highest degree reached 90°, 1 p. m., 13th and 25th; lowest degree reached, 72°, occurred at 13 morning and evening readings.

September.—Total precipitation, 37.31 inches, daily average, 1.24; two days, 18th and 19th, no rain; greatest fall in one day, 4.74, on 9th. Temperature, daily average, 6 a. m., 73.9°; 1 p. m., 86.7°; 6 p. m., 75°; highest degree, 90°, on 30th; lowest degree, 72°, on 8 morning and evening readings.

There is little to add to the above; nearly all the rain falls after noon; the moon is less visible than the sun; rare indeed is it that we are able to distinguish any constellation. There is very little or no wind. The rain always comes from the west, and seldom accompanied by either thunder or lightning, but the month of September past was a very notable exception to this. Some of the peculiar pranks of our telephone system would indicate that there is plenty of electrical force in the sky. The effect of this climate upon the human system is rather surprising to most men; we have no fevers and no rheumatism, though we have in our employ men from many places from the northern part of the States to the southern part of Chile. Our physician has little to do and is as much surprised at the good health of the community as any one. Our hygrometer (Mason's) shows about 8°.

NOTES BY THE EDITOR.

AMERICAN CLIMATOLOGICAL PUBLICATIONS.

The Editor has noticed several remarks in various publications to the effect that climatic data for the United States is very scarce and hardly to be obtained by European students. Probably many of those who are studying the climate of America are not aware of the fact that the Weather Bureau has organized climatological work in every State and Territory, and that for many years past there have been published monthly reports which are now known as the "Section Reports of the Climate and Crop Service of the Weather Bureau." Each of these reports contain from four to eight printed leaves, and gives the rainfall, the maximum and minimum temperatures for each day of the month, and for each station in the section or State, as also in another table the general climatological data and oftentimes excellent articles on local climatic peculiarities. When these monthly reports are bound up together with the Annual Summary, there results a volume of from fifty to a hundred large quarto leaves or 150 pages of material for the study of the climate of each section, and as there are about fifty sections, it may be said that the climatological data for the United States, as published in detail, would make an annual volume of 4,500 pages of tabular matter and 1,300 pages of charts. Additional matter is also given in the MONTHLY WEATHER REVIEW, published at the Central Office in Washington. Nothing comparable to this is done by any other nation in the world. In India the rainfall data is collected together in a similar way, monthly, for each province, and the collected reports constitute a large volume of rainfall date. But the United States does the same for both temperature and rainfall, as well as for other climatological elements. The summaries, as given in the MONTHLY WEATHER REVIEW, present only the broadest features of the local climates.

Each section prints from 50 to 250 copies of its monthly reports, according to the demand in the respective States, and we suppose that there has not been sufficient energy shown in distributing these reports to institutions outside of each State, otherwise the meteorologists of Europe would have realized the great work that has been accomplished in publishing this American data. We respectfully suggest to the section directors that they urge the observers to retain complete sets of these publications for the past few years, and that those who are willing to dispose of their sets offer them to the central meteorological bureaus and scientific libraries, where students of climatology may have access to this precious material.

It is very desirable that the section directors or other qualified persons should interest themselves in compiling general works on the climatology of each section, thus summarizing the data contained in the long series of section reports which are now so rarely accessible to the general student.

The principal journals published in England, France, and Germany, whether they make meteorology, climatology, or geography a specialty, frequently comment in an appreciative manner upon the work done by our State sections, in so far as they have received their publications, and will certainly appreciate every further step that is taken to set forth the peculiarities of our various local climates.

BACK NUMBERS OF THE MONTHLY WEATHER REVIEW.

The Secretary of the Canadian Institute, Toronto, Canada, desires to complete his library set of the MONTHLY WEATHER REVIEW by obtaining the first *fifteen* volumes, 1873–1888. Any voluntary observer having a set to dispose of will confer a favor by informing the Chief of the Weather Bureau.

In general, the recipients of the MONTHLY WEATHER REVIEW will do well to preserve their sets in good order and offer them to libraries or second-hand book dealers if they do not wish to retain them for their own use. It is already quite impossible for the Weather Bureau, or the Superintendent of Public Documents, to supply the demand for past volumes, as no great stock is kept on hand.

NOTES FROM THE VOYAGE OF LA PÉROUSE.

We are indebted to Mr. O. J. Klotz, chief astronomer of the Department of the Interior, for calling our attention to the instructions prepared by the Academy of Sciences at Paris for the guidance of the astronomers and others who accompanied J. F. G. de la Pérouse in his voyage of exploration during the years 1785–1788. The Editor thereupon examined those volumes with the following results. Owing to the complete destruction of his ships, with all on board, the final results of the work accomplished by these distinguished men has been lost to the world. But occasional reports were made during their progress, from time to time, so that the National Assembly of France was able to publish a very important account of the voyage around the world. An English edition of this was published in 1799, in two volumes, from which we will make some extracts. The vessels were named the *Boussole* and *Astrolabe*. The principal scientists were Dagelet and Monge, as astronomers, De Lamanon and Dufresne, naturalists, including meteorology. The instructions given by the Academy were signed by Condorcet, as secretary, in March, 1795. These instructions give an interesting picture of the views entertained by the best men of that time as to points, some of which have not even yet been elucidated. The meteorological instructions will especially interest the readers of the MONTHLY WEATHER REVIEW:

METEOROLOGICAL INSTRUCTIONS IN 1785.

[1]It (the Academy) also invites the navigators to keep an accurate register of the height of the barometer in the vicinity of the equator at different hours of the day, with a view to the discovery, if possible, of the quantity of the variation of this instrument owing to the influence of the sun and of the moon, this variation being there at its *maximum*,

[1]See Vol. I, p. 122.

while the variations, owing to the ordinary causes, are at their *minimum*. It is unnecessary to remark that these delicate observations should be made on shore and with the greatest precaution. The navigators may ascertain, likewise, whether it be true, as some have imagined they have observed, that the mercury in the barometer is an inch higher on the western coast of America than on the eastern.

The state of the atmosphere and its continual variations, the observation of which is an object of prime necessity in a sea voyage, offer to the navigators a field of meteorological inquiries, interesting on account of the directions of the higher winds compared with those near the surface of the sea, to which they are not unfrequently opposite.

The Academy, being informed that the navigators will carry with them a certain number of small aerostatical balloons, invites them to make use of them for the purpose of ascertaining the height at which the winds blowing in the inferior portion of the atmosphere change their course and the directions of their different currents. These observations are particularly important in the places where the trade winds prevail, the relation of which to the winds in the superior region of the air it would be curious to examine.

The fluid on which our navigators sail will also attract their attention by the different currents it offers to their notice. The Academy could wish that, on their return, they would transmit to it a summary of the important labors they will have undertaken to determine these currents, from a comparison of the course given by their reckoning with that deduced from observation, both in latitude and longitude.

Besides these phenomena, which occur in the ordinary course of nature, the navigators may have opportunities of observing some that exhibit themselves only at intervals, such as certain meteors, and among others, the aurora borealis or australis. The Academy would wish them to observe the altitudes and amplitudes of these auroræ.

The cause that produces waterspouts is a matter of dispute, some attribute them to electricity, others consider them as the effect of a whirling motion contracted by a body of air.

[On the latter hypothesis the centrifugal force of the molecules of air at a distance from the axis of rotation must diminish the pressure of those which are near the axis, oblige them to let go the water they hold in solution, and occasion a cloud, the form of which will be nearly that of a revolving solid, and the drops of which will be quickly dispersed by the effect of the centrifugal force. The pressure of the air of the atmosphere not being diminished in the direction of the axis of rotation, the air must be perpetually renewing itself, by arriving at each extremity of the axis, and from the diminution of the pressure it must keep up a continual precipitation of water in the interior part, which will last as long as the duration of the whirling movement, and the quantity of which will depend on the velocity of this movement and the body of air affected by it.]

The navigators will be very attentive to observe all the circumstances that can lead to an explanation of this singular phenomenon.

The navigators will not want opportunities of making a great number of interesting experiments on the different degrees of temperature of the sea, and its saltiness in different parts, and at different depths, the specific gravity of its water, its different degrees of bitterness, in proportion to the distance or proximity of the land, etc.

The Academy trusts that they will not neglect to compare the temperature of the sea at a certain depth with that of water at its surface.

It is to be wished too, that the navigators would avail themselves of all the pits and excavations that may offer, to observe their temperature, as well as that of springs and deep wells.

Sailors have distinguished the flat ice which covers certain parts of the sea from those thick masses which appear distinct, and resemble floating mountains. The Academy wishes that a regular attention to the circumstances that, with respect to these two kinds of ice, may give room for some conjecture relative to their formation.

Next, following these instructions, the two volumes of the English edition contain the narrative of several portions of La Pérouse's voyages of exploration in the Philippine Islands, and on the coasts of Alaska and California, and other portions of the Pacific Ocean. Numerous extracts might be made showing the first steps in our knowledge of the storms of the North Pacific, the monsoons of the Chinese coast, the currents and tides and other meteorological phenomena, to say nothing of numerous experiences with the natives in all portions of the ocean.

FOEHN WINDS ON THE COREAN COAST.

On page 537 of the first volume is a short description of a phenomenon observed May 26, 1787, off the coast of Corea. Between midnight of the 26th and sunrise of the 27th, the vessels were apparently within a few miles of the southeast point of the Peninsula of Corea, approximately in latitude 35° N. and longitude 129° east of Greenwich, the land north and west of the vessel was a high mountainous coast.

La Pérouse says:

This day, May 26, was one of the finest and most interesting of our expedition, as we were enabled to take the bearings of more than thirty leagues of coast. Notwithstanding this fine weather the barometer fell to twenty-seven inches ten lines, but as its indications had been erroneous several times we continued our course till midnight along the coast, which we could discern by the light of the moon. The wind then chopped about from the south to the north with considerable violence, without the change being announced by any cloud. The sky was clear and serene, but it grew very black and I was obliged to stand off the shore, that I might not be embayed by the easterly winds. If the clouds did not give us warning of this change we had an indication of it which we did not understand, and which it is not, perhaps, easy to explain. The men at the masthead cried out that they felt burning vapors, resembling those of the mouth of an oven, coming in puffs every half minute. All the officers went to the masthead and felt the same heat. The thermometer at that time was at 14° upon deck. We sent one up to the cross trees, and it rose to 20°. These puffs of heat, however, passed with great rapidity, and in the intervals the temperature of the air did not differ from that of the temperature of the level of the sea. During the night we experienced a gale of wind from the north which continued only seven or eight hours, but the sea ran very high.

This is the first record, as far as known to the Editor, of a feature in foehn phenomena, that was vividly called to his own attention, during January, 1890, when on board the U. S. S. *Pensacola*, in the harbor of Cape Town. The *Pensacola*, when at her wharf, lay about 6 miles northeast of the so-called Lion's Head and 10 miles north of Table Mountain. Whenever a strong southwest wind prevailed, and Table Mountain was covered with the ordinary cloud called the "table cloth," and when in the afternoons, from 4 to 6 p. m., Cape Town experienced a series of violent gusts of wind, I observed upon the vessel a rapid succession of very warm and dry puffs of air intermingled with cold, moist puffs. The warm puffs were due to strong descending gusts, and they came with such violence as to produce the howling heard throughout the rigging of the vessel. Overhead, the warm descending air came in great masses, but by the time it had reached the surface of the bay, or the land near the vessel, it pushed away the cooler air near the water, and as it rushed past the observer was merely a mixture of warm and cool masses, which, doubtless after a time, became so thoroughly mixed as to be of homogeneous temperature and moisture. Many observations made with very sensitive thermometers, exposed on the windward end of the bridge of the *Pensacola* showed alternations of temperature of from 4° to 6° F. within two minutes, accompanied with alternations of the wind velocity from 5 to 30 miles per hour. It would seem as though masses of descending air warmed dynamically were tearing away and mixing with the cooler air at the surface of the water, and that the observer caught these in the very act of mixing together. Subsequently, on the Island of Ascension, where the Editor was again precisely to leeward of Green Mountain, a similar phenomenon was observed daily between 9 p. m. and 5 a. m., except only that being 800 feet above sea level on Telegraph Hill, he caught these descending gusts before they had time to mix with any great quantity of air near the surface of the ground.

J. Y. Buchanan (Proc. Roy. Soc. 1894, LVI, 108) has described the foehn phenomenon at Fort William Observatory, Scotland, and at Pontresina, Engadine, Switzerland, as consisting of rapid alternations of warm air with cooler masses, and is surprised that the foehn has been generally described as a descending wind of uniform high temperature, instead of alternating warm and cool gusts; probably, these alternations are not an invariable accompaniment of the foehn wind, but depend upon local orographic peculiarities. The foehn that descends on the leeward side of a mountain ridge may in some cases come down like the steady flow over Niagara Falls, but, at other times, like the mixture of vortices at the

stern of a vessel. The former is the case generally observed at Helena and other famous foehn stations in Montana; the latter case is that of Green Mountain and of Table Bay when south and southwest winds blow over Table Mountain and the Lion's Rump.

Undoubtedly, the same phenomenon must be observed in every similar combination of conditions the world over, and precisely these were present on the date quoted by La Pérouse in whose case, as the center of low pressure passed over him, the easterly winds veered quickly to the south and then to the west and north, and descended upon him from the mountains a few miles to the northwest.

BAROMETRIC TIDES.

Passing by the many observations on storms and fogs contained in the second volume of the English edition, we come to the last article in the appendix describing observations made to discover the flux and reflux of the atmosphere. This article by Mr. de Lamanon is dated from St. Catherines, November 5, 1785, and embodies observations made hourly from September 28 to October 1, when the vessel was sailing in a southwesterly course, between latitude 1° 5′ N. and 1° 34′ S., and therefore near the equator. Observations of this character had been recommended by the Academy as being most likely to reveal the slight tidal influence that the moon might exert on the earth's atmosphere. De Lamanon found that the tide at the equator amounted to a variation in the barometric pressure of about 0.12 English inch, which is equivalent to a rise and fall of about 100 feet. This result was sufficient to show the extreme delicacy of the problem, which has, since then, been so abundantly investigated, but still remains one of the mysteries of meteorology.

The following are the exact words of De Lamanon's report:

THE FLUX AND REFLUX OF THE ATMOSPHERE.

By G. DE LAMANON (from La Pérouse, Vol. II, p. 521).

Having been present at the reading of this article [the Instructions—ED.] in an extraordinary sitting of the Academy, I caused an excellent barometer to be constructed by the Sieur Fortin, so as to show a variation of $\frac{1}{50}$ of a line. This ingenious artist was recommended to me by M. Lavoisier. It was supposed I should make use of this instrument, constructed for the above purpose, and it was for this reason the Academy, in its instructions, recommends that the observations should be made on shore; but having procured at Brest a marine barometer, made by Nairne, and described in the voyage of the celebrated Cook, I found that it was perfectly calculated for making exact observations even at sea. However great may have been the rolling of the vessel, the mercury has hitherto remained immovable, owing to the excellent suspension of the barometer and to the capillary tube, which is fitted to the common tube, and by the help of the nonius, which is added to it, variations so small as $\frac{1}{10}$ of a line may be readily perceived.

By observing this barometer daily, at sunrise, at noon, and at sunset, I remarked that, from the latitude of 11° 2′ north to that of 1° 17′ north, its movement was extremely regular. It was always at its maximum of elevation about noon, when it descended till the evening, and rose during the night.

We reached the latitude of 1° 17′ north on the 27th of September, and on the 28th, before daybreak, I began a series of observations, for which I had made preparations the evening before, and I continued them every hour till the 1st of October, at 6 o'clock in the morning; that is, for a period of upwards of three days and three nights. During the six hours that I devoted to sleep, M. Monge was so good as to supply my place. I thought it necessary at the same time to observe the thermometer in the open air as well as that attached to the barometer, and the hair hygrometer. I marked down, also, in separate columns, the direction of the wind, the course of the ship, and the rate of our sailing, estimated by the log, and embraced the same opportunity of observing the temperature of the sea and the dip of the needle.

The results of these observations appear to me to be extremely curious. The barometer gradually ascended for six hours, and then descended during the next six, and continued thus alternately rising and falling, as may be seen by the following table, extracted from my journal. [The table is omitted.—ED.]

The flux and reflux of the air at the equator is accordingly so great as to cause a variation in the barometer of about one line and $\frac{2}{10}$ of the English division, which supposes a rise and fall in the atmosphere of about a hundred feet; while the combined action of the sun and moon, according to M. Bernoulli, causes an elevation in the sea at the equator of only seven feet.

It is true, there are corrections to be made, first, for the difference in the temperature of the mercury in the barometer; secondly, for the difference that may exist in the temperature of the air; and lastly, for the seven feet rise and fall of the sea, on which I was placed when making observations.

I must leave it, however, to more able philosophers than myself to determine whether or not this be agreeable to theory and calculation. But, be it as it may, it is evident from the observations, that meteorologists allow far too much to the action of the moon, as I hinted in my observations on the fog of 1783, printed in the Journal de Physique, and which M. de la Place, author of La Cosmographie Elementaire, has mathematically demonstrated. It would, nevertheless, be equally erroneous to count as nothing the action of the moon; since by causing a variation of one line and $\frac{3}{10}$ in the barometer, it may influence the atmosphere and occasion sensible alterations.

As I think it my duty to lay my observations before the Academy in the state in which they were made, I here subjoin them. It should be remembered, however, that the change of level in the reservoir of the barometer requires a line to be added to the different heights of the mercury marked in the table. [Table omitted.—ED.]

NOTES FROM THE VOYAGE OF LANGSDORFF.

Mr. O. J. Klotz also furnishes the following note:

A singular phenomenon is noted by Langsdorff in his Voyage and Travels, 1803–1807, Part II, p. 219, latitude 39° 49′, longitude 133°: "The current of the wind at different heights in the air was very disproportionate; the sea was perfectly calm and almost as smooth as glass, and the lower sails hung totally loose while the upper were so filled with wind that by means of them alone we ran at the rate of 6 miles an hour."

NOTES FROM THE SEPTEMBER REPORTS OF THE CLIMATE AND CROP SECTIONS.[1]

ARIZONA.

The weather was remarkably cloudless during the month. Mr. Leopold Walloth reports that a deep thundering noise was heard between noon and 1 p. m, September 12, proceeding from the Granite Range, between his station (Yarnell) and Prescott, both of which are in Yavapai County. He adds that from all accounts a large meteor struck the earth at this time.

It is often difficult to distinguish between the noise and concussion due to an earthquake and that due to a meteor rushing through the atmosphere, and as both of these occur frequently, either one is a plausible hypothesis in connection with the Arizona phenomenon. But it is entirely improbable—as for that matter, impossible—that the noise heard at Yarnell could have been due to the striking of a meteor against the ground in the neighborhood of the Granite Range. Whenever, as has happened in a few cases, any one has actually been near enough to observe a meteoric stone fall to the ground, a noise has, indeed, been heard proceeding from the air as the meteor rushes through it, but nothing remarkable has been recorded relative to the noise made when the meteor actually strikes the ground. In fact, a cannon ball roaring through the air over one's head, makes very little noise when it finally buries itself in the earth. The noise heard at Yarnell could easily have been produced by a meteor rushing through the air, but not by one when it struck the ground. It occurs to us, however, to remark that these deep thundering noises in hilly and mountainous countries, are sometimes produced by landslides on the surface and sometimes by the cracking apart of great masses of rock long before the visible landslide occurs. In the interest of science it is desirable that such noises should be traced back to their true origin and cause; one should not be satisfied with the popular idea that, *perhaps*, a large meteor struck the earth, for this latter is among the rarest of observed phenomena.

We are pleased to note that the Agricultural Association of

[1] These were prepared for the September REVIEW but were necessarily postponed.