METEOROLOGICAL RECORD AT ORONO, ME.

By Prof. JAMES S. STEVENS, dated November 23, 1903.

From January 1, 1869, to January 1, 1893, a series of meteorological records was kept at Orono, Me., by Dr. M. C. Fernald, ex-president and sometime professor of physics at the University of Maine. The observations included three records daily of temperature, relative humidity, maximum and minimum temperature, air pressure, cloudiness, and wind direction and force. These were taken at 7 a. m. and 2 and 9 p. m. local time.

The latitude of the place of observation is 44° 54′ 2″ north; longitude 68° 40′ 11″ west, and height above sea level 115 feet.

These results have not been published heretofore and it was thought that their presentation here might be of general interest, and that some of the results might prove of more than passing value.

Considering first the observations relating to temperature, we note the following:

	°
Mean of warmest day, August 7, 1876	85.3
Mean of coldest day, January 8, 187 .8	—17.2
Absolute highest temperature, August 31, 1876	96.7
Absolute lowest temperature, December 31, 1890	—36.3
Mean of maximum temperatures	51.26
Mean of minimum temperatures	33.68
Mean of the mean maximum and minimum temperatures	42.47
Mean of three daily readings for the same period	42.48

The agreement between the last two numbers in the above list is remarkable. So far as these observations go, the average of the maxima and minima is essentially the same as the average of three daily readings when carried through a sufficiently prolonged period. Taking the records for each separate month of the twenty-four years it is found that about once a year the mean from the maximum and minimum differ from that of three daily readings by as much as one degree.

A striking result is obtained if we take the mean of the mean daily temperature for each month of the period under consideration, and then in turn take the mean of the months which differ by six. This is shown, as follows:

Mean temperature for twenty-four years.

Month.	Mean.	Month.	Mean.	Mean of both.
	°		°	°
January	16.09	July	67.40	41.75
February	19.21	August	65.54	42.38
March	27.31	September	57.51	42.41
April	40.19	October	45.81	43.00
May	52.51	November	34.12	43.32
June	62.41	December	25.57	41.99
Average	36.29	Average	48.66	42.48

Comparing these results with the mean temperature for the whole period (42.48°), we observe that in no case does the mean of the pairs of months considered differ by as much as one degree therefrom. It is hoped that other observers who have recorded the data for long periods will apply this test.

The mean temperature for each month shows that the maximum occurred in July, 67.40°, and the minimum in January, 16.09°. This latter is contrary to the prevailing opinion regarding Maine temperature, as February is generally regarded as the coldest month. When the monthly means are plotted the curve has the general characteristics of curves of this class plotted by other observers. See, for example, Loomis's Treatise on Meteorology, p. 31, where is plotted a like curve for New Haven, covering a period of eighty-six years. The similarity of the two curves is striking.

During the period in question the total annual rainfall averaged 36.00 inches and the snowfall 94.43 inches, making the average annual precipitation 45.44 inches, or 3.79 inches per month.[1]

[1] It can not be too strongly urged that observers measure both depth of snowfall and equivalent melted snow water; the use of the ratio 10 is only allowable in extreme necessity.—ED.

The mean percentage of cloudiness for the twenty-four years was 52. The direction and force of the wind, recorded in accordance with the instructions of the United States Weather Bureau, resulted as follows: Northwest and west, 40 per cent; southwest and south, 28 per cent; northeast and north, 20 per cent; southeast and south, 12 per cent.

The maximum barometric pressure reduced to 32° F. was 30.833 inches; the minimum, 28.423 inches; and the mean, 29.842 inches. The correction for gravity is inappreciable.

The mean pressure of vapor for fifteen years (1869–1884) was 0.257 inches of mercury.

The relative humidity ranged from a maximum of 100 per cent to a minimum of 10 per cent, with a mean for the 24-year period of 77 per cent.

The number of thunderstorms observed[2] during the period was as follows:

Year.	No.	Year.	No.
1870	7	1882	12
1871	5	1883	12
1872	10	1884	10
1873	4	1885	13
1874	4	1886	13
1875	6	1887	11
1876	4	1888	12
1877	7	1889	11
1878	9	1890	10
1879	12	1891	13
1880	9	1892	8
1881	13		

When these numbers are plotted there seem to exist periods of maxima and minima of thunderstorms.

MOUNTAIN AND VALLEY BREEZES.

By Mr. W. S. TOWER, Assistant in Meteorology in Harvard University, dated Cambridge, November 17, 1903.

It is a well-known fact that mountains and valleys have certain phenomena that are peculiarly their own. Probably the best known of these are mountain and valley breezes.

Because of active radiation at night the layers of air near the earth become cooled, hence heavy, and tend to move down hill. This tendency soon results in a general down-valley movement of the lower strata, producing a perceptible breeze. This is the so-called mountain breeze. During the day, the presence of warmer, therefore lighter air near the earth, causes a general movement up the valley slope, and also gives a sensible breeze. This is the valley breeze.

While in the Needle Mountains of southwestern Colorado during the past summer, with the Harvard University class in Rocky Mountain geology, I had an opportunity to see these phenomena under favorable conditions. In all the valleys of these mountains, and particularly in the side valleys of the Rio de las Animas canyon, this system of winds was very marked. Each valley had its own separate wind. That is, during the day, in a west draining valley there was a west wind, but in a nearby east draining valley an east wind, so that in passing from one such valley to the other a reversal of wind direction was experienced.

The duration of each wind seemed to depend almost entirely on the time that the sun entered the valley in the morning and left it at night; or in other words, it was dependent on the time when nocturnal cooling ceased and diurnal warming began and vice versa. But though the hours of duration for either wind varied because of local topography, and from day to day, according to general atmospheric conditions, the average hours remained fairly constant. Thus, in this particular region the valley wind ordinarily prevailed from 8 or 9 a. m. until 6 or 7 p. m., and the mountain wind from 8 or 9 p. m. until 6 or 7 a. m., leaving between the two winds a transitional period of relative calm.

In the case of two valleys heading together, there is, as we

[2] Actually experienced at this station.