The occurrence of solar eclipses has afforded opportunity for observations showing a close connection between the frequency of sun spots and the characteristic processes in the solar corona. At the time of sun-spot minimum the coronal streamers are especially frequent in the neighborhood of the solar equator, where they appear radial to the solar disk and with very considerable extension outward; as we approach the sun's pole their dimensions diminish and they curve toward the equator. During a sun-spot maximum these streamers are distributed more equally over the sun's disk and are everywhere smaller. Simultaneously the spectral lines of the gaseous components of the aurora are much brighter during sun-spot maxima and observable to a much greater distance from the sun's limb than during sun-spot minima. According to Nordmann, this gaseous layer in the sun's atmosphere receives its ability to send us light by its absorption of Hertzian waves. Furthermore, with reference to meteorologico-magnetic relations, Nordmann has made a brief summary that enables him to draw conclusions as to the velocity with which disturbances in the sun are transmitted to terrestrial conditions. For instance, in five well-known cases simultaneous observations as to the sudden occurrence of solar eruptions and magnetic disturbances show that the passage from the sun to the earth must take place with the velocity of light. Again, in another place Nordmann collects data from which it follows that the occurrence of a magnetic disturbance is simultaneous with the passage of a sun spot through the central meridian in only the rarest possible number of cases. These two latter results would certainly seem likely to entirely overthrow the hypotheses that refer the origin of auroras to the direct cathodic radiation from the sun. But, on the contrary, arguing from the experiments by Lenard, J. J. Thomson, Ebert, and Wiedemann, Nordmann is rather inclined to the idea that Hertzian waves proceeding from the sun do cause the auroras in our atmosphere.

It is well known that as early as 1896 Scheiner and Wilsig endeavored to solve the question whether energy comes to us from the sun in the form of electro-dynamic radiation; the measurements carried out in Potsdam led to no positive results. On the other hand, the occurrence of the great sun spot of October 31, 1903, which was accompanied by a great aurora and a remarkable magnetic disturbance, brought about no Hertzian waves in the lower strata of the atmosphere, as we know from the fact that the atmospheric or wireless telegraphy was not interfered with to any appreciable extent. In consideration of the fact that J. J. Thomson has suggested that the Hertzian waves would be absorbed to a large degree by the thin gases of our upper atmosphere, Nordmann decided to repeat the observations at much higher altitudes. Unfavorable weather prevented his work on the summit of Mont Blanc. It was, therefore, carried out in September, 1901, at the Bossons at an altitude of 3100 meters in accordance with the following method:

The receiver for the Hertzian waves consisted of a wire 5 millimeters in diameter and 175 meters long, isolated and so located on the earth that at midday the solar rays struck it normally to its length. The indicator for the possible Hertzian wave was a form of coherer that was placed inside of a vessel filled with quicksilver. The coherer was connected on the one hand with the above-mentioned wire receiver, and on the other hand with a well insulated wire inside the mercury; the wire led to a galvanometer and a LeClanche element, and then returned to contact with the mercury. If a Hertzian wave were present, a current would follow, but the experiments led to no decision.

According to Nordmann this was explained by the fact that at this time the sun had unusually few spots, and furthermore by the fact that at midday the altitude of the sun was too low. The author intends to repeat these observations in the course of the present year under more favorable conditions. The best chance for success would be to execute such observations during a high balloon voyage at the time of a great magnetic disturbance. It must surprise one that Nordmann did not delay the publication of his theory of the auroral light until he could obtain some more reliable basis for his ideas. The hypothetical character of his views is easily seen by the following simple statement of his train of thought.

Hertzian waves come from the sun; their intensity increases with the increased solar activity; in proportion to their intensity, they penetrate into our atmosphere to within 50 kilometers of the sea level and thus are absorbed, partly with the evolution of light; thereby the respective strata of air become electrically conductive, and if great potential differences exist electric currents are developed whose intensity varies with the physical conditions; the air that is made luminous gives occasion to the emanation of cathode rays which spread through space, thereby deciding the arrangement of the magnetic lines of force and the distribution of the electrostatic field. Rapid changes in the movement of the visible processes, namely the aurora, due to the absorption of the cathode rays in the air, are explained by the sudden changes, positive or negative, in the sign of the electrostatic field.

A more careful consideration of recent magnetic literature should have shown the author many objections, not only against the validity of his theory but also against his explanations of other magnetic questions.

CORRIGENDA.

MONTHLY WEATHER REVIEW for November, 1903, p. 526, column 2, line 4 above the second table, for "J. E. Keller" read "J. E. Keeler."

THE WEATHER OF THE MONTH.

By Mr. W. B. STOCKMAN, District Forecaster, in charge of Division of Meteorological Records.

PRESSURE.

The distribution of mean atmospheric pressure is graphically shown on Chart VIII and the average values and departures from normal are shown in Tables I and VI.

The mean barometer was generally high over the central and eastern districts and low over the southwestern. The crest of high mean pressure overlay Lake Superior, northern Minnesota, eastern North Dakota, and the contiguous Canadian territory. The area of low mean pressure overlay the middle and southern Plateau and slope regions, with the lowest mean readings reported from the upper Rio Grande Valley.

The mean pressure was below the normal in the Florida Peninsula and from central South Carolina northward over the lower Lake region and central New England, also in the north Pacific region; elsewhere it was above normal.

The negative departures were slight, not exceeding —.05 inch at any of the stations in the United States, while over the central half of the country from eastern Texas, northwestward and northeastward, the positive departures were quite marked and ranged from +.05 to +.16 inch, the maximum departure occurring in southeastern South Dakota.

Generally east of the eighty-seventh meridian, also in southern Arizona and extreme southern California, the mean pressure diminished from that of March, 1904; elsewhere it increased over March, 1904.

Over the eastern lower Lakes and the Atlantic States north of Georgia the minus changes were quite decided, ranging from —.05 inch in the southern and western portions of this area to —.15 inch over southern New England.

As a rule, the plus changes were greater than the minus. An area of changes amounting from +.10 to +.15 inch overlay the central slope districts, and a less extensive area, but with more decided changes, over the extreme northwestern districts, in which area the changes ranged from +.10 inch on the south and east to +.25 inch on the northwestern coast of Washington.

TEMPERATURE OF THE AIR.

The distribution of maximum, minimum, and average surface temperatures is graphically shown by the lines on Chart V.

Generally over the eastern two-thirds of the country and in interior California, Nevada, and western Arizona the temperature was below the normal.

Over almost the entire area where there was a deficiency in temperature the changes were marked, and ranged from —2.0° to —8.5°, the area of greatest deficiency overlaying the Ohio Valley, Tennessee, and the central Mississippi Valley, with the greatest changes in Missouri, where they ranged from —6.1° to —8.5°.

The plus departures were slight, and nowhere in the United States did they equal 4.0°. The previous highest mean temperature for the month of April since the establishment of the station was exceeded by 1° at Seattle and Tacoma, Wash., and by 4° at Lewiston, Idaho, and the lowest by 1° at Binghamton, N. Y., Fort Smith, Ark., Green Bay, Wis., Harrisburg, Pa., Lexington, Ky., Little Rock, Ark., Springfield, Ill., Sandusky, Ohio, Sioux City, Iowa, and Wichita, Kans.; by 2° at Columbus, Ohio, Concordia, Kans., and Evansville, Ind.; by 3° at

Kansas City and Springfield, Mo., and by 4° at Hannibal, Mo.

Maximum temperatures of 90°, or higher, were reported from southeastern Georgia, central Florida, Arizona, and southern California, and of 100°, or higher, from western Arizona and southeastern California.

The record of highest temperature during the month of April, since the establishment of the station, was exceeded by 1° at Jupiter, Fla.; by 2° at Eureka, Cal., and Tacoma., Wash.; 3° at Roseburg, Oreg., and 4° at Fort Worth, Tex.; and the lowest recorded temperature for any April by 1° at Elkins, W. Va.

Freezing temperatures occurred generally as far south as the thirty-fifth parallel and somewhat farther south over the Plateau region. Zero temperatures were reported from portions of southwestern Wyoming, northwestern Wisconsin, and extreme northern Maine.

The average temperatures for the several geographic districts and the departures from the normal values are shown in the following table:

Average temperatures and departures from normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	8	41.5	− 1.5	−14.5	− 3.6
Middle Atlantic	12	48.3	− 2.3	−15.7	− 3.9
South Atlantic	10	58.8	− 3.1	− 9.6	− 2.4
Florida Peninsula*	8	70.4	− 0.2	+ 2.5	+ 0.6
East Gulf	9	62.2	− 3.5	− 3.4	− 0.8
West Gulf	7	64.6	− 2.5	+ 5.6	+ 1.4
Ohio Valley and Tennessee	11	50.0	− 6.1	−12.6	− 3.2
Lower Lake	8	40.7	− 4.0	−18.4	− 4.6
Upper Lake	10	37.1	− 3.4	−18.5	− 4.6
North Dakota*	8	38.9	− 2.9	−15.5	− 3.9
Upper Mississippi Valley	11	45.9	− 5.2	−14.8	− 3.7
Missouri Valley	11	46.0	− 5.0	− 4.2	− 1.0
Northern Slope	7	45.2	+ 0.6	+ 5.4	+ 1.4
Middle Slope	6	51.9	− 2.3	+ 8.8	+ 2.2
Southern Slope*	6	60.4	− 0.7	+12.3	+ 3.1
Southern Plateau*	13	56.4	+ 0.5	+ 8.5	+ 2.1
Middle Plateau*	8	48.8	+ 1.1	+ 5.6	+ 1.4
Northern Plateau*	12	49.6	+ 3.0	+11.1	+ 2.8
North Pacific	7	51.3	+ 2.7	+ 1.3	+ 0.3
Middle Pacific	5	56.0	+ 1.5	− 0.1	0.0
South Pacific	4	59.4	+ 0.7	+ 2.8	+ 0.7

* Regular Weather Bureau and selected voluntary stations.

In Canada.—Prof. R. F. Stupart says:

The mean temperature of April was higher than the average in British Columbia and Alberta and probably also in all the more northern Canadian Territory, while it was below average in Assiniboia, Saskatchewan, Manitoba, and from the Great Lakes eastward to the Maritime Provinces. Nearly the whole of British Columbia showed a positive departure of at least 3°, and the trend of the isotherms would indicate a still larger departure to the northward. At Dawson, Yukon, the mean temperature was 34°, being 4° above average. The largest negative departure, 6°, occurred in southwestern Ontario, near Lake Erie, whence northward and eastward the difference from average became less, and in the Ottawa Valley and thence to the Maritime Provinces it did not exceed 1° or 2°.

PRECIPITATION.

The distribution of total monthly precipitation is shown on Chart III.

The precipitation was above the average in New England, northern portion of the Middle Atlantic States, lower Lake region, eastern upper Lake region generally, west-central Minnesota, southern Iowa, southeastern Nebraska, northeastern Kansas, northern Missouri, the central portions of Illinois and Indiana, eastern Texas, extreme northern and the coast of central California, southwestern Idaho, eastern and central Washington, Oregon generally, and southern Florida; elsewhere there was a deficiency in precipitation.

Precipitation 2 inches, or more, in excess of the normal occurred in New England, west-central Minnesota, southern Iowa, southeastern Nebraska, northeastern Kansas, northern Missouri, and southeastern Texas, the greatest excess being reported from the last-named district, where it amounted to somewhat more than 8 inches.

Deficiencies of 2 inches, or more, were reported generally from the South Atlantic and east Gulf States, and the coast of Washington, the greatest deficiency, —3.8 inches, being reported from the last-named section.

The greatest amount of precipitation occurred in southeastern Texas, lower Missouri and central Mississippi valleys, and southeastern New England.

Measurable amounts of snowfall occurred generally as far south as the thirty-sixth parallel, except in western California.

Except at very high mountain points no snow remained on the ground at the end of the month.

Average precipitation and departure from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	8	6.01	187	+2.8	+0.1
Middle Atlantic	12	2.34	70	−1.0	−4.3
South Atlantic	10	1.08	32	−2.3	−5.2
Florida Peninsula*	8	1.82	78	−0.5	+0.7
East Gulf	9	2.05	42	−2.8	−9.1
West Gulf	7	4.85	126	+1.0	−4.4
Ohio Valley and Tennessee	11	2.81	70	−1.2	−2.9
Lower Lake	8	2.62	113	+0.3	+3.1
Upper Lake	10	2.06	87	−0.3	−0.3
North Dakota*	8	1.55	79	−0.4	+0.3
Upper Mississippi Valley	11	3.27	110	+0.3	+0.2
Missouri Valley	11	3.50	121	+0.6	−0.1
Northern Slope	7	0.77	46	−0.9	−0.9
Middle Slope	6	1.86	86	−0.3	−1.4
Southern Slope*	6	1.08	47	−1.2	−2.9
Southern Plateau*	13	0.18	31	−0.4	−2.1
Middle Plateau*	8	0.82	80	−0.2	+1.3
Northern Plateau*	12	1.34	108	+0.1	+1.7
North Pacific	7	2.73	66	−1.4	+3.2
Middle Pacific	5	2.47	100	0.0	+6.1
South Pacific	4	1.32	100	0.0	−0.2

* Regular Weather Bureau and selected voluntary stations.

In Canada.—Professor Stupart says:

The precipitation of the month was less than the average over the western half of the Dominion and very generally above average from Lake Huron to the Maritime Provinces, excepting in parts of eastern Quebec. In Saskatchewan it was almost nil, and in Alberta and western Assiniboia amounted to but a few tenths of an inch. In eastern Assiniboia and Manitoba it was somewhat greater, but in few localities did it reach the average. In Ontario and western Quebec, where the average was exceeded, it was mostly rain, but in all districts there were a few light snowfalls, and very much the same conditions obtained in the Maritime Provinces.

HAIL.

The following are the dates on which hail fell in the respective States:

Alabama, 1, 8, 16, 25, 26. Arkansas, 1, 7, 12, 13, 14, 15, 16, 22, 24, 25. California, 14, 15, 19, 20, 21, 22, 26, 27, 28, 30. Colorado, 29, 30. Connecticut, 2, 19. Delaware, 11. District of Columbia, 9. Florida, 6, 7, 9. Georgia, 1, 6, 8, 17, 26. Idaho, 16, 18, 19, 22, 27, 28, 29. Illinois, 1, 8, 11, 20, 23, 24, 25. Indiana, 1, 2, 8, 9, 10, 11, 12, 14, 20, 24, 25. Indian Territory, 12, 21, 30. Iowa, 11, 13, 15, 19, 20, 21, 22, 23. Kansas, 4, 19, 20, 21, 23, 24, 25, 30. Kentucky, 9, 10, 12, 25, 26. Louisiana, 1, 2, 7, 8, 9, 24, 25. Maine, 20. Maryland, 8. Massachusetts, 11, 19, 30. Michigan, 8, 9, 10, 11, 24. Minnesota, 7, 10, 11. Mississippi, 1, 7, 8, 9, 14, 16, 17, 20. Missouri, 8, 14, 16, 19, 20, 21, 22, 23, 24. Nebraska, 1, 19, 20, 21, 22, 23, 24, 25. Nevada, 3, 16, 17, 18, 19, 20, 21, 26, 29, 30. New Hamphire, 1, 11, 12. New Jersey, 2, 30. New York, 2, 3, 9, 10, 12, 16, 19, 30. North Carolina, 8, 12, 16, 20, 21, 26, 28. North Dakota, 10, 19, 20, 22, 29. Ohio, 1, 8, 9, 10, 11, 12, 24, 25, 26, 30. Oklahoma, 5, 6, 7, 21, 22, 23, 24. Oregon, 19, 21, 22, 27. Pennsylvania, 1, 9. Rhode Island, 1. South Carolina, 13, 16, 26. South Dakota, 18, 19, 21. Tennessee, 1, 14, 15, 16, 20, 21, 25, 26, 28. Texas, 1, 5, 7, 8, 14, 15, 16, 21, 22, 24, 25, 26, 29, 30. Utah, 1, 2, 6, 15, 19, 20, 23, 28. Virginia, 10, 16, 26,

27. Washington, 6, 14, 19, 21, 22, 29. West Virginia, 3, 8, 9, 10, 12, 23, 26. Wisconsin, 8, 23. Wyoming, 19, 23, 28.

SLEET.

The following are the dates on which sleet fell in the respective States:

Alabama, 17. Arkansas, 9, 15, 16, 20. California, 19, 20, 21, 22, 26, 27. Colorado, 21. Connecticut, 19. Georgia, 17, 20. Idaho, 16, 27. Illinois, 1, 9, 12, 15, 20. Indiana, 9, 10, 11, 12, 20. Iowa, 7, 8, 9, 11, 12, 15, 19, 20, 21. Kansas, 8. Maine, 1, 12. Massachusetts, 1, 11, 14, 16, 19. Michigan, 1, 2, 8, 9, 10, 11, 15, 22. Minnesota, 1, 7, 8, 11, 12, 14, 22. Montana, 19, 24. Nebraska, 1, 3, 4, 8, 9, 11, 19, 20, 21, 22, 23, 24. Nevada, 3, 19, 20, 22, 23, 26. New York, 1, 2, 3, 10, 11, 12, 13, 14, 15, 16, 19, 20. North Carolina, 10, 17, 20, 28. North Dakota, 7, 8, 14, 19, 20, 21, 22. Ohio, 9, 10, 12. Oregon, 22, 30. Pennsylvania, 10, 11, 12. South Carolina, 20, 21, 26. South Dakota, 4, 7, 8, 11, 19, 20, 21. Tennessee. 9, 10, 13, 14, 16, 17, 20. Utah, 6, 20, 21, 22, 23. Vermont, 1, 2, 11. Virginia, 10, 16. Washington, 5, 6. West Virginia, 12. Wisconsin, 9, 11, 15.

CLEAR SKY AND CLOUDINESS.

The distribution of clear sky is graphically shown on Chart IV, and the numerical values of average daylight cloudiness, both for individual stations and by geographic districts, appear in Table I.

The cloudiness was above the average in the Atlantic and east Gulf States, Florida Peninsula, Ohio Valley and Tennessee, lower Lakes, North Dakota, and the middle slope and middle Pacific regions; elsewhere it was below the average.

The average cloudiness for the various districts, with departures from the normal, are shown in the following table:

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	6.1	+ 0.8	Missouri Valley	4.7	— 0.7
Middle Atlantic	5.9	+ 0.7	Northern Slope	4.6	— 0.8
South Atlantic	4.8	+ 0.4	Middle Slope	4.9	+ 0.5
Florida Peninsula	4.2	+ 0.3	Southern Slope	3.6	— 0.6
East Gulf	5.0	+ 0.5	Southern Plateau	2.2	— 0.1
West Gulf	5.1	— 0.1	Middle Plateau	4.2	— 0.3
Ohio Valley and Tennessee	5.9	+ 0.6	Northern Plateau	5.0	— 1.3
Lower Lake	6.5	+ 1.0	North Pacific	6.3	— 0.2
Upper Lake	5.3	— 0.4	Middle Pacific	5.1	+ 0.5
North Dakota	5.7	+ 0.2	South Pacific	3.6	— 0.3
Upper Mississippi Valley	4.5	— 1.0			

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IV, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—Reports of 2498 thunderstorms were received during the current month as against 2677 in 1903 and 3289 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country was most numerous were: 24th, 249; 23d, 218; 25th, 188.

Reports were most numerous from: Missouri, 231; Texas, 201; Kansas, 145.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the dates of full moon, viz: March 27 to April 4, inclusive, and April 25 to May 3, inclusive.

In Canada: Thunderstorms were reported from Charlottetown, 30; Father Point, 12; Quebec, 9; Ottawa, 9, 30; Kingston, 9; Toronto, 9; Port Stanley, 1, 24; Saugeen, 24; Parry Sound, 9, 24; Medicine Hat, 29; Edmonton, 29; Hamilton, Bermuda, 4, 5, 19.

Auroras were reported from Quebec, 10; White River, 3, 19; Parry Sound, 3; Port Arthur, 17, 19; Winnipeg, 18, 19; Minnedosa, 13, 18; Swift Current, 7, 17, 18; Banff, 10; Edmonton, 1, 11, 13, 18, 19, 26; Prince Albert, 1, 2; Battleford, 2.

HUMIDITY.

The relative humidity was normal in the upper Mississippi Valley; above normal in New England, Ohio Valley and Tennessee, lower Lakes, North Dakota, and the northern slope, middle and northern Plateau, and north Pacific regions. In the remaining geographic districts its was below normal.

The averages by districts appear in the subjoined table:

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	77	+ 4	Missouri Valley	63	— 2
Middle Atlantic	66	— 1	Northern Slope	62	+ 4
South Atlantic	67	— 5	Middle Slope	56	— 1
Florida Peninsula	72	— 2	Southern Slope	53	— 2
East Gulf	69	— 1	Southern Plateau	27	— 3
West Gulf	69	— 3	Middle Plateau	47	+ 2
Ohio Valley and Tennessee	69	+ 4	Northern Plateau	64	+ 7
Lower Lake	77	+ 7	North Pacific	78	+ 7
Upper Lake	71	— 2	Middle Pacific	71	— 1
North Dakota	73	+ 5	South Pacific	66	— 2
Upper Mississippi Valley	68	0			

WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Amarillo, Tex	24	57	nw.	New York, N. Y	16	73	nw.
Cairo, Ill	8	50	w.	Do	20	53	nw.
Cheyenne, Wyo	22	58	w.	North Head, Wash	2	50	s.
Chicago, Ill	24	53	sw.	Do	5	52	s.
Dodge, Kans	6	57	se.	Do	21	60	s.
Do	21	50	sw.	Do	23	60	se.
Duluth, Minn	1	58	nw.	Do	24	58	se.
Do	2	60	nw.	North Platte, Nebr	8	52	nw.
Do	8	54	ne.	Point Reyes Light, Cal	3	53	nw.
Do	11	50	ne.	Do	5	65	nw.
Eastport, Me	20	54	e.	Do	6	60	nw.
Fort Smith, Ark	8	52	w.	Do	18	60	se.
Green Bay, Wis	15	67	ne.	Do	19	52	w.
Hatteras, N. C	19	50	ne.	Do	21	50	nw.
Huron, S. Dak	8	51	nw.	Do	29	55	nw.
Jupiter, Fla	9	60	s.	Do	30	55	nw.
Knoxville, Tenn	25	50	w.	Pueblo, Colo	6	52	w.
Lincoln, Nebr	8	64	nw.	St. Louis, Mo	8	60	sw.
Do	9	50	nw.	Sand Key, Fla	30	50	sw.
Modena, Utah	19	53	sw.	Sioux City, Iowa	8	54	n.
Do	26	60	sw.	Do	11	56	nw.
Mount Tamalpais, Cal	6	53	nw.	Do	22	56	s.
Do	12	58	sw.	Springfield, Mo	8	54	w.
Do	21	54	nw.	Tatoosh Island, Wash	11	56	e.
Do	22	55	nw.	Do	22	51	s.
Do	23	55	nw.	Do	24	50	s.
New York, N. Y	12	50	w.	Williston, N. Dak	11	52	nw.

DESCRIPTION OF TABLES AND CHARTS.

By Mr. W. B. STOCKMAN, District Forecaster, in charge of Division of Meteorological Records.

For description of tables and charts see page 136 of REVIEW for March, 1904.