

Milledgeville and Eatonton Railroad, causing loss of life and considerable injury to property. After leaving Nona the cloud moved in an easterly direction.—*Atlanta (Ga.) Constitution.* South Carolina.—Pacolet, Spartanburgh Co.: about 6 a. m. a tornado passed about a half a mile from this place, and all houses, crops, and lumber over a stretch of country about one-fourth of a mile wide suffered from its ravages.—*Charleston (S. O.) News and Courier.* North Carolina.—Wilmington: a high northwest gale began 9.10 a. m. and ended 1.45 p. m.; maximum velocity of wind, thirty-six miles per hour at 12.10 p. m. Several trees and one frame building were blown down.—*Report of Signal Service observer.*

21st. Georgia.—Augusta: a severe snow storm prevailed steadily all day, followed at night by rain and sleet. The approximated depth of snow, which melted as it fell, was about six inches.—*Report of Signal Service observer.* South

Carolina.—Columbia: snow began at 8.20 a. m. and ended 6.30 p. m., followed by sleet and rain, which ended during the night. It was the heaviest fall of snow within the recollection of citizens.—*Report of Signal Service observer.* Gaffney City, Spartanburgh Co.: the deepest snow here in twenty years fell this date; depth twelve to fourteen inches.—*Charleston (S. C.) News and Courier.*

21st-22d. Michigan.—Sault de Ste. Marie: high wind, accompanied by blinding snow, began the evening of the 21st, and continued throughout the following day. Maximum velocity of wind one hundred and thirty-two miles per hour from the northwest, at 5 p. m., 22d. The wind was the severest ever experienced at this place, and caused much damage to the telegraph, telephone, and electric light wires. Trains due here from various points were blockaded by the drifting snow.—*Report of Signal Service observer.*

INLAND NAVIGATION.

STAGE OF WATER IN RIVERS AND HARBORS.

In the following table are shown the danger-points at the various stations; the highest and lowest depths for February, 1889, with the dates of occurrence and the monthly ranges:

Heights of rivers above low-water mark, February, 1889 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:						
Shreveport, La.	29.9	3	31.9	28	20.5	11.4
Arkansas River:						
Fort Smith, Ark. ...	22.0	1	9.0	18, 19	3.7	5.3
Little Rock, Ark. ...	23.0	1	13.4	19	6.8	6.6
Missouri River:						
Leavenworth, Kans. ...	20.0	20, 21	4.8	12	3.0	1.8
Kansas City, Mo. ...	21.0	24-28	5.7	6, 7, 13-16	5.1	0.6
Mississippi River:						
Saint Paul, Minn. ...	14.5					
La Crosse, Wis. ...	24.0					
Dubuque, Iowa ...	16.0					
Davenport, Iowa ...	15.0					
Keokuk, Iowa ...	14.0	23	3.3	6, 13	0.8	2.5
Saint Louis, Mo. ...	32.0	19	6.7	27	2.7	4.0
Cairo, Ill.	40.0	26, 27	32.7	17	13.8	18.9
Memphis, Tenn. ...	34.0	28	25.4	19	11.0	14.4
Vicksburg, Miss. ...	41.0	1	33.2	24	20.8	12.4
New Orleans, La. ...	13.0	15, 16, 17	12.4	26, 27	8.9	3.5
Ohio River:						
Pittsburgh, Pa.	22.0	18	18.0	16	2.9	15.1
Parkersburg, W. Va. ...	38.0	21	22.2	16	5.9	16.3
Cincinnati, Ohio ...	50.0	22	38.3	16	13.4	24.9
Louisville, Ky.	25.0	23	13.9	16	6.9	7.0
Cumberland River:						
Nashville, Tenn. ...	40.0	21	35.6	15	6.0	29.6
Tennessee River:						
Knoxville, Tenn. ...	29.0	19	15.0	15	1.9	13.1
Chattanooga, Tenn. ...	33.0	18	29.6	15	6.2	23.4
Monongahela River:						
Pittsburgh, Pa.	29.0	18	18.0	16	2.9	15.1
Savannah River:						
Augusta, Ga.	32.0	18	33.3	14	9.8	23.5
Willamette River:						
Portland, Oregon ...	15.0	23, 24	3.5	11	0.0	3.5

•Frozen.

ICE IN RIVERS AND HARBORS.

The following reports relative to ice in rivers and harbors have been made by Signal Service observers:

Thames River.—New London, Conn.: the river froze over on the 25th, the ice being sufficiently strong to interrupt navigation. Floating ice in harbor, 26th and 27th.

North (Hudson) River.—New York City: floating ice in river, 10th to 15th, 25th, 26th.

East River.—New York City: floating ice in river, 10th, 25th.

Monongahela River.—Pittsburgh, Pa.: floating ice in river, 6th, 18th, 24th to 27th. The river was frozen over and navigation closed to points above Lock No. 1 on the 7th; navigation was again resumed on the 20th.

Allegheny River.—Pittsburgh, Pa.: ice in river, 1st to 5th, 7th to 9th, 18th, 21st, and 27th.

Ohio River.—Parkersburg, W. Va.: floating ice in river, 2d to 16th, 20th. Ice caused a partial suspension of navigation from the 6th to 9th.

Saint Clair River.—Port Huron, Mich.: the steamer "Mary," plying between this port and Marine City, Saint Clair Co., Mich., discontinued her regular trips on the 6th, this being the latest date in six years that the steamer has been compelled to lay up on account of ice; floating ice in river, 10th; the river froze for the first time this winter on the 14th.

Mississippi River.—Keokuk, Iowa: floating ice, 5th. River froze over for the first time this season on the 24th and 25th.

Missouri River.—Leavenworth, Kans.: floating ice in river, 1st, 6th, 7th, 18th to 23d. The river froze over for the first time this season on the 24th.

Lake Michigan.—Milwaukee, Wis.: 28th, navigation between this and the east shore ports, by the regular line steamers, has been interrupted considerably during the month by ice. Milwaukee Bay has been blocked with ice several times, and at the close of the month there were large fields of floating ice in the southern part of the lake.

FLOODS.

Chattanooga, Tenn.: the heavy rains from the 14th to 17th caused the Tennessee River to rise above the danger line on the 18th. A portion of the city was inundated and considerable damage was done to foundations of buildings, causing walls to cave in, etc. Train men reported high water and land slides along the various railroads.

Augusta, Ga.: the Savannah River continued to rise very rapidly during the 18th, attaining its highest point at 11 p. m. A number of streets in the lower portion of the city were submerged and all the mills were compelled to close. The river began to fall after midnight.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Faint auroral displays were reported as far south as Egg Harbor City, N. J. West of the Atlantic coast no auroras were reported south of the fortieth parallel. The only notable displays reported during the month are described as follows:

Saint Vincent, Minn.: aurora began 8.30 p. m., 26th, and ended during the night. The display was in the form of an arch; azimuth 90°; altitude 8° to 10°. Maximum brilliancy about 1 a. m., 27th. Quite a brilliant aurora began 9 p. m., 28th, and ended during the night. It was in the form of an

auroral arch, with several small needles. Maximum brilliancy about midnight, when the display extended to about 35° altitude and 140° azimuth.

Fort Buford, Dak.: an aurora was observed 10.25 p. m., 28th, consisting of an irregular arch of a pale color extending to about altitude 15°, azimuth 75°. The arch rose gradually higher, and a second and brighter arch formed at 11.08 p. m. The arch first observed had now attained about altitude 25°, and extended to about 80° azimuth; the second arch was in about the same position that the first arch occupied when first observed. Both arches were now well-defined, also the dark segment. A few streamers of a reddish tinge appeared at the extreme points of the arches. The maximum brilliancy occurred between 12.52 a. m. and 1.20 a. m., March 1st. The arches united between 1 a. m. and 1.20 a. m., the lower merging into the upper, which then changed to a straw color. The dark segment continued well-defined. Between 1.40 a. m. and 2 a. m. the arch became diffused and appeared like a bank of smoke or fog slightly illuminated; the dark segment having disappeared. At 2.30 a. m. the aurora had disappeared.

Auroras were observed during the month as follows: 1st, Egg Harbor City, N. J. 2d, Provincetown, Mass. 3d, Poplar River, Mont., and Egg Harbor City, N. J. 5th, Saint Vincent, Minn. * 7th, Angelica, N. Y. 15th and 16th, Angola, Ind. 17th, Poplar River, Mont. 19th, Leech Farm, Dak. 22d, Leech Farm, Dak.; Saint Vincent, Minn.; Poplar River,

Mont. 26th, Leech Farm, Dak.; Saint Vincent, Minn.; Poplar River, Mont. 27th, Leech Farm, Dak. 28th, Kimball and Leech Farm, Dak.; Saint Vincent, Minn.; Alma, Calumet, and Sand Beach, Mich.

THUNDER-STORMS.

Thunder-storms were reported during the month, by states and territories, as follows: 1st and 2d, 1; 5th, 1; 7th, 2; 8th, 1; 9th, 2; 12th and 13th, 1; 15th, 7; 16th, 12; 17th, 9; 18th, 10; 19th, 3; 22d, 1; 26th, 2; 28th, 1. None were reported on the 3d, 4th, 6th, 10th, 11th, 14th, 20th, 21st, 23d to 25th, and 27th. They were reported in the greatest number of states and territories, twelve, on the 16th; in ten on the 18th; and in nine on the 17th. During this three-day period of their greatest frequency the thunder-storms were confined principally to the central and south-central states.

Thunder-storms were reported in the several states and territories, by days, as follows: Ala., 3; Dak., 1; Ga., 4; Ill., 1; Ind., 2; Iowa, 1; Kans., 2; Ky., 3; La., 2; Me., Md., and Mass., 1; Miss. and Mo., 4; Nev. and N. Mex., 1; N. C., 3; Ohio, 1; Tenn., 7; Tex., 4; Va., 2; Wash., 1; W. Va., 2; Wis., 1. In Ariz., Ark., Cal., Colo., Conn., D. C., Fla., Idaho, Ind. Ter., Mich., Minn., Mont., Nebr., N. H., N. J., N. Y., Oregon, Pa., R. I., S. C., Utah, and Wyo. no thunder-storms were reported. They were reported on the greatest number of days, 7, in Tennessee; in Georgia, Mississippi, and Missouri on 4; and in Alabama, Kentucky, and North Carolina on 3.

MISCELLANEOUS PHENOMENA.

FOREST AND PRAIRIE FIRES.

Prairie fires were reported as follows: Fort Reno, Ind. T., 2d to 7th; Fort Sill, Ind. T., 2d to 7th, 9th to 16th, 18th to 22d. Forest fires were noted at Red Bluff, Cal., 4th, 21st, 28th.

HALOS.

Solar halos were most frequently noted in Pennsylvania, where they occurred on fourteen days. In Dak., Ill., Mass., and Tenn. they were reported on thirteen days; in New York on eleven; and in Mich., Minn., N. J., and Ohio on ten days. None were reported in Ala., Del., D. C., Ind. Ter., Ky., N. Mex., N. C., R. I., and Utah. They were noted in the greatest number of states and territories, 17, on the 21st; in 12 on the 7th; in 11 on the 13th and 24th; and in 10 on the 10th, 11th, 18th, and 20th. There were no days for which solar halos were not reported in one or more states or territories.

A display of parhelia, noted the 21st, at Spearfish, Lawrence Co., Dak., is described as follows in the "Queen City Mail," published at that place: "Parhelia, or mock suns, were observed in the morning. The display was composed of three distinct circles of rainbow-tinted light, the first encircling the sun and the others outside and crossing the first at its centre. Each ring or circle was studded with four mock suns on its rim, dividing the circle into four equal parts. The display was very brilliant and lasted over an hour."

Lunar halos were most frequently noted in California, where they were reported on twelve dates. In Missouri and Oregon they occurred on eleven dates; in Dakota and New York on ten; in Ohio and Texas on nine; and in La., Mass., Tenn., and Wash. on eight. None were reported in Conn., Del., N. Mex., R. I., Utah, and Vt. They were reported in the greatest number of states and territories, 23, on the 13th; in 18 on the 9th and 12th; in 17 on the 11th and 14th; and in 16 on the 7th. On the 27th and 28th no lunar halos were reported.

METEORS.

The distribution of meteors, by dates, was as follows: 1st, Villa City, Fla. 3d, Queensbury, N. Y. 7th, Lexington, Ky.; Barren Creek Springs and Fallston, Md.; Beverly, Camden, Clayton, Egg Harbor City, New Brunswick, and Somers Point, N. J.; Ardenia and Newburgh, N. Y. 14th, Ellicott City, Md.; Egg Harbor City, N. J. 15th, Limona, Fla. 17th, Villa City,

Fla. 20th, Nashua, N. H. 24th, Eden Centre, N. Y.; Westerville, Ohio. 27th, East Portland, Oregon. 28th, Santa Maria, Cal.

The following are descriptions of the more notable meteoric displays reported; those relating to meteors observed between 5 and 6 p. m. of the 7th, at stations in Maryland, New Jersey, and southern New York, being especially noteworthy:

Fallston, Harford Co., Md.: a large meteor observed in the full light of the day at 5 p. m., 7th, passing along the northern horizon towards the west.—*Report of voluntary observer.*

Egg Harbor City, N. J.: a large and bright meteor passed in a horizontal direction from east to west at 5.10 p. m., 7th; it exploded and caused a rumbling like thunder, and left a bright trail which remained in sight about five seconds.—*Report of voluntary observer.*

Beverly, Burlington Co., N. J.: a large meteor was seen in the east-northeast, altitude 45°, at 5.20 p. m., 7th, apparently moving southward. At the instant it was observed the head appeared to separate from the tail and explode, bursting into small, fiery fragments which fell toward the ground. The display lasted ten or twelve seconds; no sound was heard.—*Report of voluntary observer.*

Camden, N. J.: a meteor was seen about 5.25 p. m., 7th, going in a northwesterly direction, leaving a long trail of light. The meteor appeared to gradually diminish in size, and finally burst into two parts and vanished.—*Atlantic Review, Feb. 9th.*

New Brunswick, N. J.: about 5.30 p. m., 7th, a meteor appeared in the southwestern sky and traveled leisurely in a westerly direction until it exploded with a tremendous report that was heard not only all over this city but for miles around. Its bursting was like that of a large rocket, and was accompanied by a magnificent display of many colored lights. The observer at Princeton says: The meteor was in the west, altitude 30°, and resembled a big ball of fire going at a rapid rate and accompanied by a loud rumbling noise. It threw off a myriad of bright sparks, similar to a huge sky-rocket. In its trail was a long mass of bluish red flame. A few seconds later it burst with a loud report and display of vari-colored sparks.—*Report of New Jersey State Weather Service.*

Somers Point, Atlantic Co., N. J.: a meteor was observed at 5.35 p. m., 7th, passing from the south in a northerly direc-