

Marquette, Nebraska, 26th.  
Reidsville, North Carolina, 30th.

## MISCELLANEOUS PHENOMENA.

## DROUGHT.

Harrisburg, Pennsylvania, 21st: throughout the Lebanon Valley very little rain has fallen for several weeks, and many wells and cisterns have become dry. The drought extends over the central portions of the state; farmers in Berks and neighboring counties report the drought to be the severest that has occurred within twenty years. In the Mahanoy Valley one heavy rain only has fallen in nine weeks.

Chattanooga, Tennessee, 23d: dry weather has prevailed in this vicinity during the past six weeks. Farmers state that owing to the dryness of the soil they are unable to plow and that it is impossible to prepare land properly for fall seeding.

Nashville, Tennessee, 25th: a severe drought prevails throughout the central part of the state; streams, wells, and springs have become dry. Only 0.45 inch of rain has fallen since the 28th of September.

Portland, Maine, 25th: a severe drought prevails in this vicinity and throughout the entire state. Many wells are dry and much inconvenience and loss has occurred from the lack of rain.

Kitty Hawk, North Carolina, 26th: a drought has prevailed in this vicinity during the past two months; creeks and springs have become dry and cattle are suffering from want of sufficient water.

Upper Montclair, Essex county, New Jersey: on the 26th heavy rain set in and the long drought was broken. Wells and cisterns had become exhausted and small streams were dry.

Reidsville, Rockingham county, North Carolina: during the past two months the sowing of wheat and rye has been retarded by dry weather. The drought was broken on the 26th by a copious rainfall.

Quakertown, Bucks county, Pennsylvania: on the 26th and 27th 1.60 inches of rain fell, breaking the drought which had become quite severe; many wells and creeks were dry and, on account of the hardness of the soil, farmers have been unable to prepare land for fall seeding.

Chincoteague, Virginia: copious rain fell on the 27th. The continued dry weather had seriously affected the oyster and agricultural interests.

Moorestown, Burlington county, New Jersey, 31st: owing to the prevailing drought wheat and rye sown on the first days of the month have not yet germinated.

Wytheville, Wythe county Virginia: the total rainfall for the months of September and October is only 1.35 inches, while the normal for this station is 6.37 inches. The ground has become thoroughly dried and grain, pasturage, and late vegetables have suffered; streams and wells are very low.

Rappahaunock Station, Fauquier county, Virginia: owing to the drought throughout this section much of the land sown in wheat during the first days of the month will have to be resown.

Milan, Gibson county, Tennessee, 31st: during the past six weeks a severe drought has prevailed in this locality, springs and wells are failing and it is necessary, in some parts of the county, to drive stock two and three miles for water.

Milledgeville, Baldwin county, Georgia, 31st: the total rainfall of the past two months is only 0.59 inch, and since August 2d only 2.64 inches of rain have fallen in this locality. Owing to the dry weather fall crops are short, and farmers have been unable to sow small grain.

Livingston, Sumter county, Alabama: the month has been extremely dry; total rainfall, 0.76 inch; owing to the dry weather the season has been very favorable for cotton picking.

The following note in regard to the drought in Alabama is from the October report of the "Alabama Weather Service":

The drought that began the 23d of August has extended through October and continues unabated. This period already is longer by one week than the corresponding drought that occurred in 1884. This season has resulted in

good as well as evil to the farming interests throughout the country, because the cotton plant had about completed its growth before the soil became too dry, and the bolls opened rapidly under the warming influence of the sun's rays; the farmer has consequently been enabled to gather the staple in an unstained condition. The drought has, however, been unfavorable to the preparation of market gardens and planting of fall crops.

## FOREST AND PRAIRIE FIRES.

Bismarck, Dakota: on the 3d a prairie fire originated on the line between Hughes and Sully counties and passed over the prairie at the rate of fifteen miles per hour before a strong southerly gale that was prevailing at the time. Ploughed fire guards, from ten to thirty feet wide, did not obstruct the progress of this fire, as ignited "tumble weeds" were blown across and speedily communicated the fire to the grass on the opposite side.

Moorhead, Clay county, Minnesota: on the 6th and 7th prairie fires were burning in this county, destroying much property in the form of hay, wheat stacks, and fencing. Owing to the continued drought and high winds, fires are more frequent and extensive than usual; on the 9th a large area of prairie northeast of Moorhead was burned over and much damage was done in the vicinity of the villages of Hope and Leonard, 35,000 bushels of wheat, considerable farming machinery, and many tons of hay were destroyed.

Sherman, Grayson county, Texas: between the 10th and 15th a large area of prairie in the northeastern corner of the Indian Territory, extending along each side of the Missouri, Kansas, and Texas Railroad, was burned over. A number of cattle were burned, and also large quantities of hay.

Saint Paul, Minnesota: from the 10th to the 18th prairie fires were burning in the Turtle Mountain region, Bottineau county, Dakota, destroying the grass and timber on two hundred square miles of land. Thousands of tons of hay were also destroyed, with a large number of houses, barns, and all kinds of stock, many settlers losing all their possessions. It is reported that the losses will reach \$700,000.

Egg Harbor City, Burlington county, New Jersey: the long drought has dried the springs and smaller water courses and made the pine forests very combustible. On the 17th the forest in the southern part of the county was ignited by a spark from a locomotive, the fire spread rapidly over several miles of territory and burned much valuable timber.

Akron, Summit county, Ohio: on the 19th and 20th the "Copley swamps," a large body of marshy land covering several square miles, were burned over, together with several hundred acres of timber and pasture land and many miles of fencing. The soil in the neighborhood of these swamps is composed of muck which burned for several days, in some places to a depth of three feet into the ground.

North Platte, Nebraska: on the 23d an extensive prairie fire occurred in the neighborhood of this station, burning over an area ten miles long by two wide. The fire was accompanied by a high northwesterly wind, maximum velocity twenty-four miles per hour, which caused the fire to spread with great rapidity. Besides burning twenty square miles of valuable prairie grass, 1,500 tons of baled hay were consumed, with many miles of fencing; estimated loss \$10,000.

Reading, Pennsylvania: on the 23d, 24th, and 25th extensive forest fires prevailed in the Blue Mountains near this town, burning over 5,000 acres of valuable timber land. The charred remains of a number of cattle were found in the burned district.

Dover, Strafford county, New Hampshire: on the 23d and 24th forest fires burned 1,200 acres of valuable timber land in this vicinity.

Forest and prairie fires have also been reported from the following places:

Linkville, Oregon: forest fire, 27th.

Saint Vincent, Minnesota: prairie fires, 2d, 4th to 9th, 28th.

Moorhead, Minnesota: prairie fires, 11th, 14th, 19th, 23d, 31st.

Yankton, Dakota: prairie fires, 29th, 31st.

Huron, Dakota: prairie fires, 7th.  
Fort Shaw, Montana: prairie fires, 6th, 7th.

## METEORS.

Mobile, Alabama: a brilliant meteor, passing from north-east to southwest, was seen at 7.40 p. m. of the 17th. It was followed by a train of light 20° in length and apparently six inches wide. The meteor exploded while in the direction of the constellation Hercules. It was seen by many persons, some asserting that they heard the report of its explosion.

Charleston, South Carolina: a large meteor, apparent diameter six inches, was seen at 9.30 p. m. of the 24th moving from the zenith toward the west; it disappeared at an altitude of 20°.

Meteors were also observed in the various states and territories, as follows:

*Alabama.*—Mobile, 19th.  
*California.*—Keeler, 1st, 17th, 27th.  
*Florida.*—Limona, 3d, 5th, 27th to 31st.  
*Illinois.*—Charleston, 29th; Pekin, 31st.  
*Indiana.*—Vevay, 19th; Clinton, 20th; Terre Haute, 31st.  
*Kansas.*—Mauhattan, 17th; Sterling, 22d; Allison, 27th to 31st; Salina, 31st.  
*Kentucky.*—Richmond, 2d, 15th.  
*Maryland.*—Woodstock, 1st, 8th, 15th, 19th, 20th to 23d.  
*Massachusetts.*—Cottage City, 3d, 11th; Amherst, 9th.  
*Michigan.*—Kalamazoo, 2d; Mackinaw City, 30th.  
*Nebraska.*—Genoa, 28th.  
*New Hampshire.*—Nashua, 21st.  
*New Jersey.*—Egg Harbor City, 2d, 17th; Beverly, 25th; Dover, 31st.  
*New York.*—North Volney, 23d; Palermo, 31st.  
*Ohio.*—Tiffin, 2d, 13th; Wauseon, 19th; Jacksonborough, 24th.  
*Oregon.*—Albany, 22d, 28th.  
*Pennsylvania.*—York, 13th; Fallsington, 24th.  
*South Carolina.*—Stateburg, 15th, 20th, 28th; Spartanburg, 22d, 24th, 25th; Charleston, 28th.  
*Texas.*—Cleburne, 17th, 25th.  
*Virginia.*—Rappahannock, 10th, 17th; Wytheville, 16th, 18th; Dale Enterprise, 30th.  
*Wisconsin.*—Manitowoc, 3d; Madison, 20th; Delavan, 27th.

## MIGRATION OF BIRDS.

*Geese flying southward.*—Lead Hill, Arkansas, 26th; Red Bluff, California, 8th, 10th, 11th, 12th, 14th, 15th, 16th, 19th, 20th, 25th, 26th, 29th, 30th; Cape Henlopen, Delaware, 12th; Cœur d'Alene, Idaho, 14th; Fort Sill, Indian Territory, 20th, 21st; Muscatine, Iowa, 14th; Allison, Kansas, 15th, 16th, 17th; Manhattan, Kansas, 17th; Salina, Kansas, 15th; Liberty Hill, Louisiana, 1st, 16th, 17th, 22d; Ocean City, Maryland, 1st, 15th, 21st; Somerset, Massachusetts, 17th, 31st; Marquette, Michigan, 10th, 15th; Hudson, Michigan, 16th; Moorhead, Minnesota, 1st, 3d; Vicksburg, Mississippi, 25th, 26th; Poplar River, Montana, 20th; North Platte, Nebraska, 24th; Moorestown, New Jersey, 16th; Factoryville, New York, 19th; Ithaca, New York, 13th, 18th, 31st; Kitty Hawk, North Carolina, 28th; Garrettsville, Ohio, 16th; Wauseon, Ohio, 17th; Albany, Oregon, 6th, 7th, 8th, 10th, 11th, 12th, 16th, 29th; East Portland, Oregon, 8th, 19th; Linkville, Oregon, 8th, 9th, 13th, 17th, 23d, 30th, 31st; Roseburg, Oregon, 13th, 23d, 28th; Astoria, Oregon, 22d, 23d, 27th, 28th, 29th; Chattanooga, Tennessee, 26th; Fort Elliott, Texas, 13th; Corsicana, Texas, 13th, 14th, 16th, 26th; Austin, Texas, 24th; San Antonio, Texas, 25th; Cape Henry, Virginia, 19th; Tatoosh Island, Washington Territory, 14th.

*Geese flying northward.*—Pensacola, Florida, 29th; Ocean City, Maryland, 25th; Moorhead, Minnesota, 2d, 31st.

*Ducks flying southward.*—Kitty Hawk, North Carolina, 15th, 20th; Cape Henry, Virginia, 7th, 9th, 24th.

*Cranes flying southward.*—West Leavenworth, Kansas, 15th, 16th, 24th; Fort Elliott, Texas, 14th.

## POLAR BANDS.

Polar bands were reported from the following stations:

Fort Apache, Arizona, 10th.  
Montrose, Colorado, 9th.  
Archer, Florida, 4th, 14th.  
Riley, Illinois, 6th, 28th.  
Salina, Kansas, 9th, 11th, 13th.  
Gardiner, Maine, 4th, 18th.  
Amherst, Massachusetts, 12th.  
Fort Macon, North Carolina, 4th, 28th.  
Napoleon, Ohio, 11th, 12th.  
Wauseon, Ohio, 23d.  
Nashville, Tennessee, 3d.  
Dale Enterprise, Virginia, 4th.  
Wytheville, Virginia, 25th.  
Tatoosh Island, Washington Territory, 16th.  
Prairie du Chien, Wisconsin, 10th, 11th, 12th, 16th, 17th.

## SAND STORMS.

North Platte, Nebraska: brisk to high southerly winds set in during the afternoon of the 18th; they increased steadily in force, attaining at 8.45 p. m. a velocity of sixty miles per hour. Owing to the prevailing drought heavy clouds of sand and dust were raised by the force of wind, completely hiding the sky from view.

Sand storms also occurred on the following dates:

Yuma, Arizona, 9th, 10th, 18th, 31st.  
Fort Verde, Arizona, 15th, 29th.  
Keeler, California, 9th, 16th.

## SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and fifty-five stations show 4,763 observations to have been made, of which two were reported doubtful; of the remainder, 4,761, there were 4,341, or 91.2 per cent., followed by the expected weather.

## SUN SPOTS.

Prof. David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for October, 1886:

Date— October, 1886.	No. of new.		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
2, 5 p. m.	0	2	0	0	0	0	1	5	
3, 5 p. m.	0	51	0	0	0	0	1	101	
6, 11 a. m.	1	101	0	0	0	0	2	151	
7, 4 p. m.	0	0	0	0	0	0	2	151	
8, 11 a. m.	0	0	0	0	0	0	2	101	
10, 12 m.	0	0	0	0	0	0	2	8	
11, 4 p. m.	0	0	1	3	0	0	1	5	
16, 11 a. m.	1	251	0	0	0	0	1	251	
20, 12 m.	0	0	0	0	0	0	1	1	
21, 3 p. m.	0	2	0	0	0	0	1	3	
22, 3 p. m.	0	0	0	0	0	0	1	2	
24, 4 p. m.	1	6	1	2	1	6	1	6	

Faculae were seen at the time of every observation.

‡Approximated.

Mr. H. D. Govey, of North Lewisburg, Champaign county, Ohio, reports having observed sun spots on the following dates: 1st, 2d, 5th, 6th, 7th, 10th, 16th, 18th, 22d, 23d, 25th.

Mr. M. A. Veeder, of Lyons, New York, furnishes the following interesting note on sun spots and other phenomena:

On October 3d an extensive area of faculae came into view by solar rotation, and on October 6th several sun spots had formed in its midst. On October 6th and 7th an aurora, which was quite bright, although somewhat dimmed by strong moonlight, was observed. On these dates also a suspended bar magnet was much agitated at intervals. On the morning of the 8th of October there was a renewal of earthquake activity in South Carolina, and, coincidentally, a shock was reported from San Diego, California, which may be regarded as confirmatory of the view expressed in "Nature," for September 16th, at page 465, that when magnetic perturbations and auroras increase there is a corresponding increase in the number of earthquakes. On October 8th also the recent Gulf cyclone crossed the island of Cuba, and on following days moved slowly northward. On October 14th two groups of sun spots suddenly appeared in the sun's eastern quadrant. There was a sudden accession of

storm-energy, the southwestern depression uniting with others from the north-west and moving northeastward, with severe gales on the lakes. Preceding this outbreak, and during marked solar activity at the site where the sun spots appeared on the 14th, there had been on the 11th, 12th and 13th considerable agitation of the suspended magnet. On these dates and on October 10th the formation of clouds, moving in distinct layers and with different velocities, had been strongly marked, cumulus being surmounted by long streamers of cirrus, radiating from points toward the west and northwest. From October 3d onward there had not been a day on which cirrus or high stratus had not been observed. On October 4th, 6th, and 7th there was also at some time during the day underlying cumulus or scud.

The rapid formation of spots in the sun's eastern quadrant on October 14th, whilst remaining portions of the sun's surface were almost entirely free from disturbance, nearly fulfills the conditions mentioned in my last communication in regard to the occurrence of a "cold wave" of energetic character and wide extent, when a disturbed portion of the sun has come into view, following a portion comparatively calm. It seems to be a general rule that a single energetic disturbance upon the solar surface has a much more marked and distinguishable influence upon atmospheric conditions than has a succession of such disturbances.

It will be understood that in presenting these points as bearing upon the causes of general atmospheric perturbations with incidental local storms the writer regards them as of a tentative nature. Although he has given some attention to these matters for seven or eight years past he is not fully satisfied as to the possibility of tracing out satisfactorily the influence of cosmical agencies as affecting the weather in individual instances. Coincidences of the character indicated in these notes constitute valid proof only when sufficiently multiplied.

**WATER-SPOUTS.**

Capt. Chas. Acocks, commanding the bark "Mary," on the 6th, in N. 34° 42', W. 74° 43' (at noon), saw a large water-spout in the morning.

The bark "Julius," on the 8th, at 10 p. m., in N. 20° 52', W. 83° 50', was struck forward by a water-spout, lasting only three minutes, which knocked one of the crew on lookout from fore-castle to lower deck, and, passing around port side of vessel, went clear without causing any damage.

Capt. Samuel Hess, commanding the s. s. "Philadelphia," gives the following interesting description of a water-spout: "October 16th, at 3 p. m., civil time, in N. 27° 34', W. 69° 48', observed a most remarkable and well-defined water-spout; computed height, or length of spiral column of water, from observations by sextant, sixteen hundred feet; elapsed time from beginning to end, forty-five minutes; movement north-west. The weather was fine, with light airs from northeast. After the spout broke the clouds suddenly spread themselves overhead, and heavy showers of rain fell for half an hour, accompanied with fresh breezes from southeast."

**VERIFICATIONS.**

**INDICATIONS.**

The indications for October, 1886, were made by 2d Lieutenant J. E. Maxfield, Signal Corps, U. S. Army, Assistant, and were verified by 2d Lieutenant Frank Greene, Signal Corps, U. S. Army, Assistant.

The detailed comparison of the tri-daily indications for October, 1886, with the telegraphic reports during the twenty-four hours for which the indications were prepared, shows the general average percentage of verifications to be 81.51. The percentages for the different elements are: Weather, 85.29; wind, 73.39; temperature, 78.82. By states, etc., the percentages are: For Maine, 77.26; New Hampshire, 77.12; Vermont, 78.04; Massachusetts, 76.85; Rhode Island, 76.29; Connecticut, 79.69; New York, 81.45; Pennsylvania, 80.22; New Jersey, 81.18; Delaware, 80.62; Maryland, 81.77; District of Columbia, 79.73; Virginia, 80.99; North Carolina, 88.18; South Carolina, 85.51; Georgia, 87.98; Florida, 85.37; Alabama, 87.58; Mississippi, 84.75; Louisiana, 86.02; Texas, 88.76; Arkansas, 84.30; Tennessee, 84.78; Kentucky, 85.83; Ohio, 84.48; West Virginia, 79.06; Indiana, 84.86; Illinois, 84.50; Michigan, 83.09; Wisconsin, 75.48; Minnesota, 76.10; Iowa, 74.18; Kansas, 76.13; Nebraska, 73.71; Missouri, 82.35; Colorado, 73.47; east Dakota, 72.02.

There were ten omissions to predict, out of 9,951, or 0.10 per cent. Of the 9,941 predictions that have been made, five hundred and one, or 5.04 per cent., are considered to have entirely failed; four hundred and thirty-nine, or 4.42 per cent., were one-fourth verified; 1,589, or 15.98 per cent., were

one-half verified; 1,793, or 18.04 per cent., were three-fourths verified; 5,619, or 56.52 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

In the table below are shown for the Pacific coast the percentages of indications for the months of July, August, and September, 1886. The indications for the three months were made by 2d Lieutenant W. A. Glassford, Signal Corps, U. S. Army, Assistant; those for July and September were verified by 2d Lieutenant J. E. Maxfield, Signal Corps, U. S. Army, Assistant; those for August were verified by 2d Lieutenant Frank Greene, Signal Corps, U. S. Army, Assistant:

*Percentages of indications verified.*

Districts.	July.	August.	September.
Washington Territory .....	84.30	79.62	83.49
Oregon.....	84.12	82.39	84.66
Northern California.....	90.91	83.25	92.14
Southern California.....	89.66	84.21	92.14

**CAUTIONARY SIGNALS.**

During October, 1886, the total number of signals ordered of all kinds, the verifications of which were determined, was one hundred and fifteen, of these, sixty-two, or 53.91 per cent., were fully verified both as to direction and velocity. Of the above, fifteen were ordered for on-shore winds, number verified, eleven, or 73.33 per cent.; three were ordered for northeasterly winds, number verified, none; twelve were ordered for south-westerly winds, number verified, three, or 25.00 per cent.; eight were ordered for northwesterly winds, number verified both as to direction and velocity, five, or 62.50 per cent.; verified as to velocity only, one, or 12.50 per cent.; seventy-seven were ordered for winds without regard to direction, number verified, forty-three, or 55.84 per cent.; four, or 3.50 per cent., were ordered late, *i. e.*, after the verifying velocity had begun.

In twenty-one cases winds occurred which would have justified the display of cautionary signals but for which they were not ordered, and in fifteen instances winds which would have justified the display of on-shore signals, but for which they were not ordered.

In addition to the above, two hundred and eighteen signals were ordered at display stations, the verification of which it was impracticable to determine.

**COLD-WAVE SIGNALS.**

During October, 1886, the total number of cold-wave signals ordered, the verifications of which were determined, was ninety-three; number verified, fifty-six, or 60.22 per cent. Twenty signals were ordered, the verifications of which it was impracticable to determine. In addition to the above, in one hundred and forty-four instances, the signals ordered from this office were repeated by the observers at the regular stations to towns in their vicinity. The verification of these it was impracticable to determine.

**RAILWAY WEATHER SIGNALS.**

P. H. Mell, jr., director of the "Alabama Weather Service," in the report for October, 1886, states:

The verification of predictions for the whole area was 97 per cent. for temperature, and 96 per cent. for weather.

The following corporations comprise this system: South and North; Montgomery and Mobile; Mobile and Girard; Georgia Pacific; East Tennessee, Virginia and Georgia system in Alabama; Memphis and Charleston; Columbus and Western; Atlanta and West Point of Georgia; Northeastern of Georgia; Western and Atlantic; East Tennessee, Virginia and Georgia system in Georgia; Montgomery and Eufaula; Pensacola and Selma; Pensacola and Atlantic; the cities of Milledgeville, Georgia, and Talladega, Alabama.

J. D. Plunkett, M. D., President of the Tennessee Board of Health, in the bulletin for October, 1886, states:

The percentage of verifications of weather predictions as telegraphed from the Signal Office at Washington, and displayed by signal flags at various stations in the state are: for temperature, 90° 3; for weather, 87° 6.

The following is from the "Bulletin of the New England Meteorological Society" for October, 1886:

Verification of weather signals at New Haven was 81 per cent. for temperature, 87° for weather; at seven stations reporting to the Boston Signal Office, 90° for temperature, 94° for weather.