continued from 3 a. m. to 3 p. m. of the 24th. At the former time the potential suddenly rose to a very high value, and remained beyond the scale limit until 5 a. m., when it rapidly fell to 700 volts negative. Oscillations from positive to negative continue until 1.20 p. m., when the potential becomes positive, reaching an observed value of 2,500 volts, becoming normal at 3 p. m. Rain began on the morning of the 24th, turning to snow at 11.45 a. m. and ending at 2.50 p. m."

At New Haven, Connecticut, negative values were obtained on December 31st, during sleet; on January 1st, during rain; on the 14th, during rain; on the 17th, during rain; on the 24th, during rain; on the 29th, during rain. Snow was accompanied by characteristic positive values on the 4th, 5th, 15th, and 26th.

At Boston, Massachusetts, negative values were recorded on January 4th, in advance of, and during, snow; at 1 p. m. on the 5th, six hours in advance of rain; on January 9th, preceding, and during, snow; on January 24th, during rain, preceding thunder by two hours; on the 26th, at 9 and 11 a. m., preceding snow, beginning at 11.15 a. m. Thus on all these dates the electrometer indications might have been successfully used in the prediction of coming weather changes. Rain occurred on December 31st and January 1st, ending at 2.10 p. m. of the latter date, accompanied with low positive values. High positive values prevailed during the clear weather following. Rain on the 6th from 11 a. m. until 1 p. m., preceded by snow, was accompanied by low positive values. Snow and rain on the 14th and 17th were accompanied by low positive values. On the 24th rain began at 7 a. m., ending at 8.45 a. m., beginning again at 9.05 and continuing throughout the day. Two loud peals of thunder were heard at 1.30 p. m. The values noted for the four observations were, respectively, 14.0, —31.6, 20.2, and 30.8 volts. On the 28th light drizzling rain began at 12.30 p. m. and continued until 2.15 p. m. A negative value was observed at 10 a. m., or two and a half hours in advance of the commencement of the rain. Snow, as was said above, in several cases was preceded, sufficiently long to be of value in prediction of the weather, by negative values, and in all cases by a fall in the value of the potential. At Columbus, Ohio, negative values were recorded only on the 14th, with threatening weather and rain, and on the 28th, during fine rain. Snow at this station was generally accompanied by positive values.

At Ithaca, New York, snow on January 1st, 5th, and 7th, was accompanied by positive values. On January 10th light snow began at 8.45 a. m., ending at 10 a. m. The values at the 9 and 11 a. m. observations being, respectively, negative 130 volts, and positive 40 volts. On January 13th negative values precede the snow by five hours; on the 15th, during the continuance of snow all that day and the next, the values remain negative, when, as a rule, during continued snow, values which are at first negative change to positive, often of very high value. On the 17th negative indications precede rain four hours. Snow on the 18th is accompanied by high positive values. On the 19th and 20th, during cloudy weather, negative values are recorded, from which snow might have been anticipated on either date. Snow on the 21st was accompanied by negative, and preceded by low positive values. On the 24th negative values were obtained during snow; on the 26th, low, changing to high positive values, were recorded during snow; and on the 28th negative values were obtained during threatening weather.

Chart vi shows the observations made at the different stations during the month of January.

There would seem to be at all four stations some slight agreement as to the dates of negative values, particularly on January 24th.

As the observations at present embrace but a part of the days, and are made at different elevations, and under differing conditions, it is hardly worth while to do more, in the discussion of these results at present, than to call attention to some of the most general correspondences.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various states and territories on the following dates:

Arizona.—4th, 19th, 20th, 26th, 27th.
California.—1st, 2d, 4th, 19th, 27th.
Colorado.—7th.
Connecticut.—7th, 8th, 13th, 19th.
Dakota.—1st, 5th, 6th, 7th, 9th, 16th, 31st.
District of Columbia.—7th, 9th, 10th.
Florida.—14th, 28th.
Georgia.—4th, 19th, 28th.
Idaho.—9th.
Illinois.—1st to 3d, 5th to 11th, 13th, 16th, 18th, 21st, 24th, 27th to 30th.
Indiana.—6th, 11th, 12th, 22d, 24th.
Iowa.—1st, 2d, 3d, 5th, 6th, 7th, 10th, 12th, 17th, 18th, 25th, 30th.
Kansas.—6th, 18th, 19th, 21st, 25th, 26th, 27th, 29th, 30th, 31st.
Maine.—9th, 12th, 13th, 19th, 31st.
Maryland.—7th, 9th, 10th, 13th, 19th, 20th.
Massachusetts.—7th to 10th, 13th, 17th, 19th, 23d, 25th, 31st.
Michigan.—6th, 11th, 13th, 20th, 27th, 29th, 30th.
Minnesota.—4th, 10th, 17th, 20th, 21st, 22d, 25th, 30th.
Missouri.—1st.
Montana.—10th, 14th, 17th.
Nebraska.—1st, 3d, 6th, 31st.
Nevada.—2d.
New Hampshire.—8th, 13th, 19th, 25th, 28th, 31st.
New Jersey.—7th, 8th, 19th, 28th.
New York.—4th, 5th, 7th, 8th, 13th, 20th, 25th, 27th, 30th.
North Carolina.—3d.
Ohio.—4th, 6th, 7th, 8th, 11th, 16th, 21st, 26th.
Oregon.—16th.
Pennsylvania.—4th, 7th, 8th, 14th, 25th, 31st.
South Carolina.—2d, 4th, 6th, 13th, 19th, 28th.
Tennessee.—2d, 3d, 4th, 6th, 7th, 14th, 16th, 19th, 21st, 23d, 27th, 30th.
Vermont.—13th.
Virginia.—4th, 7th, 9th, 10th, 31st.
Wisconsin.—1st, 3d, 5th, 6th, 7th, 9th, 10th, 14th, 17th, 18th, 21st, 25th, 27th, 29th.

LUNAR HALOS.

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

Arizona.—1st to 5th, 12th, 30th.
Arkansas.—5th, 6th, 30th.
California.—1st to 6th, 11th, 29th.
Colorado.—2d to 5th, 7th, 8th, 15th.
Connecticut.—6th, 7th, 8th, 11th, 31st.
Dakota.—1st, 3d to 8th, 10th, 11th, 15th, 16th, 29th, 30th, 31st.
Delaware.—11th.
District of Columbia.—7th.
Florida.—6th, 10th, 31st.
Georgia.—4th, 6th, 30th.
Illinois.—1st, 3d, 4th, 5th, 7th to 12th, 29th, 30th.
Indiana.—3d, 5th, 7th, 10th, 11th, 27th, 29th, 30th.
Iowa.—3d, 5th, 11th, 16th, 17th, 29th, 31st.
Kansas.—1st, 3d, 5th, 6th, 7th, 10th, 14th, 18th, 19th, 21st, 29th, 30th, 31st.
Kentucky.—3d.
Louisiana.—1st, 3d, 8th, 29th.
Maine.—7th, 8th, 31st.
Maryland.—4th, 6th, 7th.
Massachusetts.—4th, 6th, 7th, 8th, 11th.
Michigan.—2d, 3d, 4th, 7th to 10th, 13th, 18th, 19th, 29th.
Minnesota.—2d, 3d, 5th, 8th, 10th, 11th, 20th, 31st.
Missouri.—5th, 7th, 12th, 30th, 31st.
Montana.—3d, 5th, 9th, 10th.

Nebraska.—2d, 4th, 5th, 6th, 9th, 10th, 11th, 13th, 17th, 29th, 30th.
Nevada.—4th.
New Hampshire.—1st, 6th, 7th, 8th, 11th.
New Jersey.—4th, 6th, 7th, 8th, 11th, 13th, 31st.
New Mexico.—4th.
New York.—4th to 8th, 10th, 11th.
North Carolina.—2d, 4th, 6th, 8th.
Ohio.—1st to 6th, 8th, 10th to 13th, 16th, 27th to 31st.
Oregon.—1st to 5th, 8th, 10th, 14th.
Pennsylvania.—4th, 5th, 7th, 8th, 11th, 12th, 13th, 16th, 20th, 25th.
Rhode Island.—7th, 8th. 11th.
South Carolina.—2d to 7th, 28th, 30th.
Tennessee.—2d to 7th.
Texas.—2d to 6th, 8th.
Utah.—2d.
Vermont.—4th, 6th, 7th, 8th, 11th.
Virginia.—4th, 6th, 7th, 8th, 10th, 11th, 14th, 21st, 31st.
Washington Territory.—7th, 16th.
West Virginia.—4th, 6th.
Wisconsin.—4th to 12th, 27th, 29th, 30th.

The phases of the moon (Washington mean time) during January, as given in "The American Ephemeris and Nautical Almanac" for 1887, are as follows: New moon, 23d, 9 h. 52.9 m.; first quarter, 1st, 19 h. 12.3 m., and 31st, 15 h. 18.6 m.; full moon, 9th, 5 h. 24.0 m.; last quarter, 15th, 22 h. 13.8 m.; perigee, 11th, 12.9 h.; apogee, 27th, 13.6 h.

MIRAGE.

Mirages were observed during the month at the following places:
Dakota.—Henry and Webster, 27th.
Kansas.—Belleville, 9th; Salina, 15th, 17th, 18th, 24th, 29th.
Nebraska.—Marquette, 9th, 10th, 12th, 13th, 19th, 20th, 21st, 26th; Genoa, 9th.
Arizona.—Willcox, mirage seen nearly every day of the month.

MISCELLANEOUS PHENOMENA.

FOREST AND PRAIRIE FIRES.

Taylor, Williamson county, Texas: on the afternoon of the 14th a large area of prairie land, a few miles north of this place, was burned over. Five thousand sheep were surrounded by the fire; five hundred were killed and a large number injured.

Tahlequah, Indian Territory: a disastrous prairie fire occurred two miles north of this place on the afternoon of the 19th. The wind was blowing a gale at the time, causing the fire to spread rapidly and burn everything in its path; fences, hay, and out-buildings were destroyed, as well as many acres of prairie grass.

Eureka Springs, Carroll county, Arkansas: on the 18th, 19th, and 20th extensive forest fires were burning near this town. On the 20th the fire spread to the outskirts of the town and consumed two frame dwellings.

Forest and prairie fires were also reported from the following places:

Fort Reno, Indian Territory: prairie fires, 11th, 12th, 15th, 19th, 29th.

Fort Supply, Indian Territory: prairie fires, 19th, 20th, 21st, 27th, 28th.

Fort Sill, Indian Territory: prairie fire, 19th.

Silver Falls, Texas: prairie fires, 14th, 25th to 29th.

Duke, Florida: forest fire, 18th.

METEORS.

Oroville, Butte county, California: on the 2d, at 8 p. m., a meteor, of greenish color, started from a point about 30° west of the zenith and moved westward; as it progressed the color changed to red, and the meteor burst with a loud report.

Rockport, Essex county, Massachusetts: at 5.15 p. m. of the 3d a large and brilliant meteor passed over this town, moving from west to east; it was visible fully one minute. This meteor was also seen by the keeper of the breakwater lighthouse at Block Island, Rhode Island, who states that it was visible about one minute and disappeared seaward. The observer at Eastport, Maine, states that at 5.15 p. m. of the 3d a large meteor passed over that station from southwest to northeast, and was remarkable not only for its brilliancy but for the length of time that it was visible, about fifty seconds.

Riverside, San Bernardino county, California: Mr. A. K. Holt, voluntary observer at this place, furnishes the following descriptions of meteors observed by him during the month: "At exactly 7 o'clock (standard time), January 10th, a very bright meteor, like an immense ball of metal at white heat, appeared in the southeast about 10° above the horizon, moving from the north. In a few moments it exploded, scattering fire in every direction. The meteor was so bright that it cast a very clearly defined shadow, dimming the light of the full moon that was shining brightly at the time. On the evening of January 20th, at 7.32 (standard time), an extraordinarily bright meteor passed over from south to north, near the zenith, followed by a white trail thirty-five to forty degrees in length, giving the phenomenon the appearance of an immense bar of molten iron traversing the sky, the head of which continually threw off corruscations of fire." Reports of this meteor have been received from points one hundred and twenty-five miles south and sixty miles north of Riverside.

Cape Henlopen, Delaware: a brilliant meteor, about the size of an orange, and followed by a long train, was observed at 10 p. m. of the 23d, moving from north to south.

Meteors were also reported from the various stations, as follows:
Arizona.—Yuma, 10th.
Indiana.—Logansport, 10th; Butlerville, 20th; Vevay, 29th.
Iowa.—Monticello, 5th, 14th.
Kansas.—Wakefield, 4th; Salina, 4th, 28th, 29th; Wyandotte, 26th; El Dorado, 30th.
Massachusetts.—Dudley, 1st; Fall River, 3d.
Nebraska.—Fremont, 30th.
New Hampshire.—Berlin Mills, 3d.
New Jersey.—Beverly, 10th; Dover, 21st; Clayton, 31st.
Ohio.—Jacksonborough, 27th.
Oregon.—Linkville, 2d; Lakeview, 17th.
South Carolina.—Stateburg, 24th, 25th.
Texas.—Cleburne, 15th.
Virginia.—Rappahannock, 11th.
West Virginia.—Middlebrook, 26th.

MIGRATION OF BIRDS.

Geese flying southward.—Fort Reno, Indian Territory, 7th; Ashwood, Tennessee, 8th; Tatoosh Island, Washington Territory, 9th; Linkville, Oregon, 16th.

Geese flying northward.—Austin, Tennessee, and Marion, Virginia, 2d; Chattanooga, Tennessee, 8th; Salina, Kansas, and Fort Reno, Indian Territory, 15th; Stockham, Nebraska, 21st, 24th; Fort Madison, Iowa, 23d to 27th, 31st.

POLAR BANDS.

Polar bands were reported from the following stations:
Arkansas.—Lead Hill, 12th.
California.—Keeler, 1st, 4th, 5th, 25th.
Colorado.—Montrose, 24th, 31st.
Florida.—Archer, 20th, 28th, 30th.
Illinois.—Riley, 3d, 6th, 9th.
Iowa.—Cedar Rapids, 4th, 26th, 29th.
Kansas.—Allison, 5th; Salina, 14th, 15th, 17th, 23d, 29th.
Maine.—Gardiner, 7th, 9th, 11th, 13th.
Ohio.—Wauseon, 6th, 7th, 10th, 16th; Napoleon, 6th, 7th, 10th, 21st, 27th.
Tennessee.—Nashville, 5th, 6th.
Texas.—Abilene, 5th, 18th.
Virginia.—Dale Enterprise, 12th.

SAND STORMS.

Fort Grant, Arizona: a southeasterly gale set in at 11 a. m. of the 17th and continued until midnight, the wind blowing at a rate varying from thirty to forty-two miles per hour. The