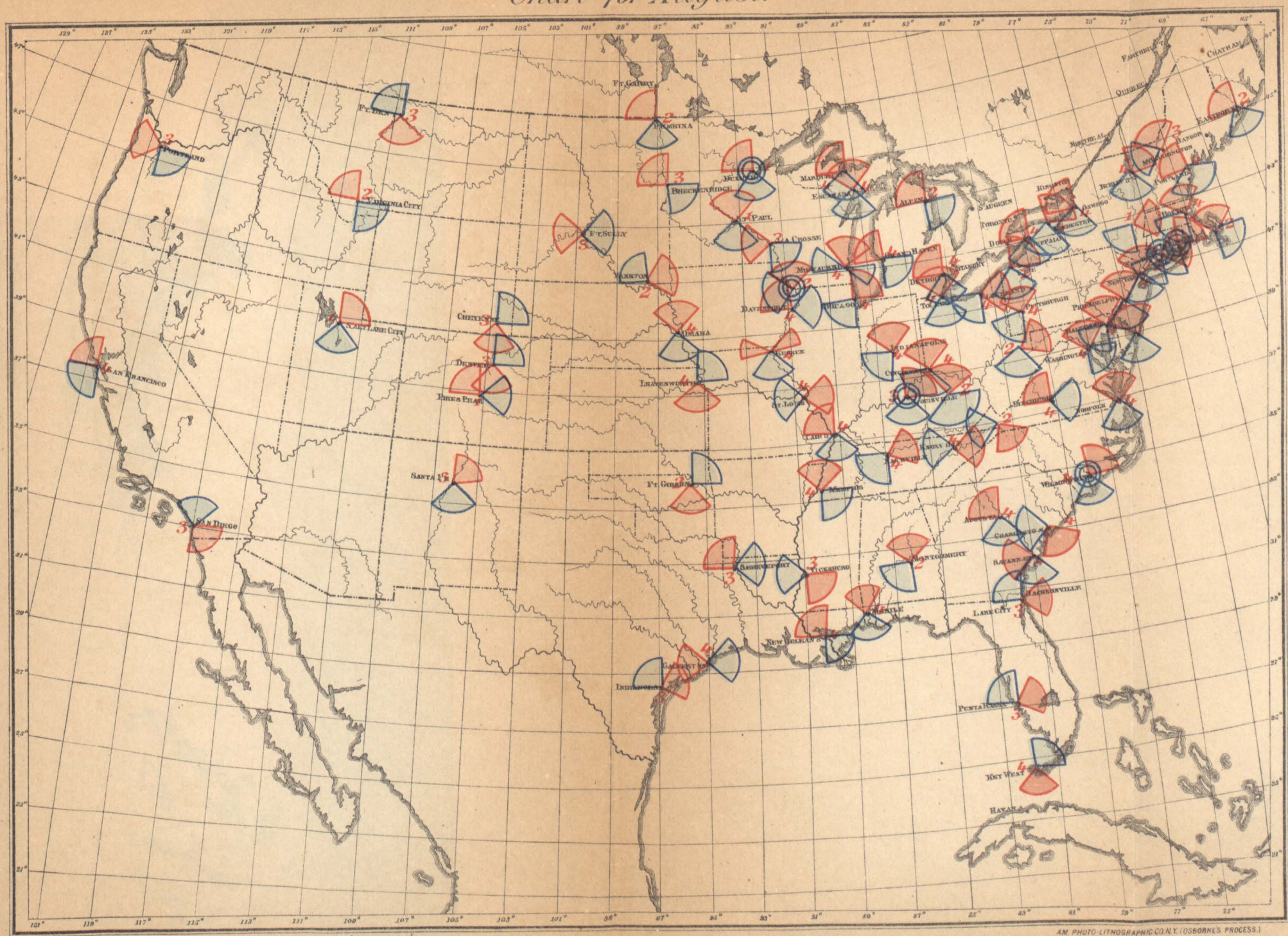
Chart for August.



A.M. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

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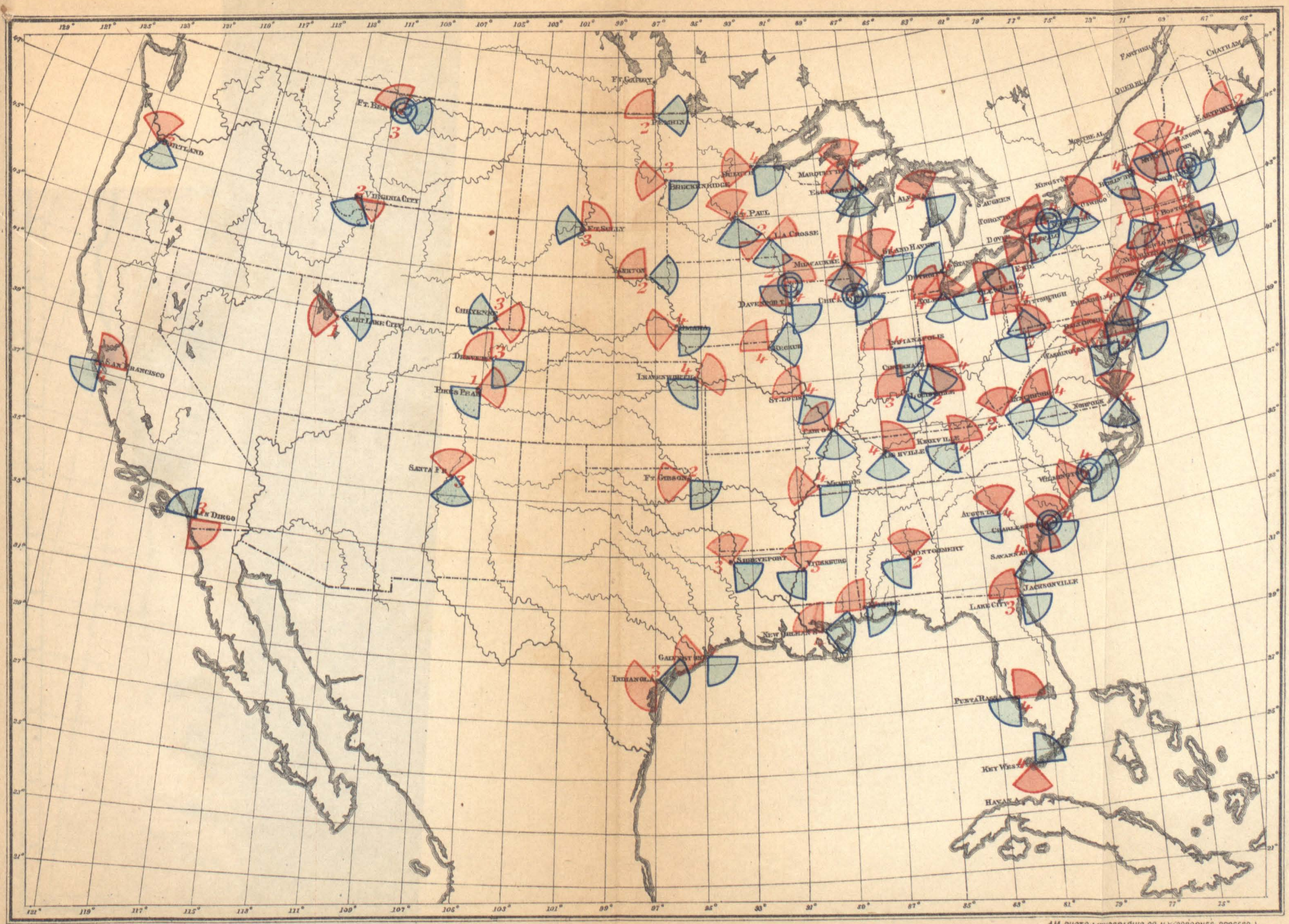
Chart for September.



A.M. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

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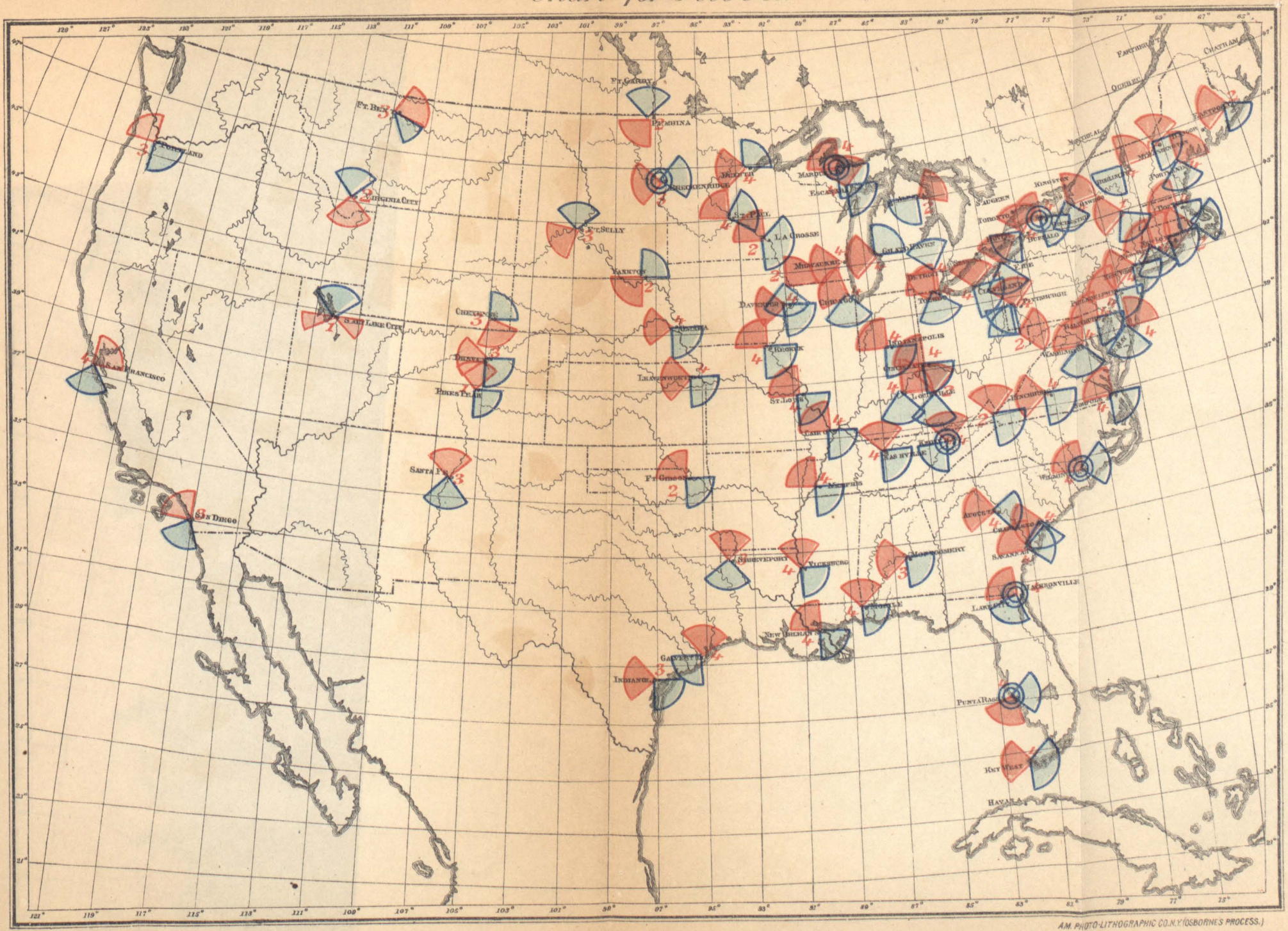
Chart for October.



A.M. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNES PROCESS.)

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Chart for November.

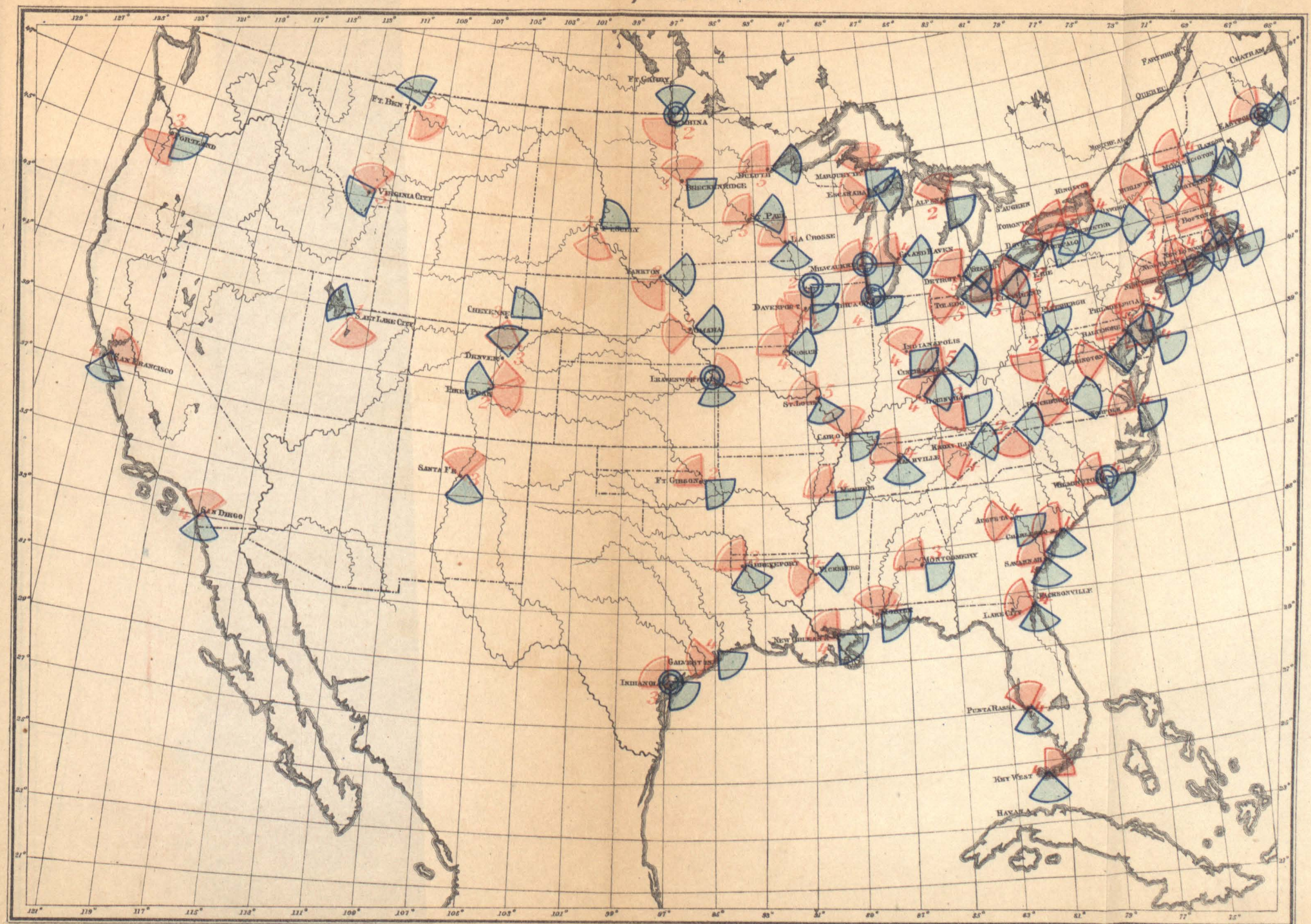

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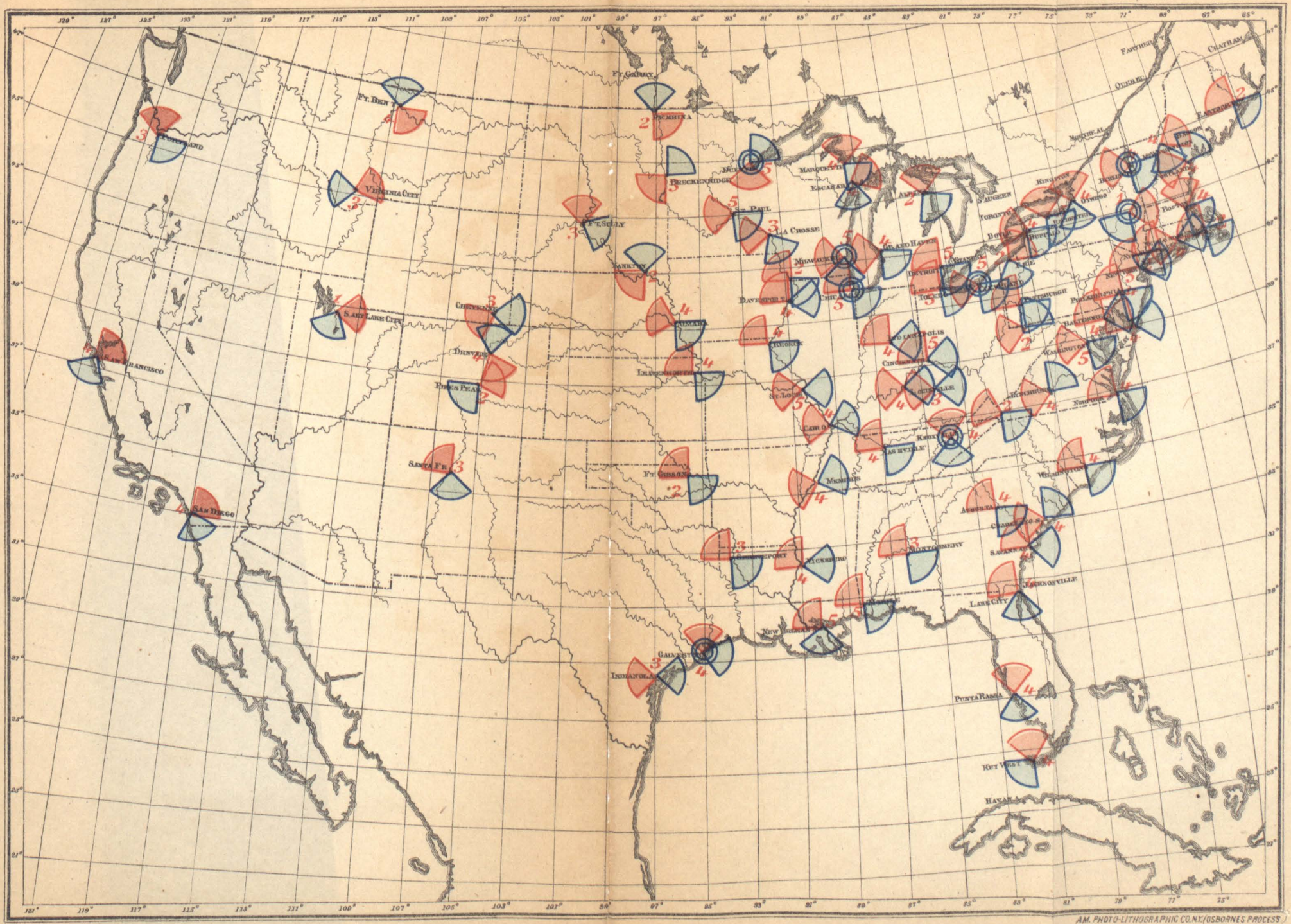
Chart for December.



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7.35 A.M.
February 10th
1875.

Equator

Arrows fly with the wind.
Force of wind is shown by line on tail of arrow
thus ⟶ Force 1 and 2, 0 to 9 miles per hour.
" ⟶ " 3 " 4, 9,1 to 22,5 miles per hour.
" ⟶ " 5 " 6, 22,6 to 40,5 " " "
" ⟶ " 7 " 8, 40,6 to 67,5 " " "
" ⟶ " 9 " 10, 67,6 upwards.
Absence of wind is indicated by C
Isobaric lines are marked ————
Isobaric lines doubtful are marked – – – – –
Isothermal lines " " ————
Isothermal lines doubtful " – – – – –

INTERNATIONAL WEATHER MAP.

Clear weather or cloudiness of 1/10 is indicated thus Co or ⟶o
Fair " " 3/10 to 5/10 or clear weather
with Fog is indicated thus C+ or ⟶+
Cloudy weather or cloudiness of 6/10 to 10/10 C+ or ⟶+
Rain, Hail, Snow or Sleet is indicated thus C• or ⟶•

10° East from 25° Greenwich

CAPE COLONY

Cape Town

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7.35 A.M.
February 11th
1875.

Equator

20° East from 25° Greenwich 30° 25°

CAPE COLONY

Arrows fly with the wind.
Force of wind is shown by line on tail of arrow
thus ⟶ Force 1 and 2, 0 to 9 miles per hour.
" ⟶ " 3 " 4, 9,1 to 22,5 miles per hour.
" ⟶ " 5 " 6, 22,6 to 40,5 " " "
" ⟶ " 7 " 8, 40,6 to 67,5 " " "
" ⟶ " 9 " 10, 67,6 upwards.
Absence of wind is indicated by C
Isobaric lines are marked ————
Isobaric lines doubtful are marked – – – – –
Isothermal lines " " ————
Isothermal lines doubtful " ---------

INTERNATIONAL WEATHER MAP.

Clear weather or cloudiness of 1/10 is indicated thus Co or ⟶
Fair " " 2/10 to 5/10 or clear weather
with Fog is indicated thus C≡ or ⟶
Cloudy weather or cloudiness of 6/10 to 10/10 C+ or ⟶
Rain, Hail, Snow or Sleet is indicated thus C• or ⟶

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7.35 A.M.
February 12th
1875.

INTERNATIONAL WEATHER MAP.

Arrows fly with the wind.
Force of wind is shown by line on tail of arrow
thus ⟶ *Force 1 and 2, 0 to 9 miles per hour.*
" ⟶ *" 3 " 4, 9,1 to 22,5 miles per hour.*
" ⟶ *" 5 " 6, 22,6 to 40,5 " " "*
" ⟶ *" 7 " 8, 40,6 to 67,5 " " "*
" ⟶ *" 9 " 10, 67,6 upwards.*
Absence of wind is indicated by C
Isobaric lines are marked ————
Isobaric lines doubtful are marked – – – – – –
Isothermal lines " " ————
Isothermal lines doubtful " – – – – – –

Clear weather or cloudiness of 1/10 is indicated thus Co *or* ⟶
Fair " 2/10 to 5/10 or clear weather
" with Fog is indicated thus C≡ *or* ⟶
Cloudy weather or cloudiness of 6/10 to 10/10 C● *or* ⟶
Rain, Hail, Snow or Sleet is indicated thus C● *or* ⟶

20° East from 25° Greenwich
CAPE COLONY
Cape Town

7.35 A.M.
February 13th
1875.

INTERNATIONAL WEATHER MAP.

Arrows fly with the wind.
Force of wind is shown by line on tail of arrow
thus ⟶ *Force 1 and 2, 0 to 9 miles per hour.*
" ⟶ *" 3 " 4, 9,1 to 22,5 miles per hour.*
" ⟶ *" 5 " 6, 22,6 to 40,5 " " "*
" ⟶ *" 7 " 8, 40,6 to 67,5 " " "*
" ⟶ *" 9 " 10, 67,6 upwards.*
Absence of wind is indicated by C
Isobaric lines are marked ———
Isobaric lines doubtful are marked – – – – –
Isothermal lines " " ———
Isothermal lines doubtful " – – – – – –

Clear weather or cloudiness of 1/10 is indicated thus Co *or* ⟶
Fair " " 2/10 to 3/10 or clear weather
with Fog is indicated thus C+ *or* ⟶
Cloudy weather or cloudiness of 8/10 to 10/10 C+ *or* ⟶
Rain, Hail, Snow or Sleet is indicated thus Co *or* ⟶

7.35 A.M.
February 13th
1875.

HIGH

LOW

Equator

70° East from 25° Greenwich

CAPE COLONY

Cape Town

INTERNATIONAL WEATHER MAP.

Arrows fly with the wind.
Force of wind is shown by line on tail of arrow
thus ⟶ *Force 1 and 2, 0 to 9 miles per hour.*
" ⟶ " 3 " 4, 9,1 to 22,5 miles per hour.
" ⟶ " 5 " 6, 22,6 to 40,5 " " "
" ⟶ " 7 " 8, 40,6 to 67,5 " " "
" ⟶ " 9 " 10, 67,6 upwards.
Absence of wind is indicated by C
Isobaric lines are marked ————
Isobaric lines doubtful are marked – – – – –
Isothermal lines " " ————
Isothermal lines doubtful " – – – – – –

Clear weather or cloudiness of 1/10 *is indicated thus* C○ *or* ○⟶
Fair " 3/10 *to* 5/10 *or clear weather*
with Fog is indicated thus C+ *or* +⟶
Cloudy weather or cloudiness of 6/10 *to* 10/10 C+ *or* ═⟶
Rain, Hail, Snow or Sleet is indicated thus C● *or* ●⟶

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7.35 A.M.
February 14th
1875.

INTERNATIONAL WEATHER MAP.

Arrows fly with the wind.
Force of wind is shown by line on tail of arrow
thus ⟶ *Force 1 and 2, 0 to 9 miles per hour.*
" ⟶ *" 3 " 4, 9,1 to 22,5 miles per hour.*
" ⟶ *" 5 " 6, 22,6 to 40,5 " " "*
" ⟶ *" 7 " 8, 40,6 to 67,5 " " "*
" ⟶ *" 9 " 10, 67,6 upwards.*
Absence of wind is indicated by C
Isobaric lines are marked ——————
Isobaric lines doubtful are marked – – – – – –
Isothermal lines " " ——————
Isothermal lines doubtful " – – – – – – – –

Clear weather or cloudiness of 1/10 is indicated thus C○ *or* ⟶○
Fair " " " 2/10 to 1/10 or clear weather
with Fog is indicated thus C+ *or* ⟶+
Cloudy weather or cloudiness of 2/10 to 10/10 C● *or* ⟶●
Rain, Hail, Snow or Sleet is indicated thus C● *or* ⟶●

20 East from 25° Greenwich 30' 25'
15' CAPE COLONY Cape Town 15'

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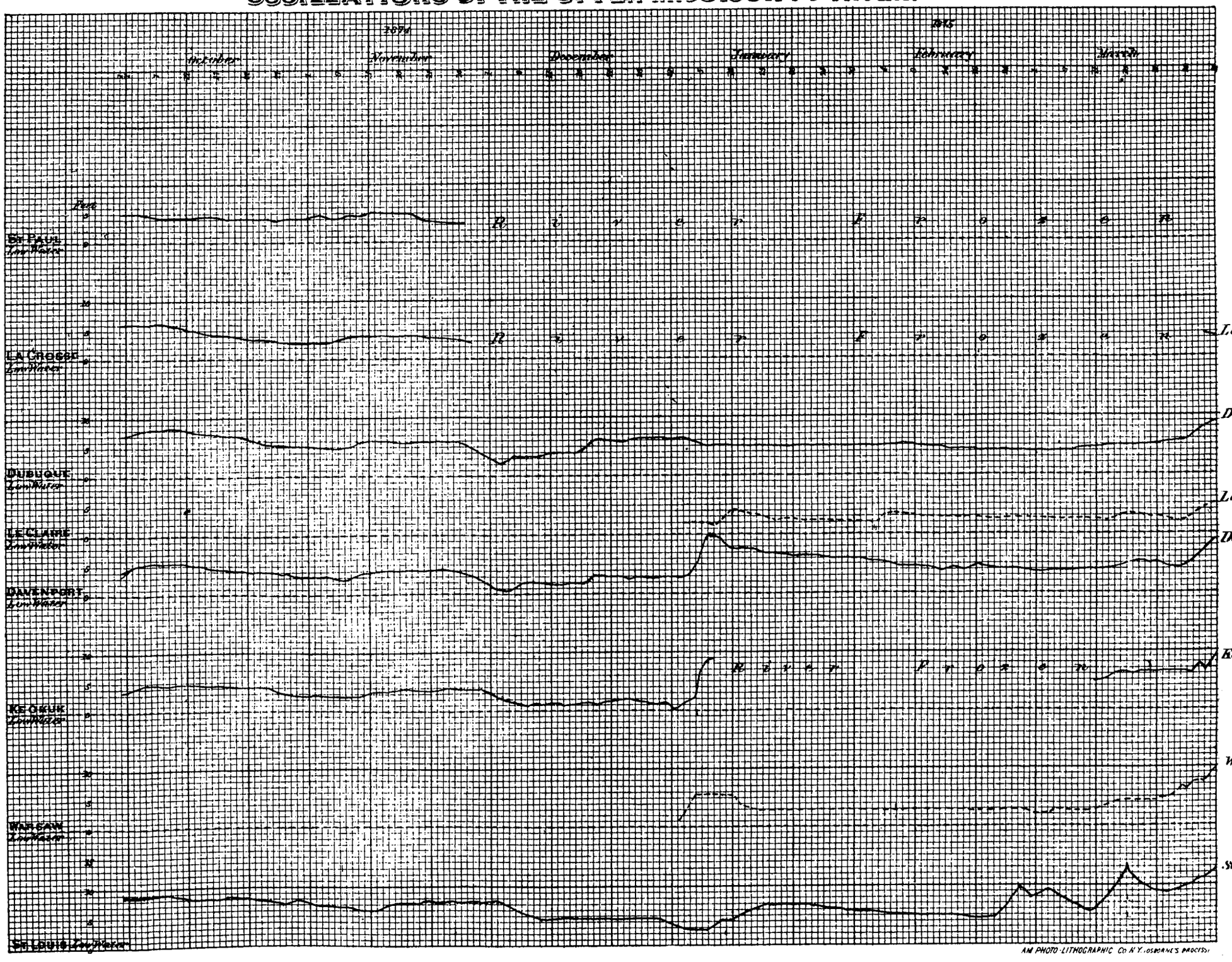
OSCILLATIONS OF THE UPPER MISSISSIPPI RIVER.



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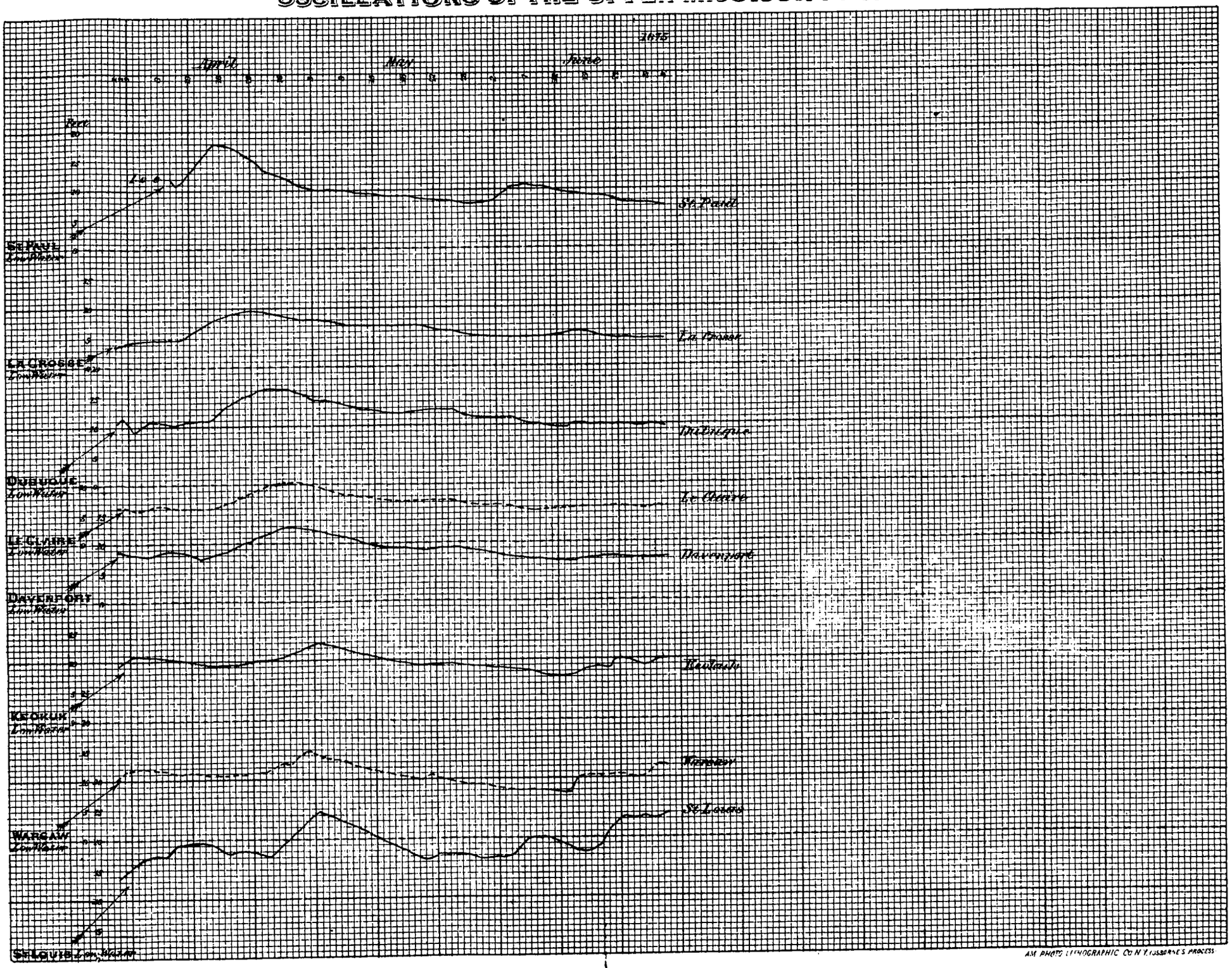
OSCILLATIONS OF THE UPPER MISSISSIPPI RIVER.

(Concluded)



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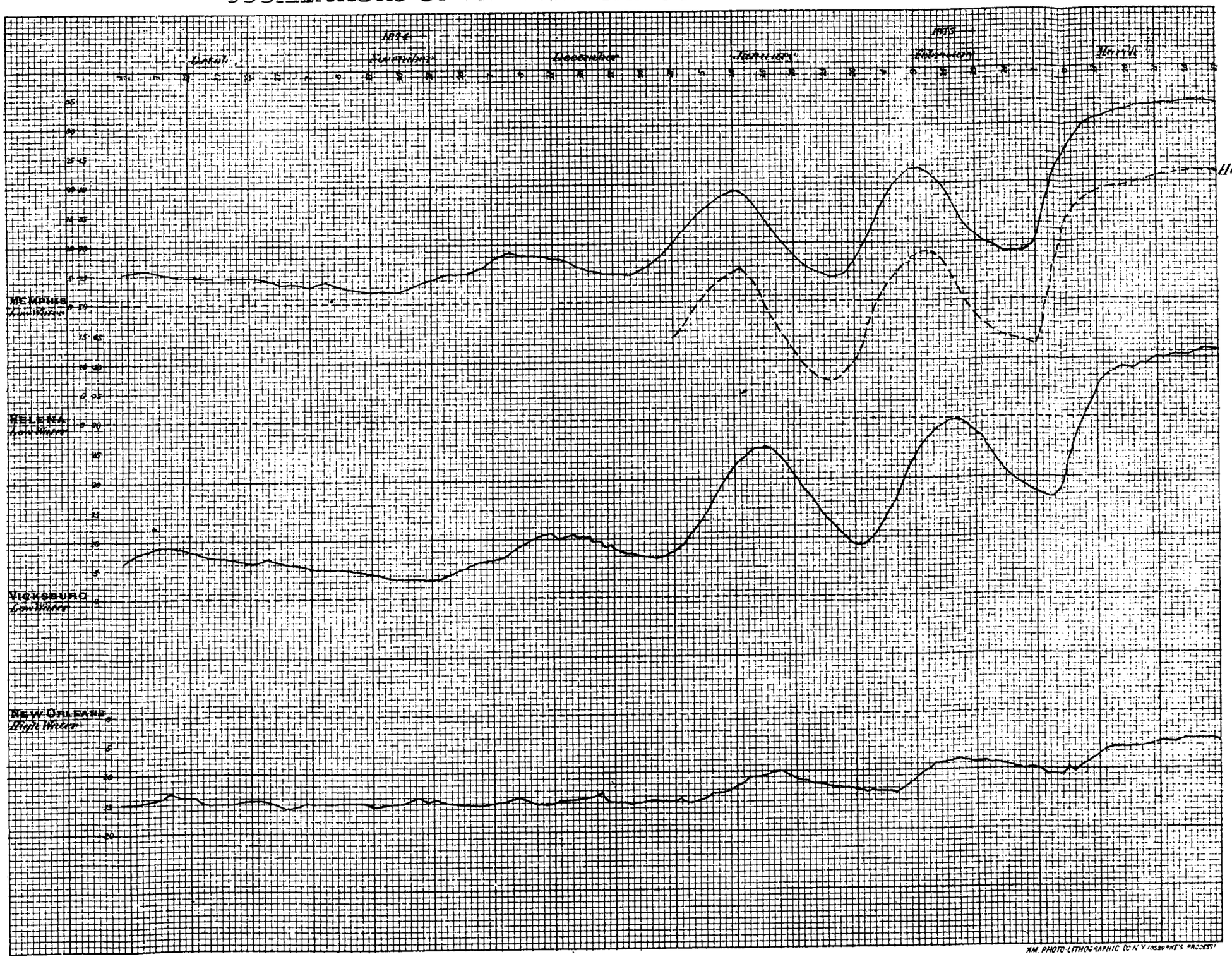
OSCILLATIONS OF THE LOWER MISSISSIPPI RIVER.



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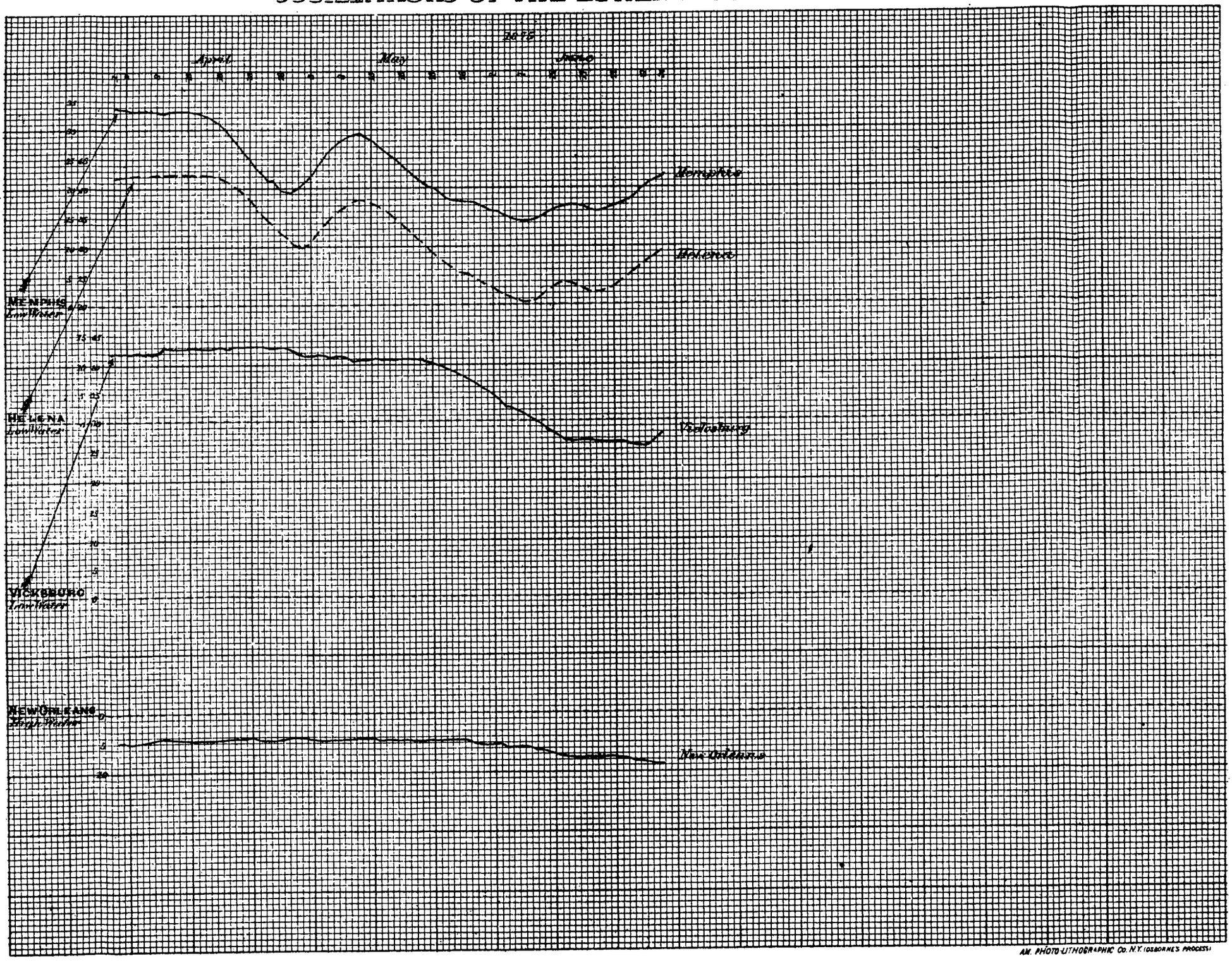
OSCILLATIONS OF THE LOWER MISSISSIPPI RIVER.

(Concluded.)



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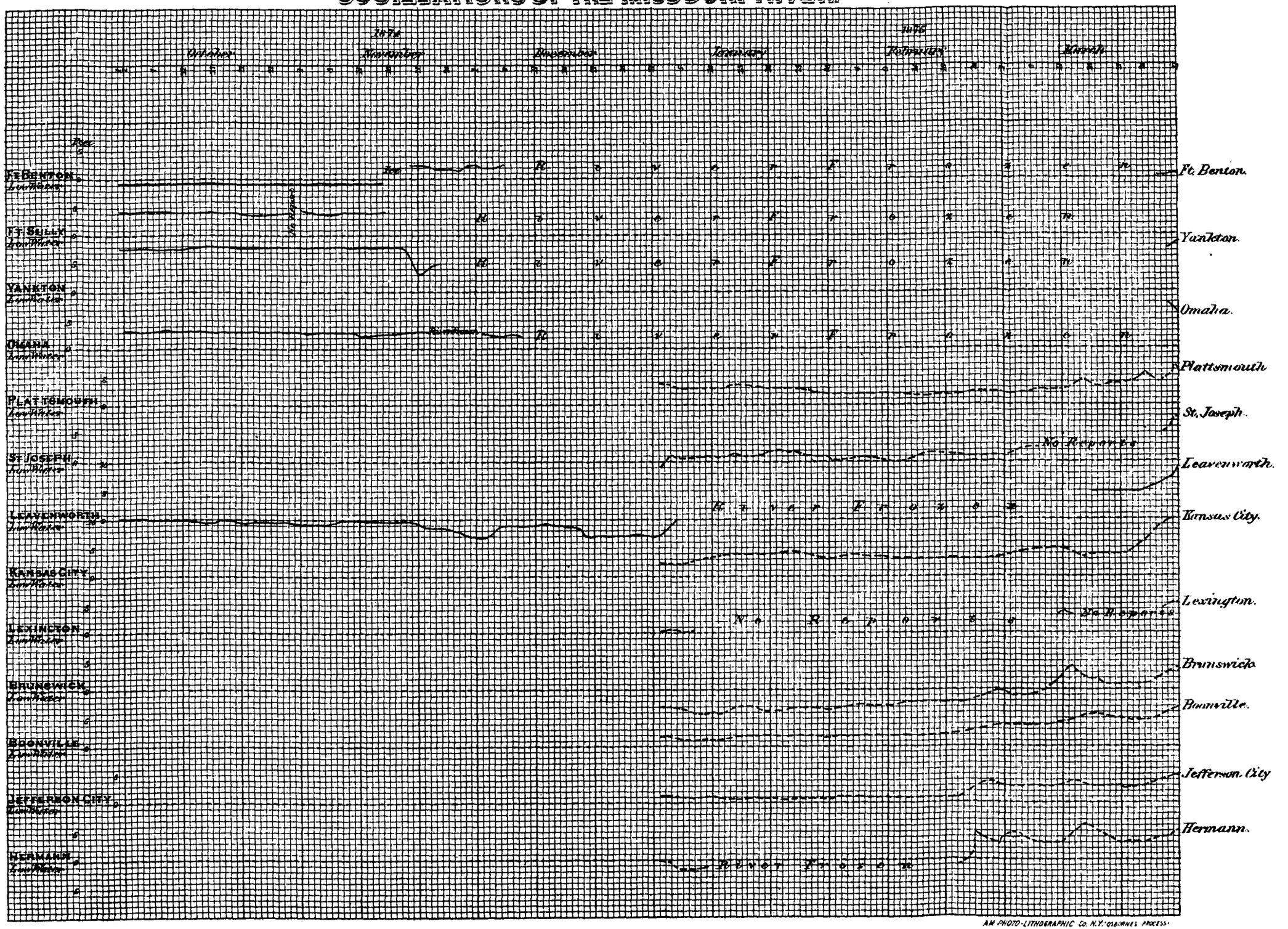
OSCILLATIONS OF THE MISSOURI RIVER.



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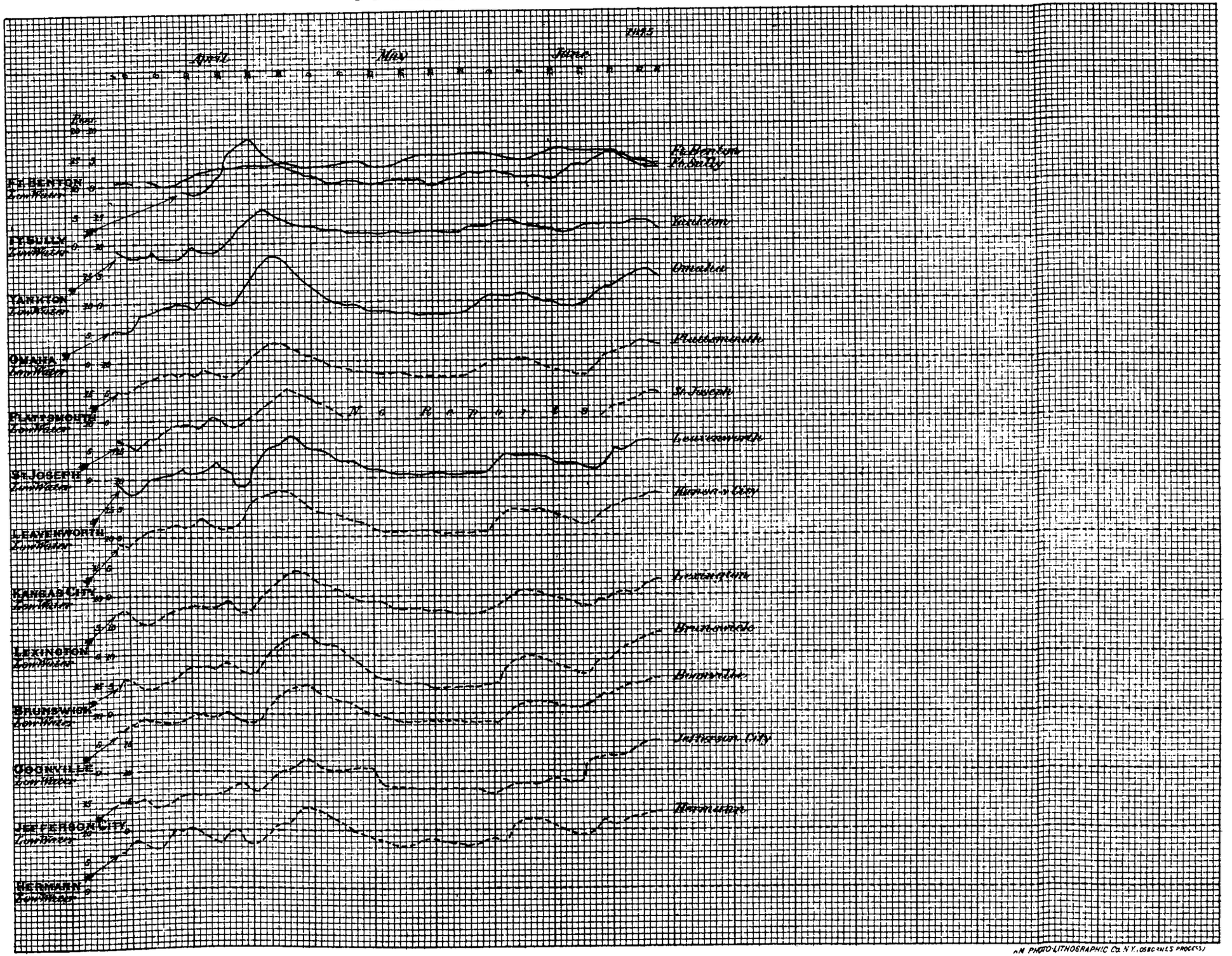
OSCILLATIONS OF THE MISSOURI RIVER.

(Concluded)



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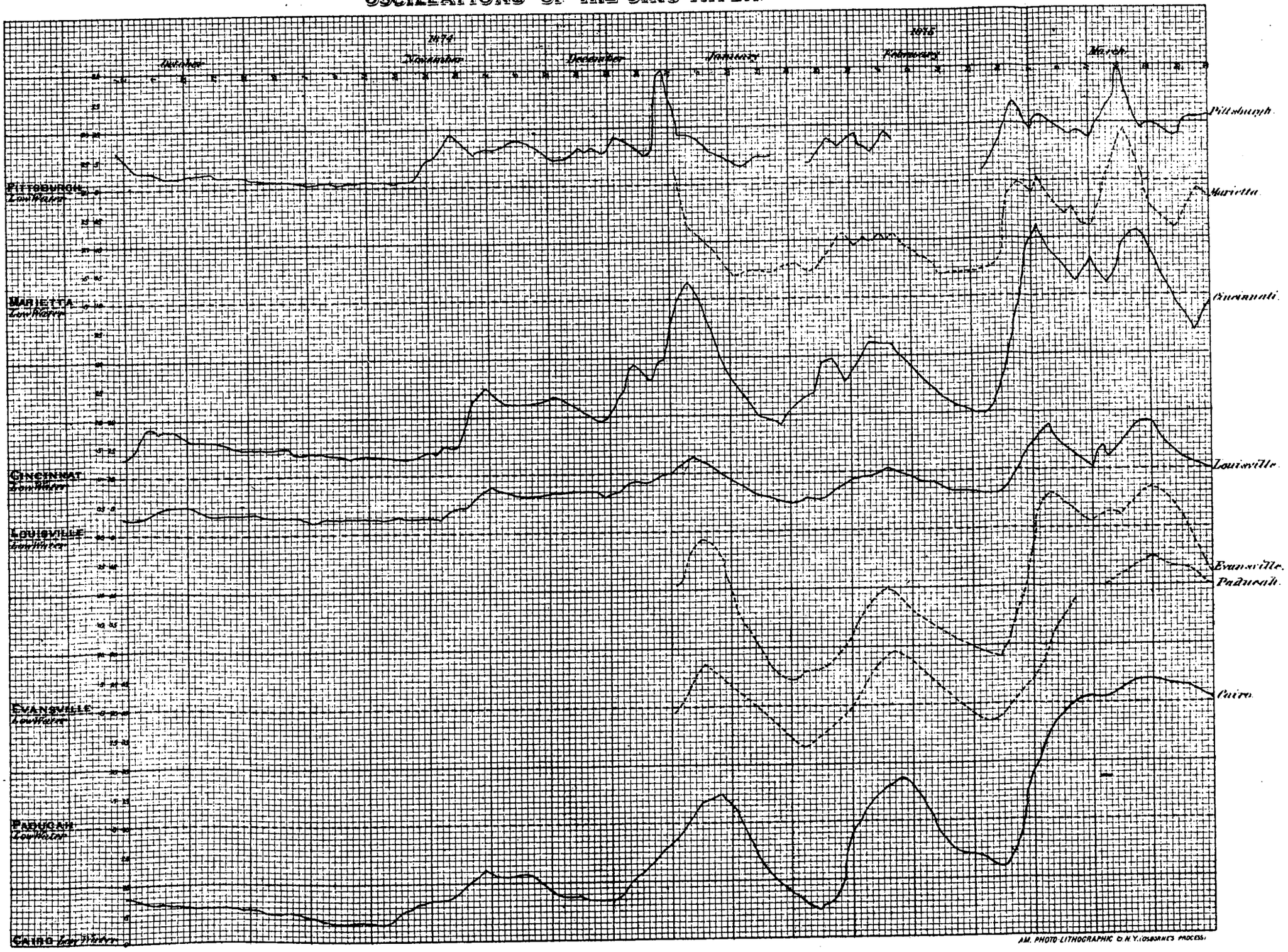
Oscillations of the Ohio River.



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OSCILLATIONS OF THE OHIO RIVER.

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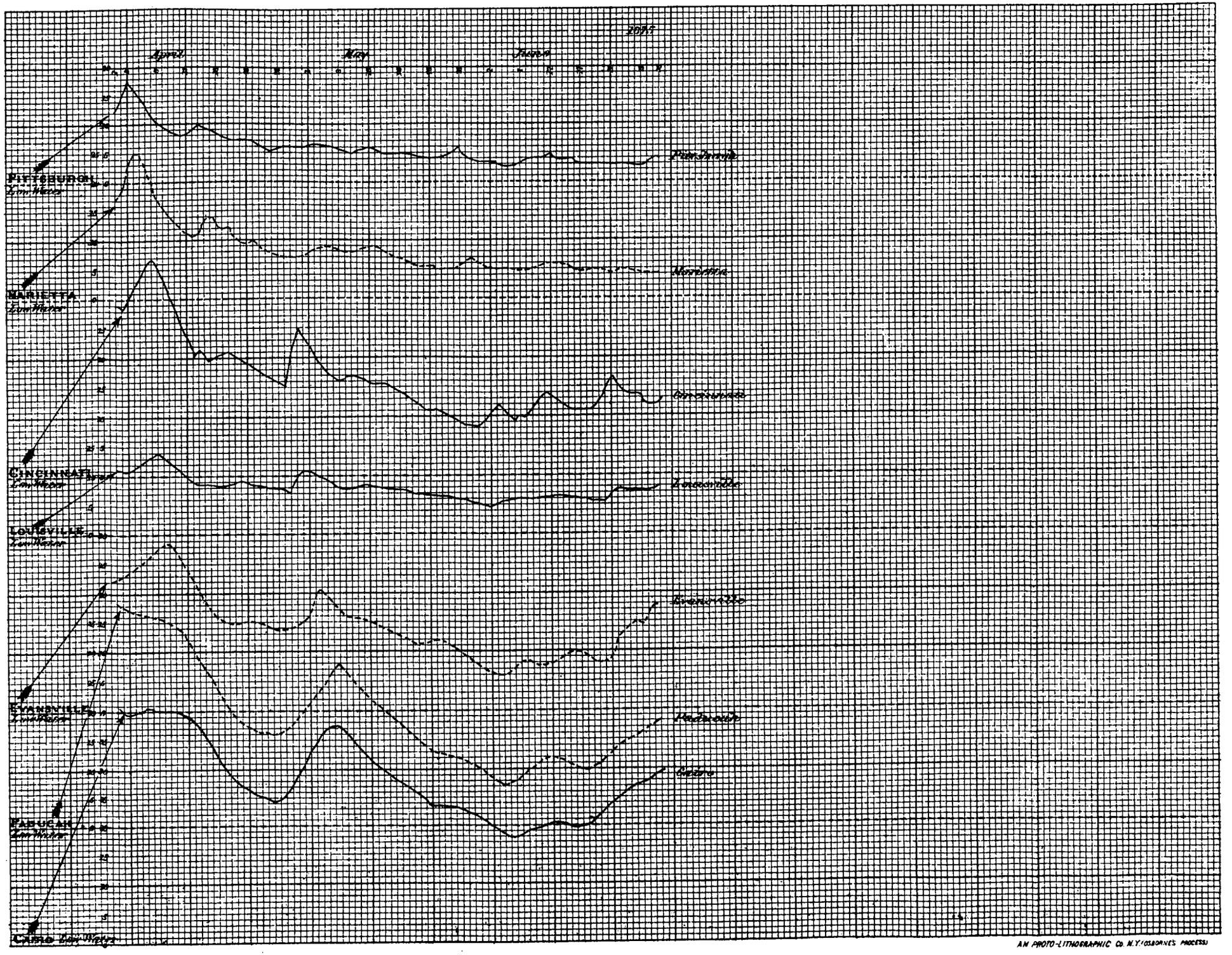

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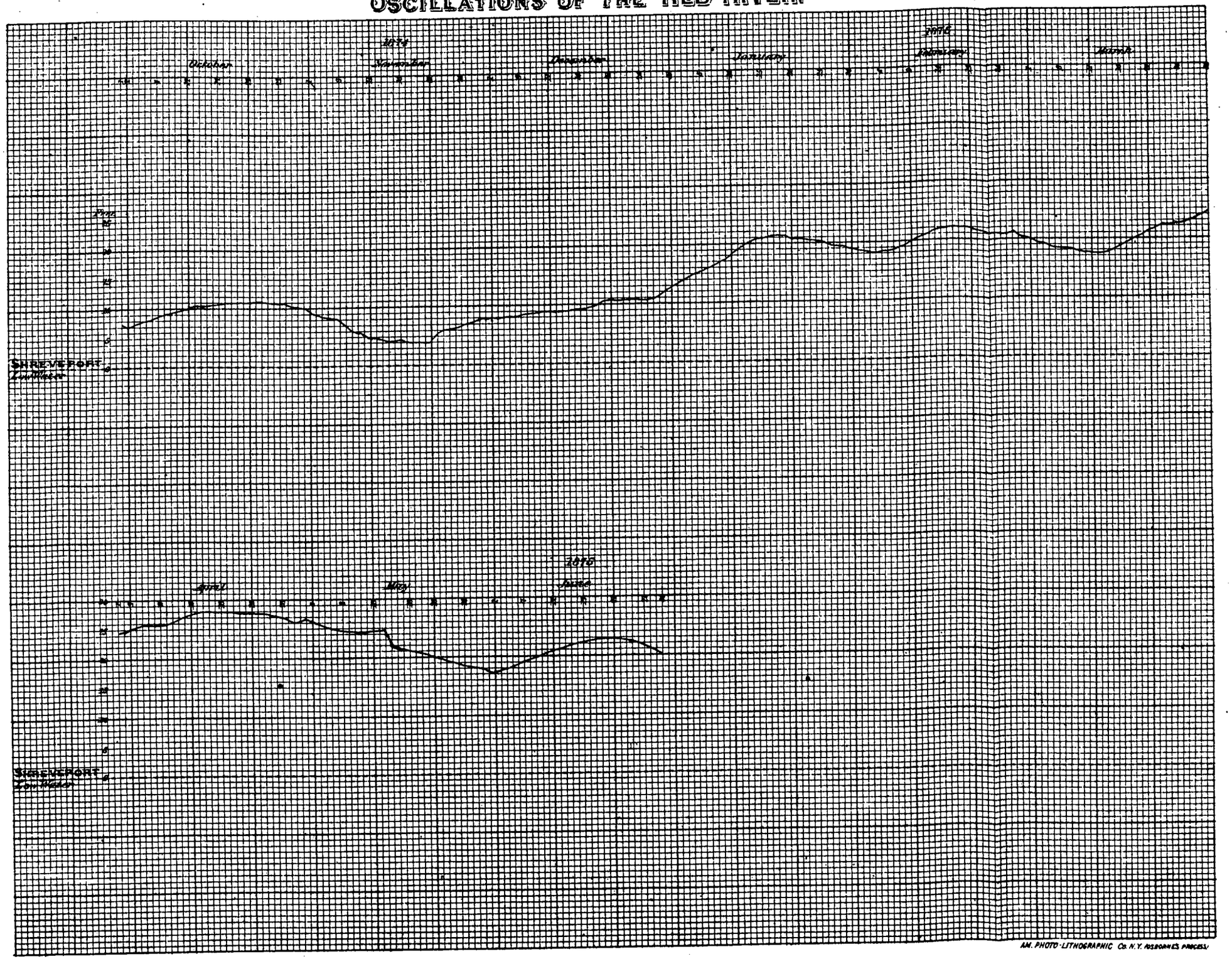
OSCILLATIONS OF THE RED RIVER.



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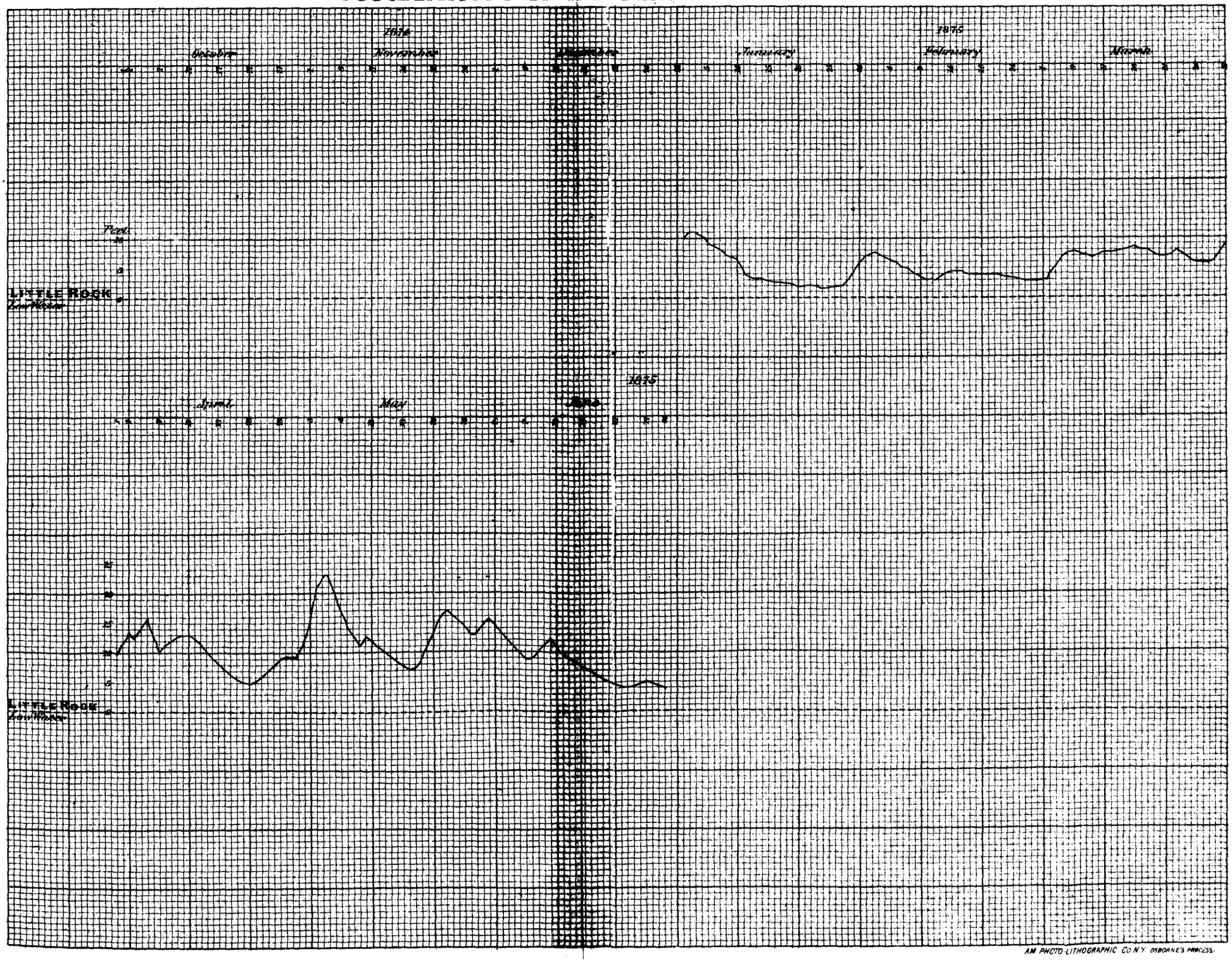
OSCILLATIONS OF THE ARKANSAS RIVER.



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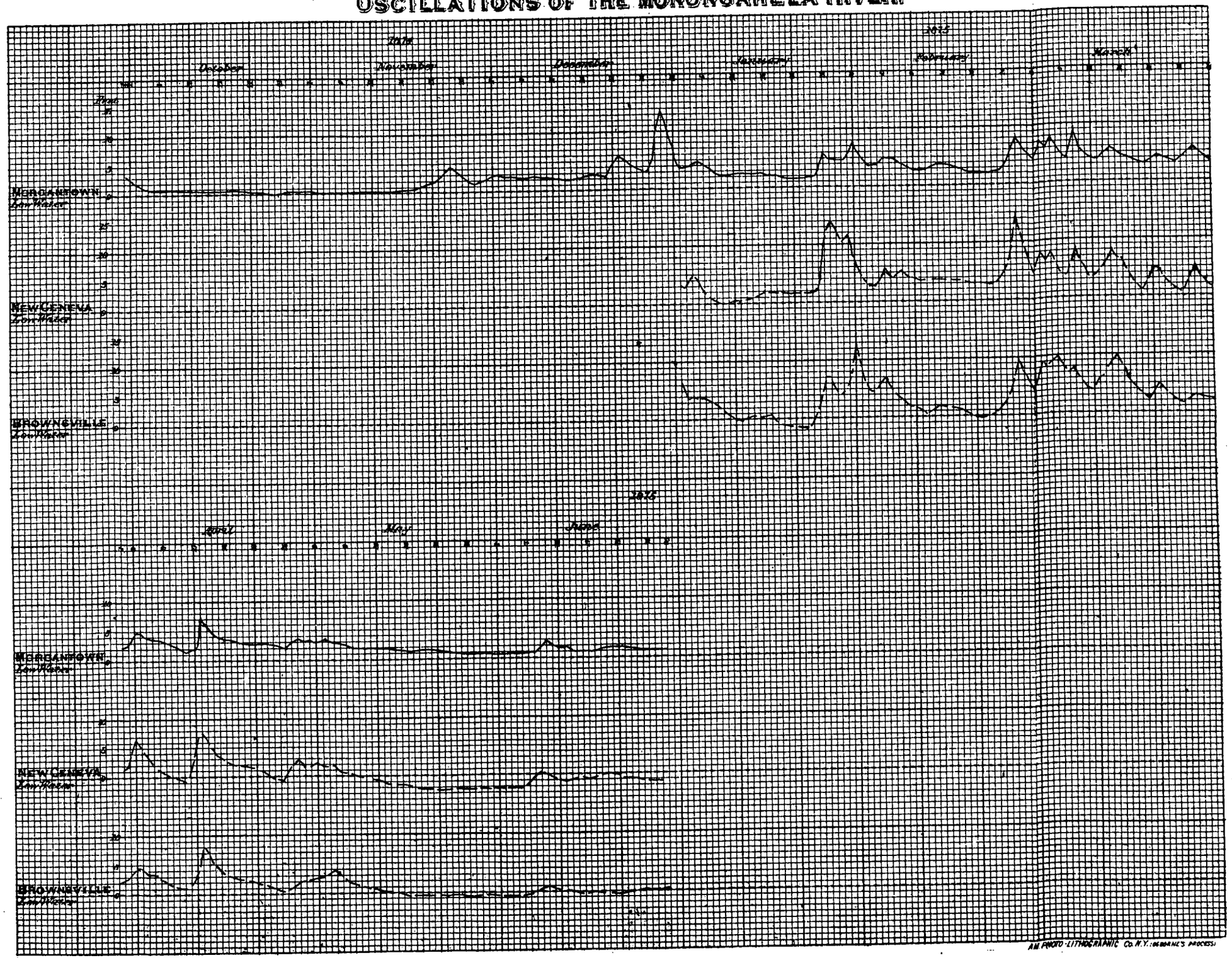
OSCILLATIONS OF THE MONONGAHELA RIVER.



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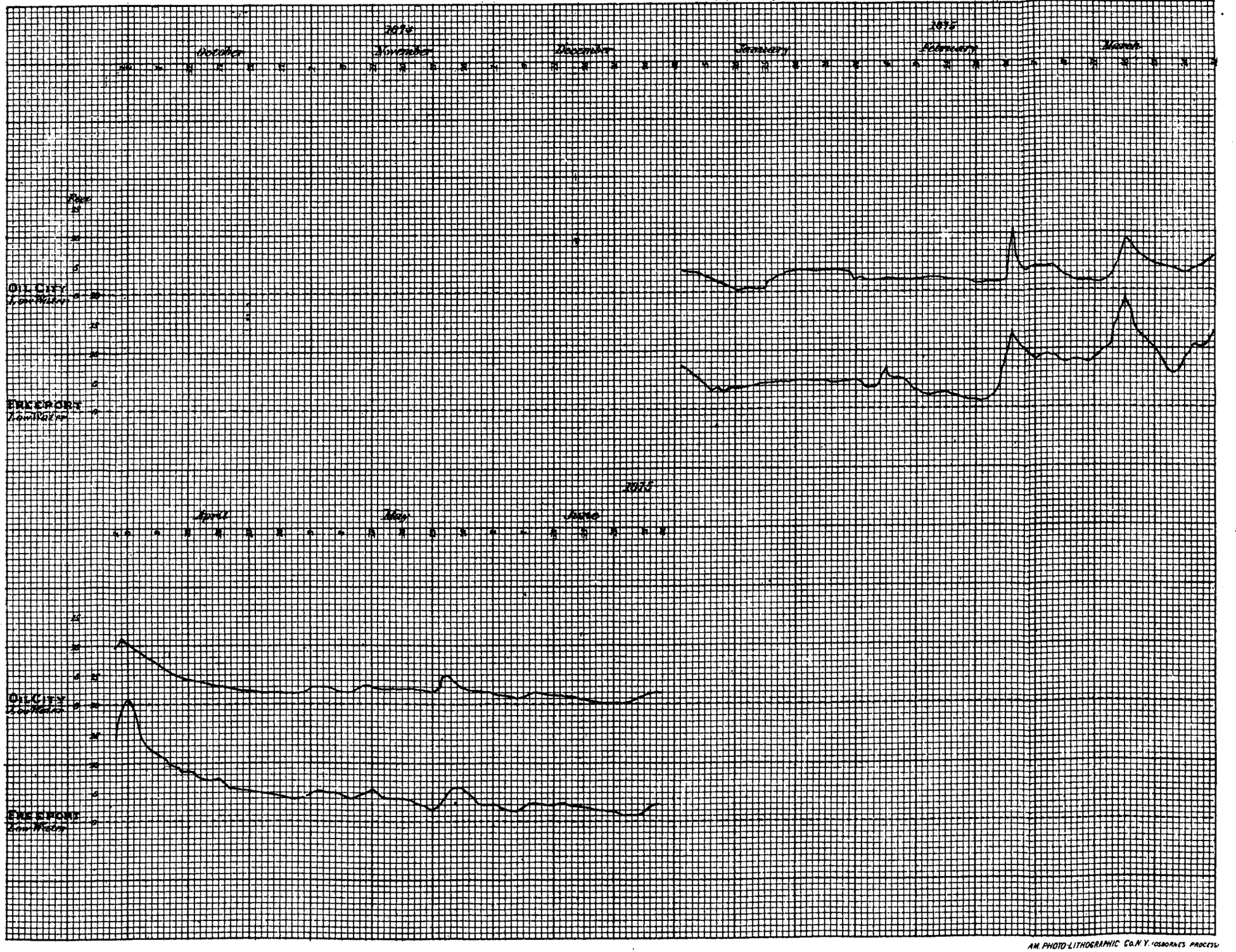
Oscillations of the Allegheny River.



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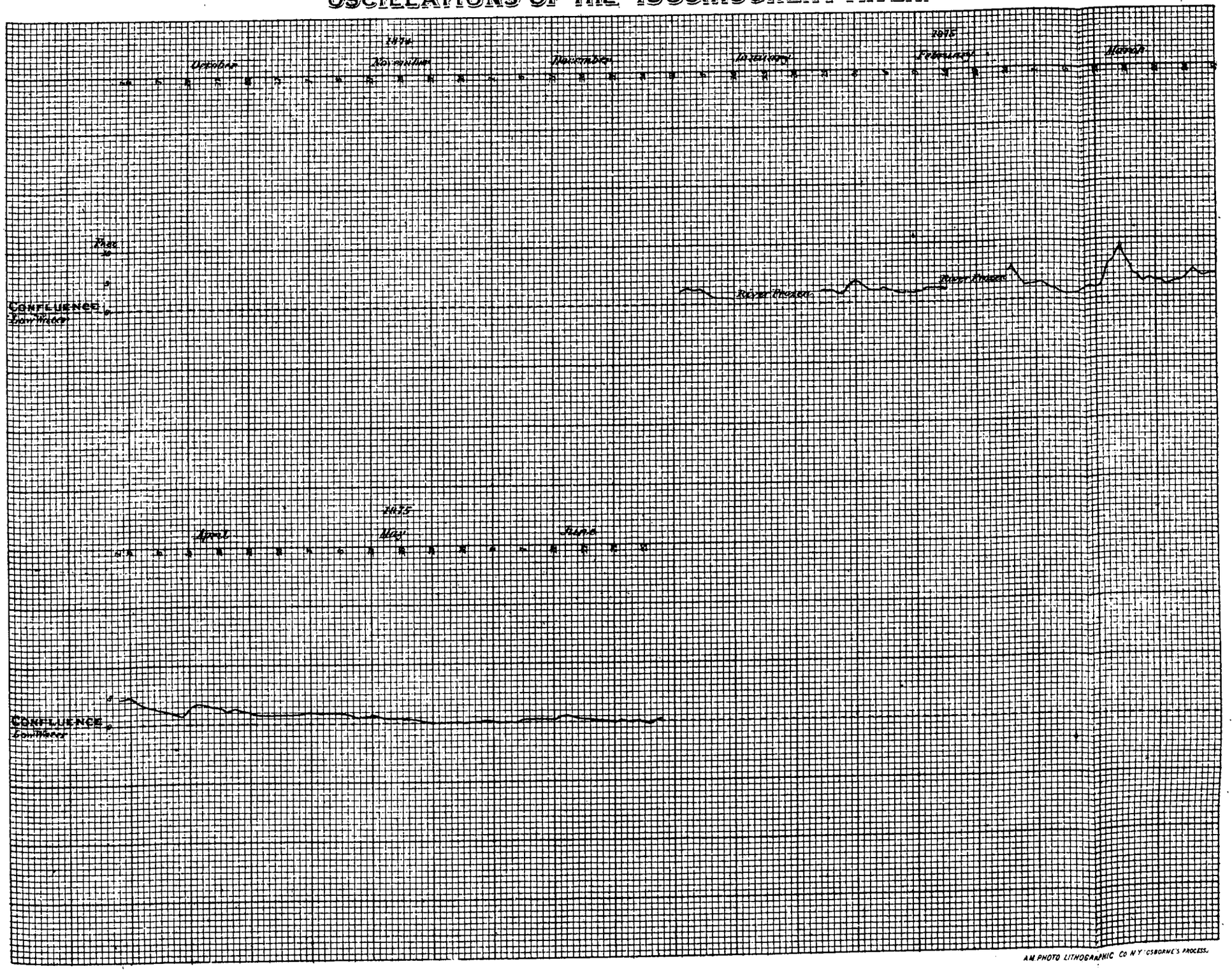
OSCILLATIONS OF THE YOUGHIOGHENY RIVER.



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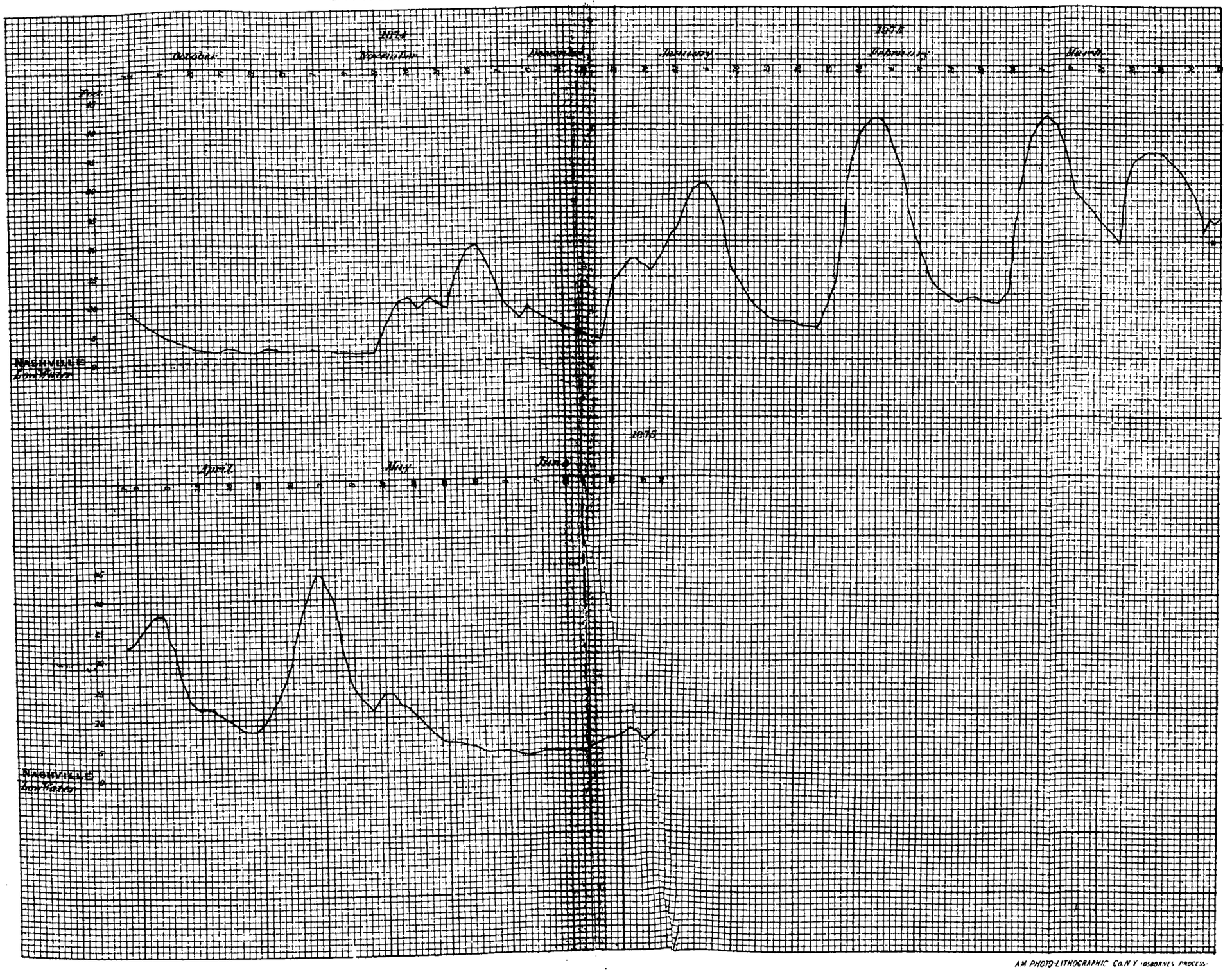
OSCILLATIONS OF THE CUMBERLAND RIVER.



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