Meteorological record of voluntary observers, etc.—Continued.

Stations.	Temperature. Maximum.	Minimum.	Mean.	Rainfall.
Florida.	°	°	°	*Inches*
Archer *	84	26	56.7	12.33
St. Augustine, Fort	79	39	58.7	7.61
Gatlin, Fort	89	39	.....	.....
Limona *	92	36	66.5	5.78
Manatee *	90	41	65.2	5.20
Meade, Fort	.....	.....	.....	5.25
Merritt's Island	81	42	63.2	4.99
Tallahassee *	72	32	.....	9.79
Georgia.				
Athens	74	25	51.2	9.74
Dahlonega *	71	20	48.6	13.47
Forsyth *	80	30	54.6	8.67
Milledgeville	78	26	53.9	5.71
Quitman *	80	33	57.6	9.10
Idaho.				
Boise Barracks	68	20	41.7	0.83
Cœur d'Alene, Fort	70	12	38.7	2.16
Illinois.				
Anna *	80	21	43.8	4.05
Bloomington	75	12	38.4	1.81
Bunker Hill	84	18	40.0	2.86
Beardstown *	80	22	39.6	.....
Collinsville	80	20	42.3	2.77
Charleston *	78	11	41.0	3.32
Geneseo *	73	3	33.4	3.17
Mattoon *	80	15	40.5	3.55
Pekin *	79	12	34.9	2.70
Peoria	78	17	40.2	2.25
Riley	67	5	30.2	3.68
Rockford *	66	— 6	30.8	4.55
South Evanston	72	9	.....	2.28
Sycamore	70	4	31.6	3.85
Windsor	77	10	38.2	2.60
Indian Territory.				
Reno, Fort	89	15	47.0	0.00
Supply, Fort	86	8	43.4	0.34
Indiana.				
Fort Wayne *	75	13	39.0	4.01
Guilford *	74	16	39.9	2.30
Jeffersonville	70	20	43.4	2.83
Knightstown	76	12	38.8	1.85
Laconia	80	20	42.7	2.68
Lafayette	76	10	37.8	2.04
LaGrange	73	7	34.4	2.27
Mauzy	72	10	34.7	2.88
Spicehand	74	14	38.4	2.72
Sunman *	74	13	40.5	2.80
Terre Haute *	76	22	.....	3.67
Vevay	79	17	43.4	2.18
Iowa.				
Bancroft	55	— 2	27.4	1.83
Cedar Rapids *a*	68	6	28.7	4.47
Cedar Rapids *b*	66	— 2	30.8	.....
Clinton *	71	— 5	32.1	4.45
Cresco	59	— 9	26.1	2.04
Des Moines	73	6	34.4	.....
Humboldt	60	0	29.7	1.40
Independence *	60	2	30.2	1.98
Logan	64	2	32.2	2.50
Fort Madison	72	7	.....	.....
Manchester	62	5	31.5	2.09
Monticello *	67	0	30.2	3.50
Mount Vernon *	63	7	33.5	.....
Muscatine	70	0	32.4	4.16
Oskaloosa *a*	74	11	33.2	1.43
Oskaloosa *b*	66	8	.....	.....
Kansas.				
Allison	78	2	35.9	1.62
Atchison *	74	10	37.5	0.95
El Dorado	78	5	40.3	.....
Elk Falls	.....	.....	.....	1.46
Emporia *	80	10	40.7	2.25
Hays, Fort	74	— 4	37.0	2.39
Independence *	83	14	43.1	1.68
Lawrence	79	11	40.4	1.63
Manhattan *a*	80	8	38 8	2.21
Manhattan *b*	82	9	39.2	1.55
Minneseah	89	12	41.1	1.01
Ottawa	82	12	40.5	2.27
Riley, Fort	80	8	39.7	1.05
Salina	61	14	40.0	0.07
Sterling	80	10	37.7	3.30
Topeka *a*	82	9	45.0?	1.84
Topeka *b*	80	10	38.3	1.70
Wellington	81	14	42.1	1.59
Wakefield *	69	10	38.2	0.80
W. Leavenworth *	80	13	.....	0.34
Westmoreland *	80	8	38.0	3.50
Wyandotte	78	12	33.0	1.81
Yates Centre	86	9	40.5	1.83
Kentucky.				
Frankfort	77	19	43.6	4.44
Richmond	74	18	42.9	5.02
Louisiana.				
Grand Coteau	78	36	60.2	5.92
Liberty Hill *	75	40	58.0	5.17
Luling *	80	36	.....	0.94
Maine.				
Bar Harbor	56	— 9	.....	3.28
Buckfield *	48	—11	.....	1.38
Cornish *	49	— 8	27.9	2.85
Gardiner	48	— 9	29.4	3.90

Stations.	Temperature. Maximum.	Minimum.	Mean.	Rainfall.
Maine—Cont'd.	°	°	°	*Inches*
Kent's Hill	43	—11	26.4	3.12
Orono *	46	—19	26.9	2.87
Maryland.				
Cumberland	68	12	40.2	3.53
Emmittsburg	62	14	39.0	5.79
Fallston *	68	12	39.4	6.03
Great Falls *	68	13	40.4	4.16
McDonogh	63	9	47.5	5.50
McHenry, Fort	69	15	42.2	4.80
Woodstock	67	10	39.6	5.74
Massachusetts.				
Amherst *a*	61	3	34.4	3.50
Amherst *b*	61	— 1	33.5	3.31
Blue Hill Obs'y	59	— 3	30.6	3.05
Deerfield	59	— 2	32.8	3.28
Dudley	57	—12	32.0	2.98
Fall River	68	11	33.6	3.85
Heath	50	— 6	.....	.....
Milton	65	0	34.1	1.86
New Bedford	58	2	33.5	4.99
Princeton	46	— 6	28.9	3.54
Quincy	67	0	32.3	3.38
Somerset *	68	1	35.1	4.09
Taunton	65	1	35.0	3.52
Worcester *	59	— 1	30.9	3.57
Westborough *	65	4	35.5	3.63
Williamstown	64	— 5	30.2	5.01
Michigan.				
Birmingham	54	4	.....	2.50
Brady, Fort	45	—20	24.6	1.78
East Saginaw	58	5	31.8	3.08
Harrisville *	48	1	.....	.....
Hudson	73	5	.....	0.75
Kalamazoo	68	7	.....	1.64
Lansing	67	5	32.1	2.83
Manistique	61	—10	27.8	3.52
Mottville *	74	7	.....	.....
Pentwater	60	— 3	29.5	4.24
Thornville	54	6	32.6	1.89
Traverse City *	52	— 2	.....	4.60
Minnesota.				
Minneapolis	60	— 9	27.5	1.51
Northfield	54	—13	26.9	2.06
Preston *	51	—16	.....	.....
Snelling, Fort	56	—12	27.3	0.95
Missouri.				
Carthage	82	17	45.8	1.65
Central College *	80	21	40.6	2.35
Centreville	77	19	.....	3.87
Conception *	74	4	34.9	.....
Pierce City *	81	19	42.3	3.30
Springfield *	80	19	42.8	1.50
Warrenton *	82	18	40.4	.....
Montana.				
Assinaboine, Fort	65	—19	28.1	1.18
Ellis, Fort	67	—14	27.5	1.68
Keogh, Fort	75	— 8	30.4	0.68
Missoula, Fort	62	11	35.2	0.37
Shaw, Fort	68	—20	32.3	0.55
Nebraska.				
Brownville *	67	2	36.3	2.02
De Soto *	59	0	32.2	3.16
Fairbury	.....	.....	.....	2.56
Fremont *	56	— 6	34.2	4.93
Genoa	61	— 7	29.0	0.82
Hay Springs *	68	—15	27.9	1.51
Marquette	.....	.....	.....	3.52
Niobrara, Fort	77	— 7	29.5	1.72
Robinson, Fort	73	— 8	33.4	1.74
Sidney, Fort	75	—12	30.5	0.59
Stockham	.....	.....	.....	2.00
Yutan *	61	— 4	32.8	2.71
Nevada.				
Carson City	70	19	38.7	1.60
Halleck, Fort	65	10	32.8	1.10
McDermit, Fort	69	15	35.2	0.50
New Hampshire.				
Ashland	.....	.....	.....	3.14
Belmont	.....	.....	.....	3.41
Berlin Mills	51	—14	25.1	.....
Bristol	.....	.....	.....	3.16
Lake Village	.....	.....	.....	3.68
Nashua	61	— 3	31.9	2.99
Wier's Bridge	.....	.....	.....	3.19
Wolfborough	.....	.....	.....	2.28
Woodstock	.....	.....	.....	4.13
New Jersey.				
Beverly *	68	12	38.5	3.64
Clayton *	70	13	39.0	2.59
Dover *	66	9	35.0	3.23
Egg Harbor City	68	15	41.2	4.50
Moorestown	64	12	37.5	3.54
Paterson *	65	13	37.3	3.84
Phillipsburg	.....	.....	.....	3.66
Princeton	67	10	37.2	3.41
Readington *	60	12	39.0	.....
South Orange *	62	10	37.7	3.47
Vineland	66	15	40.3	3.81
New Mexico.				
Bayard, Fort	80	12	44.5	0.18
Gallinas Spring	70	22	.....	1.00
Puerto de Luna	77	21	45.1	0.81

Meteorological record of voluntary observers, etc.—Continued.

Stations.	Temperature. Maximum.	Minimum.	Mean.	Rainfall.
N. Mexico—Cont'd.	°	°	°	*Inches*
Selden, Fort	86	20	41.4	0.00
Union, Fort	71	3	36.5	0.50
Wingate, Fort	65	12	34.3	0.82
New York.				
Auburn	63	— 2	33.4	3.78
Columbus, Fort	62	10	36.8	3.33
Cooperstown *	68	—10	29.0	2.92
David's Island	60	20	35.9	23.3
Factoryville *	65	4	33.5	1.98
Humphrey *	60	— 6	30.4	2.57
Ithaca	66	— 3	32.5	2.50
LeRoy	67	0	31.4	2.24
Madison Barracks	63	— 9	28.5	2.72
Menand Station	61	— 3	32.2	2.63
Mountainville	66	4	34.6	3.80
Niagara, Fort	51	1	31.8	1.99
North Volney *	65	— 5	30.3	3.25
Palermo *	63	—11	28.2	1.68
Palmyra *	66	1	32.2	.....
Penn Yan	.....	.....	.....	1.18
Plattsburg B'ks	62	—16	26.4	1.42
Setauket	65	8	35.5	3.18
Syracuse	71	8	.....	.....
West Point	62	5	35.7	3.98
White Plains	58	3	35.5	2.65
North Carolina.				
Chapel Hill	80	24	49.0	4.97
Flat Rock	71	20	43.8	8.64
Lenoir	.....	.....	.....	3.40
Lincolnton	67	26	45.1	5.89
Raleigh *	81	27	49.0	3.80
Reidsville *	80	20	45.7	0.69?
Statesville *	74	22	47.0	4.91
Wake Forest *	79	25	49.3	4.22
Weldon *	79	25	48.2	4.01
Ohio.				
Cleveland	66	7	36.6	2.41
Clyde	65	20	.....	.....
College Hill *	80	12	42.8	1.25
Fostoria *	81	5	36.1	1.98
Garrettsville	73	0	33.6	2.69
Hiram	72	4	34.3	1.71
Jacksonborough *	70	12	38.8	2.35
Napoleon	72	8	37.3	1.38
North Lewisburg	73	6	40.5	2.60
Ruggles *	70	6	35.3	2.00
Tiffin *	74	6	34.4	2.16
West Milton	74	12	43.0	3.50
Wauseon	75	5	34.5	1.56
Westerville	73	10	37.7	2.11
Yellow Springs	74	10	39.3	1.94
Oregon.				
Albany *	72	30	46.4	3.19
Bandon *	55	28	41.5	5.81
East Portland *	68	26	.....	3.04
Eola *	64	28	42.8	3.67
Klamath, Fort	70	10	34.1	1.54
Pennsylvania.				
Altoona	66	10	40.6	2.20
Bethlehem *	68	9	38.8	4.08
Blooming Grove *	62	— 2	.....	5.30
Catawissa *	68	1	37.2	4.13
Dyberry *	62	— 6	31.2	3.51
Easton	.....	.....	.....	4.11
Fallsington	65	12	37.0	3.53
Franklin *	64	0	29.8	3.40
Germantown *	64	10	.....	2.67
Grampian Hills *	64	4	32.8	3.62
Mahanoy Plane	64	7	39.2	7.59
Philipsburg *	69	0	36.4	.....
Quakertown *a*	63	8	35.6	4.46
Quakertown *b*	67	19	36.0	.....
Troy *	62	— 4	32.6	.....

Stations.	Temperature. Maximum.	Minimum.	Mean.	Rainfall.
Pennsylvania—Con.	°	°	°	*Inches*
Wellsborough *	68	4	36.0	8.25
West Chester	66	8	37.8	4.87
Wilkesbarre *a*	64	1	33.4	3.98
Wilkesbarre *b*	68	3	35.9	4.10
Wysox	66	3	34.2	2.82
Zionsville	60	8	40.3	7.00?
South Carolina.				
Aiken *	80	28	55.3	5.75
Kirkwood *	72	24	50.0	3.40
Pacolet *	.....	.....	.....	6.43
Spartanburg	57	42	50.4	7.70
Stateburg *	77	28	53.1	4.40
Tennessee.				
Ashwood	78	20	49.0	4.46
Milan	81	24	47.2	4.44
Paris *	75	24	51.5	9.38
Texas.				
Austin *	83	34	60.3	3.94
Clark, Fort	89	33	62.6	1.70
Comfort	.....	.....	.....	3.56
Corsicana	.....	.....	.....	4.22
Huntsville *	80	31	.....	3.89
McIntosh, Fort	89	41	66.8	1.26
Midland	88	23	52.5	0.43
Ringgold, Fort	94	50	70.4	0.12
New Ulm	81	34	58.7	4.75
Silver Falls	90	19	.....	.....
Vermont.				
Brattleborough	57	— 3	32.3	2.98
Burlington	66	— 9	28.6	1.33
Charlotte *	66	—10	25.8	2.40
Dorset	66	—10	27.9	3.29
Lunenburg	50	—16	25.2	0.90
Newport *	51	—16	24.6	2.50
Post Mills Village *	52	—12	26.0	.....
Poultney	70	—11	28.0	2.75
Strafford *	50	—16	25.9	2.20
Stowe *	45	—16	20.0	2.81
Virginia.				
Accotink	72	16	42.7	6.65
Bird's Nest *	76	19	46.8	2.85
Bruington	.....	.....	.....	4.46
Dale Enterprise *	76	14	44.7	6.86
Marion *	70	16	41.0	3.48
Monroe, Fort	74	20	45.8	1.35
Snowville *	69	17	.....	.....
Summit	72	14	42.0	.....
University of Va	66	32	47.5	5.65
Variety Mills	75	16	43.5	6.16
Wytheville	70	18	42.4	5.31
Washington Territory.				
Bainbridge Island *	70	26	44.0	2.78
Pleasant Grove *	71	15	.....	0.24
Spokane, Fort	75	20	41.5	trace.
Tacoma *	62	23	43.0	3.35
Townsend, Fort	59	26	43.8	0.54
Walla Walla, Fort	77	17	46.5	trace.
West Virginia.				
Helvetia *	71	— 2	38.6	4.46
Parkersburg	76	15	40.6	4.39
Wisconsin.				
Beloit	68	2	30.5	4.60
Embarras *	55	0	28.2	3.95
Fond du Lac *	50	— 2	27.5	3.43
Madison	49	4	28.9	4.07
Manitowoc	45	10	30.6	3.62
Neillsville *	43	—19	19.4	0.50
Prairie-du-Chien	58	— 8	30.9	2.36
Wyoming.				
Bridger, Fort	50	— 7	26.0	1.18
Fred Steele, Fort	57	— 5	28.7	0.62
Laramie, Fort	65	—11	23.4	0.36
Washakie, Fort	60	—15	28.4	2.05

NOTES AND EXTRACTS.

The following is an extract from the March, 1886, report of the "Alabama Weather Service," under direction of Prof. P. H. Mell, jr., of the Agricultural and Mechanical College, Auburn:

The first part of the month presented no unusual features in atmospheric changes, but towards the close a low depression began to manifest itself and the barometer became quite unsteady until the 26th, when a violent storm burst over the state, producing extensive and damaging floods. The rise in the rivers was greater than ever known to occur before.

The temperature was 6° below the average and frosts were quite frequent, with occasional snows.

There was an increase in precipitation of 2.72 inches above the normal, and most of this rain fell within the last few days of the month. Several tornadoes originated in sections of the state during the storm of the 26th-31st, and considerable damage resulted therefrom.

Ice formed on the 10th and 11th all over the state, and at some places it is reported from one-fourth to one-half inch in thickness.

Light snows are reported at Trinity on the 9th and 31st; Birmingham on 10th and 31st; Springville and Russellville on 31st.

State summary.

Temperature.—Mean, 53°; highest, 89°, at Livingston, on the 25th; lowest, 18°, at Gadsden, on the 11th; range, 71°; greatest monthly range, 58°, at Gadsden nd Trinity; least monthly range, 36°, at Lafayette; mean daily range, 13°; greatest daily range, 46°, at Gadsden, on the 24th; least daily range, 0°, at Mount Willing, on the 4th, Selma, on the 13th.

Precipitation (inches).—Mean depth of rainfall, 10.05; mean daily rainfall, 0.324; greatest depth of monthly rainfall, 18.25, at Newton; least depth of monthly rainfall, 3.38, at Decatur; greatest daily rainfall average for state, 3.04, on the 30th; greatest daily local rainfall, 9.75, at Russellville, on the 29th.

Average number of days on which rain fell, 10; average number of cloudy days, 15; average number of fair days, 7; average number of clear days, 9; warmest days, 18th, 19th, 29th; coldest days, 10th and 11th.

Prevailing directions of wind, southeast and southwest.

The following is an extract from the March, 1886, "Weather Review of the Illinois Weather Service," under direction of Mr. Charles F. Mills, of the Illinois Department of Agriculture, Springfield:

The "Review" contains a general summary of the conditions which prevailed over Illinois during the month of March, 1886, based upon the reports received from the Signal Service and voluntary observers reporting to the Illinois Department of Agriculture.

The state covers such an extended area from north to south (385 miles) that it has been found advisable to divide the same and follow the judicial divisions, which include the following territory, viz., the northern division extends from 42°.30 to about 40°.31; the central division extends from about 40°.31 to about 39°; the southern division, from about 39° to 36°.51.

Atmospheric pressure.—The highest barometer reported at the twenty-six stations during the month of March was on the 2d, at twenty-two stations; on the 3d, 10th, 12th, and 25th, at one station each. The lowest barometer reported during the month was on the 7th at one station, on the 21st at one, and on the 20th at twenty-four stations; the barometer in March, 1886, reached a higher point than in any of the four preceding Marches, as well as falling below any point reached in those months.

Temperature.—The mean temperature of March, 1886, was above the average of the same month at all except eight of the stations from which reports have been received for a term of years; the mean temperature of March for the last twelve years was 37°.58, which was 0°.80 below the mean temperature of March, 1886. The mean temperatures of March, 1878, 1879, and 1882 alone were higher than that of March, 1886, and March, 1875, 1876, 1877, 1880, 1881, 1883, 1884, and 1885 were colder than March, 1886. The highest mean temperature for March during the last twelve years was 48°, 1878, and the lowest, 33°.01, 1881; the highest temperature of the month was reported on the 19th, at thirty-four stations; on the 18th, at twenty-five stations; on the 24th, at three stations; on the 17th, at two stations; and on the 15th, at one station. In the northern division of the state the highest temperature was reported on the 19th, at eighteen stations, and on the 17th and 24th, at one station, each. In the central division the highest temperature was reported on the 19th, at eleven stations; on the 18th, at ten; and on the 17th and 24th, at one station each. In the southern division the highest point reached at fifteen stations was on the 18th, at five on the 19th, and on the 15th and 24th at one station each.

From the above it will be seen that the warm wave commenced in the southern part of the state on the 18th, and, travelling north, reached the northern portion on the 19th, when the temperature began to fall.

The lowest temperature in March, 1886, was reported on the 1st, at one station; on the 2d, at eighteen stations; on the 3d, at thirty-two; on the 4th, at two; and on the 10th, at thirteen stations. In the northern division of the state the lowest temperature was reported on the 2d, at eleven stations, and on the 3d at nine and on the 4th at one. In the central division the lowest point reached was on the 1st at one station, on the 2d at six and on the 3d at fifteen. In the southern division the lowest temperature was on the 2d at one station, on the 3d at eight, on the 4th at one, and on the 10th at thirteen. The highest temperature in March, 1886, was 85°, at Bluffdale, Greene county, on the 18th, and the lowest, —7°, at Cedarville, Stephenson county, on the 2d.

Precipitation.—The precipitation in March, 1886, including melted snow, averaged 3.34 inches for the fifty-four stations reporting. This was 0.42 inch more than the average March precipitation of twelve years past. The March, 1886, rainfall was less than that of the corresponding month in but three years, viz., 1876, 1.63 inches less; 1877, 1.07 less, and 1882, 1.13 less. It was greater than that of the corresponding month in 1875, 1878, 1879, 1880, 1881, 1883, 1884, and 1885. The precipitation of March, 1886, was more than the average at seventeen of the stations from which reports have been received for a term of years, and less than the average at but five stations. Rain fell very generally over the state on the 5th, 7th, 11th, 12th, 20th, 21st, 28th, 29th, 30th, and 31st, and in the southern division of the state on the 26th, and 27th. Local rains occurred in various portions of the state, March 1st, 6th, 8th, 9th, 10th, 13th, 14th, 17th, 18th, 19th, 22d, 24th, and 25th. No rain was reported from any part of the state on the 2d, 3d, 4th, 15th, 16th, and 23d. The least precipitation at any station in March, 1886, was 1.64 inches, at Oquawka, Henderson county. The greatest precipitation of the month was 16.23 inches, at Elizabethtown, Hardin county.

The snowfall of the month was much greater than that for March, 1885, the average for the entire state being 7.72 inches more than for March, 1885. By far the heaviest snow storm of the month occurred on the 31st, it being generally reported as the heaviest ever recorded so late in the season. Had the ground been frozen and the temperature of the air below freezing point, this would have been one of the deepest snows of the season, but it melted so fast that only a comparatively small quantity lay on the ground over night. This storm was very general throughout the state.

Wind.—The prevailing direction of the wind was northwest.

The following meteorological summary and accompanying remarks are from the March, 1886, report of the "Indiana Weather Service," under direction of Prof. W. H. Ragan, of De Pauw University, Greencastle:

Districts.	Temperature.			Average precipitation.
	Highest.	Lowest.	Monthly means.	
	°	°	°	*Inches.*
Northern counties	77.0	5.0	36.3	2.33
Central counties	76.0	10.0	38.4	2.80
Southern counties	80.0	13.0	42.2	2.37
State	80.0	5.0	39.0	2.50

Weather and precipitation.—At eight stations, averaged, 8.0 days were clear, 9.2 fair, 13.8 cloudy, and 0.01 or more precipitation fell on 12.1. The first third of the month was cold, with general snows in the latter half; the second, warmer, commencing with the general rain of the 12th and light snows in the first half, fair, very warm weather following, culminating in thunder-storms on the 18th and 19th at one or two northern stations and heavy rain and thunder-storms at most stations on the 20th; and the third, moderate, with gradually increasing cloudiness and rain and snow, ending with the general and heavy rain and snow of the 30th and 31st. Thunder-storms also occurred at some central and southern stations on the 28th and 29th.

Temperature.—The first five days were cold, and the 18th and 19th remarkably warm. At Spiceland, a very good representative station, the temperature was below freezing on nineteen days and above 50° on ten. The mean for the month was 1°.9 above normal at Spiceland; 0°.1 below at Indianapolis; 3°.1 above at Connersville; 0°.8 below at Mauzy; 4°.6 above at Sunman; 4°.4 above at Worthington; 0°.8 above at Vevay; 0°.5 above at Blue Lick; and for the state 2°.9 higher than in 1883; 1°.9 lower than in 1884; 7°.8 higher than in 1885; and 2°.2 higher than the normal from four years' observations. Normals from short periods are probably too low, the last four or five seasons having been unusually cold compared with previous longer periods. At Spiceland the warmest March (47°.0) was in 1871, the coldest (27°.0) in 1856, the highest temperature (77°) in 1875 and the lowest (—9°) in 1857. The highest station mean was 44°.5, at Marengo, and lowest, 34°.5, at Angola. Our southern station, Degonia, averaged 9°.9 higher than La Grange, the one furthest north. Highest reading, 80°, at Marengo; lowest, 5°, at Angola; average station range, 59°.0; greatest, 67°, at Angola; least, 31°, at North Liberty.

Precipitation (inches).—The precipitation was somewhat less than normal and well distributed through the month and over the state, varying from an aggregate of 14.85 (at twenty-six stations) on the 20th to 0.01 or less on the 2d, 3d, 4th, 15th, 16th, 23d, 24th, and from 3.97 at Terre Haute to 1.50 at Miami. The snowfall ranged from 9.5 at North Liberty and Connersville to 0.2 at Vevay, several stations not reporting. The principal precipitation fell on the 12th (aggregate, 8.33), 20th (14.85), 29th (9.67), 30th (14.52), 31st (11.73). The snowfall was about normal. At Spiceland the precipitation was greatest in 1876 (7.40) and least in 1885 (0.70), snowfall greatest in 1881 (18.0) and least in 1871, 1878, and 1882 (not measurable).

The following meteorological summary and accompanying remarks are from the March, 1886, report of the "Indiana Weather Service," under direction of Prof. H. A. Huston, of Purdue University, Lafayette:

Districts.	Temperature.			Average precipitation.
	Highest.	Lowest.	Monthly means.	
	°	°	°	*Inches.*
Northern counties	77.0	10.0	37.2	3.45
Central counties	77.0	10.0	38.7	4.53
Southern counties	80.0	15.0	42.4	3.29
State	80.0	10.0	39.4	3.76

Temperature.—The mean temperature of the state for March, 1886, was 2°.7 above the mean of the month for the past four years; 0°.1 below the mean of fifteen years at Indianapolis; 0°.9 below the mean of twenty-six years at Logansport; 3°.4 below the mean of twenty-one years at Vevay; 3°.0 above the mean of thirty years at Spiceland; 3°.9 above the mean of six years at Mauzy; 2°.4 below the mean of eight years at Blue Lick; 0°.3 above the mean of four years at Worthington; and 3°.3 above the mean of seven

years at this station. The temperature has been normal, since 40° may be taken as the normal temperature for March.

Precipitation (inches).—The mean precipitation was 0.23 above the mean of the past four years; 1.45 below the mean of fifteen years at Indianapolis; 1.09 below the mean of twenty-six years at Logansport; 1.67 below the mean of twenty-one years at Vevay; 1.50 below the mean of twenty-seven years at Spiceland; 1.0 below the mean of six years at Mauzy; 0.29 below the mean of five years at Blue Lick; 0.42 above the mean of four years at Worthington; 0.03 below the mean of seven years at this station; and about 1.50 below the normal amount for March.

The following is an extract from the March, 1886, report of Prof. F. H. Snow, of the University of Kansas, from observations made at Lawrence, Kansas:

The temperature of the month was slightly below the average, and the rainfall about 25 per cent. below the average; the cloudiness of the first and last weeks was excessive, giving a high mean for the month. The season is later than usual.

Temperature.—The mean temperature, 40°.04, is 1°.31 below the March average; the highest temperature, 79°.0, occurred on the 17th and 24th, and the lowest, 11°.0: on the 10th, giving a range of 68°.0.

Precipitation.—The total precipitation, including melted snow, was 1.63 inches, which is 0.50 inch below the March average; rain or snow, in measurable quantities, fell on ten days; the total snowfall being 4 inches. The entire precipitation for the first three months of 1886, 4.47 inches, is 0.19 inch below the average for the same months of the preceding eighteen years.

State of the sky.—The mean cloudiness of the month was 55.05 per cent., being 15 per cent. cloudier than usual; number of clear days, 12; half clear, 5; cloudy, 14; there were five entirely clear days and eight entirely cloudy days.

Wind.—The prevailing direction of the wind was northwest and the total movement 13,900 miles, which is 501 miles below the March average.

Relative humidity for the month 67.7 per cent., the extreme being 100 per cent. on the 4th, and 18 per cent. on the 24th.

The following is an extract from the "Kansas Weather Observer," for March, 1886, under direction of John H. Wolfe, of Wellington:

Reports for the month were received from twelve observers.

The average monthly mean temperature, covering the area of the state, was 39°.9, which may be termed as about the normal for March. The coldest period was noted on the 9th and 10th, when the temperature reached the minimum for the month, 10°, or a range of from 2° to 15°, as noted from the various stations; the maximum temperature, 79°, occurred on the 18th, which was found to register nearly even over the state.

The average precipitation for the state was 1.63 inches, which is slightly below the normal; the total snowfall was 8.0 inches over the northwest portion and 2.0 inches towards the southeast portion of the state. The greatest precipitation, 3.50 inches, occurred at Westmoreland; and Salina, a station in close proximity, reports the least, 0.07 inch.

At the close of the month the season was delayed fifteen days by the continuous low temperature and cold north winds.

High winds were below the average.

The following is an extract from the March, 1886, report of the "Minnesota Weather Service," under direction of Prof. Wm. W. Payne, Carleton College, Northfield:

The average mean temperature of Minnesota for March, as deduced from reports received from the several stations of the Minnesota Weather Service, is 26°.8; this is 13°.7 warmer than February, and 2°.6 warmer than March, 1885. The mean for the month was very near the normal in the southeastern part of the state, La Crosse reporting a mean for the month of 31°.0, only 0°.2 below the average of the last fourteen years, and Duluth, in the east, on Lake Superior, the same. As in February, there has been a decided uniformity in the mean between the northern and southern parts of the state; this is caused by the fact that the month has been much warmer than the average in the Red River Valley, Moorhead being 5° warmer than the average March, while, as before stated, the southern and southeastern sections were slightly below the mean for that month. The weather has been unusually pleasant for an initial spring month with, especially in the west, many clear, bright, and mild days. All the stations, with but two exceptions, have reported zero readings on one or two days, but these occurred during calm weather, as is usually the case, and therefore occasioned no hardship.

During the first half of the month there were many calm days, or days of light wind, but the frequent rapid changes in the atmospheric pressure, or weight of the air, during the latter half of the month caused much windy weather and occasional gales. Bird Island, as usual, had the greatest total wind movement, 10,565 miles, and Red Wing, the least, 4,083 miles. At Grand Forks, on the 24th, during the passage of a storm-centre, with sharp contrasts of pressure, the wind for a short time had a velocity of sixty miles per hour. Bird Island reported forty miles per hour on the 12th, and forty-two miles per hour on the 21st.

The precipitation, while generally small in amount, was somewhat greater than March, 1885, being an average of 1.09 inches for 1886 and 0.51 inch for 1885. Largest amounts recorded were, Northfield, 2.06 inches; Albert Lea, 2 inches; and Spring Valley, 2.14 inches. Least amounts were, Moorhead, 0.14 inch, and Morris only 0.02 inch. Two heavy snow storms visited the southeastern part of the state, the first occurring on the 20th with high northeast winds, and falling to a depth of 11.2 inches at Northfield, 5.9 inches at Red Wing, and 2.6 inches at Mankato. This storm, by drifting the moist snow, caused slight delay to the movement of trains on the Minnesota and Northwestern and the Southern Minnesota division of the Chicago, Milwaukee, and Saint Paul Railway. The second occurred on the 28th and 29th, and was lighter than the first, the average depth of snow not being over three or four inches, and melting rapidly. On the 19th snow fell to the depth of six inches at Grand Forks, but it soon disappeared. The first thunder-storms of the season were on the 17th. The ice was only partially out of the larger streams and rivers at the end of the month, and still remains solid in the lakes.

Seeding of spring grain had not generally begun at the end of the month. During the warmer periods there was some harrowing and other preparatory work, and in some cases a limited amount of grain was sown in the western part of the state and in Dakota. There being but little snow on the ground during the last decade of the month, seeding would have become general in those districts had it not been prevented by the frozen condition of the ground, caused by the cold weather, which, beginning on the 26th, continued to the end of the month. Cold weather and the unmelted snow arising from the heavy snows of January have prevented seeding in the southeastern part of the state, but the conditions of the land and of the weather are of such a favorable nature that the sowing of spring crops will probably become general during the first half of April.

The month has been more favorable than usual for logging operations, which were interfered with somewhat by the warm mid-day sun melting and softening up the roads, yet the hard freezes at night, re-enforced by occasional light falls of snow, have kept the roads in fair condition and enabled hauling and banking operations to be continued almost to the end of the month, thus increasing the cut materially, and insuring a much larger supply of logs for the season's supply than was anticipated at the very unpropitious commencement of the season. It is not probable, however, that the supply for 1886 will be excessive and the prospects for that industry are very favorable indeed. On the headwaters of the Mississippi, since September, 1885, there has been a decided deficiency in the amount of rain and snowfall, and heavy rains will be needed during April and May to insure the successful arrival of the drives at the mills.

The following is an extract from the March, 1886, report of the "Missouri Weather Service," under direction of Prof. Francis E. Nipher, Washington University, Saint Louis:

The month of March, 1886, has been normal in temperature, with a slight deficiency in precipitation. The one peculiarity of the month has been the fact that a somewhat unusual amount of precipitation occurred as snow. The rain and melted snow was distributed throughout the month, as follows: first decade, 0.45 inch; second decade, 0.50 inch; and third decade, 2.35 inches. A little over half (1.19) the precipitation of the last decade occurred in the form of snow on the 30th and 31st. This snow was about 5 inches deep, and seems to have been much lighter to the west of Saint Louis.

The lowest temperature of the month was 24°.5, on the 3d, and the highest, 79°.8, on the 18th and 19th. During the month the temperature fell to or below the freezing point on seven days, only one of which was later than the 15th. The average temperatures of the decades were 35°, 52°, and 49°.

In the state the precipitation has been greatest (from 3 to 3.50 inches of water) east of a line drawn from the mouth of the Missouri River southward to the west of Iron Mountain, and to the mouth of the Ohio. Over the rest of the state, excepting in small regions in the northern part of the state, and in a narrow belt surrounding the area of maximum fall, the precipitation has been between one and two inches.

The lowest temperatures reported, were: 6°, at Oregon; 8°.8, at Leavenworth, and 12°, at Kirksville; the highest, 86°, at Miami, and 85°, at Steelville.

The following is an extract from the March, 1886, report of the "Nebraska Weather Service," under direction of Prof. Goodwin D. Swezey, of Doane College, Crete:

The most striking feature of the month has been the unprecedented snowfall of 25.3 inches, the normal amount for March being 4.6 inches, and the greatest heretofore recorded by this service being 12.1 inches in March, 1881; the greatest snowfall for any month was in February, 1881, when it reached 14.4 inches, a trifle more than half of what has fallen the past month. The precipitation, number of days of precipitation, and proportion of cloudy days have been correspondingly large.

The temperature has been about 5° below the normal, being the coldest March, except that of 1881, for the past nine years.

The average precipitation for the different sections of the state is as follows: northeast section (two stations), 2.20 inches; north middle (one station), 1.88 inches; west (one station), 1.51 inches; south middle (two stations), 0.98 inch; southeast (covering essentially what has heretofore been the "whole state," as far as reporting), 0.70 inch; state average by sections, 1.45 inches.

The following is an extract from the March, 1886, "Bulletin of the New England Meteorological Society," under direction of Prof. Winslow Upton, Providence, Rhode Island:

Reports for the month were received from one hundred and forty-seven observers.

General conditions.—The mouth was nearly normal in temperature, with a deficiency in precipitation. The conditions may be briefly described in seven divisions: First, 1st–7th; fair and cold, with very high winds on the opening

days and a few snow squalls. Second, 8–9th; light snows attending the passage of a cyclonic depression which moved southeasterly over the southern portion of New England. Third, 10–11th; fair and cold. Fourth, 13–16th; cloudy, with light snows and rains attending the passage of two depressions from the lakes easterly on the 13th and 16th. Fifth, 17–19th; fair, with average temperature. Sixth, 20–22d; heavy rains or snows, high winds, and thunder-storms, attending the passage of a severe storm, more particularly described below. Seventh, 23d–31st; cloudy and warm, culminating in general rains at the close of the month, which caused freshets in the northern rivers. Two cyclonic depressions occurred in this period, the former moving far north of the district on the 25th, the latter from the Southern States to the Lake region on the 31st.

Special features.—The following deserve mention:

1. *The violent winds of the 1st–3d:* These were a continuation of the gales of February 25–28th, and closed a period of remarkable severity. Their cause, as explained in the February "Bulletin," was the steep barometric gradient following the passage of a cyclonic depression of unusual depth. The extreme cold which prevailed at the same time added to the discomfort. The minimum temperature of the month, as well as the maximum wind velocities, occurred at many stations during this period.

2. *The storm of the 20th–22d:* A depression moved from Illinois to the Lakes on the 20th, the pressure diminishing to 29.1 inches. On the 21st an auxiliary depression formed in Delaware, joining the former off the Maine coast on the 22d. The rain was heavy and the winds very high.

3. *Thunder-storms:* Two thunder-storms occurred in connection with the depression just described. On the 19th, at Setauket, lightning, with hail, occurred at 5 p. m.; the storm reached New London about midnight. It was reported at many stations in Connecticut, but was most severe at Bristol, Farmington, Middletown, Waterbury, and Watertown, the lightning striking buildings at all these towns, and causing loss of life at the last named. At this time the storm-centre was distant 1,000 miles westward. Forty-eight hours later the second thunder-storm occurred. Lightning was noted at Deerfield on the 21st at 7.30 p. m., at many Massachusetts stations near midnight, and at Belfast on the 22d at 6 a. m. The storm was severe near Boston, the greatest damage reported having been done at Woburn at 12.30 a. m., where the water mains were shattered. At this time the auxiliary depression was passing in the immediate vicinity, and the primary depression was about 300 miles northwestward. The barograph at Blue Hill observatory shows marked fluctuations. Thunder and lightning were also noted on the 30th and 31st at a few stations. At Setauket on the 31st, hail and rain, with thunder and lightning, occurred at 9.30 p. m.

Advance of the season.—The winter has been characterized by less snow than usual. At the close of the month the frost was nearly out of the ground and no snow remained in the southern portion, and at many places in the northern portion. At Gardiner twenty-two inches of snow still remained.

Miscellaneous.—The winter just passed has been noteworthy for the number of ice storms and the resulting damage to trees. The ice storms of January 28th and February 10th were widespread. On the 21st of March a third storm was experienced at Princeton, the ice forming to a thickness of two inches on the trees.

The verification of weather signals at New Haven was 77.4 for temperature, and 80.7 for weather; at fourteen other stations reporting to the secretary, 90.2 for temperature, and 90.5 for weather.

The following summary is made from reports furnished by Prof. B. F. Thomas, of the Ohio State University, Columbus, Ohio, director of the "Ohio Meteorological Bureau," in advance of the regular monthly report:

State summary.

Temperature.—Mean, 38°.5; highest, 79°.5; at Portsmouth, on the 19th; lowest, 3°.0, at Levering, on the 2d; monthly range, 76°.5; mean daily range, 18°.3; greatest daily range, 46°.5, at Logan, on the 18th; least daily range, 1°.0, at Granville, on the 27th.

Average monthly precipitation, 2.73 inches; greatest rainfall, 5.16 inches, at Marietta; least rainfall, 0.81 inch, at Oberlin.

Average number of days on which rain or snow fell, 13.7; clear days, 6.5; fair days, 11.4; cloudy days, 13.1.

Prevailing direction of the wind, southwest.

The following is an extract from the "Tennessee State Board of Health Bulletin," for March, 1886, prepared under the direction of J. D. Plunkett, M. D., President of the State Board of Health. The summary is prepared by Major H. C. Bate, in charge of the State Meteorological Service:

The principal features for March were the excessive rainfall of the last week of the month and the absence of the usual high winds.

The mean temperature for the month was 47°.16, 4°.59 above that for March of last year and 1°.84 below that for March of the year previous. The highest temperature, recorded on the 18th, was 81°, 3° above the maximum of March of last year and 1° above that of March, 1884. The lowest temperature, 14°, was recorded about the 10th and 11th, and was, respectively, 9° and 4° above the minima recorded in March, 1885 and 1884. The mean of maximum temperatures was 76°.67, 4°.04 above the mean of March of last year, and 1°.67 above that of the corresponding period in 1884. The mean of minimum temperatures was 22°.42, 7°.09 and 1°.02 above the respective means of March, 1885 and 1884.

The mean precipitation was 6.48 inches, 4.14 inches greater than that for the corresponding period last year, and 1.42 inches less than the mean for March, 1884. The eastern division received a very large proportion of this amount, the average fall in that section being 9.48 inches, or more than one-half of the whole amount in the state. The middle division received about five and three-fourths inches, while the western division received only three and one-half inches. The rainfall, from the 26th to 30th, inclusive, was almost continuous, and was very heavy on the 29th and 30th, especially in the eastern division, making a daily average for the entire state of 1.21 inches for the former and 1.68 inches for the latter day. The greatest local daily rainfall was 5.95 inches, at Chattanooga, on the 30th. On that day the fall at Knoxville was 5.56 inches; Andersonville, 5.43 inches; Careyville, 4.40 inches; Parksville, 4.09 inches; and Grief and Fostoria each 4.00 inches. This rainfall, following immediately the heavy rains of the few days previous, caused almost unprecedented floods in the Tennessee River and its tributaries, and the consequent destruction of much valuable property along their banks. Much greater loss was averted by the excellent system of river and flood warnings established a few years ago by the Signal Service.

The rains of the above-mentioned dates, together with those of the 12th and 20th, were general. There were six days reported without rain or snow: 2d, 3d, 16th, 17th, 23d, 24th.

The snowfall during the month was light, the greatest depth reported being 1.34 inches, at Jonesborough. Snow fell on the 7th, 8th, 9th, 10th, 11th, 12th, 13th, 20th, 21st, 30th, and 31st. The snows on the 9th and 10th were reported from most of the stations in the state; that of the 31st was general, and was the heaviest fall during the month; the others were generally very light.

The verification of weather signals for all stations was 86.4 per cent. for temperature and 79.4 per cent. for weather.

State summary.

Temperature.—Mean, 47°.2; highest, 81°.0, on the 18th, at Milan and Memphis; lowest, 14°.0, on the 11th, at Farmingdale; range, 67°.0; mean monthly range, 54°.2; greatest monthly range, 60°.0, at Farmingdale and Hohenwald; least monthly range, 44°.0, at Fostoria; mean daily range, 15°.1; greatest daily range, 45°.0, on the 19th, at Rogersville; least daily range, 1°.0, on the 1st, at Trenton, on the 28th, at Lexington, and on the 29th, at Howell; mean of maximum, 76°.7; mean of minimum, 22°.4.

Precipitation (inches).—Mean depth, 6.48; mean daily, 0.209; greatest, 12.77, at Chattanooga; least, 2.95, at Huntingdon; greatest local daily, 5.95, on the 30th, at Chattanooga; days of greatest, 20th, 26th, 27th, 29th, 30th; day of greatest, 30th.

Average number of days on which rain or snow fell, 11; average number of clear days, 7; fair days, 10.6; cloudy days, 13.4.

Mean depth of snowfall, 0.15 inch; greatest depth of snowfall, 1.34 inches, at Jonesborough.

Days without precipitation, 2d, 3d, 16th, 17th, 23d, 24th; warmest days, 18th, 19th; coldest days, 10th, 11th.

Prevailing wind, southwest.

The following additional remarks in reference to the meteor observed on January 16, 1886, are furnished by Rev. John G. Hagen, S. J., voluntary observer at the College of the Sacred Heart, Prairie du Chien, Wisconsin:

From the records of the MONTHLY WEATHER REVIEW from January, 1886, of the meteor of January 16th, the following path may be traced: After correcting the date of observation at Manchester, Iowa, from the 15th to 16th, and that at Bancroft, Iowa, from the 17th to 16th, and the hour of observation at Dubuque from 10.50 to 9.50 p. m., we have seven reports of the phenomenon, of which those from Prairie du Chien, Wisconsin, Manchester and Dubuque, Iowa, and Mankato, Minnesota, are the most important. If the azimuth lines of first and last appearance are drawn on a map from the three points, Prairie du Chien, Mankato, and Bancroft, it becomes evident that the meteor moved in the direction from Emmettsburg, Palo Alto county, towards Dubuque. If again the azimuth lines of the three explosions are drawn from Prairie du Chien, their intersection with the path of the meteor will exactly represent the reports from Manchester and West Union, Iowa; the third explosion alone was seen in Dubuque, about 20° from the zenith, which corresponds to a horizontal distance of about eleven miles, judging from the approximate height of the meteor. If, with a radius of eleven miles, a circle be drawn around Dubuque it is to intersect the path of the meteor in an eastern azimuth of 20° from Prairie du Chien; this place is northwest of Dubuque, between Pin Oak and Richardsville, Iowa. The second explosion must have taken place near Edgewood, Clayton county, Iowa, and the first at the boundaries between Bremer and Butler counties, Iowa. The apparent altitude at the moment of disappearance was 40°, as seen from Prairie du Chien, and 44°, as seen from Manchester, which correspond to the vertical heights of 29.7 and 30.7 miles, respectively, or to 30 miles as a mean value. At the time of the second explosion the meteor had reached its greatest elevation of 58°, as seen from Prairie du Chien, which corresponds to a vertical height of forty-five miles above Edgewood. The inclination of the meteoric orbit to the horizon between this place and Dubuque was therefore 27°. Had this remained the same, the angle at which the meteor was first seen at Dubuque could not be less than 30°, while the report gives it as 20°. The meteor therefore approached the horizon like a projectile, and may have struck it in the northern parts of Jo Daviess or Stephenson counties, Illinois. The vertical elevations of 20°

observed at Mankato, and of 60° at Manchester, can not form the basis of a computation, as no azimuth was given for these phases of the phenomenon, although they can well be brought into accordance with the path above described. One feature of the phenomenon is worthy of special attention, as it may throw some light on the nature of the upper parts of the atmosphere. The interval of time between light and sound was estimated at 2.2 minutes at Prairie du Chien and "a few seconds" at Manchester; this latter expression can not be taken literally, as the nearest approach of the meteor to Manchester was not below forty-five miles air line. The nearest distance from Prairie du Chien was about fifty miles, which would be traversed by sound in four minutes at least in the lower parts of the atmosphere; the actual time observed was only half this amount. The evident conclusion is that sound travels with much greater velocity in the upper regions of our atmosphere than near the surface of the earth; in no other way could the facts be reconciled that the meteor passed between Prairie du Chien and Manchester, forty miles distance from each other at the respective altitudes of 50° and 60°, and that the report of the explosion was heard in 2.2 minutes in one and "a few seconds" in the other place.

The following directions for setting up minimum thermometers and reuniting detached columns of alcohol are given for the information of those interested:

The brass support for the minimum thermometer should be screwed into the upper part of the board, and the holes so arranged as to slightly incline the left end of the support downward. The top of the thermometer should be fastened by the small brass screw upon the support and the lower end dropped into the notch to the left. The instrument is made ready for observation by raising the bulb-end until the index glides down to the top of the column, and then lowering it into the notch again.

To reunite the alcohol when the detached portion is only a few degrees in length, the most convenient way is to take the thermometer about vertically in one hand, with the bulb down, and strike the brass edge sharply against a block of wood held in the other. A continued jarring in this way soon causes the alcohol to run down. The larger the bore of the thermometer the better this method succeeds, but it can be made to work even in the case of narrow bore thermometers.

Another method of uniting the detached column is to heat up the bulb in warm water until the column is driven into the enlargement at the top of the tube and the main column joins on to it. The thermometer is allowed to cool down while it is kept in a vertical position.

When there is much of the alcohol detached and the thermometer is heated up, it sometimes occurs that before joining on to the alcohol in the enlargement a separation will take place in the main column of the alcohol, or that bubbles will form in the bulb. The best way to do in this case is to swing the thermometer. For this purpose a loop of several strands of copper wire should be made in the eye at the top of the brass scale, and to this a stout cord should be fastened. If the cord is put into the eye of the scale, without the loop, it may become cut through in whirling, and the thermometer is apt to fly off and break. The length of cord from the loop to the hand should be about eighteen inches. To make the column join in a thermometer with a narrow bore it must in some cases be whirled with very great rapidity. The detached column works down gradually as the whirling is continued. In the case of very refractory thermometers, instead of a continued uniform velocity of rotation it is sometimes found that the column runs down more readily to whirl by jerks, so that the thermometer has a very high velocity for only a part of a revolution.

Sometimes in joining on a detached column, in order to save trouble in fitting on a cord or heating up water, the thermometer is taken in the hand about the middle of the scale and swung in an arc of a circle. To swing a narrow bore thermometer in this way with sufficient force to drive down the alcohol it must be grasped so firmly that there is danger of breaking the stem.