

thunder-storms in southern New England late in the autumn; and heavy snow-fall early in December, marking the opening of a severe winter.

The following is an extract from the January, 1887, report of the "New Jersey Weather Service," Prof. George H. Cook of the Agricultural College, New Brunswick, director:

The mean temperature at ten stations, Atlantic City, Dover, Moorestown, Newark, New Brunswick, New York, Philadelphia, Princeton, Somerville, and South Orange, as compared with the normal January mean temperatures as given in Signal Service reports, Prof. J. C. Smock's tables, and other reliable sources, shows that the mean temperature throughout the state was but a half degree below the normal.

The first ten days were very cold; the following were warmer, but still quite cold; and the last eleven were comparatively comfortable, considered in the light of history, as reflected by our valuable observer at Somerville, who says: "Thirty years ago, on Sunday, January 16th, there was a snow storm remarkable for the intense cold and amount of snow. Snow fell three feet deep on a level on Main street, Somerville. Cars did not get up from New York until Wednesday evening, January 19th. A train of eight engines, a mail car, and a passenger car came as far as this place. The mercury was four degrees below zero. People rode in sleighs to church from over the river for thirteen Sundays after the storm, but sleighing in town ceased two weeks sooner."

The maximum temperature for the month was reported at Red Bank, 78°, on the 23d, and the lowest at Blairstown, 6° below zero, on the 8th. Matawan showed the highest mean temperature for the month, 38°.7, while Blairstown recorded the lowest, 22°.7.

Rain or snow fell at each station on an average of ten days out of thirty-one. Sixteen stations noting amount of cloudiness report an average of twelve days when the amount of cloudiness averaged eight or more on a scale of zero to ten. The greatest amount of sunshine was reported at Atlantic City, Red Bank, Egg Harbor City, and Philadelphia, while Dover recorded the greatest number of cloudy days. The precipitation was unevenly distributed. Out of a list of eleven stations where normals have been determined eight stations report an excess, while three show a deficiency. The average excess throughout was 0.97 inch. The ground was reported perfectly free from snow, except in the northern counties, at the end of the month, and the frost was out in a number of places.

**Thunder-storms.**—The observer at Lockton reports thunder and lightning at 3 a. m. of the 14th, and the Princeton observer notes a thunder-storm at 2 a. m. on the 18th.

**Navigation.**—The ice moved out of the Raritan, at Somerville and New Brunswick, on the 16th. The ice in Paulin's Kill, at Blairstown, broke up and flowed out on the 29th. Ice in the Delaware, at Billingsport Front lighthouse, broke up on the 24th, and at the end of the month the river was clear.

The following meteorological summary for January, 1887, is from the "Bulletin of the North Carolina Department of Agriculture." The weather service is under the direction of Dr. Charles W. Dabney, jr., of Raleigh:

**Temperature.**—The mean temperature of the state was 39°.1. The characteristic features of the first ten days were decidedly cold; the lowest temperature for the month at many points occurred during this period, especially at Salem, Forsyth county, where the minimum, -4°, was recorded on the 6th. This can be regarded as the lowest in the state during the month, but it was not, however, the coldest day, which occurred on the 3d, when a mean of 17° for all points was recorded. The minimum at Asheville, on this date, stood at 2°, and at Salem, 4°. Minimum temperatures for the state ranged from -4° at Salem, central district, to +16° at Wilmington, eastern district.

With the exception of a second cold snap, 18th to 19th, inclusive, the temperatures were generally normal, or abnormally high, and continued so to the end of the month.

**Precipitation.**—The average precipitation of the state for the month was 2.92 inches; for the eastern district, 2.81 inches; for the central district, 2.49 inches; and for the western district, 3.94 inches. The precipitation was generally distributed throughout the month, and most points in the state were favored with a fair average rainfall. The heaviest rains, or snows, fell on the 1st, 5th, 18th, 14th, 17th, 23d, 24th, 29th, and 30th. There were eight days during the month noted for an entire absence of rain. Sleet storms prevailed at Raleigh and Reidsville on the 1st, at Weldon on the 5th, at Mount Pleasant on the 6th, at Raleigh on the 10th, at Tarborough on the 26th.

The following meteorological summary for January, 1887, is from the report of the "South Carolina Weather Service," Hon. A. P. Butler, Commissioner of Agriculture for South Carolina, director:

Mean temperature, 40°.1; highest temperature, 73°, at Cheraw, on the 23d; lowest temperature, 5°, at Spartanburg, on the 4th; range of temperature, 68°; greatest daily range of temperature, 38°, at Spartanburg, on the 14th; least daily range of temperature, 2°, at Stateburg, on the 8th.

Mean depth of rainfall, 2.80 inches; greatest monthly rainfall, 4.48 inches, at Aiken; least monthly rainfall, 1.36 inches, at Spartanburg; greatest daily rainfall, 1.08 inches, at Charleston, on the 18th; least daily rainfall (inappreciable), at several stations on the 18th, 23d, and 20th.

Average number of rainy days, 8.  
Killing frosts occurred on the 1st to 18th, inclusive, also on the 15th, 16th, 18th, 19th, 20th, 25th, 26th, 27th, 28th, and 31st.

Snow fell generally in the upper and middle divisions of the state on the 5th and 7th; it was also reported in the upper counties on the 8th and 9th. Sleet was reported on the 5th, 7th, and 9th.

**Thunder-storms.**—On the 23d, at Abbeville, accompanied by high wind, heavy rain, and hail; on the same date at Spartanburg and Yorkville. The observer at Yorkville reports: "From 10 p. m. of the 23d until 4 a. m. of the 24th a rain storm, accompanied by vivid lightning and high wind, prevailed. The wind did some damage to fencing and to small unprotected out-houses."

The following is an extract from the "Tennessee State Board of Health Bulletin" for January, 1887, prepared under the direction of J. D. Plunkett, M. D., President of the State Board of Health. The weather report is prepared by H. C. Bate, Director of the State Meteorological Service:

The meteorological features for January were the severe thunder-storms of the 13th and 23d, the high winds which prevailed at intervals during the month, and the small proportion of cloudiness.

The mean temperature was 37°.2, which was several degrees higher than the January mean of any of the three preceding years. The highest temperature was 78°, recorded on the 21st, and was above the maximum recorded in January of the two preceding years, and only 1° below the maximum recorded for the corresponding month in 1884. The minimum temperature was -2°, recorded on the 2d and 3d, and was the highest minimum recorded in January during the past three years, the next highest being -5°, in 1885. The proportion of cloudiness for the month was the smallest during the past three years.

The mean precipitation for the month was 4.71 inches, which was considerably below the January mean of the past three years, the highest being 6.98 inches, in 1885; of this amount the eastern division received an average of more than 4.50 inches, the middle division an average of nearly 5 inches, and the western division a little more than 4.50 inches. The rains of the 9th, 13th, 23d, and 25th were general, and those of the 23d, 28th, and 29th were very heavy; that of the 23d especially so, the fall amounting to an average of 1.72 inches for the entire state.

#### Summary.

Mean temperature, 37°.2; highest temperature, 73°, on the 21st, at Riddleton; lowest temperature, -2°, on the 2d, at Nashville, and on the 3d, at Farmingdale; range of temperature, 75°; mean daily range of temperature, 16°.3; greatest daily range of temperature, 39°, on the 8th, at Cookeville; least daily range of temperature, 2°, on the 1st, at Ashwood; on the 18th, at Howell; and on the 22d, at Covington; mean of maximum temperatures, 68°.4; mean of minimum temperatures, 3°.1.

Average number of clear days, 12.4; average number of fair days, 9.6; average number of cloudy days, 9.

Mean depth of rainfall, 4.71 inches; mean daily rainfall, 0.152 inch; days of greatest rainfall, 9th, 13th, 23d, 28th, 29th; day of greatest rainfall, 23d.

### NOTES AND EXTRACTS.

#### SUN SPOTS AND METEOROLOGICAL PHENOMENA.

[Prepared under direction of officer in charge of Review Division by Jr. Prof. H. A. HARRIS.]

In answer to many inquiries regarding a probable connection between sun spots and meteorological phenomena, there is given in this REVIEW, on the back of chart i, a series of curves showing monthly values for fifteen years of the following elements, viz.: (curve A) sunspots, (B) diurnal range of magnetic declination, (C) monthly range of air pressure, (D) mean monthly temperature, (E) clouds, (F) precipitation. Tables I and II give the data from which these curves have been drawn, and these will enable any one to study the original data as he may wish. The following description of the sources of information and the manner of discussion is given:

The period covered by the fifteen years is that from January, 1872, to December, 1886, comprising nearly all of the observations of the Signal Service. Wolf's sun spot numbers have been taken from January, 1872, to July, 1878; from August, 1878, to May, 1877, the Greenwich observations of sun spots have been used, and from June, 1877, to December, 1886, the observations of Prof. D. P. Todd, as published month by month in past MONTHLY WEATHER REVIEWS, have been utilized. The first two have been reduced to correspond, as nearly as possible, with the values in the longest series.

The mean monthly diurnal range of magnetic declination is the mean of the values at Milan and Prague, as these were nearly identical. In 1884 and 1885 the values at Prague, only, were at hand. The remaining elements are taken from the Signal Service observations at Saint Paul, Davenport, Saint Louis, Cairo, Memphis, Vicksburg, and New Orleans. A mean of these seven stations would serve to eliminate local peculiarities, and give a much more satisfactory result than a single station could. These are given in Table I. The fifteen-year normal for each month is obtained in the usual way.

The general mean is then obtained by finding the mean of these twelve normals. The algebraic difference between the general mean and the normal for any one month may be regarded as a correction to be applied to each of the fifteen monthly values. By the application of the correction to each month the seasonal variation is approximately eliminated. The correction for the seasonal variation of the meteorological elements is placed at the foot of each month in Table I. It was found that the corrected monthly values when projected gave curves which were difficult to compare, because of great irregularities from month to month. In order, then, to smooth out many of these sudden turns, a mean of each five consecutive months has been taken, and these are shown in Table II, from which the curves are drawn.