

been: 29° at Pittsburg; 29°5 at Portland, Me., and Norfolk; 30° at New York, and 31° at Louisville and Keokuk. At Alpena, Buffalo, Chicago, Cleveland, Escanaba, La Crosse, Marquette, Omaha, St. Paul, Toledo and Yankton the observations have been interrupted by ice.

*Ranges of Temperature.*—The least have been 3° at Grand Haven and New London; 4° at Wood's Holl, Wilmington, Duluth; and 5° at Sandusky, Eastport and Charleston. The largest, 14° at Nashville, 12° at Augusta, Galveston, Memphis, San Francisco and Norfolk.

## ATMOSPHERIC ELECTRICITY.

*Thunder-storms* were of rare occurrence. They are reported as follows: 12th, Fla., La., Tex.; 13th, Del., N. C., Va.; 17th, Kan.; 18th, Tex.; 19th, Fla., La., Miss., Ala.; 20th, Ohio; 21st, N. C.; 22nd, Cal.; 25th, Col., La.; 26th, Ark., Kan., Ind. Ter.; 27th, Ill., N. C., Ohio, Va., Ga.; 28th, S. C.; 29th, La., Miss.; 30th, Ga., Ala. An interesting series of thunder-storms was reported by Prof. Nipher of the Missouri Weather Service, as occurring in Missouri, see the account of low barometer No. XI At Visalia on the 16th a severe sand and rain storm with intense electricity occurred, and the telegraph line to Modesta, 133 miles north, was worked without battery.

*Distant Lightning* was reported as follows: 9th, Ga.; 12th, Miss.; 13th, Ga., N. C.; 16th, Cal., Kan.; 17th, Kan.; 19th, Miss.; 20th, Fla.; 21st, Va.; 22d, Cal.; 26th, Kan.; 27th, Ga., N. C.

*Auroras.*—1st, Mass.; 3d, Ohio; 17th, Iowa, La.; 22d, N. Y.; 23d, Neb., Minn, Iowa, N. Y., Ohio, W. Va., N. J., Pa., Mass., Conn., Me., R. I., Vt., Md., Mich., N. H., Dak.; 24th, Iowa, Me., Mo., Wis.; 25th, Neb.; 30th, Iowa, N. C.

*Magnetic Phenomena.*—The average diurnal magnetic range in declinations is reported by Prof. Hinrichs, of Iowa City, as 4½ minutes.

## OPTICAL PHENOMENA.

*Solar Halos.*—1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 17th, 18th, 19th, 20th, 21st, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th, 29th, 30th and 31st.

*Lunar Halos.*—5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th, 20th, 21st, 22nd, 23rd, 24th, 25th, 26th, 27th and 30th.

*Mirage.*—Great Bend, Kan., 14th, 17th; New Bedford, Mass., 17th, 29th; Moorhead, Min., 2nd, 21st, 28th; Genoa, Neb., 14th, 15th; Galveston, 4th; Smithville, N. C., 7th; Savannah, 18th; Tybee Island, 5th, 6th, 11th, 12th; New London, 1st, 2nd, 3rd, 8th, 16th, 24th; 30th. At Key West, Fla., on the 12th, an optical phenomenon occurred, caused by the sun's rays falling obliquely upon a stratum of condensed vapor resting upon the surface of the ocean, the temperature of the water being about 15° below that of the air; the surface of the sea appeared raised to the upper surface of this stratum, the vessels in the harbor seeming to sink, their hulls gradually disappearing while their masts and rigging stood out in bold relief.

## MISCELLANEOUS PHENOMENA.

**BOTANICAL.**—Okahumpka, Fla., 5th, roses blooming; Monticello, Iowa, 1st, pansies blooming; Independence, Kan., wheat growing rapidly since the 15th; Great Bend, Kan., 31st, wheat looking fine; Kinsley, Kan., wheat growing throughout month; Owing Mills, Md., lilacs budding; Fayette, Miss., 8th, daises blooming; 20th, daffodils in bloom; 30th, peach and plum trees blooming; Kensico, N. Y., 28th, transplanting seedlings; Ringgold, Ohio, 31st, wheat very green; McMinnville, Tenn., violets blooming all winter; 18th, hyacinths in bloom; Clarksville, Tex.; 31st, wheat looks well, some cotton yet unpicked; Visalia, Cal., 31st, grain and grass growing luxuriantly, almond trees in bloom; Nashville, 29th, lilac buds swelling, sap rising in rose bushes; Louisiana, Mo., 28th, fruit buds of apples, peach and apricots were pronounced safe and very abundant. The volunteer observer at Brookhaven, Miss., reports the following botanical notes: 18th, hyacinths in bloom; 20th, strawberries in bloom; 25th, narcissus in bloom; 26th, pansies in bloom and spirea budding; 27th, jonquils in bloom, woodbine leafing and lilac budding; 28th, dogwood and peach buds swelling. Communication from Mr. A. Story, Salem, Mass., states that in that portion of the State nothing is more common than to find dandelions in bloom in mild winter weather, and the trailing arbutus was possibly in bloom in December, but that apple, rose, cherry and lilac were not in bloom out of doors in Fitchburg during December, as is stated in the WEATHER REVIEW for that month.

**BIRDS.**—*Blackbirds* were seen at Judsonia, Ark., 28th. *Bluebirds*, Southington, Conn., 12th, 20th to 28th; Baxter Springs, Kan., 17th, 18th. *Geese* flying N., Carbondale, Ill., 5th; Fort Madison, Iowa, 16th; Baxter Springs, Kan., 27th; Emerson, Neb., 31st; Urbana, Ohio, 17th, 18th; flying W., Carbondale, Ill., 30th; Fort Madison, Iowa, 22nd; flying NW., Visalia, Cal., 10th; flying S., Cresswell, Kan., 30th; Boise City, Idaho, 28th; Vineland, N. J., 19th; Bellefontaine, Ohio, 18th; seen at Omaha, Neb., 18th; Clear Creek, Neb., numerous throughout the month; Corning, Mo., every day throughout the month. *Crows*, Judsonia, Ark., 8th; Pike's Peak, on summit, 6th. *Bluejays*, Judsonia, Ark., 17th; Monticello, Iowa, 30th;

Palermo, N. Y., 22nd; Westerville, Ohio, 20th. *Ducks*, Judsonia, Ark., 25th; Cresswell, Kan., flying E., 14th; S., 28th; Boise City, Idaho, 28th, numerous. *Snowbirds*, Monticello, Iowa, 27th. *Bobolinks*, Westerville, Ohio, 20th. *Meadow Larks*, first heard, St. Meinrad, Ind., 23th; Monticello, Iowa, 22nd; Somerset, Mass., 13th. *Prairie Chickens*, Monticello, Iowa, 10th; flying S., in large flocks, 22nd and 26th. *Mocking Birds*, Baxter Springs, Kan., 17th. *Robins*, Somerset, Mass., 13th; New Bedford, Mass., 13th. *Sparrows*, Somerset, Mass., 13th; New Bedford, Mass., 13th. *Sea Gulls*, Cincinnati, 27th, first appearance this season.

**INSECTS**—*Bees*.—Fayette, Miss., 4th; Martinsville, Ill., 11th to 13th, 18th, 22d to 26th; Milford, Ind., 18th, 19th, 20th. *Frogs*—piping, Milton, Fla., 5th; Sedgewick, Kan., 27th. *Butterflies*—Fayette, Miss., 26th. *Caterpillars*—Palermo, N. Y., 20th; Cleveland, Ohio, 19th.

**Polar Bands**.—3d, Ind., Va.; 5th, Ind.; 6th, Ind.; 7th, Miss., S. C.; 8th, Neb., N. H., N. J., Va.; 10th, N. H.; 12th, Va.; 15th, N. J.; 17th, Ind., Iowa; 18th, Ind., Va.; 19th, Dak., Ind.; 21st, Neb.; 23d, Ind.; 24th, Iowa; 25th, Va.; 27th, Va.; 29th, Ind.

**Sunsets**.—The characteristics of the sky as indicative of fair or foul weather for the succeeding 24 hours have been observed at all Signal Service stations. Reports 101 stations show 3,128 observations to have been taken; of these 58 were reported doubtful; 2,508 cases or 80.1 per cent. were followed by the expected weather, and 620 were not.

**Prairie Fires**.—1st, 2nd, 3rd, 4th, 5th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 21st, 22nd, 23rd, 24th, 25th, 27th, 28th, 29th, 30th, 31st.

**Meteors**.—1st, Southington, Conn, Woodstock, Md., Rowe, Mass; 2nd, Woodstock, Md., Flushing, N. Y.; 3rd, Woodstock, Md., Wappingers Falls, N. Y.; 4th, Como, Ill.; 6th, Boise City, Idaho, Southington, Conn., Vevay, Ind., Kensico, N. Y.; 7th, Fall River, Mass.; 9th, New Orleans; 13th, Cresswell, Kan.; 14th, Boise City, Idaho; 17th, St. Louis and Oregon, Mo., Starkey, N. Y.; 23rd, Woodstock, Md., Oregon, Mo.; 24th, Sedgewick, Kan., Woodstock, Md., Rowe, Mass., Atco, N. J.; 27th, Davenport, St. Marys Home, Ind.; 28th, Hennepin, Ill., Woodstock, Md.; 31st, Yankton, Dak.; 24th, Corsicana, at 7h. 6 or 10 min., a large meteor appeared SE. 30° of zenith, moved west, and exploded at an elevation of about 30° like an ordinary rocket; color, greenish-blue, and very brilliant; vapor cloud floated west.

**Earthquakes**.—Yokohama, Japan, reported by J. W. Coles, U. S. Navy, U. S. Nav. Hosp. Yokohama, Japan, Nov. 22d, 3:50 p. m., severe shock of earthquake, lasting 5 sec.; 10:20 p. m., slight shock. 24th, 12:55 p. m., slight earthquake, 27th, 11:18 p. m., slight earthquake. 30th, 3:20 p. m., smart shock of earthquake, lasting 20 sec. Jan. 2nd, Louisa and Hanover counties, Va., about 7 p. m., slight shock accompanied by roaring sound. 8th, Cairo, Ill. 10:30 p. m., two slight shocks.

**Zodiacal Light**.—Southington, Conn., 1st, 3rd, 6th, 7th, 23rd, 24th, 25th, 28th, 29th; Monticello, Iowa, 23rd; St. Mary's Home, Ind., 3rd, 5th, 6th, 7th, 23rd, 24th, 29th; Great Bend, Kan., 3rd; Orono, Me., 29th, 30th; Somerset, Mass., 1st, 3rd, 5th, 6th, 23rd, 24th, 25th, 26th, 28th, 29th; Rowe, Mass., 29th; Cambridge, Mass., 1st, 3rd, 5th, 7th, 23rd to 26th, 28th to 30th; Clear Creek, Neb., 3rd, 5th, 20th, 22nd, 23rd; Freehold, N. J., 23rd, 28th; Atco, N. J., 26th, 28th, 29th; Waterburg, N. Y., 24th, 29th; Tybee Island, 21st to 23rd, 28th; Newbury, Vt., 3rd, 28th, 29th, 30th.

## SOLAR PHENOMENA.

**Sun Spots**.—The following observations, made by Mr. D. P. Todd, upon the spots of the sun, have been kindly communicated by Rear Admiral John Rodgers, U. S. N., Superintendent of the Naval Observatory: None visible on the 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 11th, 12th, 15th, 16th, 18th, 19th, 29th, 30th; on the 22nd, one group and six spots, both new; 23rd, the same; 24th, one group and twelve spots, six new spots; 25th, the same; 26th, one group and ten spots, two spots having disappeared by solar rotation; 29th, none, all having disappeared by solar rotation. At Iowa City, Prof. Hinrichs reports none on the 2nd, 4th, 5th, 6th, 7th, 11th, 12th (? cloudy,) 15th and 27th; two spots on the 22nd—one large one near the centre of sun; one group of five spots on the 24th; two spots on the 25th.

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