which was central in the Lake region on the 24th, noon, and passed southeastward over New England. On the 25th, noon, it was central at N. 42°, W. 62°; 26th, noon, N. 40°, W. 57°, after which it disappeared.

K. This was a continuation of United States series No. XI, which was central in the St. Lawrence Valley on the 27th, noon, and passed to the east-northeast, being central on the 29th at about N. 53°, W. 43°, after which it disappeared.

IN GENERAL.

From the 17th to the 30th of the month there was a general tendency in the pressure to increase over the Atlantic Ocean in the belt between Newfoundland and Great Britain, and at the close of the month the pressure in this region ranged between 30.2 and 30.6; high pressure also prevailed over central and western Europe and over all the eastern portion of North America. As this was not an average normal condition of the atmosphere for this season over the ocean, although it fairly represented the tendency over the land, it was expected that a return to the normal condition during the following month of December would be accompanied by severe storms.

OCEAN FOG.

The limits of fog belts west of the fortieth meridian, as determined by reports of shipmasters, are shown on Chart I by dotted shading. Near the Grand Banks of Newfoundland, fog was reported on 17 dates; between the fifty-fifth and sixty-fifth meridians on 2 dates; and west of the sixty-fifth meridian on 3 dates. Compared with the corresponding months of the last seven years, the dates of occurrence of fog near the Grand Banks numbered 7 more than the average; between the fifty-fifth and sixty-fifth meridians, 1 less than the average. No fog west of the sixty-fifth meridian was reported in November, 1893.

OCEAN ICE.

The limits of the region within which field ice or icebergs were reported for November, 1894, are shown on Chart I by crosses.

The southernmost ice, a berg 1,000 feet long with two high peaks, was reported on the 3d, in N. 47° 05′, W. 51° 15′; and the easternmost ice was reported on the 26th, in N. 47° 30′, W. 49° 34′. The ice of the current month was noted on one date in the Straits of Belle Isle.

No arctic ice was reported for November, 1892. In November, 1891, an iceberg was observed in N. 51° 58′, W. 55° 35′, on the 8th. In November, 1890, a small piece of ice was noted in N. 46° 35′, W. 47° 51′. In November, 1882, 1883, 1887, and 1888, no ice was reported near Newfoundland and the Grand Banks. In November, 1884 and 1889, several icebergs were seen over the eastern part of the Banks of Newfoundland. On one date in November, 1885, and one date in November, 1886, ice was observed south of the fiftieth parallel.

TEMPERATURE OF THE AIR.

[*In degrees Fahrenheit.*]

The distribution of the monthly mean temperature of the air over the United States and Canada is shown by the dotted isotherms on Chart II; the lines are drawn over the high irregular surface of the Rocky Mountain plateau, although the temperatures have not been reduced to sea level, and the isotherms, therefore, relate to the average surface of the country occupied by our observers; such isotherms are controlled largely by the local topography, and should be drawn and studied in connection with a contour map.

DIURNAL PERIODICITY.

The regular diurnal period in temperature is shown by the hourly means given in Table V for all stations having self-registers.

NORMAL TEMPERATURE.

In Table II, for voluntary observers, the mean temperature is given for each station, but in Table I, for the regular stations of the Weather Bureau, both the mean temperatures and the departures from the normal are given for the current month. In the latter table the stations are grouped by geographical districts, for each of which is given the average temperature and departure from the normal; the normal for any district or station may be found by adding the departures to the current average when the latter is below the normal and by subtracting when it is above.

DEPARTURES FROM NORMAL TEMPERATURE FOR NOVEMBER, 1894.

As compared with the normal for November the mean temperatures for the current month were decidedly in excess from Texas, Kansas, Nebraska, western North and South Dakota westward to the Pacific Ocean. The ridge of greatest excess includes the following: Laramie, 9.8; Helena, 8.4; Red Bluff, 6.0; Salt Lake City and Yuma, 5.6; Spokane and Tucson, 5.5.

Considered by districts, the mean temperatures for the current month show the following departures from normal temperatures:

Positive departures: Northern slope, 4.8; middle slope, 2.4; southern slope (Abilene), 2.1; southern plateau, 4.5; middle plateau, 4.3; northern plateau, 5.1; north Pacific, 1.4; middle Pacific, 3.7; southern Pacific, 0.6.

Negative departures: New England, 3.5; middle Atlantic, 3.0; south Atlantic, 2.1; Key West, 0.6; east Gulf, 1.7; west Gulf, 0.4; Ohio Valley and Tennessee, 3.8; lower lakes, 4.2; upper lakes, 4.1; North Dakota (extreme northwest), 1.3; upper Mississippi, 4.5; Missouri Valley, 1.2.

For certain voluntary stations of rather long periods of observation the normal and extreme mean temperatures and the departures are shown in detail in Table X *a*, which is now placed among the meteorological tables instead of being inserted in the text as heretofore.

YEARS OF HIGHEST MEAN TEMPERATURE FOR NOVEMBER.

The mean temperature for November, 1894, was the highest on record at regular Weather Bureau stations as shown in the following table, which also gives the highest previous record:

Stations.	November, 1894.		Highest previous.	
	Mean temperature.	Departure from normal.	Temperature.	Year.
Wichita, Kans	46.0	+2.5	45.9	1890
Santa Fe, N. Mex	43.2	+5.1	42.7	1873
Tucson, Ariz	62.5	+5.5	58.6	1892
Yuma, Ariz	68.3	+5.6	65.2	1890
Pueblo, Colo	43.6	+2.9	42.3	1892
Denver, Colo	44.8	+4.8	42.9	*
Cheyenne, Wyo	41.0	+5.6	39.3	1873
Lander, Wyo	36.8	+9.8	34.3	1887
Salt Lake City, Utah	45.6	+5.6	44.2	1891
Helena, Mont	41.0	+8.4	39.1	1885
Walla Walla, Wash	47.2	+4.7	46.8	1892
Spokane, Wash	42.9	+5.5	41.1	1885
Olympia, Wash	47.4	+2.2	47.2	1891
Red Bluff, Cal	59.4	+6.0	58.0	1890
Carson City, Nev	44.4	+2.7	44.4	1891
Sacramento, Cal	58.2	+4.8	55.9	1891
San Francisco, Cal	59.4	+3.4	59.0	1890
Fresno, Cal	58.6	+3.2	56.9	1890

* Frequently.

YEARS OF LOWEST MEAN TEMPERATURE FOR NOVEMBER.

The mean temperature for November, 1894, was the lowest on record at regular Weather Bureau stations, as shown in the following table:

Stations.	November, 1894.		Lowest previous.	
	Mean temperature.	Departure from normal.	Temperature.	Year.
Vineyard Haven, Mass	43.8	−2.0	44.4	*
Block Island, R. I	42.3	−3.4	27.4	1882
Nantucket, Mass	41.6	−3.0	43.1	1892
Northfield, Vt	28.4	−4.6	31.6	1890
Harrisburg, Pa	40.0	−2.4	40.4	1893
Parkersburg, W. Va	40.3	−3.8	40.5	1892
Sault Ste. Marie, Mich	27.5	−3.7	29.0	1892
Green Bay, Wis	29.8	−2.8	29.8	1892

* Frequently.

MAXIMUM TEMPERATURE.

The maximum temperatures of the month at regular stations of the Weather Bureau are given in Table I, from which it appears that the highest maxima were: Yuma, 92; Tucson and Red Bluff, 87; Tampa, 85; Jupiter, 84; Key West and Dodge City, 83; Jacksonville, Corpus Christi, Palestine, Wichita, and Fresno, 82; Pueblo and Titusville, 81; Shreveport and Vicksburg, 80.

The lowest maxima were: St. Vincent, 45; Duluth, Marquette, and Sault Ste. Marie, 48; Green Bay and Alpena, 51; St. Paul, 52; Moorhead and La Crosse, 53.

YEARS OF HIGHEST MAXIMUM TEMPERATURE FOR NOVEMBER.

The maximum temperatures for November were the highest on record at regular Weather Bureau stations, as shown in the following table:

Stations.	November, 1894.		Highest previous.	
	Maximum.	Excess above previous record.	Temperature.	Year.
Buffalo, N. Y	70	0	70	1891
Rapid City, S. Dak	79	+ 2	77	1891
Laramie, Wyo	72	+ 3	69	*
Pueblo, Colo	81	+ 3	78	1890
Havre, Mont	72	+ 1	71	1887
Helena, Mont	71	+ 3	68	1891
Sacramento, Cal	78	0	78	*
San Francisco, Cal	79	+ 1	78	*
Fresno, Cal	82	0	82	1890
Yuma, Ariz	92	0	92	1891

* Frequently.

MINIMUM TEMPERATURE.

The minimum temperatures of the month at regular stations of the Weather Bureau are given in Table I, from which it appears that the lowest minima were: St. Vincent, —25; Moorhead and Laramie, —14; Williston, —10; Bismarck, —9; Sault Ste. Marie, —7; Duluth, —6; St. Paul and Northfield, —2; Marquette, —1.

Among the highest minima were: Key West, 60; Jupiter, 48; San Francisco, 46; San Diego and Yuma, 45; Point Reyes Light and Corpus Christi, 42; Galveston, 41; Titusville, 40.

YEARS OF LOWEST MINIMUM TEMPERATURE FOR NOVEMBER.

The minimum temperatures for November were the lowest on record at regular Weather Bureau stations, as shown in the following table:

Stations.	November, 1894.		Lowest previous.	
	Minimum.	Deficit below previous record.	Temperature.	Year.
Cape Henry, Va	22	− 2	24	1880
Sault Ste. Marie, Mich	− 7	− 5	− 2	1891
Wichita, Kans	10	0	10	1891

MONTHLY MEAN TEMPERATURE.

For the regular stations of the Weather Bureau the monthly mean temperature is the simple mean of all the daily maxima and minima; for voluntary stations a variety of methods of computation is necessarily allowed, as shown by the notes appended to Table II.

During November, 1894, the highest mean temperatures at regular Weather Bureau stations were: Key West, 73.6; Jupiter, 71.0; Yuma, 68.3; Tampa, 67.0; Titusville, 66.0; Corpus Christi, 65.1; Galveston, 63.8; Tucson, 62.5; Port Eads, 61.9; Jacksonville, 61.4; New Orleans, 60.5.

ACCUMULATED TEMPERATURES.

From January 1 to the end of the current month the average temperature for each geographical district was above or below the normal by an amount that is given in the last column of the following table. The accumulated monthly departures from normal temperatures, as given in the second column, may be used for comparison with the departures of current conditions of vegetation from the normal conditions.

Districts.	Accumulated departures.		Districts.	Accumulated departures.	
	Average.	Total.		Average.	Total.
	°	°		°	°
New England	+ 9.1	+ 0.8	Key West	− 6.5	− 0.1
Middle Atlantic	+13.1	+ 1.2	East Gulf	− 1.6	− 0.1
South Atlantic	+ 4.9	+ 0.4	Southern plateau	−10.0	− 0.9
West Gulf	+ 0.5	+ 0.0	Middle plateau	− 4.4	− 0.4
Ohio Valley and Tennessee	+11.7	+ 1.1	Northern Pacific	− 7.6	− 0.7
Lower Lake	+20.5	+ 1.9	Middle Pacific	− 6.8	− 0.6
Upper Lake	+25.0	+ 2.3	Southern Pacific	−21.3	− 1.9
North Dakota (Ex. NW.)	+24.2	+ 2.2			
Upper Mississippi	+21.5	+ 2.0			
Missouri Valley	+21.4	+ 1.9			
Northern slope	+10.9	+ 0.9			
Southern slope (Abilene)	+ 7.0	+ 0.6			
Northern plateau	+ 1.3	+ 0.1			

DAILY AND MONTHLY RANGES OF TEMPERATURE.

The greatest daily range of temperature is given for each of the regular Weather Bureau stations in Table I, which also gives data from which may be computed the extreme monthly ranges for each station:

Greatest daily ranges.—Large values: Pueblo, 56; North Platte, 54; Rapid City, 53; Valentine, 52; Carson City, 50; Havre, Dodge City, Winnemucca, and Wichita, 48; Pierre and Laramie, 47; Miles City, Cheyenne, and Concordia, 46. Small values: Tatoosh Island, 11; Key West, 12; Astoria, 13; East Clallam and Galveston, 15; Port Angeles, 16; Pysht, Seattle, and Fort Canby, 17; Port Crescent and Atlantic City, 19; Hatteras and Jupiter, 20.

Extreme monthly ranges.—Large values: Laramie, 86; Rapid City, 78; Havre, 74; Dodge City, 73; Bismarck, Pierre, Valentine, and Wichita, 72; Cheyenne and Williston, 71; St. Vincent, Denver, and Oklahoma, 70. Small values: Tatoosh Island, 20; Key West, 23; Port Angeles, 26; Port Crescent and Pysht, 27; Seattle, 28; Astoria, 29; Fort Canby and Neah Bay, 30.

LIMITS OF FREEZING TEMPERATURE.

The region within which the air has had a freezing temperature at some time during the month is bounded by the isotherm of minimum 32°. The isotherm of minimum 40° presents, approximately, the boundary of the region within which severe frosts are likely to have occurred. During the winter season these lines are shown on the chart of snowfall, No. V.

The line of minimum 40° passes from Titusville southwest across Florida, a little south of Tampa. It reappears just north of Galveston and runs parallel to the coast of southern Texas to Rio Grande City. It reappears in southern Arizona, passes northwest midway between Tucson and Yuma, crosses southern California to the coast near Los Angeles, and

passes up along the immediate coast to a point midway between San Francisco and Eureka.

The line of minimum 32° passes from the coast near Kittyhawk southwest along the coast to a point midway between Savannah and Jacksonville and then across Florida to Cedar Keys. It reappears between Mobile and New Orleans, passes through the center of Louisiana, and thence southeast through San Antonio. It reappears east of Tucson and passes northwest through central California to the southwest corner of Oregon.

PERIODS OF HIGH TEMPERATURE.

The maximum temperatures of November in the respective States occurred principally at the following periods:

(A) 1st, northern Minnesota and Michigan, southern Indiana and Ohio, Kentucky, Tennessee, Arkansas, northern Louisiana, and eastern Texas; 2d, throughout Michigan, Lakes Erie, Huron, and Ontario, New York, Pennsylvania, Maryland, West Virginia, and the coast of North Carolina; 3d, New England, New Jersey, the coast of Virginia, and Titusville.

(B) 6th, western Oregon; 7th, Washington, Oregon, California.

(C) 11th, Montana and Wyoming; 12th, Kansas.

(D) 14th, North and South Dakota, Wyoming, and Nebraska; 15th, northern Texas, Oklahoma, Missouri, eastern Iowa, northern Illinois; 16th and 17th, southern Alabama, western Florida, southern Mississippi, Georgia, North and South Carolina.

(E) 26th, Utah, Iowa, western Wisconsin, and northern Missouri.

PERIODS OF LOW TEMPERATURE.

The minimum temperatures of November in the respective States occurred principally at the following periods:

(A) 11th, eastern Kansas, southern Missouri, central Arkansas; 12th, the Ohio Valley, Kentucky, Tennessee, western North Carolina, Mississippi, Alabama, Georgia, South Carolina, and Florida.

(B) 16th, Washington, Oregon, Idaho, western Montana, Wyoming, northern California, northern Nevada, northern Utah, northern Colorado; 17th, southern Colorado, western Kansas, New Mexico, Oklahoma, Texas; 18th, eastern Arizona, eastern Montana, western North and South Dakota; 19th, eastern Nebraska, Iowa, northern Missouri and Illinois, Wisconsin, and northern Michigan; 20th, Lake Huron, Pennsylvania, Connecticut, western Massachusetts, eastern New York, Vermont, New Hampshire, southern Maine, Rhode Island, and southern Massachusetts.

(C) 28th, Manitoba, eastern part of North Dakota, Minnesota; 29th, a narrow belt including the following stations: Port Huron, Sandusky, Parkersburg, Lynchburg, Wilmington, Norfolk, Washington, Baltimore, Atlantic City, Block Island, Nantucket; these stations lie just outside of the region that experienced its minimum temperature on the 20th, showing that the cold area of the 29th overlapped and pushed beyond its predecessor of the 20th by at least this much.

REGIONS OF 20° RISE IN TWENTY-FOUR HOURS.

The daily weather charts show by heavy dotted lines the regions within which the temperature has risen 20° in the preceding twenty-four hours. The following list enumerates all of these regions and gives the dimensions of the principal axes in miles:

(A) 1st, a. m., 200 by 200, Missouri and Arkansas, and 200 by 150, southern Texas.

(B) 3d, a. m., 200 by 150, South Dakota.

(C) 5th, p. m., 300 by 200, Assinniboia and Montana. 6th, a. m., 300 by 200, Montana.

(D) 7th, a. m., 300 by 100, Colorado and northern Texas, and 300 by 200, Illinois and Missouri; p. m., 200 by 100, Tennessee and Kentucky.

(E) 10th, p. m., 300 by 200, Alberta. 11th, a. m., 300 by 300, Alberta, Saskatchewan, Montana; p. m., 800 by 800(?), Saskatchewan, Assinniboia, Manitoba, Montana, North and South Dakota, Nebraska. 12th, a. m., 500 by 500, Manitoba, North and South Dakota, and portions of Minnesota, Montana, Nebraska; p. m., 500 by 400, Kansas, Missouri, Oklahoma. 13th, a. m., 500 by 200, Indiana, Kentucky, Tennessee, Mississippi, and Alabama.

(F) 14th, a. m., 500 by 200, Assinniboia, Montana; p. m., 600 by 300, Montana, South Dakota, Nebraska, Wyoming. 15th, a. m., 200 by 100, Oklahoma and Kansas; p. m., 300 by 150, portions of Kentucky, Indiana, Ohio. 16th, a. m., 200 by 100, portions of Mississippi and Alabama. The small areas of the last three dates, although not necessarily continuations of the large area of the 14th, p. m., are to be regarded as the results of inflow from the south and east sides into the same area of low pressure instead of from the southwest side. This process ended in the following warm area, namely, 17th, a. m., 300 by 100, Virginia, North and South Carolina.

(G) 17th, a. m., 800 by 300, Alberta, Montana, Wyoming, Colorado, and South Dakota; p. m., 800 by 400, Wyoming, South Dakota, Nebraska, Colorado, Kansas, northern Texas. 18th, a. m., 600 by 600, Colorado, Kansas, Oklahoma, and portions of Iowa and Texas.

(H) 19th, p. m., 1,000 by 400, Assinniboia, Montana, Wyoming, North and South Dakota, Nebraska. 20th, a. m., 1,400 by 600, Manitoba, Ontario, Lake Superior, Wisconsin, Minnesota, Iowa, South Dakota, Nebraska, Kansas, and portions of Colorado and Illinois; p. m., 900 by 400, Ontario, Lakes Huron and Michigan, Illinois, Michigan, and portions of Wisconsin, Missouri, and Indiana. 21st, a. m., 500 by 700, Ontario, lower Lakes, and the coast from New Jersey to the Bay of Fundy; p. m., 500 by 500, Quebec, Maine, New Brunswick, Nova Scotia. 22d, a. m., 200 by 300, New Brunswick, Nova Scotia, Cape Breton.

(I) 21st, a. m., 300 by 500, Alberta, Assinniboia, Saskatchewan. This warm region, due to an inflow from the south and west, disappeared and was followed by the following warm areas, due to an inflow from the south and east: 22d, a. m., 300 by 200, Iowa, Missouri, Illinois; 400 by 100, Texas and Louisiana; p. m., 400 by 200, Illinois, Indiana, Ohio. 23d, a. m., 200 by 200, West Virginia.

(J) 26th, a. m., 200 by 200, North and South Dakota; p. m., 300 by 200, Ontario and Lake Superior. 27th, a. m., 300 by 100, Ontario, Lake Ontario, and a portion of New York. This warm area, due to an inflow from the southwest, was followed by the following, due to an inflow from the southeast: 27th, a. m., 600 by 200, Tennessee, Kentucky, West Virginia, Ohio.

(K) 28th, a. m., 300 by 400 (?), Alberta. This warm area did not appear on the 28th, p. m., although temperature rose to the 20° limit at one or two stations, but it reappeared as follows: 29th, a. m., 700 by 700, Manitoba, Ontario, North Dakota, Minnesota, Wisconsin; p. m., 400 by 200, Ontario and Lake Superior.

(L) 29th, p. m., 400 by 100, Oklahoma and Missouri. This warm area accompanied the inflow from the east into a relatively low area that had appeared in Texas. 30th, a. m., 300 by 100, Kentucky and Ohio.

REGIONS OF 20° FALL IN TWENTY-FOUR HOURS.

A fall of temperature of 20°, or more, in twenty-four hours is indicated on the Daily Weather Map by inclosing the region within which this occurs by a heavy dotted line. According to recent instructions such falls are no longer to be regarded as technical cold waves, the exact definition of which is given in the subsequent paragraph. The following list enumerates the regions of 20° fall for the month of November and the dimensions of the principal axes are stated in miles:

(A) 3d, a. m., 200 by 100, Illinois and Tennessee; p. m., 200 by 100, Ohio and West Virginia.

(B) 4th, a. m., 300 by 200, Wyoming.

(C) 7th, a. m., 200 by 100, Assinniboia and Montana.

(D) 8th, a. m., 400 by 150, Nebraska and South Dakota.

(E) 8th, p. m., 300 by 600 (?), Alberta and Assinniboia. 9th, a. m., 600 by 300, Saskatchewan, Assinniboia, Alberta, and Montana; p. m., 700 by 200, Manitoba, North and South Dakota, and Nebraska. 10th, a. m., 400 by 300, Manitoba, Minnesota, and Wisconsin, and also 200 by 100, Kansas; p. m., 150 by 150, Texas.

(F) 13th, a. m., 100 by 100, South Dakota, and 100 by 100, Wyoming.

(G) 14th, p. m., 200 by 200, Alberta. 15th, a. m., 600 by 600, Alberta, Saskatchewan, Assinniboia, and Montana; p. m. 1,200 by 900, Saskatchewan, Alberta, Assinniboia, Montana, North and South Dakota, Minnesota, Nebraska, Wyoming, Colorado, Idaho, Utah, Oregon, and Nevada. 16th, a. m., 1,600 by 600, Manitoba, North and South Dakota, Minnesota, Wisconsin, Iowa, Nebraska, northern Texas, Colorado, Wyoming, Montana, Utah, Idaho, Nevada, and Oregon; p. m., 1,200 by 500, Wisconsin, Iowa, Illinois, Missouri, Kansas, Nebraska, Utah, Oklahoma, Texas, Arkansas. 17th, a. m., 100 by 200, Wisconsin, and 1,100 by 400, Illinois, Missouri, Arkansas, Oklahoma, northern Texas, and New Mexico; p. m., 900 by 200, western Pennsylvania, West Virginia, southern Ohio, Kentucky, Tennessee, Mississippi, and northern Alabama. 18th, a. m., 300 by 100, western Tennessee.

(H) 17th, p. m., 400 by 300, Alberta, Saskatchewan, Assinniboia. 18th, a. m., 900 by 500, Alberta, Saskatchewan, Assinniboia, Manitoba, Montana, North and South Dakota; p. m., 1,100 by 400, Manitoba, Montana, North and South Dakota, Minnesota, Wisconsin, Iowa, and Nebraska. 19th, a. m., 1,400 by 400, Ontario, the upper Lake region, Wisconsin, Iowa, Kansas, Nebraska; p. m., 400 by 300, Ontario, Quebec, Vermont, New York, and Lake Ontario. 20th, a. m., 600 by 300, New Brunswick, Nova Scotia, Quebec, and New England; p. m., 300 by 200, Nova Scotia and Cape Breton.

(I) 20th, p. m., 500 by 200, Montana, Wyoming, and South Dakota. 21st, a. m., 500 by 300, South Dakota, Iowa, and portions of Minnesota, Nebraska, and Missouri.

(J) 22d, a. m., 700 by 200, Nevada, Idaho, Utah, and Wyoming; p. m., 300 by 200, Colorado. 23d, a. m., 200 by 150, Kansas and Oklahoma.

(K) 24th, a. m., 300 by 100, Kentucky and Tennessee.

(L) 26th, p. m., 400 by 300, Alberta, Assinniboia, Saskatchewan, and Montana. 27th, a. m., 800 by 300, Saskatchewan, Assinniboia, Manitoba, North Dakota; p. m., 1,200 (?) by 600, Manitoba, Ontario, Lake Superior, Wisconsin, Minnesota, North and South Dakota, Nebraska, Kansas, Iowa, Missouri, Illinois, Wisconsin, and Upper Michigan. 28th, a. m., 1,200 (?) by 1,000 (?). We have here three areas closely adjoining each other, separated by small areas of cloud and snow and, in general, covering Manitoba, Ontario, the Lake region, Wisconsin, Minnesota, Iowa, Missouri, Illinois, Kentucky, Indiana, Ohio, and Michigan. 28th, p. m., 2,000 by 300, Oklahoma, Arkansas, Tennessee, Kentucky, North Carolina, Virginia, West Virginia, Ohio, Pennsylvania, Maryland, Delaware, New Jersey, Long Island, Rhode Island, and the shores of Massachusetts, New Hampshire, Maine and southern Nova Scotia. 29th, a. m., 300 by 300, Virginia, North and South Carolina.

COLD-WAVE SIGNALS FOR NOVEMBER.

According to recent instructions (No. 75 of 1894) the cold-wave signal, namely, the white flag with black center, will be displayed during the months of March to November, inclusive, whenever, in the judgment of the forecast official, the fall of temperature in twenty-four hours is expected to be at least 18° and to reach at least 32° in the district north of Arkansas and between the Mississippi River and the Rocky Mountains, including Minnesota; at least 16° and to reach 36°, in the region of Tennessee and North Carolina and east of the Mississippi River, including St. Louis; at least 16° and to reach 40°, in all other districts east of the Rocky Mountains, except along the Gulf coast and in Florida; at least 16° and to reach 42°, along the Gulf coast and in Florida. During the months of December, January, and February the first limit remains the same, but the second limit is placed 6° lower. When cold-wave signals are not ordered and the temperature falls 4° more than the first limit and reaches 4° below the second limit, such falls will be considered as cold waves without signals.

In accordance with these instructions the following cold-wave signals were ordered during the month of November:

2d, p. m., Milwaukee and Chicago.

8th, p. m., Williston, Pierre, Huron, Cheyenne, Lander, Denver, Valentine, and North Platte.

12th, p. m., Rapid City, Pierre, Cheyenne, Lander, and Denver.

14th, p. m., Rapid City, Pierre, Valentine, and Moorhead.

15th, a. m., Cheyenne, Lander, Denver, Pueblo, and North Platte.

15th, p. m., Oklahoma, Amarillo, Duluth, Dubuque, Davenport, Keokuk, St. Louis, Springfield, Mo., Columbia, Mo., Hannibal, Fort Smith, Green Bay, Milwaukee, Springfield, Ill., Cairo, Marquette, Yankton, Omaha, Concordia, Wichita, Dodge City, Topeka, Sioux City, Des Moines, Minneapolis, St. Paul, and Duluth.

16th, a. m., San Antonio, Abilene, Palestine, Little Rock, Shreveport, Cincinnati, Louisville, Nashville, Memphis, Vicksburg, Cairo, and Indianapolis.

16th, p. m., Galveston, New Orleans, Columbus, Knoxville, Chattanooga, Vicksburg, Meridian, Pittsburg, Parkersburg, Atlanta.

17th, a. m., Mobile, Pensacola, Harrisburg, Atlantic City, Baltimore, Washington, Lynchburg, Richmond, Raleigh, Charlotte, Columbia, S. C., Augusta, Dubuque, Davenport, Keokuk, Minneapolis, St. Paul, Duluth, La Crosse.

17th, p. m., Rapid City, Pierre, Huron, Yankton, Valentine, Moorhead.

18th, a. m., Kansas City, North Platte, Omaha, Concordia, Topeka, Sioux City, Des Moines.

18th, p. m., Alpena, Grand Haven, Port Huron, Detroit, Toledo, Sandusky, Cleveland, Columbus, Cincinnati, Louisville, Buffalo, Rochester, Oswego, Ithaca, Erie, Pittsburg, Parkersburg, Northfield, Springfield, Ill., Cairo, Marquette, Sault Ste. Marie, Indianapolis, Columbia, Mo., St. Louis, Springfield, Mo., Hannibal, Wichita, Dodge City, La Crosse, Milwaukee, Chicago.

19th, a. m., Albany, New York, Harrisburg, Philadelphia, Portland, Boston, New London, New Haven, New Brunswick, Atlantic City, Baltimore, Washington, Lynchburg.

19th, p. m., Rapid City, Cheyenne, Lander, Denver, Pueblo.

20th, a. m., Huron, Yankton, Pierre, Valentine, Omaha, Sioux City, Des Moines, Dubuque.

25th, a. m., Oswego, Albany, Northfield, Davenport, La Crosse, Green Bay, Milwaukee, Chicago.

25th, p. m., Portland.

26th, a. m., Huron, Yankton, Pierre, Valentine, Sioux City, Moorhead.

26th, p. m., St. Paul, Duluth, Minneapolis, Des Moines, Dubuque, Davenport, La Crosse, Green Bay, Milwaukee, Chicago.

27th., a. m., Oklahoma, Abilene, Fort Smith, Little Rock, Columbus, Cincinnati, Louisville, Nashville, Memphis, Pittsburg, Parkersburg, Marquette, Sault Ste. Marie, Alpena, Grand Haven.

27th, p. m., Cairo, Knoxville, Chattanooga, Ithaca, Albany, Harrisburg, Northfield.

FROST WARNINGS FOR NOVEMBER, 1894.

The following are the frost warnings issued during the current month in connection with the respective high areas:

High No. II.—3d, a. m., Alabama, central and northern portions.

High No. III.—5th, a. m., North and South Carolina and Georgia, probably in the interior, western Florida, Louisiana, eastern Texas, in the interior, Arkansas, Tennessee, and Kentucky. 6th, a. m., Virginia, North and South Carolina, eastern and western Florida in the interior.

High No. VI.—10th, a. m., North and South Carolina and Georgia, eastern Florida, northern portion, Alabama, Mississippi, and Louisiana in the interior, eastern Texas in the interior. 11th, a. m., special to Florida stations.

High No. VIII.—Eastern Florida.

FROSTS.

The frosts reported by the voluntary observers of the Weather Bureau usually have reference to the injury done to tender plants, and the classification "light" or "heavy" depends almost entirely upon the nature of the plant. In general, it may be assumed that a light frost will injure the most sensitive vegetables that are raised by methods of forcing, while the heavy frosts will injure hardy fruits and grains that ripen in the open air. In both cases, however, the extent of the injury will largely depend upon the location of the plant, namely, whether in a quiet valley or on an elevated spot. The meteorologic phenomenon of hoar frost accompanies the occurrence of a frost properly so called by the agriculturist; a freezing temperature without hoar frost is a dry freeze or a cold wave, according to its intensity The isotherms of minimum 40° and minimum 32° are shown on Chart VI.

The principal frosts of November occurred in the southern portion of the United States as follows: 1st, from Maryland to South Carolina, and killing frost in Illinois; 2d, from New York to Virginia; 3d, from Minnesota south to Louisiana; 4th, from Kentucky to Louisiana; 6th, from eastern Texas and Arkansas to Maryland; 7th, from Louisiana to the south Atlantic coast and Virginia; 9th, Arkansas and Louisiana; 10th, Arkansas; 11th, South Carolina and Georgia; 12th, and 13th, Florida; 17th, southern Texas and southern California; 19th and 20th, southern California; 22d and 23d, northern California; 28th, southern California; 29th, central California.

The following table shows the dates of the occurrence of the first light and heavy frosts and the first snow of the season at the respective stations. When the observer makes no mention of frost the first occurrence of a minimum temperature of 32° is selected and the date is given in the table. The dagger at the right of the name of the station indicates, therefore, a minimum temperature of 32° with or without frost:

Dates of first light and heavy frosts and snow, November, 1894.

State and station.	First frost. Light.	First frost. Heavy.	Snow.
Alabama.			
Alco†		7	
Ashville†		6	
Bermuda†		6	
Carrollton†		7	
Citronelle†		11	
Claiborne		12	
Collirene†		11	
Daphne		7	
Decatur†		4	
Eufaula†		11	
Evergreen†		7	
Florence†		4	
Fort Deposit†		7	
Gadsden†		6	
Greensboro		7	
Healing Springs†		4	
Alabama—Cont'd.			
Highland Home		6	
Jasper†		1	
Madison Station†		4	
Mobile		7	
Mount Willing		6	
Newbern		6	
Oxanna†		6	
Pine Apple†		4	
Pushmataha		11	
Rock Mills		6	
Scottsboro†		6	
Thomasville†		7	
Tuscaloosa†		5	
Tuscumbia†		6	
Union		6	
Union Springs†		6	

Dates of first light and heavy frosts and snow—Continued.

State and station.	First frost. Light.	First frost. Heavy.	Snow.
Alabama—Cont'd.			
Uniontown†		11	
Arizona.			
Benson†		17	
Calabasas†		16	
Eagle Pass†		19	
Navajo†		15	
Parker		18	
Red Rock†		18	
Walnut Ranch†		20	
Arkansas.			
Brinkley†		3	
Corning			16
Dallas†		17	
Forrest†		3	
Helena†		9	
Malvern†		3	
Mount Nebo†		11	
Osceola†		6	
Rogers†		2	
California.			
Agnew†		11	
Barstow†		14	
Bethany	26	29	
Crescent City	5	14	
Eureka	13		
Fall Brook	20		
Folsom City	22		
Fresno (near)	15		
Georgetown		28	
Greenville			27
Hydesville		16	
Iowa Hill	28		
Jackson		29	
Julia		27	
Kennedy Gold Mine		28	
La Grange	22		
Lodi	15		
Los Angeles	13		
Middletown†		17	
Mokelumne Hill	28		
Napa	21		
Nordhoff†		20	
Oakdale†		30	
Oleta		24	
Palermo	13		
Paso Robles†		20	
Placerville		22	
Pleasonton†		9	
Red Bluff	23		
Reedley (near)	28		
Represa†		23	
Riverside		21	
Rosewood		20	
Sacramento	23		
San Francisco	22		
San Jacinto	1	28	
San Jose		17	
San Luis Obispo	11	15	
San Rafael		22	
Santa Cruz		15	
Santa Paula†		18	
Stanford University	22		
Sutter Creek†		28	
Tulare	22	29	
Turlock	15	17	
Ukiah	16	17	
Vacaville	23		
West Butte	27		
Wheatland	18		
Winchester†		14	
Wire Bridge	22	30	
Yuba City	8		
Colorado.			
Avoca			15
Boxelder			15
Byers			16
Climax			15
Collbran			16
Cope			15
Deertrail			15
Downing			16
Dumont			16
First View			15
Fleming			15
Fort Collins			15
Greeley			15
Holly			17
Hugo			15
Julesburg			15
Lake Moraine			1
Las Animas			16
Lavender			27
Lay			15
Le Roy			7
Leslie			18
Loveland			15
Rangely			15
Rico			1
Rocky Ford			16
St. Cloud			17
Scissors			15
Seibert			15
Colorado—Cont'd.			
Smoky Hill Mine			15
Springfield			15
Stamford			1
T. S. Ranch			16
Vernon			15
Watkins			15
Connecticut.			
Bridgeport			5
Canton			5
Colchester†		5	5
Falls Village			5
Greenfield Hill		7	5
Hartford			5
Middletown			5
New Hartford			5
New Haven			5
New London			5
North Grosvenor Dale			5
Southington			5
South Manchester			5
Storrs		5	5
Thompson			5
Voluntown			5
Wallingford			5
Waterbury			5
West Simsbury			5
Delaware.			
Dover		12	
Seaford		9	
Wilmington			9
District of Columbia.			
West Washington			13
Florida.			
Amelia	6	11	
Archer	11	12	
Brooksville	11		
De Land	12	13	
Eustis	13		
Federal Point	13		
Grasmere	12		
Green Cove Springs†		12	
Homeland		12	
Jacksonville	7	12	
Lake City	7	12	
Moseley Hall		7	
New Smyrna	12		
Orange City	12		
Orange Park	6	13	
Orlando	11		
Pensacola		12	
Plant City	12		
Talahassee	7		
Tampa	12		
Tarpon Springs	16		
Georgia.			
Alapaha	1	7	
Albany†		7	
Americus†		7	
Athens		6	
Atlanta		6	
Augusta		6	
Bainbridge†		7	
Blakely		7	
Camak†		7	
Canton		6	
Columbus†		7	
Cordele†		7	
Covington†		6	
Darien		12	
Eastman†		7	
Elberton†		5	
Forsyth		7	
Fort Gaines†		7	
Gainesville†		6	
Gillsville†		12	
Griffin†		10	
Hawkinsville		11	
Lagrange		6	
Louisville		6	
Macon		7	
Marietta		8	
Marshallville		1	
Millen†		6	
Monticello†		11	
Newnan†		4	
Piscola		12	
Point Peter†		6	
Poulan		7	
Quitman†		7	
Ramsey			11
Savannah	6	11	
Talbotton†		7	
Union Point†		7	
Washington†		7	
Way Cross		12	
Waynesboro		7	
West Point†		7	
Idaho.			
Boise Barracks			30
Chesterfield			15
Fort Sherman			17
Garden Valley			30

Dates of first light and heavy frosts and snow—Continued.

State and station.	First frost. Light.	First frost. Heavy.	Snow.
Idaho—Cont'd.			
Kootenai			22
Moscow			18
Murray			18
Salubria			23
Illinois.			
Albion			10
Aurora			7
Bloomington			7
Braidwood			7
Carlinville			10
Carrollton			10
Chemung			7
Chicago			7
Decatur			9
Dixon			7
East Peoria			10
Effingham			15
Fort Sheridan			9
Galva			2
Golconda			10
Greenville			10
Havana			10
Herrins Prairie			10
Kankakee			9
Louisville			10
Martinsville			9
Monmouth			9
Mount Pulaski			10
Olney			10
Oswego			6
Ottawa			7
Paris			9
Peoria			10
Philo			9
Rantoul			7
Riley			7
Rushville			10
St. John			10
Springfield			10
Sycamore			7
Walnut			2
Winnebago			7
Indiana.			
Angola			7
Butlerville			5
Cambridge City			7
Columbia City			8
Columbus			11
Connersville			11
De Gonia Springs			11
Delphi			6
Evansville			11
Farmland			7
Franklin			3
Hammond			7
Indianapolis			9
Jasper			10
Jeffersonville			10
Kokomo			10
Lafayette			9
Logansport			6
Madison			10
Marion			10
Mauzy			7
Mount Vernon			11
Plymouth			6
Princeton			10
Rockville			9
Rushville			11
Scottsburg			5
Seymour			10
South Bend			6
Terre Haute			10
Valparaiso			10
Vevay			10
Worthington			11
Indian Territory.			
Healdton†		3	
Iowa.			
Algona			9
Amana			10
Carroll			20
Cedar Falls			29
Cedar Rapids			13
Cresco			2
Davenport			2
Decorah			7
Elkader			7
Fairfield			16
Forest City			9
Galva			11
Grundy Center			9
Hampton			7
Hawkeye			7
Hopkinton			9
Independence			9
Keokuk			10
Keosauqua			10
Knoxville			6
Larrabee			9
Mason City			9
Mechanicsville			16
Iowa—Cont'd.			
Monticello			9
Moour			10
North McGregor			9
Ogden			9
Osage			7
Osceola			10
Oskaloosa			15
Ottumwa			9
Richland			16
Rockwell City			9
Seymour			16
Vinton			10
Williams			13
Wilton			10
Kansas.			
Achilles			10
Collyer			15
Coolidge			16
Englewood			16
Eureka			10
Garden City			12
Garfield			10
Gibson			16
Gove			15
Hutchinson			16
Jaqua			15
Johnson			16
Leoti			16
Manhattan			16
Morland			10
Morton			16
Mount Hope			16
Sharon Springs			15
Tribune			16
Ulysses			16
Wallace			16
Wellington			23
Wichita			9
Winona			15
Kentucky.			
Alpha		4	10
Blandville			11
Carrollton			5
Catlettsburg			11
Earlington			10
Eddyville†		6	
Edmonton			10
Eubank			10
Franklin			9
Greendale			11
Greensburg			10
Harrodsburg			10
Henderson†		6	10
Louisa			11
Louisville			10
Marrowbone			10
Matlock			10
Mount Sterling			5
Pellville			10
Richmond†		6	10
Shelby City			10
South Fork			10
Williamsburg			10
Louisiana.			
Abbeville		4	
Alexandria†		7	
Bastrop†		6	
Baton Rouge†		12	
Calhoun†		6	
Cheneyville†		4	
Clinton		6	
Cinclare		6	
Donaldsonville	7		
Emilie	5	12	
Franklin		12	
Grand Coteau	6		
Houma		12	
Lafayette†		12	
Lake Providence		4	
Maurepas		6	
Minden†		11	
Natchitoches†		3	
New Orleans (near)	12		
Oberlin†		12	
Opelousas		4	
Rayne†		12	
Shriever†		7	
Shreveport		17	
Sugar Experim't Station		11	
Thibodeaux		8	
Maine.			
Bar Harbor			5
Calais			6
Cornish			6
Easton			6
Eastport			6
Fairfield			5
Gardiner			5
Houlton			6
Lewiston			5
Orono			6
Portland†		6	5

Dates of first light and heavy frosts and snow—Continued.

State and station.	First frost. Light.	First frost. Heavy.	Snow.
Maryland.			
Bachmans Valley			10
Baltimore		12	30
Boettcherville			7
Burkittsville			7
Cherryfields		12	
Cumberland†		10	
Denton†		6	
Easton		12	
Fallston			10
Frederick†		12	
Great Falls†		12	
Mardela Springs			5
Mt. St. Marys College			7
Popes Creek†		3	
Solomons†		12	
Taneytown†			11
Massachusetts.			
Amherst			5
Bedford			5
Beverly Farms†		6	5
Blue Hill†		6	5
Boston			5
Brockton			6
Cambridge†		6	6
Chestnut Hill			5
Concord†		6	6
Dudley†		6	5
East Templeton			5
Egg Rock, Nahant†		6	
Fall River		6	6
Fitchburg			5
Framingham†		5	5
Gilbertville			5
Groton			5
Hadley		7	5
Hingham			5
Hyannis		6	25
Lake Cochituate†		2	
Lawrence†		6	5
Leeds			5
Leominster		6	6
Long Plain			5
Ludlow Center			6
Lynn†		6	5
Mansfield			6
Milton†		6	6
Monroe†		4	
Monson			5
Mount Nonotuck			5
Mystic Lake			5
Nantucket			6
Natick†		6	5
New Bedford			5
North Billerica†		6	5
Plymouth†		7	6
Provincetown†		6	9
Randolph			5
Roxbury		6	6
Salem			6
Salisbury			5
Somerset			5
Taunton			6
Wakefield			5
Webster			6
Wellesley†		5	5
Westboro			5
Williamstown†		5	5
Winchendon			6
Winchester			5
Worcester			5
Michigan.			
Adrain			5
Albion			7
Allegan			7
Alma			6
Arbela			5
Ball Mountain			8
Berlin			6
Berrien Springs			6
Birmingham			9
Bronson			6
Charlevoix			6
Cheboygan			9
Clinton			6
Detroit			7
Fitchburg			6
Flint			6
Gladwin			5
Grand Rapids			7
Grape			5
Hanover			7
Harbor Springs			5
Harrison			6
Harrisville			5
Hart			5
Howell			6
Ivan			3
Jeddo			8
Kalamazoo			4
Lake City			9
Lansing			5
Lathrop			5
Michigan—Cont'd.			
Lewiston			5
Madison			6
Mayville			5
Northport			6
Old Mission			11
Ovid			9
Paris			7
Parkville			5
Pontiac			16
Port Huron			6
St. Ignace			6
St. Johns			7
Sand Beach			9
Stanton			8
Thornville			5
Vandalia			6
Ypsilanti			6
Minnesota.			
Ada			11
Dawson			9
Grand Meadow			2
Hutchinson			8
Jadis			8
Lake Winnibigosish			3
Mazeppa			7
Minnesota City			7
Pine River			7
St. Charles			2
St. Paul			2
St. Peter			9
Sunrise			7
Wabasha			7
Winona			1
Mississippi.			
Agricultural College		6	
Biloxi†	6	11	
Briers†		11	
Brookhaven†		4	
Canton†		11	
Columbus		6	
Corinth†		4	
Duck Hill		5	
Edwards		6	
Fayette		14	
Greenville		4	
Hattiesburg		12	
Hazlehurst†		7	
Hernando†		6	
Kosciusko†		6	
Lake†		6	
Leakesville†		6	
Logtown		6	
Moss Point†		11	
Natchez†		12	
Okolona†		4	
Pontotoc		11	
Port Gibson†		7	
Stonington		4	
Thornton†		12	
Topton		6	
University		6	
Vicksburg		11	
Water Valley		4	
Waynesboro†		5	
Woodville		11	
Missouri.			
Boonville			16
Brunswick			16
Carrollton			16
Columbia			16
Downing			10
East Lynn			16
Edgehill†		3	
Eldon		11	
Emma†		5	
Fairport			16
Farmersville			16
Gallatin			7
Hannibal			10
Houstonia (near)			17
Ironton			10
Kansas City			13
Kidder			16
Lamonte			16
La Plata			16
Louisiana Bridge			11
McCune			16
Marceline			16
Marshall†			10
Miami			16
Nevada			16
New Hartford			10
New Madrid		3	
New Palestine			16
Oak Ridge†		6	
Potosi			10
St. Charles			10
St. Louis			10
Sedalia			16
Steffenville			9
Stellada			16
Vermont†		3	

Dates of first light and heavy frosts and snow—Continued.

State and station.	First frost. Light.	First frost. Heavy.	Snow.
Missouri—Cont'd.			
Warrensburg			16
Montana.			
Columbia Falls			16
Glasgow			9
Nebraska.			
Alliance			16
Chadron			15
Cornlea			15
Ewing			15
Gering			15
Holdrege			15
Indianola			16
Lexington			15
Lodge Pole			15
Lynch			11
Marquette			16
Oakdale			15
Ogallala			15
Ravenna			15
Santee Agency			1
Wallace			15
Nevada.			
Cranes Ranch			28
New Hampshire.			
Alstead			5
Brookline			5
Concord			6
Dublin			5
Grafton			5
Hanover			6
Keene			6
Lancaster			5
Newton			5
North Conway			5
Peterboro			5
Plymouth			5
Sanbornton			5
New Jersey.			
Asbury Park			9
Atlantic City		7	
Barnegat†		7	
Bayonne			9
Beach Haven†		7	
Belvidere			8
Bridgeton		12	
Camden		7	9
Cape May		12	
Charlotteburg			8
Deckertown†		6	5
Dover			8
Franklin Furnace			8
Freehold			9
Gillette			8
Hightstown†		7	7
Imlaystown		6	
Junction			8
Lambertville†		7	30
Moorestown		7	9
Newark		6	6
New Brunswick			8
Newton			7
Ocean City		7	
Oceanic		7	30
Paterson		6	8
Pensauken		7	
Perth Amboy		11	9
Plainfield			9
Readington†		5	
River Vale†			9
Somerville			7
South Orange			8
Tenafly			29
Trenton†		7	9
Whiting†		7	
New Mexico.			
Chama			1
Ciruella			15
Eddy†		11	
Sulphur Hot Springs			28
New York.			
Baldwinsville			5
Bedford			5
Cooperstown			5
Fleming			8
Glens Falls			5
Hamilton			5
Honeymead Brook			5
Marlboro			6
Middletown			9
New York		7	9
Ogdensburg			4
Oneonta			4
Oswego		2	
Oxford			7
Palermo			10
Port Jervis			5
Poughkeepsie			8
Setauket			9
Stillwater			5
Wappgeinrs Falls			5
West Chazy			5
North Carolina.			
Asheville			11
Auburn		15	
Bailey			11
Bakersville			11
Blowing Rock			10
Chapel Hill		6	
Charlotte		7	
Falkland		7	
Fayetteville		7	
Flat Rock			11
Goldsboro†		7	
Greensboro†		11	
Highlands			10
Horse Cove			11
Littleton†		6	
Louisburg†		7	
Lumberton†		7	
Lynn†		7	
Marion†		6	
Mocksville			11
Moncure†		7	
Murphy			11
Newbern†		7	
Oak Ridge			11
Raleigh		11	
Rockingham		7	
Roxboro			11
Shelby		6	11
Skyuka		6	7
Sloan		7	
Soapstone Mount			10
Southern Pines		7	
Waynesville			10
Weldon			11
Wilmington		7	
North Dakota.			
Ashley			9
Grafton			8
Lemert			19
Minto			1
Oakdale			28
St. John			9
Ohio.			
Akron			5
Annapolis			5
Arcanum			11
Ashland			5
Athens			6
Atwater			6
Auburn			6
Bellefontaine			5
Bement			5
Benton Ridge			7
Big Prairie			6
Binola			5
Bladensburg			6
Bloomingburg			7
Bloomington			7
Bowling Green			7
Bucyrus			6
Caledonia			10
Cambridge			6
Camp Dennison			10
Canal Dover			7
Canton			6
Carrollton			6
Cedarville			11
Celina			5
Cherry Fork			10
Cincinnati			9
Circleville			6
Clarksville			7
Clifton			7
Coalton			10
Columbus			6
Cynthiana			9
Dayton			7
Defiance			7
Demos			5
Dupont			12
Ellsworth			5
Elyria			5
Fayetteville			5
Findlay			5
Fostoria			7
Georgetown			10
Granville			6
Gratiot			6
Greenfield			6
Greenville			5
Hackney			13
Hanging Rock			10
Harbor			10
Hedges			7
Hillhouse			5
Hillsboro			7
Jacksonboro			7
Kenton			5
Kilbourne			5
Killbuck			6
Levering			7
Logan			11

Dates of first light and heavy frosts and snow—Continued.

State and station.	First frost. Light.	First frost. Heavy.	Snow.
Ohio—Cont'd.			
Lordstown			5
McArthur			7
McConnelsville			6
Mansfield			6
Marietta			13
Milfordton			7
Milligan			6
Millport			6
Montpelier			7
Napoleon			7
New Alexandria			6
New Berlin			7
New Bremen			5
New Comerstown			5
New Holland			5
New Waterford			5
North Fairfield			6
North Lewisburg			7
North Royalton			8
Northwood			6
Norwalk			6
Oberlin			6
Ohio State University			7
Orangeville			6
Ottawa			7
Pataskala			5
Plattsburg			7
Pomeroy			5
Portsmouth			5
Ridge			7
Ridgeville Corners			9
Ripley			10
Rittman			7
Rocky Ridge			6
Rosewood			7
Sharon Center			6
Shenandoah			6
Sidney			7
Springboro			11
Stoutsville			7
Sylvania			14
Thurman			7
Toledo			6
Upper Sandusky			6
Vanceburg			10
Vermilion			7
Vickery			6
Warsaw			5
Wauseon			7
Waverly			7
Waynesville			10
Wellington			6
Westerville			7
Weymouth			6
Wheeler			7
Willoughby			6
Wooster			6
Zanesville			6
Oklahoma.			
Fort Reno†		11	
Guthrie		5	
Norman		5	
Ponca†		4	
Oregon.			
Albany		16	
Astoria	4	16	
Aurora		16	
Bay City		16	
Eugene		5	
Jacksonville		16	
La Grande			23
Lakeview†		1	17
Langlois		16	
McMinnville		21	
Mount Angel		4	
Portland		16	
Roseburg		16	
Springbrook		16	
Pennsylvania.			
Aqueduct			13
Beaver Dam			6
Bethlehem			8
Brookville			8
Carlisle			13
Coatesville			9
Confluence			7
Coopersburg			8
Davis Island Dam			13
Drifton			8
East Mauch Chunk			8
Easton			7
Erie			6
Freeport			7
Greensboro			6
Hamburg			10
Honesdale			8
Lebanon			7
Lewisburg			8
Lock Haven			12
Lock No. 4			8
Lycippus			10
Mahoning			12

State and station.	First frost. Light.	First frost. Heavy.	Snow.
Pennsylvania—Cont'd.			
Philadelphia		7	9
Phœnixville			9
Quakertown			7
Salem Corners			5
Selinsgrove			8
Somerset			7
South Eaton			8
Stoyestown			7
Uniontown			6
Warren			8
Wellsboro			7
West Newton			7
Westtown			9
Wilkesbarre			6
Rhode Island.			
Block Island		6	30
Bristol		7	5
Kingston			5
Lonsdale			6
Newport†		7	6
Pawtucket†		6	5
Providence			5
South Carolina.			
Aiken†		11	
Allendale†		7	
Batesville†		11	
Blackville		11	
Blenheim		17	
Branchville		1	
Central			13
Charleston	6	11	
Cheraw		6	
Columbia		7	
Cross Hill		6	
Flint Hill	1	7	
Florence		7	
Georgetown†		10	
Greenville†		9	
Greenwood†		11	
Hardeeville		7	
Holland		7	
Kingstree†		11	
Little Mountain		11	
McCormick		6	
Pinopolis		7	
Port Royal	7	12	
St. George†		7	
St. Matthews†		12	
Santuck	1	6	
Society Hill		6	
Spartanburg†		16	
Statesburg		6	
Trenton		6	
Trial		7	
Watts		6	
Yorkville		6	
South Dakota.			
Forestburg			11
Parkston			6
Tyndall			1
Wessington Springs			1
Tennessee.			
Andersonville		1	11
Arlington†		3	
Bolivar†		3	
Bristol†		4	5
Brownsville†		6	
Byrdstown			10
Chattanooga			11
Covington		3	
Dyersburg†		3	
Florence			11
Franklin			11
Greeneville			11
Hohenwald			11
Jacksboro			10
Jackson†		3	
Lynnville			11
Memphis		3	
Nashville			11
Newport			11
Parksville†		6	
Riddleton			10
Rogersville			6
South Bethehem			11
Springdale			11
Trenton†		3	
Tullahoma			11
Texas.			
Abilene†		17	
Albany†		11	
Arlington†		6	
Aurora†		11	
Austin†		17	
Belton†		17	
Boerne		17	
Brady		6	
Brenham		15	
Burnet†		17	
Coleman†		17	
College Station		17	
Corsicana†		11	

Dates of first light and heavy frosts and snow—Continued.

State and station.	First frost. Light.	First frost. Heavy.	Snow.
Texas—Cont'd.			
Dallas		17	
Duval		17	
Fort Worth		17	
Fredericksburg†		6	
Graham†		3	
Grape Vine		6	
Hallettsville		20	
Hearne†		17	
Huntsville†		16	
Lampasas		19	
Llano		17	
Longview†		17	
Luling		20	
Marshall		12	
Mountain Spring		17	
New Braunfels		20	
Palestine		11	
Paris†		11	
Rocksprings†		16	
Round Rock		20	
San Marcos†		7	
Silver Falls†		5	
Temple†		11	
Tyler†		6	
Waco†		17	
Weatherford		11	
Wichita Falls†		11	
Vermont.			
Cornwall			5
Hartland			5
Irasburg			5
Jacksonville			5
Norwich			5
Vernon			5
Wells			5
Virginia.			
Alexandria†		6	
Ashland			11
Virginia—Cont'd.			
Avon†		4	11
Bedford†		7	11
Birdsnest			12
Blacksburg			5
Buckingham			11
Dale Enterprise			6
Grahams Forge†		11	5
Hampton		7	
Irwin			12
Lexington			5
Lynchburg		11	11
Petersburg			11
Richmond†		11	11
Rocky Mount			6
Salem†		3	5
Smithville†		11	
Spottsville			6
Staunton			6
Warsaw†		7	
Whittles Depot			11
Wytheville			5
Washington.			
Aberdeen		15	
Blaine			17
Bridgeport			22
Colfax			22
Conconully			23
Ellensburg			23
Fort Canby	4	16	
Fort Simcoe			23
Fort Spokane			23
Hunters			16
Lakeside			22
Moxee Valley			22
Neah Bay†		15	
Port Angeles		16	
Rosalia			21
Seattle	15	16	

Dates of first light and heavy frosts and snow—Continued.

State and station.	First frost. Light.	First frost. Heavy.	Snow.
Washington—Cont'd.			
Spokane			23
Tatoosh Island	16		
West Ferndale			16
West Virginia.			
Bloomery			6
Burlington			6
Charleston			10
Creston			6
Elkhorn			5
Ella			6
Fairmont			6
Glenville			6
Grafton			6
Madison			6
Marlinton			5
Morgantown			6
New Cumberland			5
Parkersburg			6
Philippi			6
Point Pleasant			10
Powellton			5
Raleigh			6
Rowlesburg			6
Spencer			6
Weston			5
Wheeling			6
Wisconsin.			
Amherst			7
Antigo			2
Ashland			2
Baraboo			7
Barron			3
Bayfield			8
Beaver Dam			4
Beloit			7
Black River Falls			7
Centralia			6
Chippewa Falls			4
Wisconsin—Cont'd.			
City Point			3
Columbus			7
Crandon			1
Delavan			7
Depere			5
Eau Claire			2
Florence			2
Fond du Lac			7
Hartford			7
Harvey			7
Hayward			6
Hillsboro			2
Janesville			7
La Crosse			2
Lancaster			4
Lincoln			7
Madison			7
Manitowoc			7
Meadow Valley			7
Menomonie			2
Milwaukee			7
Neillsville			9
Oconto			7
Oshkosh			7
Pepin			1
Portage			7
Port Washington			7
Prairie du Chien			7
Reedsburg			7
Royalton			7
Shawano			6
Spooner			3
Stevens Point			3
Valley Junction			7
Viroqua			2
Watertown			7
Waukesha			7
Westfield			7
Weston			3

HUMIDITY.

WET-BULB OR SENSIBLE TEMPERATURES.

The sensation of heat experienced by the human body and attributed to the atmosphere depends not merely upon the temperature of the air, but especially upon its dryness and the force of the wind. Physiologists have explained this nervous sensation, erroneously called subjective temperature, as a condition due to the more or less rapid evaporation of the natural perspiration and the consequent drying of the outer layers of the skin.

Investigations were made into the relations between the moisture of the air and its physiological effects by Mr. J. W. Osborne, of Washington (see the Proceedings of the American Association for the Advancement of Science, 1876), and especially by the Chief of the Weather Bureau (see his memoir on "Sensible Temperatures," read before the American Climatological Association, June 1, 1894). It would seem that the rapid evaporation from the skin in dry, hot weather reduces the temperature of the layer of nerve cells at the surface of the skin. This reduction is not measurable by thermometers which give the temperature of large masses, but is appreciated by the minute nerves that end in these microscopic cells.

The reduction of temperature, or sensible coolness, is apparently proportional to the difference between the dry and wet bulb thermometers, and as shown by the chart accompanying Professor Harrington's memoir, it amounts on the average to 20° in the month of July in Arizona, Nevada, and Utah and 10° in Kentucky, Indiana, and Ohio. The resulting sensible temperatures, as shown on his second chart, are simply the so-called average temperatures of the wet-bulb thermometer in the shaded shelter, and correspond to the temperatures of persons standing in the shade of trees or houses, exposed to a natural breeze of at least 6 miles per hour, as obtained by the whirling apparatus used with the wet-bulb thermometer. The temperature of the wet-bulb thermometer and its depression below the dry bulb are the fundamental data for all investigations into the relation between human physiology and the atmosphere. In order to present a monthly summary of the atmospheric conditions from a hygienic and physiological point of view, Table I*a* has been prepared, showing the maximum, minimum, and mean readings of the wet-bulb thermometer at 8 a. m. and 8 p. m., seventy-fifth meridian time.

HUMIDITY.

The quantity of moisture in the atmosphere at any time may be expressed by means of the weight contained in a cubic foot of air. This is usually known as the absolute measure and is equivalent to giving the tension or pressure of the vapor, or the temperature of the dew-point. The mean dew-points for each station of the Weather Bureau, as deduced from observations made at 8 a. m. and 8 p. m., daily, are given in Table I. These vapor pressures and the resulting dew-points, absolute humidities, and relative humidities are all deduced from observations of the wet-bulb thermometer by means of formulæ and tables that were first devised by August and subsequently modified by Regnault, 1845, and Ferrel in 1885, but which are still considered to be open to further improvement. In a general way the dew-points given in Table I are probably slightly lower than they should be, owing to the omission since 1887 of a correction for barometric pressure. There is also an uncertainty in the psychrometric formula which is only just now beginning to be understood, by virtue of which at temperatures below freezing the dew-points and the humidities are higher than they should be. For these reasons