

The percentages of verifications of special predictions for certain localities are, as follows:

Omaha, Nebraska (twenty-seven days), 89.35; Alabama (twenty-seven days), 85.65; Tennessee (twenty-seven days), 88.00; Georgia, (twenty-seven days), 88.94; Baltimore, Maryland, 76.61; Washington City, 77.82; Erie, Pennsylvania, 72.58; Boston, Massachusetts, 77.82; New Haven, Connecticut, 76.21; Portland, Maine, 77.42; Albany, New York, 76.61; Pittsburg, Pennsylvania, 72.58; Cincinnati, Ohio, 70.16; Louisville, Kentucky, 77.82; Columbus, Ohio, 70.97; Cleveland, Ohio, 73.39; Indianapolis, Indiana, 75.81; Oswego, New York, 72.98; Rochester, New York, 73.79; Buffalo, New York, 80.65; Milwaukee, Wisconsin, 70.56; Chicago, Illinois, 66.53; Detroit, Michigan, 77.92; Toledo, Ohio, 77.82; Sandusky, Ohio, 79.03; Cairo, Illinois, 74.60; Saint Louis, Missouri, 70.16; Memphis, Tennessee, 85.89; Shreveport, Louisiana, 85.48.

CAUTIONARY SIGNALS.

During October, 1885, one hundred and twenty-seven cautionary signals were ordered. Of these, one hundred and nine, or 85.83 per cent., were justified by winds of twenty-five miles or more per hour, at or within one hundred miles of the station. Twenty-five cautionary off-shore signals were ordered, of which number, twenty-two, or 88.00 per cent., were fully justified both as to direction and velocity; and all, or 100 per cent., were justified as to direction. One hundred and fifty-two signals of all kinds were ordered, one hundred and thirty-one, or 86.18 per cent., being fully justified. These do not include signals ordered at display stations where the velocity of the wind is only estimated. Of the twenty-five cautionary off-shore signals, fifteen were changed from cautionary signals. Four signals were ordered late. In sixty-nine cases winds of twenty-five miles or more per hour were reported for which no signals were ordered.

COLD-WAVE SIGNALS.

During October, 1885, there were ninety-three cold-wave signals displayed, of which number seventy-two, or 77.4 per cent. were justified.

As evidence of the value of cold-wave signals, and the favor with which these warnings are received by the general public, the following extracts from the reports of Signal Service observers, and from other sources, are given:

The meteorological committee state that "the establishment of the cold-wave warning signal at Jacksonville is highly appreciated by the board of trade and by the citizens of Florida, generally."—*Report of observer, Jacksonville, Florida.*

The cold-wave warnings are of vast benefit to the farmers and citizens here. Both the press and public are pleased that these warnings are given. The signals have brought the service and its workings prominently before our people.—*Report of displayman, Logansport, Indiana.*

The benefits derived from these warnings are very general to all classes. Shippers of perishable produce and dealers in fresh meats are greatly benefited. The warnings are duplicated by flag at Richmond Mills (eight miles south of the city), and give great satisfaction to the farmers and millers in that vicinity.—*Report of observer, Rochester, New York.*

Great interest is manifested by the public. During displays visitors are almost continuously in the office after information. Shippers of goods, coal and river men, and people of all avocations are interested in these warnings.—*Report of observer, Pittsburg, Pennsylvania.*

The warnings are of especial benefit to gardeners, roofers, dealers in oysters, fruit, and vegetables, farmers, ice-packers, railroad companies, and dealers in live-stock.—*Report of observer, Saint Louis, Missouri.*

The service has been very accurate in these warnings. The public now have unbounded confidence in the weather department. The observer is often consulted by interested parties, and great benefit is derived.—*Report of observer, Cleveland, Ohio.*

I consider the cold-wave signal of more practical benefit to the public at large than any recent improvement in the United States Signal Service. I know, personally, of many instances during the past winter where farmers were saved from serious losses in the shipment of potatoes and apples by the timely warning of the cold-wave signal. Other instances I know, by report, where losses were sustained in the shipment of live stock (cattle and hogs) by neglecting or disregarding the warning. Our citizens and farmers have learned to rely on the forecasts given almost implicitly, and it is not too much to say that, in my judgment, the property saved by its use during the past severe winter in the Mississippi Valley would pay for its maintenance for a generation.—*Extract from a letter from Hon. J. F. Webb, mayor of Lebanon, Illinois.*

RAILWAY WEATHER SIGNALS.

Prof. P. H. Mell, jr., director of the "Alabama Weather Service," in the report for October, 1885, states:

The verification of predictions for the whole area was 93 per cent. for temperature and 86 per cent for weather.

The following roads comprise this system: Western of Alabama; South and North; Montgomery and Mobile; Mobile and Girard; Georgia Pacific; East Tennessee, Virginia and Georgia system in Alabama; Memphis and Charleston; Columbus Western; Atlanta and West Point of Georgia; Northeastern of Georgia; Atlanta and Charlotte Air Line; Western and Atlantic; Georgia; East Tennessee, Virginia and Georgia system in Georgia; and Savannah, Florida and Western.

Prof. Benjamin F. Thomas, director of the "Ohio Meteorological Bureau," in the report for October, 1885, says:

The verification of railway signals for the month was as follows: For temperature, 96 per cent.; for weather, 89 per cent.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Point Judith, Rhode Island, 6th: a brilliant auroral display was observed from 11 p. m. until midnight.

Mount Washington, New Hampshire, 8th: an aurora was observed at 9.45 p. m., consisting of two arches of pale straw-colored light. The upper arch disappeared at 10.20 and the lower one at 11 p. m.

Poplar River, Montana, 8th: at 9.05 p. m. a diffuse auroral light appeared in the north and continued without change until 11.30 p. m., when it disappeared.

Saint Vincent, Minnesota, 8th: an irregular auroral arch formed in the northern sky at 9 p. m.; it extended from 170° to 240° azimuth and had an altitude of 25°; the display was not bright; occasionally a few beams shot upward from the arch to an altitude of 10°.

Fort Totten, Dakota, 8th: an aurora was observed at 10.10 p. m., reaching an altitude of 30° and covering 150° of the horizon; at intervals an indistinct arch, with shooting beams, was visible; the display ended at 2.15 a. m. of the 9th.

Escanaba, Michigan, 8th: a faint aurora was observed from 7.58 to 10.40 p. m.

Fort Buford, Dakota, 8th: an aurora appeared at 7.40 p. m.; it consisted of an arch which extended from north-northwest to northeast, and to an altitude of 15°; it was most brilliant at 8.14 when the light extended upward 25°; after the latter hour it gradually faded.

Burlington, Vermont, 11th: an auroral light, extending from northwest to northeast, and to an altitude of 20°, was observed from 7.30 to 11 p. m.

Mount Washington, New Hampshire, 11th: an aurora was observed at 9.55 p. m., consisting of occasional streamers shooting upward from a base of light in the north, and converging at the zenith; at 11.40 p. m. the display was still visible though less brilliant, and at midnight it had entirely disappeared.

Mackinaw City, Michigan, 11th: at 7.30 p. m. there appeared a faint auroral light of pale pink color, reaching an altitude of 20° and covering 50° of the horizon. The display continued until 12.20 a. m., when the sky was obscured by clouds.

Marquette, Michigan, 12th: an aurora, resembling the morning dawn, was observed at 1 a. m.

Moorhead, Minnesota, 13th: a faint aurora was observed from 10.30 to 11.50 p. m.; it consisted of a pale light in the north extending to an altitude of 15°.

Fort Totten, Dakota: an aurora, consisting of a pale yellow color, extending to an altitude of 20° and covering 100° of the horizon, was observed from 10 p. m. to midnight. A faint auroral display was also observed on the 14th from 10.15 to 11.50 p. m.

Mount Washington, New Hampshire, 15th: a brilliant aurora was observed at 10.55 p. m.; the light was of an intense greenish color, and illuminated the mountain as brightly as though the full moon shone.

Alpena, Michigan, 15th: an aurora was first noticed at 10.10 p. m., consisting of a few faint streamers, which appeared and disappeared at intervals until 10.50 p. m., when they were last observed.

Table of miscellaneous meteorological data for October, 1885—Signal Service observations.

Table with columns for Stations, Elevation above sea level, Atmospheric pressure (in inches and hundredths), Temperature of the air (in degrees Fahrenheit), and Winds. The table is organized into several regional sections: New England, Middle Atlantic States, South Atlantic States, Florida Peninsula, Eastern Gulf States, Western Gulf States, Rio Grande Valley, Ohio Valley & Tennessee, Lower lake region, and Upper lake region. Each station entry includes data for atmospheric pressure (mean actual, departure from normal, mean reduced), temperature (extremes, daily ranges, mean, precipitation), and wind characteristics (direction, velocity, maximum velocity, and frequency of rainy, cloudy, and clear days).

Table of miscellaneous meteorological data for October, 1885—Signal Service observations—Continued.

Main data table with columns for Stations, Elevation, Atmospheric pressure, Temperature of the air, Humidity, Precipitation, and Winds. Includes sub-sections for Upper Mississippi Valley, Missouri Valley, Northern slope, Middle slope, Southern slope, Southern plateau, Northern plateau, and Pacific coast region.

* Record for 30 days.

† Record for 29 days.

‡ Record for 27 days.

§ Record for 28 days.

Duluth, Minnesota, 15th: a pale, white auroral light was observed from 9.10 p. m. to 11.25 p. m.; at times it appeared as a partial arch; no beams were visible.

Point Judith, Rhode Island, 15th: an auroral display began at 11.30 p. m. and continued until 4 a. m. of the 16th. The light was of straw color; streamers moving across the sky from east to west were observed.

Moorhead, Minnesota, 15th: a bright auroral display was observed at 10 p. m.; the entire northern sky was covered with a waving light; occasional streamers were also observed, reaching an altitude of 75°; the display ended at 6.20 a. m. of the 16th.

Fort Totten, Dakota, 15th: a very bright aurora appeared at 9.10 p. m., consisting of an arch which extended upward 30° and covered 165° of the horizon; shooting beams were occasionally seen; the display ended at 11.50 p. m.

Block Island, Rhode Island: a faint aurora was observed at midnight of the 15-16th, consisting of an arch of pale light extending to an altitude of 10° and covering 90° of the horizon; no streamers were visible; the display continued until daylight.

Poplar River, Montana, 16th: a faint aurora, partly obscured by clouds, was observed at 1 a. m.; there were two pale streamers which extended to an altitude of 48°; the display ended at 2 a. m.

Fort Bennett, Dakota, 16th: between 12.10 and 1.15 a. m. a faint aurora was observed in the north-northeast, consisting of an arch covering 30° of the horizon and extending upward 9°.

Fort Buford, Dakota, 16th: an aurora was observed at 4.44 a. m. and continued until 5.15; it consisted of a well-defined arch extending upward 15° and covering the horizon from north-northwest to northeast.

Escanaba, Michigan, 28th: a faint aurora was observed from 8.14 to 9.53 p. m.

Mackinaw City, Michigan, 29th: when the sky cleared at 8.30 p. m. an aurora was observed; the display continued until 10.45 p. m., consisting of a light of pale pink color, which extended upward 15° and over 30° of the horizon.

Escanaba, Michigan, 30th: a faint aurora was observed from 8.53 to 11.44 p. m.

Mackinaw City, Michigan, 30th: an auroral light was observed from 8 to 11.45 p. m.; altitude, 25°; azimuth, 30°.

Marquette, Michigan, 30th: an aurora was observed at 10 p. m.; an arch appeared covering 40° of the horizon; the display ended at 11.30.

Alpena, Michigan, 30th: an aurora appeared at 9.40 p. m., consisting of a diffuse light on the northern horizon; the display ended at 11.30 p. m.

Portland, Maine, 31st: a faint auroral display was observed from 9.45 p. m. until midnight; it consisted of an irregular arch of 30° and covered 90° of the horizon.

Poplar River, Montana, 31st: a pale auroral arch was visible from 9.25 to 11.40 p. m.; two faint streamers rose to an altitude of 15°.

Mount Washington, New Hampshire, 31st: an auroral light of bluish color was observed from 9.30 to 11.40 p. m.; several streamers were visible.

Other auroral displays were observed during the month, as follows:

8th.—Webster, Dakota; Sycamore, Illinois; Cresco, Iowa; Gardiner, Cornish, and Eastport, Maine; Manistique, Michigan; Contoocook, New Hampshire; Wauseon, Ohio; Newport, Vermont.

9th.—Eastport and Kent's Hill, Maine.

11th.—Gardiner, Cornish, Orono, Buckfield, and Portland, Maine; Cambridge, Massachusetts; Hiram, Ohio; Newport, Vermont; Manitowoc and Madison, Wisconsin.

12th.—Cornish, Maine.

14th.—Webster, Dakota; Cambridge, Massachusetts, aurora suspected; Harvard, Nebraska.

15th.—Gardiner, Maine; Cambridge, Massachusetts.

16th.—Webster, Dakota.

17th.—Webster, Dakota.

18th.—Fort Totten, Dakota; Dyberry, Pennsylvania.

21st.—Gardiner, Maine.

27th.—Manistique, Michigan.

28th.—Cresco, Iowa; Manistique, Michigan.

30th.—Manistique, Michigan.

31st.—Cambridge, Massachusetts; North Volney, New York.

THUNDER-STORMS.

Thunder-storms occurred in the various states and territories, as follows:

Arizona.—Prescott, 9th, 16th; San Carlos, 9th, 22d; Fort Thomas, 22d.

Arkansas.—Lead Hill, 1st; Fort Smith, 11th, 12th.

California.—Sacramento, 6th; San Francisco and Oroville, 7th; Fort Bidwell, 9th, 22d.

Colorado.—West Las Animas, 10th; Montrose, 10th, 11th.

Connecticut.—New Haven, 3d; Bethel and Southington, 3d, 4th, 29th; South Colebrook, 3d, 29th.

Dakota.—Fort Totten, 10th.

Delaware.—Cape Henlopen, 2d, 30th.

District of Columbia.—Washington City, 2d, 3d, 13th, 29th.

Florida.—Pensacola, 1st, 2d, 3d, 28th; Cedar Keys, 2d; Key West, 2d, 4th, 10th, 11th, 28th; Sanford, 2d, 9th; Limona, 8th, 28th; Merritt's Island, 9th, 11th.

Georgia.—Atlanta, 3d, 28th; Athens, 28th.

Illinois.—Anna, 1st; Cairo, 1st, 2d, 18th; Chicago, 2d; Springfield, 2d, 18th, 22d, 28th; Charleston, 2d, 7th, 18th, 27th; Collinsville, 2d, 27th; Mattoon and Windsor, 18th, 27th.

Indiana.—Greencastle, 2d, 3d, 7th, 18th, 19th, 27th; Indianapolis and Lafayette, 18th, 27th; Fort Wayne and Logansport, 18th; Terre Haute, 27th; Jeffersonville, 28th.

Indian Territory.—Forts Reno and Sill, 24th.

Iowa.—Independence, 11th; Indianola, 11th, 12th, 27th; Keokuk, 11th, 18th, 27th; Burlington, 12th, 18th, 27th; Fort Madison, 17th, 27th; Cedar Rapids and West Union, 24th; Des Moines, 27th.

Kansas.—West Leavenworth, 1st, 11th, 12th, 18th, 24th, 28th; Allison, 10th; Achison, 10th, 11th, 18th, 21st, 27th; Fort Scott, 10th, 11th; Leavenworth, 11th, 12th, 27th, 28th; Concordia and Wyandotte, 11th; Independence, 11th, 24th; Wellington, 11th, 17th, 24th, 27th; Westmoreland, 11th, 25th, 27th; Yates Centre, 11th, 24th, 27th; Topeka, 18th, 24th, 27th; Ninnescah, 24th.

Louisiana.—Shreveport, 11th, 12th, 25th, 31st; Point Pleasant, 31st.

Maine.—Bangor, Eastport, and Gardiner, 3d; Portland, 3d, 14th; Orono, 3d, 14th, 30th.

Maryland.—Fort McHenry, 2d; Ocean City, 2d, 4th; Baltimore, 2d, 29th; Fallston, 3d, 29th.

Massachusetts.—Blue Hill, Fall River, Somerset, Taunton, and Worcester, 3d; Westborough, 3d, 4th; Dudley, 3d, 7th; Amherst and Rowe, 4th.

Michigan.—Alpena, Birmingham, Detroit, Escanaba, Grand Haven, Lansing, Mackinaw City, Manistique, and Saginaw, 2d; Mottville, 18th; Port Huron, 27th.

Missouri.—Carthage, 11th; Lamar, 11th, 27th; Saint Louis, 12th, 31st; Conception, 24th, 27th.

Nebraska.—North Platte, 10th; Genoa, 10th, 27th; Crete and Marquette, 11th; De Soto, Omaha, and Yutan, 11th, 27th; Tecumseh, 27th.

Nevada.—Carson City, 8th; Fort McDermitt, 9th.

New Hampshire.—Contoocook, 4th, 8th.

New Jersey.—Barnegat City, 3d; Dover and Sandy Hook, 3d, 4th; Somerville, 3d, 4th, 5th; Beverly and Moorestown, 3d, 4th, 29th; Little Egg Harbor, 3d, 29th; Princeton, 4th; Atlantic City, Cape May, and Readington, 29th.

New Mexico.—Fort Stanton, 9th, 17th.

New York.—Fort Columbus, Mountainville, and West Point, 3d; New York City, 3d, 4th; Albany and Menand Station, 4th; Ithaca, 3d, 4th, 27th; North Volney, 13th; Buffalo, 13th, 14th, 27th; Humphrey, 27th.

North Carolina.—Hatteras, 1st; Charlotte, 2d; Wilmington, 2d, 4th; New River Inlet, 2d, 12th, 29th; Weldon, 3d; Smithville, 12th; Stateville, 20th; Raleigh, 29th.

Ohio.—Cleveland, Garrettsville, and Napoleon, 3d, 27th; Toledo and Wauseon, 18th; College Hill, 21st, 29th; Cincinnati, Jacksonborough, Hiram, North Lewisburg, Tiffin, Westerville, and Yellow Springs, 27th.

Oregon.—East Portland, 9th; Portland, 10th.

Pennsylvania.—Wellsborough, 2d; Dyberry, 3d; Fallsington, 3d, 4th, 29th, Chambersburg, 3d, 13th; Erie, 3d, 27th; Grampian Hills and Pittsburg, 13th; Philadelphia and South Bethlehem, 29th.

Rhode Island.—Block Island, Narragansett Pier, and Point Judith, 3d.

South Carolina.—Kirkwood and Stateburg, 2d, 3d; Spartanburg, 2d, 3d, 20th; Pacolet, 20th.

Tennessee.—Memphis, Milan, and Nashville, 1st; Chattanooga, 1st, 28th, 29th; Ashwood and Knoxville, 3d and 28th; Austin, 13th.

Texas.—El Paso, 1st, 10th; New Ulm, 2d, 18th, 25th; Indianola, 11th; San Antonio, 11th, 18th; Brownsville, 12th; Fort Stockton, 17th; Palestine, 18th; Abilene, 18th, 24th; Galveston, 18th, 25th, 31st; Cleburne, 24th.

Utah.—Frisco, 8th; Salt Lake City, 9th, 10th.

Vermont.—Brattleborough, Lunenburg, Newport, and Strafford, 4th; Woodstock, 4th, 21st; Charlotte, 14th.

Virginia.—Fort Myer, 2d, 3d, 13th, 29th; Bird's Nest, 2d, 3d, 21st, 29th; Dale Enterprise, 3d, 8th, 29th; Cape Henry, Chincoteague, and Norfolk, 3d, 29th; Blacksburg, Lynchburg, and Variety Mills, 29th; Snowville, 30th.

Washington Territory.—Pysht, 29th; Neah Bay, 29th, 30th.

Wisconsin.—Manitowoc, 24th.

Wyoming.—Fort Bridger, 9th.

The following notes on the probable connection between the occurrence of thunder-storms at special stages of the tide, have been prepared by Junior Prof. H. A. Hazen, of the Signal Office:

A frequent inquiry is made as to whether the tides in any way can influence the occurrence of thunder-storms. In general, it is much safer to first determine how such influence can be possible and afterward to determine its amount and detailed action by actual observation. There are many cases, however, in which we may be able to establish certain facts pointing to interdependence between two phenomena, although there may be no apparent connection. Great care must be taken in the latter case that we do not insist on the connection, except as supported by the clearest proofs. For example, there is a well-nigh universal belief that there is an intimate connection between different phases of the moon and the weather. The reason for this is, in part, that during any particular phase all kinds of weather are experienced, and those who hold one view only consider the weather that coincides with their views, while a complete study would show that after all there is but little difference between the weather at different phases. Attempts have already been made to prove a connection between thunder-storms and the moon; it is evident that, since the moon is the principal cause of the tides, if such connection could be established we would have a partial proof of the point now under discussion. Doctor Köppen, of Germany, has published an investigation of the moon's influence upon thunder-storms, and the writer has made a study of the same from the very complete records of the Signal Service for 1884. The following table exhibits the results side by side:

Moon's Phase.	Dr. Köppen.		Signal Service.	
	No. of storms.	Per cent.	No. of storms.	Per cent.
New	336	25.2	3,538	29.5
First quarter	406	30.5	3,232	27.0
Full	270	20.3	2,930	24.4
Last quarter	321	24.1	2,296	19.1
Total	1,333	100.1	11,996	100.0

These results are quite accordant, and show a slight predominance in the number of storms during new moon and first quarter above the other two phases. The amount of the effect it will be seen, however, is extremely slight. Turning to the subject in hand, we find many well-educated people residing along the Atlantic coast who believe that no severe thunder-storm will occur in their neighborhood during a falling tide. This belief has been recently communicated to this office by Mr. S. B. Strong, the voluntary observer at Setauket, New York. There seemed to be sufficient reason for entering upon an investigation, even though no relationship between the phenomena could

be premised from general laws. There are many serious difficulties in the way of such an investigation.

1st. The storms themselves are not always well and sharply defined occurrences.

2d. It is not easy to get the moment of most intense action during the progress of the storm or any other moment in the life of a storm which will enable us to make a rigid comparison between one and another.

3d. We cannot easily determine whether we are at the centre or on the edge of a storm.

4th. The question of the place where we shall take the tide is an intricate one, though it will be safer at the outset to take the tide on promontories rather than at the head of bays or up large rivers.

With the above conditions in mind, 197 storms along the Atlantic coast from Savannah, Georgia, to Portland, Maine, have been taken, without selection, and studied in connection with rising and falling tide. Three divisions have been made; in the first were placed all storms which occurred on the rising tide, in the second all storms which lasted over from the rising tide or occurred very near the highest point, in the third all storms that occurred on a falling tide. Out of these 197 storms 111, or 56 per cent., were in the first division, 57, or 29 per cent., were in the second, and 29, or 15 per cent., were in the third. Considering half the storms in the second division as belonging to the first we have 70.5 per cent. occurring on the rising tide as against 29.5 per cent. on the falling. This is a rather remarkable result and needs corroboration by more observations, and by extending the discussion to other countries. The results would seem to be worthy of a much more exhaustive study. It is very plain that the question of a connection between thunder-storms and the tides does not stop at the sea-coast. We ought to obtain answers to question like the following:

Is there a direct effect from the tide on the storm?

Is there a force acting upon both?

Is the influence at the coast alone?

Can we find any general law connecting the occurrence of thunder-storms inland with those on the coasts?

We may go still farther. Since it has been fairly well established that our more severe thunder-storms occur in the southeast quadrant of low areas, may we not be enabled to correlate the development and progress of our more general storm-actions with some general law not yet fully discovered?

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various states and territories, as follows:

Alabama.—1st.

Arizona.—7th, 20th.

California.—12th, 15th, 22d, 23d, 25th, 26th.

Colorado.—5th, 13th, 26th.

Connecticut.—12th.

Dakota.—2d, 12th, 31st.

Florida.—26th, 27th.

Georgia.—8th, 10th, 19th, 27th.

Idaho.—13th.

Illinois.—11th, 14th, 15th, 17th, 18th, 26th, 27th.

Indiana.—15th, 18th.

Iowa.—3d, 4th, 10th, 11th, 17th, 24th, 26th, 29th.

Kansas.—26th.

Kentucky.—11th.

Maine.—13th, 31st.

Michigan.—10th, 11th, 12th, 14th, 17th, 18th, 27th.

Missouri.—15th.

Montana.—4th, 5th, 12th, 16th.

Nevada.—11th, 13th, 15th, 25th.

New Jersey.—12th, 19th.

New York.—12th, 13th, 16th, 18th.

North Carolina.—20th, 28th.

Ohio.—7th, 12th, 15th, 17th, 18th, 20th, 24th to 27th.

Pennsylvania.—10th, 12th, 18th, 19th, 30th.

Rhode Island.—12th, 20th.

South Carolina.—8th, 10th, 19th, 20th, 25th, 29th.

Tennessee.—7th, 11th, 15th, 18th, 27th, 30th.

Texas.—6th, 31st.

Utah.—11th.

Virginia.—11th, 18th, 19th, 26th, 28th.

Washington Territory.—11th, 12th, 16th.

Wisconsin.—12th, 17th, 18th, 24th.

Wyoming.—5th, 8th, 9th, 13th, 14th, 16th, 17th, 24th to 28th.

LUNAR HALOS.

Lunar halos were observed in the various states and territories, as follows: