complished, and I believe it safe to say that the work of the Weather Bureau has thus been brought before a large number of representative farmers of east Tennessee in such a manner as to enlist a lively interest in the service on their part and to awaken in them a due appreciation of the benefits it offers.

By a similar arrangement between the Chief of the Weather Bureau and Mr. Charles R. Skinner, Superintendent of Public Instruction for the State of New York, Mr. A. F. Sims, Local Forecast Official at Albany, was authorized to attend and lecture at the State summer institutes held at Chatauqua, N. Y., and Thousand Island Park, N. Y., during the month of July. About a thousand teachers assembled at each of these summer institutes. The lectures were fully illustrated and devoted especially to the methods of teaching meteorology and were very well received. They were an elaboration of the many similar lectures given by him with great success to the schools of Albany.

## MINIMUM TEMPERATURES ON MOUNTAIN PEAKS.

In the August Report of the California Section, Mr. McAdie publishes a note from Prof. J. N. Le Conte, Professor of Engineering in the University of California, giving the results of observations on the summit of Mount Lyell, on the Sierra Nevada Mountains of Central California, latitude, 37° 44′ N.; longitude, 119° 16′ W.; altitude, 13,041 feet.

On July 8, 1897, Professor Le Conte left a minimum thermometer of the United States Weather Bureau pattern on the summit. It was enclosed in a thin wooden box about 6 inches square and 2 feet long, one side of which was laid exactly in line with the edge of the great southern precipice, over 1,500 feet high. Large stones were laid upon it, but one side was exposed to the weather, and in no way could it become entirely covered with snow. On June 5, 1898, the mountain was revisited, and the thermometer box was carefully uncovered. The thermometer was in perfect condition and registered —13.6° F. It was reset and left upon the mountain a second year. Professor Le Conte was unable to make the ascent of the mountain in 1899, but Prof. H. I. Randall of the Civil Engineering Department of the State University visited the spot in July and obtained the reading. In this case it was —17.6° F.

It would be instructive to obtain the minimum winter temperatures of a number of high peaks distributed along the crest of the range from Lake Tahoe to Mount Whitney.

In reference to these Mr. McAdie writes as follows:

The above experiments were made under the auspices of this office, with a view of determining the minimum winter temperatures at the top of the Sierra Nevada Mountains. Mr. J. N. Le Conte, son of Prof. Joseph Le Conte, is an instructor in mechanical engineering in the University of California, and also one of the officers of the Sierra Club. He is an acknowledged authority upon the High Sierra, and I consider that the Bureau has been fortunate in obtaining the services of this gentleman for the experiment.

It is very interesting to note that the minimum temperature on Lyell, elevation 13,040 feet, was —17°, while at Bodie, elevation 8,248 feet, the lowest temperature was —30°. One of the objective points of meteorological investigation at present is the determination of the thickness of the stratum of air in which cold waves are thought to have their origin. I believe it is an accepted fact that the mean temperature of the Plain region is lower than that of the Rocky Mountains, although the latter are from 5,000 to 6,000 feet high. The experiment on the Sierras seems to confirm this. From many other standpoints the experiment is also interesting.

The accuracy of these results depends in part upon the assumption that the thermometer was well ventilated at the time of minimum temperature. So many accidents are liable to occur that it would be desirable to expose two or more thermometers in different places as a check on each other.

## AUGUST WEATHER ON THE PACIFIC COAST.

As the temperatures and rainfall on the Pacific coast were quite unusual during August it is interesting to compare the remarks of the respective section directors.

In the California Report, Mr. McAdie says:

The mean temperature for the State was 5.1° F. below the normal. The precipitation was 0.05 inches in excess. The prevailing direction of the wind was west. The central and northern portions of the State experienced unusual and quite severe electrical storms during the first part of the month.

In the Oregon Report, Mr. B. S. Pague says:

The total rainfall during this August has been about 4 inches along the coast, 3 inches in the Willamette Valley, 1 to 2 inches in southern Oregon and 1 inch in eastern Oregon. With rare exceptions the rainfall was heavier than in any previous August. * * * The causes producing the August rains extend back over a considerable period of time. Under the normal movement of the summer areas of high pressure, it is not possible for rain, such as fell this month, to occur. * * * Briefly the cause of the rains was the weakness of the Pacific coast highs, their sluggish movements, the development and strength of the low which came down from the north, uniting with and assisting in the development of lows over southeastern Oregon and the surrounding region. The abnormal August weather of the Pacific slope was preceded by, first, the imperfect movement of the ocean highs in 1898; second, the almost unprecedented cold period of February, 1899; and third, the cool, cloudy, and wet weather of April and May, and the low temperatures of June.

In the Washington Report, Mr. Salisbury says:

The unseasonable character of the month was more pronounced than for any August on record. Its phenomenal character deserves something more than passing notice. The temperature of August has been abnormally low and the precipitation abnormally great. * * * It would be futile to write in learned terms about the unusual southward path of low barometer areas and the unusual frequency of such lows, as producing the unusual rains, or about the unusually low latitude of high areas on the coast producing the cool weather. What is of value to know is what has *caused* the unusual southward track and unusual number and continuance of low areas during August just past, or, perhaps preferably, the reason or reasons why the high areas were this year in an *unusual position*. Such knowledge might be of utility in enabling us to foresee seasonable or unseasonable conditions; unfortunately, it has not, as yet, been attained.

## THE CALCULATION OF THE RESULTANT WIND.

Our readers will have noticed that during the past two years we have published in Table VII the resultant direction of the wind computed from two observations, 8 a. m. and 8 p. m. daily. We have also given the average movement of the wind in Table VI, for every hour of the day.

Chart IV for each month shows the resultant winds, graphically, in connection with the isobars which are also the mean of observations at 8 a. m. and 8 p. m. It is commonly supposed that there is a close connection between the wind and the distribution of pressure at any given moment. Consequently, the mean pressures and mean winds at those moments should bring out that relation more clearly. This is a sufficient argument to justify the usage of the WEATHER REVIEW. On the other hand, as the winds are often local and are always subject to small differences of pressure, not shown by means of the ordinary barometric observations, and especially, because the winds at the surface are largely affected by currents descending from the upper atmosphere, where both wind and isobars differ very much from what prevails at sea level, therefore, there are many discrepancies in the observed relation between the resultant winds and the average isobars. These discrepancies would not be diminished if the isobars and the winds were based upon twenty-four observations per day instead of two.

In reply to a recent letter maintaining that our so-called resultants are not absolutely correct, and should be deduced from more frequent observations and by a careful consideration of the measured velocity of the wind, the following reply was sent. Those interested in the subject should study the discussions published in the MONTHLY WEATHER REVIEW during 1893 and 1894.

The principal object in publishing the resultant winds is to afford students and others an opportunity to compare the mean isobars with the mean direction of the wind at 8 a. m. and 8 p. m., seventy-fifth meridian time. As stated in a previous letter on the subject, the Bureau does not attempt to combine the elements of force or velocity with that of time. It is conceded that for a special locality where the general atmospheric circulation is modified by local causes, the mean direction of the wind is best obtained by taking into account the element of velocity as you have done. It has been shown, however, that generally the difference in the velocity of the winds from different points of the compass affects the resultant but slightly, either in direction or amount. (See MONTHLY WEATHER REVIEW, December, 1893, page 365, and Coffin's Winds of the Globe.

In deciding to adopt the present method of computing the mean direction of the wind, we were largely influenced by two considerations, first, a great saving of clerical labor would be effected, and second, the results that would be obtained by the use of the two daily observations, as distinguished from the records by self-registers, would be uniform at all stations of the service. You may be interested in knowing that a comparison of resultant winds, computed by both methods, was carried on throughout 1894. (See Tables VIII and IX, MONTHLY WEATHER REVIEW of that year.)

## PROBABLE CLOUDINESS DURING TOTAL SOLAR ECLIPSE OF MAY 28, 1900.

In the MONTHLY WEATHER REVIEW for 1897, p. 394, and 1898, p. 404, Prof. F. H. Bigelow has published his first and second reports, showing the results of special observations made at the request of Prof. D. P. Todd, for the purpose of determining as far as practicable the probability of the occurrence of cloudy weather at different points along the path of totality. The exact location of this path is shown by the narrow band on Chart XI, taken from Professor Bigelow's Bulletin. As many expeditions from astronomical centers throughout the world will be sent to observe the solar and atmospheric phenomena visible in this region during totality, it is important for the astronomer to avail himself of all the information that the meteorologist can furnish so that he may as far as possible diminish the chances of the disappointment that cloudy weather must inevitably bring.

The third and final report by Professor Bigelow, being rather larger than the first and second, will be printed as a bulletin of the Weather Bureau and distributed to astronomers and scientific journals, but some of the results given therein are here quoted for the information of all voluntary observers.

The total eclipse begins on the Pacific Ocean just west of Mexico at sunrise and will be visible at stations located within a narrow band that stretches from that point due eastward over Mexico and the Gulf of Mexico and enters the United States near New Orleans whence it passes northeastward toward Norfolk and Cape Henry and, finally, after crossing the Atlantic Ocean, Portugal, and Algiers, terminates near the northern end of the Red Sea at sunset. In the United States totality begins near New Orleans at 7:20, local mean time, and ends at Norfolk about 9 a. m., local mean time, or between 1:30 and 1:55 p. m., Greenwich mean time. The respective observers can convert these times into the standards, eastern or central time, by applying the proper differences of longitude. The totality of this eclipse will last only about one and a half minutes for those who are located precisely on the line that marks the center of the path of the shadow of the moon, but will be nothing for those on the boundary lines of the path.

The short lines on Chart XI, numbered (1) to (6), drawn across the path of totality, represent the position of the center of the shadow at intervals of five minutes, as it advances along its path; No. (1) corresponds to 1h. 30m. p. m. and No. (6) to 1h. 55m. p. m., Greenwich mean time.

The observations made by voluntary observers during the past three years give uniformly harmonious results as to the probable state of the sky over this region between 8 and 9 a. m., May 28, 1900. If we classify the observers by States, and consider their observations year by year, and also divide the records into two classes according as they give the general cloudiness of the sky and the special cloudiness in the neighborhood of the sun, we obtain the figures given in the following table:

*Summary of results for three years.*

[The figures are percentages of cloudiness.]

| State. | 1897. | | 1898. | | 1899. | | Means. | |
|---|---|---|---|---|---|---|---|---|
| | General sky. | Near sun. | General sky. | Near sun. | General sky. | Near sun. | General sky. | Near sun. |
| Virginia | ..... | ..... | 44.9 | 41.7 | 35.7 | 34.3 | 40.3 | 38.0 |
| N. Carolina | 35.8 | 33.3 | 28.2 | 25.7 | 33.3 | 30.6 | 32.4 | 29.9 |
| S. Carolina | 33.7 | 32.1 | 17.5 | 16.0 | 28.1 | 26.7 | 26.4 | 24.9 |
| Georgia | 18.4 | 16.0 | 12.2 | 10.8 | 18.5 | 17.4 | 16.4 | 14.7 |
| Alabama | 15.2 | 14.9 | 17.1 | 15.7 | 22.4 | 22.6 | 18.2 | 17.7 |
| Mississippi | ..... | ..... | 23.0 | 26.4 | 38.6 | 31.9 | 30.8 | 29.2 |
| Louisiana | 26.5 | 21.5 | 36.4 | 30.9 | 35.9 | 30.6 | 32.9 | 27.7 |

In addition to this table, showing the probabilities in favor of good weather, Professor Bigelow's Bulletin gives a mass of information for the benefit of visiting astronomers, showing the railroads, the hotels, the astronomical conveniences, and the resources for enabling heavy baggage to be transported to the path of totality. Undoubtedly the Weather Bureau observers, both regular and voluntary, will receive many calls for assistance in connection with this eclipse of the sun.

# THE WEATHER OF THE MONTH.

By ALFRED J. HENRY, Chief of Division of Records and Meteorological Data.

## PRESSURE.

The month of September, 1899, was one of high pressure, great dryness, and a high percentage of sunshine.

As compared with the preceding month pressure was markedly higher in all of the interior districts. The geographic center of the country happens to mark the region of greatest increase in pressure, viz, about two-tenths of an inch, which extended from Nebraska southward to Oklahoma and northern Texas. The increase over the whole country, excepting the Florida Peninsula and the St. Lawrence Valley, was greater than a tenth of an inch.

## TEMPERATURE OF THE AIR.

The distribution of monthly mean surface temperature is shown on Chart VI which also shows by appropriate lines the monthly maximum and minimum temperatures. During August temperature was below normal in the western part of the country and above in the eastern. These conditions were reversed during the current month. West of the Mississippi River temperature was from 1° to 4° above normal, while over the remaining areas there was a deficiency ranging from a fraction of a degree in the South Atlantic States to 4° in the region about Lake Superior.

Maximum temperatures of 100° and over occurred over a large area in the Mississippi and Missouri River valleys and