

had reached 38 ft. 8 in.; at New Orleans it fell slowly from the beginning of the month to the 19th, after which it rose to end of month, when it was within 9 inches of danger-line. The *Ohio* at Pittsburg fell slowly from the 1st to the 10th; on the 12th it commenced to rise rapidly, and on the 14th reached 21 ft. 7 in., or 19 inches above danger-line, after which it fell slowly until the 26th, and remained low to end of month; at Cincinnati it fell slowly from the 1st to the 11th; on the 12th a rapid rise set in which continued to the 7th, when the water reached 53 ft. 3 in., or 39 inches above danger-line; it then fell slowly to end of month; at Louisville it remained almost stationary until the 14th, when a rapid rise set in, which on the 18th and 19th reached 30 ft. 6 in., or 6 ft. 6 in. above the danger-line, after which it fell rapidly to end of month. The *Tennessee* at Chattanooga continued low and almost stationary until the 14th, rose rapidly to the 17th, fell to 6 ft. on the 26th and rose slightly to end of month. The *Cumberland* at Nashville rose from the 1st to the 7th to 14 ft. 2 in., fell to the 11th to 10 ft. 4 in., after which it rose rapidly, and on the 19th and 20th reached 44 ft. 2 in., or 26 in. above danger-line, whence it fell to 14 ft. 10 in. on the 26th, and rose to 32 ft. 4 in. by end of month. The *Savannah* at Augusta rose 11 ft. on the 3rd, fell 11 ft. by the 9th, and remained almost stationary to end of month. On the *Red River* at Shreveport navigation has continued without interruption throughout the month, the river continuing to rise slowly from the 14th to the 29th; on the 15th the zero of river-gauge at this station was lowered 3 ft. 6 in., to correspond with the low water of 1879, but the readings given in the table for the present month are above the zero of 1878.

Ice in Rivers and Harbors.—The following notes respecting ice in rivers, &c., are of interest: *Columbia river.*—Umatilla, Or., 1st, 2nd, floating ice in river. *Missouri.*—Plattsmouth, Nev., 16th, ice broken up; 29th, ice gorge broke away from east half of pile bridge, and during the night river froze over the third time this month; Lavenworth, floating ice 1st to 7th, clear of ice 8th, floating ice 21st. *Mississippi.*—St. Paul, river frozen over throughout the month. La Crosse, 9th, ice firm, crossing very good; 27th, ice getting thin, many large open places obstructing all travel. Davenport, floating ice 2nd, 4th to 10th, 18th, 24th, 18th to 22nd, 29th. Keokuk, heavy floating ice 1st to 10th, small quantities of ice 11th; 12th, ice breaking up along Illinois shore; 13th to 16th, heavy floating ice; 17th, river free; 19th, 29th, small quantities of ice; 20th to 23rd, heavy ice; 24th, river clear. Burlington, river full of floating ice 1st to 11th, 13th, 14th, 15th, 20th, 21st, 22nd; clear of ice 12th, 16th, 23rd. St. Louis, light floating ice 4th, 5th, 6th. *Rock River.*—Rockford, Ill., 17th, free of ice; 19th, small quantities of floating ice; 20th, river partly covered with thin ice; 21st, frozen over; 23rd, small quantities of floating ice; 24th, river clear. *Ohio.*—Wellsburg, W. Va., 5th, first ice in the river at this point this winter. *Monongahela.*—Morgantown, 5th, frozen over; 10th, ice breaking up; Pittsburg, 8th, floating ice. *Alleghany.*—Pittsburg, 8th, floating ice. *Susquehanna.*—Litchfield, Pa., 26th, river entirely clear of ice. *Delaware.*—Port Jervis, N. Y., 14th, floating ice; Philadelphia, 10th, ice formed in river during night. *Hudson.*—Albany, 16th, floating ice; 18th, nearly free of ice; 24th and 25th, full of floating ice; Ardenia, 28th, river entirely clear of ice, vessels moving. *Connecticut.*—Springfield, Mass., river free of ice throughout the month. *Lake Superior.*—Duluth, harbor frozen over 1st to 29th. Marquette, harbor covered with ice throughout the month. *Lake Michigan.*—Chicago, 1st, lake frozen; 2nd, ice breaking up; 4th, lake frozen; 10th, lake clear. *Grand River.*—Grand Haven, Mich., river frozen over or full of slush ice from 1st to 21st. *Lake Huron.*—Port Huron, 4th, ice-bridge formed across the bay from Ft. Gratiot Light House to Point Edwards; 9th, ice bridge broke to-day. *St. Clair River.*—Port Huron, 4th, clear of ice; 9th, 19th, floating ice. *Lake Erie.*—Cleveland, 5th, shore ice forming around the piers in the lake; 7th, 9th, large quantities of floating ice in lake and river. *Maumee River.*—Toledo, 2nd, covered with thin ice; 5th, frozen from shore to shore; 15th, free of ice; 20th, thin ice; 28th, schooner arrived from Cleveland. *Buffalo Creek.*—Buffalo, N. Y., 3rd, frozen over; 18th, ice broke up and passed out; 21st, frozen over; 25th, ice broken up. *Lake Champlain.*—Burlington, 1st, floating ice in lake; 2nd, harbor frozen over. Charlotte, Vt., 2nd, lake freezing over, ice-bridge firm; 6th, crossing ice on foot; 11th, teams crossing; 29th, lake still frozen. *High Tides.*—Atlantic City, N. J., 3rd; Sandy Hook, 3rd, carrying away jetty in front of office, and also the track of the N. J. Southern Railroad for several miles, all telegraphic communication interrupted for 24 hours.

TEMPERATURE OF WATER.

The temperature of water as observed in rivers and harbors, with average depths at which the observations were taken, are given in the table on left side of chart No. II. At the following stations observations were not made on the date indicated on account of ice: at Alpena, Duluth, Escanaba and Marquette no observations were made throughout the month; at Buffalo, 3rd to 18th, and 21st to 25th; Burlington, 2nd to 29th; Chicago, 1st, 2nd, 4th to 9th; Cleveland, 3rd; Detroit, 2nd to 11th, 13th to 17th and 19th to 22nd; at Grand Haven, 1st to 21st; New York city, 4th and 5th; Toledo, 5th to 11th. On account of breakage of thermometer no observations were made at San Francisco throughout the month, and at New York City from the 19th to 29th. Observations were commenced at Delaware Breakwater on the 15th.

ATMOSPHERIC ELECTRICITY.

Thunder-storms were reported in the various States and Territories on the following dates: New York, 12th, 18th, 20th, and 26th. South Atlantic States, 2nd, 3rd, 18th, and 19th. In the Gulf States, 12th, 13th, 14th, 18th and 24th. Tennessee and the Ohio valley, 11th, 12th, 13th, 18th and 28th. Upper Lake region, 11th, 12th, 18th, 22nd, 24th, 25th, 26th, 27th and 28th. Missouri, 11th, 12th, 13th, 18th, 24th, 25th and

28th. Iowa, 11th, 24th, 25th and 29th. Indian Territory and Texas, 1st, 11th, 12th, 17th, 18th, 20th, 24th, 25th, 27th, 28th and 29th. California, on the 10th.

Auroras.—Harvard College Observatory, Cambridge, Mass., looked for every clear evening, none seen; 11th, 20th, 29th, evenings, hazy or cloudy. New Corydon, Ind., 8th, 10 p. m.; Muscatine, Ia., 19th, 7 to 10 p. m.; Gardiner, Me., 1st, 29th; Cumberland, Md., 26th; Starkey, N. Y., 6th, 10th, 20th, 27th, 29th; Pembina, 29th; Eastport, 6th, 7th, (29th, 9 to 11:30 auroral arch 20° in height and extending from NNW. to NNE.

Telegraphic communication interferred with by atmospheric electricity.—Ft. Sill, 12th, 24th; Jacksboro, Tex., 24th; Henrietta, Tex., 24th; Mason, Tex., 27th.

OPTICAL PHENOMENA.

Solar Halos observed in the various districts on the following dates: New England, 4th, 5th, 7th, 8th, 19th, 11th, 18th, 20th, 21st, 22nd, 24th, 25th, 27th. Middle Atlantic States, 1st, 2nd, 6th, 9th, 10th, 11th, 17th, 18th, 20th, 24th, 25th, 27th, 29th. South Atlantic States, 7th, 9th, 25th, 27th, 28th. Eastern Gulf States, 7th, 9th, 11th, 27th, 28th. Western Gulf States, 5th, 6th, 19th, 27th. Lower Lake region, 2nd, 3rd, 5th, 6th, 13th, 14th, 15th, 18th, 20th, 21st, 27th. Upper Lake region, 2nd, 9th, 11th, 14th, 15th, 16th, 18th, 29th. Ohio valley, 2nd, 12th, 16th, 22nd, 23rd, 24th. Upper Mississippi valley, 2nd, 3rd, 5th, 15th, 16th, 17th, 18th, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th, 29th. Missouri valley, 2nd, 4th, 6th, 10th, 12th, 13th, 14th, 15th, 17th, 20th, 22nd, 24th, 27th, 29th. Rocky Mountains, 6th, 8th, 9th, 10th, 15th, 16th, 17th, 23rd, 27th, 28th. Western Plateau, 8th, 20th, 27th, 28th. California, 8th, 17th, 26th. Oregon, 7th.

Lunar Halos were observed in the various districts on the following dates: New England, 2nd, 20th, 21st, 22nd, 24th, 25th, 27th. Middle Atlantic States, 14th, 16th, 17th, 18th, 20th, 21st, 23rd to 27th. South Atlantic States, 9th, 16th, 17th, 19th, 25th. Eastern Gulf States, 16th, 17th, 18th, 19th, 21st, 23rd to 27th. Western Gulf States, 15th, 17th, 18th, 19th, 20th to 27th, 29th. Lower Lake region, 9th, 12th, 14th, 15th, 16th, 21st, 22nd, 24th. Upper Lake region, 12th, 15th, 16th, 17th, 19th, 20th, 22nd, 25th. Upper Mississippi valley, 14th to 19th, 21st to 29th. Ohio valley and Tennessee, 15th, 16th, 17th, 18th to 25th. Missouri valley, 3rd, 14th, 16th, 17th, 18th, 22nd, 23rd, 24th. Rocky Mountains, 17th, 18th, 19th, 20th, 21st, 22nd. Western Plateau, 17th, 18th, 19th, 21st, 22nd, 25th. California, 25th. Oregon, 18th, 20th.

Mirage.—Oregon, Mo., 9th, 14th; Genoa, Neb., 1st, 2nd, 3rd, 7th, 8th, 29th; Pembina, 5th.

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 130 stations show 3,745 observations to have been made, of which 32 were reported doubtful; of the remainder 3,110, or 83.8 per cent, were followed by the expected weather.

Meteors.—New Corydon, Ind., 1st, 6th, 7th; Cedar Vale, Kan., 8th; Woodstock, Md., 1st, 16th, 24th, 26th; Fayette, Miss., 13th; Oregon, Mo., 7th, 27th; Waterbury, N. Y., 7th, 14th, 17th; North Volney, N. Y., 28th; Starkey, N. Y., 16th; Boise City, Idaho, 12th, 20th; Madison, Wis., 17th; Rochester, 5th.

Zodiacal Light.—Harvard College Observatory, Cambridge, Mass., looked for every clear evening; distinctly visible on the 2nd, 8th; visible 1st, 4th, 5th, 6th, 7th, 9th; observations on other evenings hindered by moonlight, clouds or haze. Southington, Conn., visible on the 7th and 8th. New Corydon, Ind., on the 1st, 4th, 5th, 7th, 8th, 9th, 10th. Muscatine, Iowa, on the 5th and 8th; Cresco, Ia., on the 7th, 8th, 11th, 12th, 29th; Monticello, Ia., on the 3rd and 9th; Ft. Dodge, Ia., on the 4th and 5th. Cedar Vale, Kan., from the 1st to 9th, 11th, 13th, 14th, 27th, 28th. Somerset, Mass., on the 1st, 4th to 9th, 11th, 27th; Fall River, Mass., on the 1st and 29th. Oregon, Mo., on the 3rd, 5th, 6th, 7th, 8th, 9th, 28th. Austin, Neb., on the 6th. Atco, N. J., on the 1st, 2nd, 3rd, 4th, 6th, 7th, 8th, 9th, 10th, 12th, 16th. Waterburgh, N. Y., on the 1st, 5th, 6th, 7th, 8th, 9th; Starkey, N. Y., on the 25th. Bellefontaine, Ohio, on the 7th, 9th and 19th. Coalville, Utah, on the 3rd and 28th. Wytheville, Va., on the 3rd, 6th and 28th. Woodstock, Vt., seen on clear evenings in the latter part of the month. Lynchburg, Va., on the 3rd, 4th, 6th, 7th. Ft. Whipple, Va., on the 23d. Mr. Ch. Hasselbrink remarks as follows in reference to observations made by him at Havana, Cuba: "February 28th, visible at about 7 p. m.; does not extend more than 30° above the true horizon. The borders or sides of the triangular shape less defined than ever; has at times the appearance of a mass of dust illumined by some source of light; not constant; intensity varies at intervals; real intermittence. The inclination on the horizon is not considerable. The axis approaches the perpendicular and forms with the horizontal line an angle of about 80 degrees; commences vanishing at about 8 p. m. February 29th, not visible; western region cloudy."

Polar Bands.—New Corydon, Ind., 9th, 16th, 20th and 27th; Guttenburg, Ia., 22nd; Yates Center, Kan., 17th; Gardiner, Me., 8th, 21st, 22nd, and 25th; Thornville, Mich., 22nd; Auburn, N. H., 3rd and 27th; Freehold, N. J., 2nd, 12th, and 24th; Vineland, N. J., 28th; Wytheville, Va., 2nd, 6th, 11th and 20th.

Prairie and Forest Fires.—Glenwood, Ia., 23rd; Creswell, Kan., 2nd, 3rd, 5th to 15th, 17th to 29th;