

port and Vicksburg. In the Lower Mississippi the lowest readings were recorded during the early part of the month, and the highest on the 27th and 28th.

*Ice in Rivers and Harbors.*—The following items will serve to show the conditions of the rivers and harbors in this respect: The Missouri, at Yankton, was frozen over until the 20th, when the ice broke, and the river has since continued open; at Omaha the ice broke on the 15th and 16th, and on the 19th the river was open for navigation; at Leavenworth it remained open throughout month. The Mississippi remained frozen over at St. Paul until the 28th, when the ice broke up and moved out; at La Crosse it remained closed until the 7th, when it commenced breaking up in the channel; on the 10th and 16th floating ice passed down from the La Crosse river, and from the 20th to 22nd shore ice gave way, and ferry-boat commenced running; Guttenburg, 2nd, river frozen over; 17th, clear; at Dubuque the ice broke up from 5th to 7th; on the 19th river was full of floating ice, but the observer states that "local navigation was practically uninterrupted during the month;" at Davenport, 1st to 4th, 9th to 12th and the 17th, floating ice; at Keokuk, on the 3d, the river was clear; 10th, slush ice; 12th, clear; Muscatine, 5th, ice in river 9 in.; 19th, clear. On the *Lakes* ice is reported as follows: Duluth, 28th, ice in bay broken up by high winds. Marquette, 5th, ice in harbor broke up; 10th, ice formed; 13th, broke up; 15th, formed; 21st, broke up. Escanaba, ice in bay throughout month. Chicago, 1st to 25th, lake frozen; 26th, shore ice floating off. Grand Haven, 12th, river frozen over. Alpena, river frozen throughout month; 10th, bay entirely clear of ice; 18th, frozen over; 23rd, clear. Detroit, 1st and 3rd, river frozen; 4th, ice broke up. Toledo, 1st to 21st, Maumee river frozen over; 22nd, broke up and cleared away from dock; at 2:45 p. m., an immense field of ice came down sweeping away span of new railroad bridge. Cleveland, 1st to 25th, floating ice. Buffalo, 1st to 23rd, river frozen; 24th, broke up; 28th, river and harbor clear. Fort Niagara, 1st, river full of floating ice; 9th, clear. Sebago Lake, Me., 28th, 15 inches ice in lower bay, "upper bay only frozen over one day this winter." Lake Champlain, at West Charlotte, Vt., 7th, partly frozen; 8th, ice all gone, except in bays; 15th, much floating ice. The Hudson river, at Wappinger's Falls, 4th, firm; 20th, ice 10 inches thick; 26th, ice spongy; 27th, ice moving; 28th, river open to Poughkeepsie, navigation resumed. Albany, 28th, ice breaking up. West Point, 27th, first steamer passed up river. Ardenia, river open throughout month. Rockford, Ill., 5th, river clear; 11th, frozen over; 14th, clear. Morristown, Dak., 28th, "James river nearly open." New London, Conn., 14th, Thames river full of floating ice from Shetucket.

## TEMPERATURE OF WATER.

The temperature of water, as observed in rivers and harbors, is shown in table on chart No. III.

*Maximum and Minimum Temperatures.*—The highest maxima have been: 65° at St. Marks, 63° at Galveston and Jacksonville, 56° at Augusta, Montgomery and Savannah, and 55° at Charleston and Mobile. The lowest minima have been: 29° at Portland, Me., 30° at Keokuk, 31° at Wood's Holl and New York city, and 32° at Sandusky.

*Ranges of Temperature.*—The least have been: 1° at Detroit and Duluth, 2° at Eastport and Grand Haven, 3°.5 at Milwaukee, and 4° at Charleston, New London, Sandusky and Wilmington. The largest: 12° at Galveston, 11° at Keokuk, Montgomery and St. Louis, and 10° at St. Marks.

## ATMOSPHERIC ELECTRICITY.

*Thunder-Storms.*—4th, Tex.; 6, Tex., La.; 7th, Fla., Ala., Ga., La., S. C.; 8th, Ala., N. C., Miss., Va.; 9th, Fla., Tenn., Ga., Ala., Ind., Ky., Ohio; 10th, Va.; 12th, Tex.; 13th, Cal., Miss., Ala.; 14th, Fla., La.; 15th, Fla.; 17th, Ga., N. C.; 19th, Tex., Iowa, Ill., Mo.; 20th, Ind. Ty., Kan., Tex., Miss., Ala., Tenn., Ark., La., Mo., Ohio; 21st, Ala., Tenn., Ky., S. C., Fla., Ga., Ind., Mo., N. C., Ohio, Pa.; 22d, Md., N. J., N. Y., Pa., Tex., Va.; 23d, Fla., Md.; 24th, Kan., N. C.; 26th, Fla., Tex.; 27th, Fla.; 28th, N. M., Neb., Kan., Ga.

*Distant Lightning.*—On the 7th at N. C., Fla., and Ga.; 9th, N. C.; 21st, N. C. and Ga.; 22nd, Tex., N. C. and Md.; 27th, Col.; 28th, Col.

*Auroras.*—On the 5th at Cornish and Orono, Me., Contoocookville and Mt. Washington, N. H.; 12th, Creco, Iowa; 19th, Atco, N. J.; 26th, Escanaba and Alpena, Mich.; 27th, Albany, N. Y.; 26th, during sand-storm at Visalia, Cal., electricity intense; 28th, Santa Fe, atmospheric electricity intense, interfering with working of line. Pike's Peak, the assistant on station at summit, in ascending the mountain encountered severe electric storm at timber line, in which his hair crackled, and he experienced a severe burning sensation all over the head.

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

## OPTICAL PHENOMENA.

*Solar Halos.*—2nd, Dak., Iowa, Kan.; 3rd, Ill., Iowa, Mich.; 4th, Conn.; 5th, Mich., Pa., La., Iowa, Fla.; 6th, Dak., Iowa, Neb., Ga., Vt.; 7th, Iowa, Neb., Ohio, Wis.; 8th, N. H., Wis., Cal., Col.; 9th, Iowa, Mich., Wis., Cal.; 10th, Ill., Iowa, Neb., Cal., Mich.; 11th, Ill., Ind., Iowa, Mich., Neb., Wis., Ohio, R. I., Mass.; 12th, Conn., N. H., Ohio, Tenn., Ala., La., Fla., Ga., R. I.; 13th, Ill., Ind., Iowa, Ohio, W. Va.; 14th, Ill., Ind., Mich., N. Y., Ky.; 15th, Conn., Ind., Me., Mass., N. H., N. Y., Vt., Tex.; 16th, Conn., Mo.

N. H., N. Y., Dak.; 17th, Me., Md., Ky., N. C.; 18th, Md., Dak.; 19th, Ill., Ind., Me., Mich., N. Y., Ohio, Ky.; 20th, Neb., Ill., Iowa, Me., Ohio, Tenn., Wis., Dak., Ga.; 21st, Neb., N. J., Ohio, Col.; 22nd, Iowa, Kan.; 23rd, Cal., Kan.; 24th, Ohio; 25th, Conn., Ind. Ty., Tex., R. I.; 26th, Col., Kan., Tex., Ga.; 27th, Mo., N. C., Ga.; 28th, Conn., Iowa, Mass., Neb., N. Y., Kan., Ga., R. I.

*Lunar Halos*.—1st, Mich.; 2nd, Mass., Neb.; 3rd, Mich.; 4th, Neb.; 6th, Ark., Me., N. H.; 7th, Can., Ill., Iowa, Md., Mich., N. J., Va., Wis., Neb., Mo., N. Y., Ky., Conn.; 8th, Ind., Minn., N. J., Wis., Tex., Mich., Vt., Mass.; 9th, Dak., Iowa, Mass., Mich., Minn., Neb., N. J., Pa., Wis., Cal., Kan., N. C., Ga., S. C.; 10th, Neb., Ill., Iowa, Mo., Ohio, Wis., N. M., Mass.; 11th, Ill., Ind., Md., Mass., Mo., Neb., N. H., N. Y., N. C., Ohio, Pa., Vt., Wis., Dak., Tex., Iowa, Mich., Tenn., R. I., Me., Conn.; 12th, Neb., Conn., Ill., Iowa, Kan., Ky., Me., Mass., N. H., N. Y., N. C., Wis., Nev., Col., Miss., Ala., Minn., Ohio, Tenn., Fla., Ga., S. C., Me., R. I.; 13th, Ind., Iowa, Kan., N. J., N. Y., Ohio, Pa., Vt., Wis., Cal., Col., Minn., Ill., Mich., Ky., Mass., Conn.; 14th, Mich., Conn., Ind., Iowa, Miss., N. J., N. Y., Ohio, Vt., Va., Wis.; 15th, Can.; Conn., Ind., Me., Mass., Neb., N. J., N. Y., Tex., Mich., N. C., N. H., R. I., Vt.; 16th, Dak., Ill., Ind., Kan., Ky., Me., Mass., Mich., Miss., Mo., N. H., N. J., N. Y., N. C., Ohio, Vt., Cal., Neb., Ala., Minn., Tenn., Va., Me., R. I., Conn.; 17th, Ill., Mass., Cal., Neb., Mo., Conn.; 18th, Ill., Iowa, Kan., Miss., Ala., La., N. Y., N. H., Mass.; 19th, Ill., Ind., Mass., Va., Ga., Conn.; 20th, Me., Nev., Mass.; 21st, S. C., 23rd, Cal.

*Mirage*.—Olivet, Dak.; 4th, Baxter Springs, Kan.; 28th, Moorhead, Minn., 1st and 2d; Genou, Neb., 4th, Tybee Island, Ga., 11th, New London, 3d and 19th.

## MISCELLANEOUS PHENOMENA.

**BOTANICAL**.—Alabama—Green Spring, peach trees in bloom, 23rd. Arkansas—Judsonia, spring beauties, maples and daffodils blooming, 17th; wild forget-me-nots and peach trees in bloom, 22nd. California—Visalia, peach trees in full bloom, 22nd; Sacramento, almond and peach trees in bloom several weeks: trees leafing. Connecticut—New London, crocus blooming, 25th. Dakota—Olivet, weeds and grass sprouting, 28th. Florida—Houston, peach trees and rose bushes in bloom, 12th, crocuses and hyacinths in bloom 28th; plum trees in bloom, 24th; Milton, plum trees in bloom, 28th; peach trees in bloom, 24th. Illinois—Havana, scilla siberica blooming, 25th: soft maples in bloom, 20th. Iowa—Fort Madison, peonies, horse radish and calamus sprouting, 7th; elder trees budding, cherry and peach buds swelling, and blackberry buds bursting, 17th. Kansas—Cresswell, peach buds swelling 23rd, wheat growing finely; 25th Empire City, snowdrop and crocus in bloom 12th, liverwort in bloom 13th; Independence, Addertongue in bloom 25th, willow leafing 22nd, soft maple blooming 27th, peaches, cherries and plums nearly in bloom 28th, wheat growing the entire month Baxter Springs, roses and honey suckles leafing 27th; Holton, forest trees budding 28th; Lawrence, maples in bloom 16th.—Mississippi, Brookhaven, maple trees and jessamine blooming, hickory buds swelling 24th; Vicksburg, peach trees blooming 24th.—Michigan, Litchfield, maple sap running 28th.—Louisiana, New Orleans, orange trees budding 27th. Missouri—Lebanon, cherries budding, peach buds fully formed, 28th. Oregon, maple trees budding, 6th. New Hampshire—Mill Village, maple sap running well, 28th. New Jersey—Vineland, cottonwood and maple buds swelling, 9th. Ohio—Ruggles, wheat green, maple-trees budding, 28th; Ringgold, wheat and fruit prospects good, 28th. Pennsylvania—Chambersburg, crocus and snow-drops in bloom, 21st. Tennessee—McMinnville, forest trees budding, iris and spirea blooming, 23d. Maryland—New Market, purple grackle first seen, 27th. Sandy Springs, wheat growing, flowers in bloom, 28th. Texas—Clarksville, peach and plum trees in bloom; Belmont Farm, wild flowers in bloom, 17th, peach and almond trees in bloom, 19th; Austin, garden vegetables abundant, flowers in bloom, all fruit trees in bloom, 28th; Graham, prairie violets in bloom, 17th. Virginia—Alto Vista, elder bushes budding, 22d; Prospect Hill, daffodils in bloom, 22d, hyacinths in bloom, 14th; Wytheville, aspens budding, 8th, pruning and transplanting, 28th. West Virginia—Morgantown, trees budding, 24th. Wisconsin—Rocky Run, willows budding, 4th.

**BIRDS**.—*Blackbirds*, Southington, Conn., 28th; Elmira, Ill., 23rd; Great Bend, Kan., 28th; Fallston, Md., 23rd; Mendon, Mass., 28th; Fayette, Miss., 1st, 7th; Bethel, Ohio, 24th. *Bullfinches*, Oregon, Mo., 26th. *Bluebirds*, Judsonia, Ark., 6th; Southington, Conn., 2nd, 5th, 8th, 12th, 22nd, 24th to 28th; Elmira, Ill., 25th; Hennepin, Ill., 27th; Sandwich, Ill., 28th; Havana, Ill., 3rd; Louisville, Ill., 17th; Fort Madison, Iowa, 20th; Guttenburg, Iowa, 27th; Empire City, Kan., 13th; Independence, Kan., 28th; Afton, Iowa, 25th; Muscatine, Iowa, 25th; Boonsboro', Iowa, 27th; Stanley, Kan., 17th; Holton, Kan., 17th; Mendon, Mass., 28th; Fort Gibson, Ind. Ty., 19th; Davenport, Iowa, 20th; Somerset, Mass., 24th; Fall River, Mass., 23rd; Northport, Mich., 28th; Litchfield, Mich., 25th; Oregon, Mo., 5th; Plattsmouth, Neb., 15th; Starky, N. Y., 25th; Flushing, N. Y., 17th; Murphy, N. C., 10th; Highlands, N. C., 7th; Bellefontaine, Ohio, 24th; Little Mountain, Ohio, 22nd; Bethel, Ohio, 13th; Jacksonburg, Ohio, 15th; Mt. Auburn, Ohio, 24th; *Robins*, Elmira, N. Y., 22nd; Sandwich, Ill., 21st; Havana, Ill., 3rd; Milford, Ind., 24th; Fort Madison, Iowa, 20th; Empire City, Kan., 15th; Independence, Kan., 28th; Boonsboro', Iowa, 27th; Holton, Kan., 19th; Fort Gibson, Ind. Ty., 14th; Somerset, Mass., 19th; Fall River, Mass., 28th; Litchfield, Mich., 1st; Oregon, Mo., 19th; Freehold, N. J., 8th and 23rd; Starky, N. Y., 28th; Bellefontaine, Ohio, 19th; Little Mountain, Ohio, 22nd; Bethel, Ohio, 13th; Jacksonburg, Ohio, 21st; Mt. Auburn, Ohio, 7th; Ringgold, Ohio, 21st; Brownsville, Pa., 21st; Lynchburg, Va., 28th. *Ducks*, Judsonia, Ark., 5th and 6th; Olivet, Dak., 20th; Elmira, Ill., 25th; Milford, Ind., 22nd; Guttenburg, Iowa, 18th; Cresswell, Kan.,