

were nearly depopulated. In the evening the river was falling slowly at Kansas City. At Little Rock the Arkansas River began to fall slowly, reaching 27.6 feet at 5 p. m. At Shreveport the Red River rose 1.3 foot in 24 hours. The Des Moines River flooded the lower part of Ottumwa, Iowa. At Des Moines the river was falling slowly.

On the 22d a serious break in the levee occurred in Saint Johns parish, 46 miles north of New Orleans on the east bank of the Mississippi River, and water covered the tracks of the Mississippi Valley Railroad for a distance of one mile. The Red River rose 1.4 foot at Shreveport, and breaks in the levees occurred at Navigation and Youngs Points and at Nicholas Place, submerging many fine plantations. The Missouri River was falling at Kansas City. Floods were reported along the Hudson River and in interior streams of New York. On the 23d the Mississippi River reached 17.1 feet at New Orleans, La., equaling the highest stage on record. Two crevasses were reported in the Red River below Shreveport, La., causing the overflow of bottom lands in the vicinity of Loggy Bayou. On the 24th the Mississippi River rose above the danger-line at Memphis, Tenn. The river was stationary at 48.2 feet at Vicksburg, and maintained a stage at 17.1 feet at New Orleans. The Arkansas River fell below the danger-line at Fort Smith, Ark. The levee on the Herdon Place in Caddo parish on the Red River broke.

On the 25th the Willamette River rose rapidly at Portland, Oregon, covering the lower docks. On the 26th the Missouri River fell below the danger-line at Kansas City, Mo. Breaks were reported in the levees of the Red River as follows: a large break in Thompsons levee at Wild Lucia; 6 breaks at Woods Place 40 to 200 feet in width; 1 break at Hati 250 feet in width; a break at Kansas 40 feet in width; and 2 breaks at Soda Fount 200 to 300 feet in width. Nearly all lands in Bossier parish were reported under water, except from Benton to Shreveport. Low lands on the Saint Francis and White rivers in Arkansas were flooded. On the 27th a large break occurred in the Red River levee at Gold Point. On the 28th the Mississippi River fell to the danger-line at Keokuk, Iowa. A crevasse occurred at the Story Plantation, 9 miles below New Orleans on the east bank of the river. The Red River reached 35.6 feet at Shreveport. At Little Rock the Arkansas River fell below the danger-line.

On the 29th the Mississippi River was below the danger-line at Keokuk, Iowa. The Red River was falling at Shreveport, La. On the 30th the Red River fell 0.4 foot at Shreveport. Ninety per cent. of the cultivated land about Gaines Landing, Chicot county, Ark., was reported overflowed. At the close of the month the Mississippi River had risen above the danger-line at Dubuque, Iowa, flooding houses in low-lying parts of the city. At Saint Louis the stage was 31.9 feet, 1.9 foot above the danger-line, and the river was falling slowly. At Memphis the river was rising and 1.2 foot above the danger-line. At Vicksburg the river was about stationary at 48.3 feet, 1.3 foot above the danger-line. At New Orleans, La., there was a 17-foot stage, and the river was rising slowly. At New Orleans the levees were holding good. Bottom lands were submerged along the Black River in Missouri. The Willamette River was over the lower docks at Portland, Oregon.

OPENING OF NAVIGATION.

The Erie Canal was opened for navigation at Rochester, N. Y., on the 1st.

Heavy floating ice was reported at Sault de Ste. Marie, Mich., on the 1st.

The first up river steamer of the season arrived at Pierre, S. Dak., on the 5th.

On the 8th the harbor at Duluth, Minn., was filled with ice, making navigation difficult.

The Straits of Macinac were open on the 6th. On the 10th a steamer passed through bound for Buffalo, N. Y.

The first arrival of the season was noted at Cheboygan, Mich., on the 12th.

Records kept at the port of Cheboygan, Mich., show that the opening of the straits for navigation this season was the earliest since 1855.

STAGE OF WATER IN RIVERS.

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

Heights of rivers above low-water mark, May, 1892 (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	28	35.7	3	18.9	16.8
<i>Arkansas River.</i>						
Fort Smith, Ark.	22.0	19	31.0	5	6.1	24.9
Little Rock, Ark.	23.0	20	27.9	7	9.4	18.5
<i>Missouri River.</i>						
Fort Buford, N. Dak.		31	11.7	4	6.1	5.6
Bismarck, N. Dak.		31	6.1	6-9, 23-25	2.8	3.3
Pierre, S. Dak.	14.0	13	3.0	31	1.4	1.6
Sioux City, Iowa.	18.7	19	11.2	4.5	7.8	3.4
Omaha, Nebr.	18.0	23	13.1	4.5	8.4	4.7
Kansas City, Mo.	21.0	21	24.9	2	12.4	12.5
<i>Mississippi River.</i>						
Saint Paul, Minn.	14.0	26	12.6	1	4.1	8.5
La Crosse, Wis.	11.8	27, 29	11.6	1	3.8	7.8
Dubuque, Iowa.	16.0	31	16.2	1	5.8	10.4
Davenport, Iowa.	15.0	31	11.8	1	4.5	7.3
Keokuk, Iowa.	14.0	7	15.6	1	6.0	9.6
Hannibal, Mo.	17.0	9	18.5	1	7.8	10.7
Saint Louis, Mo.	30.0	19	36.0	4	20.2	15.8
Cairo, Ill.	40.0	1	47.4	10	36.5	10.9
Memphis, Tenn.	33.0	2, 4	34.6	16	31.2	3.4
Vicksburg, Miss.	41.0	10, 11, 14-16, 18.	48.4	1	47.4	1.0
New Orleans, La.	13.0	23, 24	17.1	1, 2	16.1	1.0
<i>Ohio River.</i>						
Parkersburgh, W. Va.	38.0	19	19.0	3	7.0	32.0
Cincinnati, Ohio.	45.0	21, 22	32.2	6	17.2	15.0
Louisville, Ky.	24.0	21	12.4	7	8.6	3.8
<i>Cumberland River.</i>						
Nashville, Tenn.	40.0	1	22.7	18	6.8	15.9
<i>Tennessee River.</i>						
Chattanooga, Tenn.	33.0	1	8.7	18	4.8	3.9
<i>Monongahela River.</i>						
Pittsburg, Pa.	29.0	5, 29	12.2	2	3.6	8.6
<i>Savannah River.</i>						
Augusta, Ga.	32.0	13	9.8	30, 31	7.0	2.8
<i>Willamette River.</i>						
Portland, Oregon.	15.0	31	17.7	8	5.4	12.3
<i>Susquehanna River.</i>						
Harrisburg, Pa.	17.0	23, 24	8.8	2, 3, 4	2.8	6.0
<i>Alabama River.</i>						
Montgomery, Ala.	48.0	2	6.9	29, 30	3.8	3.1

ATMOSPHERIC ELECTRICITY.

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, 32, on the 26th and 27th; in 27 on the 15th; in 26 on the 18th; in 20 to 25 on the 2d, 4th, 6th, 9th, 10th, 14th, 16th, 17th, 25th, and 28th to 31st; in 15 to 19 on the 1st, 3d, 5th, 7th, 8th, 11th, 12th, 13th, 19th, 20th, 21st, and 24th; and

in 10 to 14 on the 22d and 23d. There was no date for which thunderstorms were not reported in less than 10 states east of the Rocky Mountains.

East of the Rocky Mountains thunderstorms were reported on the greatest number of dates, 29, in Illinois; on 28 in Kansas and Missouri; on 26 in Texas; on 20 to 25 in Arkansas, Florida, Indiana, Iowa, Kentucky, Nebraska, North Carolina, Ohio, Oklahoma, South Dakota, and Tennessee; on 15 to 19 in Alabama, Georgia, Louisiana, Maryland, Michigan, Mississippi,

Pennsylvania, and West Virginia; on 10 to 14 in Indian Territory, Massachusetts, New Jersey, New York, South Carolina, and Wisconsin; and on 5 to 9 in Connecticut, District of Columbia, Maine, Minnesota, North Dakota, and Vermont. The only states in which thunderstorms were reported on less than 5 dates were Montana, New Hampshire, and Rhode Island, where they were reported on 2 dates.

West of the Rocky Mountains thunderstorms were reported in Arizona on the 3d, 21st, 23d to 28th, and 30th; in California on the 1st, 2d, 3d, 6th, 12th, and 21st to 25th; in Colorado on the 2d, 4th, 6th, 7th, 8th, 10th to 14th, 16th, and 23d to 30th; in Idaho on the 23d; in Nevada on the 3d, 4th, 9th, 10th, 11th, 13th, 15th, 16th, and 21st to 29th; in New Mexico on the 3d, 4th, 17th, 18th, 19th, and 23d to 31st; in Oregon on the 2d, 6th, 7th, 8th, 10th, 15th, 23d, 24th, 25th, and 29th; in Utah on the 10th, 11th, 16th, 22d to 27th, 29th, and 30th; in Washington on the 6th; and in Wyoming on the 1st, 8th, 10th, 12th, 23d, 24th, 27th, and 29th.

AURORAS.

The most important auroral displays of the month were noted from New England to Montana and southward to Missouri and Oklahoma Territory the night of 18-19th. In New England the display was very brilliant, and at its height covered nearly the entire sky, with a well-defined corona near the zenith.

Auroral displays of May, 1892.

Date.	Station.	Extent of display.		Remarks.
		Azimuth.	Altitude.	
1	New Whatcom, Wash...	0	0	Arch, with luminous beams.
2	Tatoosh Island, Wash..	In the n.	30	Seven streamers of a pale yellow color.
7	Alpena, Mich.....		30	Arch, and beams of white light.
7	Marquette, Mich.....	135 to 195	25	Arch, with irregular rays of light.
8	Milwaukee, Wis.....	In the n.	15	A light arch.
16	Sault de Ste. Marie, Mich.	135 to 225	25	Electric blue color, with beams of light.
18	Manchester, N. H.....	105 to 245	60	Bright yellow light, with streamers to zenith.
18	Burlington, Vt.....		Zenith	Streamers.
18-19	Boston, Mass.....	110 to 280	90	Corona formed 5° south of zenith.
18-19	Woods Holl, Mass.....	100 to 260	20	Waves of light to altitude 85°.
18	Cambridge, Mass.....	Covered larger part of the sky.		Waves of pale green light met 5° south of the zenith, from which point streamers radiated in all directions, those south of zenith stopping in altitude about 75°. Center unsteady, changing position rapidly. Display observed from 8.45 p. m. At 10.15 p. m. arch of 20° altitude in the north, with shifting lights.
18	New Haven, Conn.....	90 to 270	Zenith	Streamers and "merry dancers" of white and pale yellow.
18	New London, Conn.....	135 to 225	70	Pale yellow light, with streamers.
18-19	Buffalo, N. Y.....	110 to 205	40	Waves of light and "merry dancers."
18-19	Oswego, N. Y.....		*	Double arch 1 a. m. 19th.
18	Columbia, Mo.....	In the n.	45	Arch, with streamers.
18-19	Bismarck, N. Dak.....	190 to 270	Zenith	Irregular beams of light.
18	Greenfield, Iowa.....	In nne.		Streamers.
18	Yankton, S. Dak.....	140 to 220	40	Arch, with faint rose-colored beams.
18	Helena, Mont.....	In the n.	Zenith	Light resembled the dawn of day.
18	Gate City, Okla.....	175 to 195	40	Numerous streamers of white light.
19	Rapid City, S. Dak.....	90 to 270	†	An arch of white light.
22	Marquette, Mich.....	135 to 270	15	Diffused light.

* 10° to 20° south of zenith.

† Beyond zenith.

MISCELLANEOUS PHENOMENA.

DROUGHT.

A report from Saint Thomas, W. I., dated the 14th, stated that the long drought was broken, and that unusually heavy rain had fallen at that place and over the Windward Islands. In Florida the drought continued until the 28th, when thunderstorms, with heavy precipitation, occurred generally over the state. The remainder of the month there was a fair distribution of showers, except in localities in the western part of the

state. The abundant rainfall was attended by a marked improvement in the condition of crops. Reports for the early part of the month from Charleston, S. C., and Augusta, Ga., indicate that rain was badly needed in those sections. The drought in southeastern Texas was broken on the 16th. A report from Fort Stanton, N. Mex., dated the 25th, stated that the protracted drought was injuring crops in the mountain districts.

STATE WEATHER SERVICES.

[Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.]

The following extracts and summaries are republished from reports for May, 1892, of the directors of the various state weather services:

ALABAMA.

Temperature.—The mean was 2.1 below the normal; maximum, 100, at Geneva, 25th; minimum, 36, at Healing Springs, 22d; greatest monthly range, 57, at Healing Springs; least monthly range, 34, at Chepultepec and Jemison.

Precipitation.—The average was 0.57 below the normal; greatest monthly, 8.94 at Pushmataha; least monthly, 0.86, at Newton.

Wind.—Prevailing direction, south.—P. H. Mell, Observer, Weather Bureau, Auburn, director.

ARIZONA.

Temperature.—The mean was about 4.0 below the normal; maximum, 115, at Fort Mohave, 19th; minimum, 13, at Whipple Barracks, 6th; greatest monthly range, 76, at Whipple Barracks; least monthly range, 32, at Dos Cabezos.

Precipitation.—The average was about 0.05 below the normal; greatest monthly, 7.55, at Flagstaff; least monthly, 0.00, at Bisbee, Chiricahua Mountains, Fort Bowie, Navajo Springs, Teviston, and Walnut Ranch.

Wind.—Prevailing direction, southwest.—J. C. Hayden, Observer, Weather Bureau, Tucson, director.

ARKANSAS.

The month was remarkable for the great amount of rainfall.

Temperature.—The mean was 1.3 below the normal; maximum, 95, at Keesses Ferry, 4th; minimum, 36, at El Dorado, 22d; greatest monthly range, 53, at Hope; least monthly range, 28, at Madding.

Precipitation.—The average was 5.55 above the normal; greatest monthly, 15.80, at Dallas; least monthly, 2.93, at Greenville, Miss.

Wind.—Prevailing direction, south.—M. F. Locke, Commissioner of Agriculture, Little Rock, director; F. H. Clarke, Observer, Weather Bureau, assistant.

CALIFORNIA.

Temperature.—The mean was 2.6 below the normal; maximum, 107, at Bakersfield, 21st; minimum, 29, at Fort Jones, 8th; greatest monthly range, 69, at San Ardo; least monthly range, 47, at Oakland and Yuba City.

Precipitation.—The average was 1.67 above the normal; greatest monthly, 7.58, at Georgetown; least monthly, 0.28, at Bakersfield.

Wind.—Prevailing direction, west.—J. A. Barwick, Observer, Weather Bureau, Sacramento, director.

COLORADO.

The continued cold weather was unfavorable to crops.