

the river was frozen on the 17th; ice broke up on the 21st; river frozen over on the 26th. At La Crosse, Wis., the river was rising and the ice disappearing on the 14th; 15th, river almost clear of ice; 23d, river clear of ice. On the 14th the river was clear of ice at Dubuque, Iowa, and was frozen on the 26th. At Davenport, Iowa, the ice ran out on the 4th; 7-8th, river full of floating ice; 9th, river clear of ice; 12-13th, river full of floating ice; 25th to 28th, river full of floating ice.

Missouri River.—At Pierre, S. Dak., the river was frozen over until the 20th, when open water appeared in places. At Yankton, S. Dak., the river was frozen over on the 25th. At Sioux City, Iowa, small quantities of ice were running on the 11th; ice was also running on the 12th, 14th, and 15th. At Leavenworth, Kans., floating ice was noted on the 7th, 8th, 26th, and 27th.

CLOSING OF NAVIGATION.

Navigation on the Erie Canal at Albany, N. Y., closed on the 5th. At Oswego, N. Y., navigation on Lake Ontario closed on the 28th; the harbor was open but no freight was offered. At Buffalo, N. Y., navigation was practically closed on the 14th. At Cleveland, Ohio, marine insurance expired on the 5th; many vessels continued their trips, however. Navigation closed at Toledo, Ohio, on the 9th. A report from Port Huron, Mich., states that the Fort Gratiot Light was discontinued for the season on the 12th; that ice was floating in the Black River from the 17th to 21st; and that navigation at that port was closed for the season on the 22d. Navigation was reported closed for the season at Sault de Ste. Marie, Mich., on the 8th; at Marquette, Mich., on the 2d; at Manistee, Mich., on the 17th; at Milwaukee, Wis., for all regular steamers, on the 10th; and at Duluth, Minn., on the 7th.

Heights of rivers above low-water mark, December, 1891 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River.</i>						
Shreveport, La.....	29.9	26	7.9	3	-1.6	9.5
<i>Arkansas River.</i>						
Fort Smith, Ark.....	22.0	24	3.6	2.3	1.5	2.1
Little Rock, Ark.....	23.0	26	7.9	2	3.8	4.1
<i>Missouri River.</i>						
Fort Buford, N. Dak.*.....						
Sioux City, Iowa*.....	18.7					
Kansas City, Mo.....	21.0	27	6.4	12	4.0	2.4
<i>Mississippi River.</i>						
Saint Paul, Minn.*.....	14.0					
La Crosse, Wis.*.....	11.8					
Dubuque, Iowa*.....	16.0					
Davenport, Iowa†.....	15.0	28	3.3	5	0.1	3.2
Keokuk, Iowa*.....	14.0	30, 31	2.0	8	-1.4	3.4
Saint Louis, Mo.....	30.0	26	5.7	6	2.3	3.4
Cairo, Ill.....	40.0	31	21.3	23	11.8	9.5
Memphis, Tenn.....	33.0	31	14.6	12, 13, 25	9.3	5.3
Vicksburg, Miss.....	41.0	31	15.5	1	4.8	10.7
New Orleans, La.....	13.0	17	4.2	1	2.3	1.9
<i>Ohio River.</i>						
Parkersburgh, W. Va.....	38.0	29	17.8	14	8.0	9.8
Cincinnati, Ohio.....	45.0	31	27.2	21	12.4	14.8
Louisville, Ky.....	24.0	31	11.1	22	6.5	4.6
<i>Cumberland River.</i>						
Nashville, Tenn.....	40.0	31	21.0	22, 23	3.7	17.3
<i>Tennessee River.</i>						
Chattanooga, Tenn.....	33.0	10	10.9	4	2.8	8.1
Knoxville, Tenn.....	29.0	9	7.0	3	1.3	5.7
<i>Monongahela River.</i>						
Pittsburg, Pa.....	29.0	6	15.8	16	3.8	12.0
<i>Savannah River.</i>						
Augusta, Ga.....	32.0	6	11.2	3	7.2	4.0
<i>Willamette River.</i>						
Portland, Oregon.....	15.0	30	12.8	1	4.6	8.2
<i>Susquehanna River.</i>						
Harrisburg, Pa.....	17.0	7	9.6	4	3.6	6.0
<i>Alabama River.</i>						
Montgomery, Ala.....	48.0	9	8.2	3	1.1	7.1

* Frozen. † For 27 days.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroras were reported as follows: 3d, Montevideo, Minn. 6th, Alta and Cresco, Iowa; Cornish, Me.; in Michigan; Pine River, Minn.; Grand Rapids, N. Dak.; Webster, S. Dak.; Medford, Wis. 7th, Riley, Ill.; Alta and Delaware, Iowa; Cornish, Me.; Concord and Newburyport, Mass.; Fort Assinaboine and Miles City, Mont.; Bismarek and Fort Buford, N. Dak.; Castlewood and Kimball, S. Dak. 9th, Orono and State College, Me.; Fort Assinaboine, Mont.; Webster, S. Dak. 11th, Fort Assinaboine, Mont. 12th, Cornish, Me. 19th, Woodbridge, S. Dak. 20th, Fort Buford, N. Dak. 22d, in Arkansas. 27th, Alpena, Mich.; Selins Grove, Pa. 28th, Selins Grove, Pa. 29th, in Michigan; Webster, S. Dak.; Barron and Embarrass, Wis. 30th, in Arkansas. 31st, University, Miss.

THUNDERSTORMS.

Description of the more severe thunderstorms reported for the month is given under "Local storms."

Thunderstorms were reported as follows: East of the Rocky Mountains they were reported in the greatest number of states,

14, on the 29th; in 11 on the 31st; in 10 on the 3d; in 9 on the 2d; in 8 on the 6th; in 7 on the 24th; in 6 on the 21st; in 5 on the 4th, 14th, and 23d; in 4 on the 7th, 22d, 28th, and 30th; in 3 on the 1st, 4th, and 13th; in 2 on the 25th; and in 1 on the 8th, 10th to 12th, 15th, 19th, 20th, and 27th. No thunderstorms were reported on the 9th, 16th to 18th, and 26th.

East of the Rocky Mountains thunderstorms were reported on the greatest number of dates, 13, in Texas; on 10 in Iowa; on 8 in Kansas and Missouri; on 7 in Mississippi; on 6 in Nebraska and Wisconsin; on 4 in Illinois, Indian Territory, and Virginia; on 3 in Alabama, Arkansas, Georgia, Indiana, Louisiana, and Pennsylvania; on 2 in Delaware, Maryland, Michigan, Minnesota, New Jersey, North Dakota, and West Virginia; and on 1 in Florida, Kentucky, New York, North Carolina, Ohio, and South Carolina.

West of the Rocky Mountains thunderstorms were reported in New Mexico on the 12th; in Oregon on the 2d, 8th, 16th, 22d, and 24th; in Utah on the 1st; and in Washington on the 1st, 7th, and 8th. In states and territories other than those named no thunderstorms were reported.

MISCELLANEOUS PHENOMENA.

DROUGHT.

At Manchester, N. H., the heavy rains of the last 9 days of the month broke the drought which had prevailed in that region since September, and enabled mills and factories to resume operations with full water power. Although abundant rains fell generally over New York, streams and wells in the northern part of the state were very low at the close of the month. During the first half of the month the drought was very severe about Charleston, S. C., and in the interior of the state water was very scarce, and cotton and other products

were injured. The rains of the middle part of the month were reported of great benefit to farmers in the region about Red Wing, Minn.; the fall had been very dry, a large number of wells had failed, and water for stock had to be hauled from the rivers and streams. The drought at San Antonio, Tex., was reported broken on the 12th. Heavy rain at Tucson, Ariz., on the 24th broke a drought that had continued about 3 months. A report from San Diego, Cal., dated the 11th, stated that rain was badly needed, and that the ground was too hard and dry to plow. The drought in that section was broken by rain the latter part of the month.