

the arch and also beneath it. These whorls were constant as to duration, but not as to position, as they constantly changed the latter, but were at no time entirely absent. There was very little variety of color, the only deviation from white being some faint traces of greenish yellow which occasionally appeared in the whorls. Ft. Sisseton, 7 to 11 p. m., very bright. The display of the 17th is interesting from its unusual extent and brilliancy. It was observed from Eastport, Me., to Fort Benton, Dak., except in sections where cloudy weather prevailed. The most southerly station reporting was Somerville, N. J., where it was faint. The following are the other stations reporting it: in *Maine*, Orono, Bangor and Gardiner; *New Hampshire*, Grafton; *Massachusetts*, Newburyport, Boston, Springfield, Williamstown and Fall River; *Connecticut*, New Haven and New London; *New York*, Madison Barracks, North Volney, Palermo, Oswego and Lima; *Pennsylvania*, Catawissa; *Ohio*, Toledo; *Michigan*, Detroit, Lansing and Alpena; *Wisconsin*, Manitowoc; *Dakota*: Pembina. It is described as follows: Bangor, Me., from 11:05 till 3 a. m., greatest brilliancy at 12.30 a. m.; extent, from 120° to 140° azimuth; greatest altitude, 37°; peculiarity, slender luminous beams, "merry dancers" and dark segment, color brilliant yellow. Eastport, from 9 p. m. to 3 a. m. of the 18th, extending from NW. to NE.; altitude, 40°; peculiarities, an arch with six luminous beams shooting upwards; color, straw. Springfield, Mass., 9.30 to 10.30 p. m.; very brilliant, dark arch, altitude 18°, with "merry dancers" shooting up to altitude of 30°. New Haven, Conn. Appeared at 8 p. m. It consisted of an arch of white light, measuring 12° of altitude and 40° of azimuth, with a dark-colored segment below the arch, the segment below the arch, the segment being so dark as at first to be mistaken for a cloud. Between 8 and 9 p. m. streamers of quivering white light shot upwards nearly to the zenith. The display lasted until daylight of the 18th, and would doubtless have been very brilliant but for the moon, which shone brightly during most of the time. Oswego, N. Y., from 11 p. m. till after midnight; azimuth, 50°; altitude, 5°; a luminous arch resting on dark segment; changes slight. Grafton, N. H., "first appeared at 7:20 p. m., continuing until 4 a. m. 18th. Streamers appeared at 9:30 p. m., reaching their greatest brilliancy at 10 p. m., having an altitude of 70° and a quick motion from east to west, bearing north. From 10 p. m. to 1:30 a. m. of diffuse white color, intermixed with patches of dark segments, reaching at latter hour an altitude of 40°, which was mainly the altitude of the aurora during the rest of the night. At 1:35 a. m. the aurora had a dancing motion, up and down, with the rapidity of lightning. From this time until the end, the aurora was mainly of a diffuse white, with patches of dark segment mixed in. The aurora was observed all around the horizon. The patches of dark segment had a slow lateral motion from W. to E. No dark clouds below the arch observed." Pembina, Dak., the aurora appeared at 7 p. m. It would probably have been brilliant, but for the influence of the moonlight, but as it was, the display was rather pale. It extended from about 175° to 260° azimuth, and at times almost reached the zenith. There were three arches of light of very unequal brilliancy, the upper one being generally brilliant. Occasionally, rays of light started from the lower arch and reached across the upper one, and remained for a time with a tremulous motion. Those rays generally preceded the breaking up of the upper arch into hazy nebulous masses, which soon afterwards disappeared, while a new arch was developed beneath the others. After 10 p. m. there was only one arch visible, and at 11:30 p. m. it had nearly disappeared. North Volney, N. Y., streamers soon changing to striated mass.

Telegraphic Communication interrupted by Atmospheric Electricity.—Socorro, N. M., 2nd and 26th; Dodge City, Kan., 4th, severe electric storm, telegraphic instruments could be worked without battery at times, the air was filled with floating sand; Decatur, Tex., 26th; Castroville, Tex., 11th and 21st; Masou, Tex., 2nd, 7th and 26th.

MISCELLANEOUS PHENOMENA.

Sunsets.—The characteristics of the sky at sunset as indicative of fair or foul weather for the succeeding twenty-four hours have been observed at all Signal Service Stations. Reports from 135 stations show 4,108 observations to have been made, of which 23 were reported doubtful; of the remainder, 3,347 or 81.9 per cent. were followed by the expected weather.

Zodiacal Light.—Southington, Conn., 5th, 8th, 10th, 30th. *Indiana*, New Corydon, 1st, 2nd, 5th, 28th, 29th, 30th; Wabash, 1st, 5th, 8th, 29th. *Iowa*, Cresco, 5th, 9th, 11th; Monticello, 1st, 3rd, 5th, 8th, 9th, 11th, 28th; Ft. Dodge, 1st, 5th, 28th, 29th. *Kansas*, Cedar Vale, 1st, 3rd, 4th, 7th, 10th, 27th, 30th; Yates Center, 1st, 7th, 28th, 30th, 31st. *Massachusetts*, Harvard College, Cambridge, 2nd, (4th at 8:30 p. m., Gamma Arietis and Zeta seemed to be on opposite borders of the light); 5th, 8th, 10th, distinct, perceptible on the 12th, other nights moonlight or cloudy; Rowe, 2nd, 6th; Somerset, 1st, 2nd, 4th, 5th, 6th, 8th, 10th, 30th, 31st. *Missouri*, Oregon, 1st to 4th, 7th to 10th, 28th to 31st. Clear Creek, Nebr., 1st, 8th, 28th. Freehold, N. J., 1st; Ateo, N. J., 1st, 2nd, 5th, 10th, 31st; Waterburg, N. Y., 2nd, 4th, (6th, bright), 8th, 11th, (30th, bright), 31st; Ithaca, N. Y., 31st; Bellefontaine, Ohio, 1st, 2nd, 30th, 31st; Dyberry, Pa., 10th; Coalville, Utah, 4th; Wytheville, Va., 2nd, 4th, 5th, 9th, 29th, 31st; Dubuque, 11th; New Haven, Conn., 2nd, 6th, 8th, 30th; Lynchburg, Va., 26th, 29th, 30th, 31st; Mr. Chas. Hasselbrink, observer at Havana, Cuba reports as follows, from March 27th; 27th visible from 7:15 to 7:50 p. m., "light rises almost vertically and vanishes in the region about Omega Taurus; at beginning of observations noted a luminous band which extended horizontally as far as Cassiopeia"; 31st visible from 7:15 p. m., not very bright or extensive. Pleiades 30° above the horizon formed the vertex of the triangle of the light. Intermittence in brightness less sensible than in former observations.

Meteors.—Corning, Mo., 3rd, large as full moon and passed through zenith southwards to the horizon; Oregon, Mo., 3rd, very brilliant; Ft. Dodge, Ia., 5th, 7:30 p. m., two small and very swift Perseides, moving from Algal to a point a few degrees below Capella, leaving behind two faint parallel tracks close together; 11th, a large and very slow meteor, dull yellow, size double of Jupiter when first seen but rapidly diminishing, moved along nearly parallel to the horizon and disappeared in four seconds.

Earthquakes.—Los Angeles, Cal., 6.25 a. m., most violent for many years, lasting about five seconds and felt within a radius of several miles; vibration from northeast to southwest, with a verticle impulse. San Gorgonia, Cal., 25th, 2.30 a. m., moderate, but sufficient to cause a perceptible vibration of the houses; duration about three seconds and direction from southeast to northwest.

Sun Spots.—The following record of observations, made by Mr. D. P. Todd, Assistant, has been forwarded by Prof. S. Newcomb, U. S. Navy, Superintendent Nautical Almanic Office, Washington, D. C.:

DATE— March, 1880.	No. of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		REMARKS.
	Groups	Spots.	Groups	Spots.	Groups	Spots.	Groups	Spots.	
1st, 8 p. m...	0	1	0	0	0	0	2	3	
2nd, 8 a. m...	0	2	0	0	0	0	2	5	Faculae.
4th, 8 a. m...	0	0	1	4	0	0	1	1	Several groups of faculae.
5th, 1 p. m...	1	1	1	1	0	0	1	1	Faculae.
6th, 1 p. m...	0	1	0	0	0	0	1	2	
10th, 2 p. m...	2	4	1	2	0	0	1	4	Faculae. Spots probably disappeared by solar rotation.
17th, 8 a. m...	2	3	0	0	0	0	2	2	
18th, 8 a. m...	0	0	0	0	0	0	0	0	
19th, 8 p. m...	0	0	1	1	0	0	1	1	
20th, 8 a. m...	0	0	0	0	0	0	1	1	
26th, 7 a. m...	1	2	0	0	0	0	1	2	
30th, 7 a. m...	1	6	0	0	0	0	2	8	Broad areas of faculae.
31st, 8 a. m...	0	0	0	0	0	0	2	8	} Faculae.
3 p. m	1	2	0	0	0	0	3	10	

21st, 8 a. m., 22nd, 9 a. m., 4 p. m., faculae but no spots; 23rd, 9 a. m., 24th, 8 a. m., 5 p. m. and 25th, 8 a. m., no spots or faculae.

Mr. William Dawson, at Spiceland, Ind., reports: 1st, one large spot in SW. quadrant, 3 smaller spots near W. limb; 2nd, group of small spots increased to 7; 9th, 5 spots in one group in NW. quadrant; 15th, 5 spots in one group near W. limb, one prominent spot near E. limb; 17th, 1 spot and faculae near W. limb, one large spot near east of centre; 23rd, no spots; 29th, one large spot near E. limb, group of 10 small spots in SW. quadrant; 30th, 1 large spot near E. limb, and a group of 3 small spots 4' W. of it, also a group of 10 small spots near W. edge; 31st, small spot just above the large one, 3 spots in group to W. of it and only 5 spots in the western group.

The Signal Service observer at New Haven, Conn., reports, 4th, 1:30 p. m., small spot very near NW. limb; 8th, 1 p. m., group of 4 small spots NE. of centre; 31st, 12:30 p. m., 1 large spot near centre, and group of 3 in NE. centre.

Mr. F. Hess, at Ft. Dodge, Ia., reports, 1st and 2nd, 9 a. m., 1 spot in SW. quadrant and group of 3 in NW.; 5th, noon, 2 groups of brilliant faculae near NE. limb; 6th, noon, 4 spots in SW.; 7th, noon, ditto with faculae and a new group of 2 spots in NW.; 8th, 8 a. m., 1 spot in SW. and 3 in NW.; 9th, noon, 3 small spots in NW.; 10th, 4 p. m., 1 large spot in NW.; 11th, 11 a. m., one large and one small spot in NW. 14th, 10 a. m., 2 new groups, one very large double spot, with 3 or 4 smaller ones and faculae in NW., and one large spot in faculae in SE.; 15th, 9 a. m., ditto, and also a new brilliant white spot near SE. limb; 16th and 17th, the 2 groups still visible: 19th and 20th, 9 a. m., one spot in SW.; 22nd to 28th, sun observed each day, but no spots or faculae seen; 29th, noon, 2 groups, 1 of 5 spots in SW., and one large spot and faculae near NE. limb; 31st, 1 large spot and faculae, and 2 small spots surrounded by brilliant faculae in NW. No observations on the 3rd, 4th, 12th, 18th and 30th.

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