

**Georgia.**—Atlanta, 15th.  
**Kentucky.**—Elkin, 14th; Frankfort and Shelbyville, 15th; Louisville, 14th to 16th.  
**Maryland.**—Barren Creek, 3d; Mount Saint Mary's, 2d, 3d, 17th.  
**New Mexico.**—Las Vegas, 7th, 19th, 27th, 28th, 29th; Santa Fé, 5th, 7th, 27th, 28th, 29th.  
**North Carolina.**—Charlotte, Lenoir, Monroe, and Salem, 15th; Marion, 2d.  
**South Carolina.**—Abbeville, Black's, and Spartanburg, 15th; Cedar Springs, 15th, 16th; Winnsborough, 17th.  
**Tennessee.**—Ashwood, 2d, 15th; Chattanooga, Knoxville, and Nashville, 15th.  
**Utah.**—Brock's Ranch, 8th, 9th.  
**Virginia.**—Bird's Nest, 3d; Lynchburg and Wytheville, 15th; Dale Enterprise, 15th, 17th.  
**West Virginia.**—Middlebrook, 2d, 3d, 15th, 17th; White Sulphur Springs, 6th; Hartmansville, Helvetia, and Parkersburg, 17th.

The following are reports of injury to fruit, etc., by frosts during May:  
 Springfield, Mo.: the frost on the morning of the 1st caused slight damage to vegetation.  
 Galesburg, Knox Co., Ill.: great damage was done by the freeze on the night of the 12-13th.  
 Monmouth, Warren Co., Ill.: ice formed to a thickness of three-fourths of an inch on night of 12-13th; vegetables were killed.

Yankton, Dak.: the frost of the 12th was very injurious to early vegetables.  
 Wytheville, Wythe Co., Va.: early vegetables, fruit, wheat, corn, and oats were injured by frost on the night of the 14-15th.  
 Lynchburg, Va.: frost on the 14-15th caused injury to fruit, and in some places to tobacco plants.  
 Abingdon, Washington Co., Va.: frost on the night of the 14-15th caused great damage to fruit, vegetables, and corn.  
 Marion, Smyth Co., Va.: fruit and vegetables were seriously injured by frost on the night of the 14-15th.  
 Noblesville, Hamilton Co., Ind.: fruit and vegetables were killed by the severe frosts of the 15th.  
 Lawrence, Douglas Co., Kans.: the hoar frosts on the 14th and 19th were quite severe, injuring tender vegetation in some localities.

Knoxville, Tenn., 18th.: reports from the tobacco growing counties of western North Carolina state that about two-thirds of the young tobacco plants were killed by recent frosts, and that wheat and vegetables were seriously injured in the mountain districts.  
 Louisville, Ky.: reports state that the frost of the 16th caused great damage to crops in the western portion of the state.  
 Youngstown, Mahoning Co., Ohio: ice and heavy frost formed on morning of the 17th, damaging all early fruit.  
 Uniontown, Fayette Co., Pa.: fruit and corn were much damaged by the frost on the 17th.  
 Johnstown, Cambria Co., Pa.: the frost of the 17th caused considerable damage.  
 Greenville, Mercer Co., Pa.: heavy frost occurred on the 17th, freezing plants. In the vicinity of Sharon, in this county, ice formed to a thickness of one-fourth inch, and, as many varieties of fruit trees were in full bloom, it was thought that much damage would result.

Pittsburg, Pa.: the frost on the 17th caused damage to gardens in this vicinity.

Detroit, Mich., 18th: it is reported that the recent frosts have caused serious damage to fruit trees.

Sandusky, Ohio: farmers report that fruit and vegetables were considerably injured by the frost of the 20th.

Wellsborough, Tioga Co., Pa.: on the 20th ice formed to a thickness of one inch and the ground froze to a depth of four inches; fruit was seriously injured.

TEMPERATURE OF WATER.

The following table shows the temperature of the sea-water for May, 1888, observed, under conditions as given, at the harbors of the several stations; the monthly range of water temperature; the average depth at which the observations were made, and the mean temperature of the air:

Station.	Temperature at bottom.				Mean temperature of air at the station.	Average depth of water in feet and tenths.
	Max.	Min.	Range.	Monthly mean.		
Canby, Fort, Wash.....	58.0	54.0	4.0	56.4	53.1	13.3
Cedar Keys, Fla.....	84.2	76.2	8.0	80.0	75.3	8.4
Charleston, S. C.....	78.5	63.0	15.5	72.7	72.3	34.4
Eastport, Me.....	40.7	37.0	3.7	39.0	45.3	15.6
Galveston, Tex.....	82.0	75.0	7.0	78.2	74.8	14.8
Key West, Fla*.....	87.5	75.0	12.5	81.8	78.5	18.0
New York City.....	59.4	47.0	12.4	53.6	57.9	14.9
Pensacola, Fla.....	79.5	71.8	7.7	75.7	73.3	18.4
Portland, Me.....	48.5	41.9	6.6	44.4	48.8	15.9
Portland, Oregon.....	67.5	54.8	12.7	61.1	62.3	57.7

COTTON REGION REPORTS.

In the accompanying table are given for May, 1888, means of the maximum and minimum temperatures, and the average rainfall in the cotton regions, together with normals computed from similar observations of former years:

Temperature and rainfall data for the cotton districts, May.

Districts.	Rainfall.		Temperature.						Extremes for May, 1888.	
	Average for May of five preceding years.	Average for May, 1888.	Departures.	Maximum.		Minimum.		Max.	Min.	
				Mean for May of five preceding years.	Mean for May, 1888.	Mean for May of five preceding years.	Mean for May, 1888.			
	Inches	Inches	Inches	°	°	°	°	°	°	
New Orleans..	5.19	4.75	+ 0.44	84.6	84.7	+ 0.1	62.8	61.1	1.7	84
Savannah....	2.98	2.82	+ 0.16	85.9	86.1	+ 0.2	62.3	63.4	- 1.1	87
Charleston....	3.28	4.28	- 1.00	83.0	83.9	- 0.9	59.5	62.3	- 2.8	86
Atlanta.....	3.95	3.08	+ 0.87	81.7	81.1	+ 0.6	57.1	60.1	- 3.0	84
Wilmington..	3.93	2.46	+ 1.47	81.3	80.6	+ 0.7	56.9	59.9	- 3.0	80
Memphis.....	4.13	1.28	+ 2.85	80.6	80.0	+ 0.6	57.2	58.0	- 0.8	85
Galveston....	6.13	0.00	+ 6.13	84.5	83.4	+ 1.1	62.4	63.0	- 0.6	87
Vicksburg....	5.42	1.88	+ 3.54	83.1	83.4	- 0.3	61.2	61.0	+ 0.2	86
Montgomery..	3.16	0.91	+ 2.25	84.2	83.4	+ 0.8	59.6	61.0	- 1.4	86
Augusta.....	3.04	3.21	- 0.17	84.0	82.2	+ 1.8	59.0	60.5	- 1.5	86
Little Rock..	5.49	1.42	+ 4.07	80.5	81.3	- 0.8	56.3	57.1	- 0.8	85
Mobile.....	3.92	0.59	+ 3.33	83.6	83.7	+ 0.1	60.5	61.2	- 0.7	80

The rainfall was slightly below the average in the districts of New Orleans, Memphis, Vicksburg, Little Rock, and Mobile; it was in excess of the average in the remaining districts, the departures being very large in those on the south Atlantic coast.

The minimum temperatures were generally slightly above the average. The maximum temperatures differed very little from the average, there being a slight excess in some districts and deficiencies in others.

PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for May, 1888, as determined from the reports of about one thousand stations, is exhibited on chart iv. In the table of miscellaneous meteorological data are given, for each Signal Service station, the total precipitation, with the departures from the normal. The figures opposite the names of the

geographical districts in columns for mean temperature, precipitation, and departures from the normal, show respectively the average for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal, and subtracting when above.

In the upper lake region, Ohio Valley and Tennessee, and in the west Gulf states the precipitation for May was about normal. In the northern slope, southern plateau, upper Mississippi and Missouri valleys, and in the states bordering on the Atlantic, with the exception of Florida, the precipitation was above the normal, the excess ranging from 35 to 60 per cent. in all of the districts named, with the exception of the southern plateau, where it amounted to 12 per cent. On the Pacific coast, in the northern and central plateau districts, middle and southern slopes, lower lake region, and Florida the precipitation was below the average. In Florida and the lower lakes about two-thirds of the average amount of rain fell; in other districts where deficiencies occurred the proportion of the average rainfall was as follows: Northern and middle plateaus and middle and southern slopes, about three-fourths; north Pacific coast, about one-fourth; middle Pacific coast, slightly less than two-thirds; south Pacific coast, about one-third. In nearly all districts where deficiencies occurred in the previous month the rainfall of May was excessive, and in those districts where it was deficient in April there was an excess in May, the exceptions being Florida, the northern and middle plateau, and Pacific coast districts, where marked deficiencies occurred in both months.

Chart v of this REVIEW is the first of a series of four preliminary charts which it is proposed to publish for the purpose of showing the normal rainfall for the months of April, May, June, and July, the four months during which the staple crops of the country are grown or harvested. The chart issued with this REVIEW is for the month of May, and is based upon normals of two hundred and thirty-five Signal Service and voluntary stations. One hundred and eighty-seven of the normals used are for eighteen years, and for the most part are based on actual observations covering the entire period, but in a few cases where the records were broken, they were completed by interpolation from data at neighboring stations. Forty-eight stations supply normals of fifteen years, and while nearly all have been determined from actual observations, some have been completed by interpolation, but in no case has the period for which the rainfalls were interpolated exceeded three years.

The data on which these charts is based will probably be published in tabular form in the July REVIEW.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows for certain stations, as reported by voluntary observers, (1) the average precipitation for a series of years; (2) the length of record during which the observations have been taken, and from which the average has been computed; (3) the total precipitation for May, 1888; (4) the departures of the current month from the average; (5) the extreme monthly precipitation for May during the period of observations and the year of occurrence:

State and station.	County.	(1) Average for the month of May.	(2) Length of record.	(3) Total for May, 1888.	(4) Departure from average.	(5) Extreme monthly precipitation for May.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
Arkansas.									
Lead Hill	Boone	6.45	6	8.95	+2.50				
California.									
Sacramento	Sacramento	0.50	22	0.39	-0.11	2.90	1883	0.00	1873
Florida.									
Merritt's Island	Brevard	3.82	11	2.46	-1.36	8.71	1879	0.88	1886
Illinois.									
Golconda	Pope	4.67	10	2.99	-1.68				
Peoria	Peoria	3.80	32	6.72	+2.92				
Riley	McHenry	3.26	27	4.48	+1.22				
Indiana.									
Logansport	Carr	3.83	34	5.55	+1.72	8.23	1880	1.20	1862
Vevay	Switzerland	3.45	21	2.51	-0.94	8.65	1882	0.52	1874
Iowa.									
Creco	Howard	3.22	16	7.34	+4.12				
Independence	Buchanan	3.93	12	5.54	+1.61				
Monticello	Jones	3.85	34	6.10	+2.25	7.97	1858	0.76	1874
Kansas.									
Independence	Montgomery	4.24	16	4.82	+0.58	10.16	1878	0.88	1874
Lawrence	Douglas	4.05	21	1.97	-2.08	7.12	1873	1.12	1887
Wellington	Sumner	4.89	10	4.66	-0.23	9.37	1881	0.88	1886
Louisiana.									
Grand Coteau	Saint Landry	6.75	6	7.41	+0.66				

Deviations from average precipitation—Continued.

State and station.	County.	(1) Average for the month of March.	(2) Length of record.	(3) Total for May, 1888.	(4) Departure from average.	(5) Extreme monthly precipitation for May.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
Maine.									
Gardiner	Kennebec	3.82	50	2.48	-1.34	9.59	1868	0.36	1852
Maryland.									
Cumberland	Alleghany	2.81	16	3.47	+0.66	4.73	1883	0.30	1875
Massachusetts.									
Somerset	Bristol	3.29	18	5.15	+1.86				
Michigan.									
Thornville	Lapeer	3.19	12	2.78	-0.41				
Kalamazoo	Kalamazoo	4.03	13	4.92	+0.89				
Adrian	Lenawee	3.90	11	2.70	-1.20				
Nevada.									
Carson City	Ormsby	0.39	9	1.05	+0.66	1.05	1888	0.04	1880
New Jersey.									
South Orange	Essex	3.03	18	6.46	+3.43	6.46	1888	0.93	1887
New York.									
Palermo	Oswego	2.77	35	1.17	-1.60	6.90	1867	0.30	1870
Ohio.									
Wauson	Fulton	3.91	16	3.36	-0.55	6.25	1880	1.14	1877
Oregon.									
Albany	Linn	2.44	10	1.00	-1.44	5.70	1879	0.89	1884
Eola	Polk	1.93	18	1.00	-0.93				
Pennsylvania.									
Dyberry	Wayne	2.83	19	3.86	+1.03	5.19	1882	0.36	1875
Wellsborough	Tioga	3.72	17	4.58	+0.86				
South Carolina.									
Stateburg	Sumter	3.63	8	6.68	+3.05	6.68	1888	1.24	1882
Tennessee.									
Milan	Gibson	3.44	6	1.90	-1.54	4.98	1884	1.90	1888
Texas.									
New Ulm	Austin	5.82	16	7.74	+1.92				
Vermont.									
Stratford	Orange	3.02	14	3.60	+0.58	4.55	1884	0.40	1887
Virginia.									
Bird's Nest	Northampton	3.12	19	4.75	+1.63	7.85	1885	0.50	1879
Wytheville	Wythe	3.66	25	3.73	+0.07	7.30	1873	0.51	1875
West Virginia.									
Helvetia	Randolph	4.50	12	5.85	+1.35	7.15	1882	2.75	1876

HAIL.

Descriptions of the severe hail storms of the month are given under "Local storms." In addition to those given under that heading, hail is reported to have fallen in the various states and territories as follows: 1st, Dak., Mont., Nev., Wyo. 2d, Dak., Kans., Nebr., Tex., Wis. 3d, Ark., Iowa, Kans., Mo., Mont., Tex., Wis. 4th, Mont., Nebr., S. C. 5th, Ariz., Colo., Fla., N. Mex., Wyo. 6th, N. Mex., Tex. 7th, Iowa, Mo., Ohio. 8th, Nebr., Ohio. 9th, Kans., N. Y., Ohio, Tex. 10th, Ala., Dak., Iowa, Kans., N. Y., Tex. 11th, Iowa, Mont. 12th, Dak., N. C., S. C., Va. 13th, Ark., Mo. 14th, Cal., Kans., Nev., Tex., Vt., W. Va. 15th, Colo., Ind. T., Kans., Mo., Nebr., N. Y., Pa., Tenn., Tex. 16th, Ark., N. Mex., N. Y. 17th, Colo., Iowa, Kans., Tex. 18th, N. Mex. 19th, Wash. 20th, Colo., Kans., La., Nebr. 21st, Colo., Iowa, Kans., Nebr., Tex., Wyo. 22d, Colo., Ind. T., Kans., Tex., Wyo. 23d, Ark., Colo., Kans., Mo., Nebr., Oregon, Tex., Wyo. 24th, Ark., Colo., Kans., La., Miss., Mo., Nev., Tenn., Tex., Wis., Wyo. 25th, Cal., Fla., Kans., Nebr., Ohio, Tex., Wyo. 26th, Ark., Colo., Ind. T., Kans., Nebr., Oregon. 27th, Ark., Dak., Ill., Ind., Iowa, Kans., Mo. Ohio, Wyo. 28th, Dak., Ill., Iowa., N. Y., Ohio, Pa., S. C. 29th, Colo., N. J., N. Y., Oregon, Va., Wyo. 30th, Colo., Nebr., N. Mex. 31st, Colo.

SNOW.

Snow fell on the 1st in the Lake region; on the 2d in the extreme northwest and New England; on the 3d in the Missouri Valley and upper lake region; on the 13th, 14th and 15th in the Lake region. The most southerly station reporting snow east of the Rocky Mountains was Terre Haute, Ind., where it occurred on the 14th. In the central and northern Rocky Mountain regions snow fell on numerous dates, being most general on the 2d. In Arizona snow occurred at Whipple Barracks on the 1st and 4th, and at Fort Apache on the 24th. The last date on which snow fell at stations east of the Rocky Mountains was the 18th, at Marquette, Mich.

MONTHLY SNOWFALLS (in inches and tenths).

The following monthly snowfalls have been reported: California: Summit, 4. Colorado: Georgetown, 16. Dakota: Fort Totten and Leech Farm, trace. Illinois: Lake Forest,

1st; Cedarville, Lacon, and Philo, trace. *Indiana*: Angola, 0.4; Delphi, Fortville, La Grange, Marengo, Seymour, Rockville, trace. *Massachusetts*: Boston and Dudley, trace. *Michigan*: Hillman, 6; Calumet, 5; Harrisville, 4; Lathrop, 2.3; Fletcher, 2; Charlevoix, 1; Sault Sainte Marie, 0.7; Maple Hill, 0.5; Mottville and Pulaski, 0.1; Concord, Ionia, and Port Huron, trace. *Minnesota*: Pine River Dam and Delano, 2; Minneapolis, 1.5; Saint Vincent, trace. *Nebraska*: Hay Springs, 6. *New Hampshire*: Manchester, 0.1. *Pennsylvania*: Ligonier, 1; Wellsborough, trace. *West Virginia*: Middlebrook, 1. *Wisconsin*: Embarras, 0.1; Green Bay, trace. *Wyoming*: Fort Washakie, trace.

SLEET.

Sleet fell during the month on the several dates as follows: 2d and 3d, Michigan; 11th, Nebraska; 14th, Michigan and Wisconsin; 15th, New York and Pennsylvania; 17th, Iowa and Montana; 23d, 24th, and 30th, Colorado.

EXCESSIVE PRECIPITATION IN MAY.

Table showing for the month of May monthly rainfalls of 10 inches, or more (in states where monthly rainfalls did not reach 10 inches the station reporting the maximum amount is given); rainfalls of 2.50 inches, or more, in any 24 consecutive hours; and rainfalls equaling or exceeding one inch in one hour.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
<i>Alabama.</i>		<i>Inches.</i>			<i>Inches.</i>			<i>h. m.</i>	<i>Inches.</i>
Fort Deposit	1885	14.45	1885	30	3.00				
Greenville	1885		1885	6	2.80				
Do.	1885		1885	21	2.80				
Do.	1885		1885	30	5.85				
Livingston	1887		1887	26	2.65				
Mobile	1873		1873	6	2.95	1879	5	0 20	1.64
Do.	1873		1873	18	3.41	1888	7	3 30	3.38
Do.	1876		1876	7	3.69				
Do.	1882		1882	31	2.72				
Do.	1883		1883	29	5.62				
Do.	1888		1888	7	3.38				
Montgomery	1873	10.25	1873	1	3.47	1888	19	0 20	0.82
Do.	1880		1880	21	3.33				
Do.	1881		1881	13-14	3.63				
Opelika	1887		1887	27	2.73				
Do.	1888		1888	20	3.30				
<i>Arizona.</i>									
Fort Thomas	1887	2.73				1887	25	1 35	2.25
<i>Arkansas.</i>									
Dallas	1888	10.10							
Hot Springs			1888	27-28	5.52	1888	24	0 50	1.00
Do.			1888			1888	27	0 30	1.06
Judsonia			1878	2	2.75				
Lead Hill			1888	17	3.25				
Little Rock	1882	15.91	1882	7	4.19				
Do.			1882	9-10	6.33				
Madison			1884	22	2.50				
Malvern			1885	26	4.00				
Do.			1888	28	4.89				
Monticello			1883	30	3.05				
Do.			1885	26	3.10				
Prescott			1884	3	4.00				
Pine Bluff			1888	28	2.50				
Russellville			1887	3	2.55				
Texarkana			1884	19	2.56				
<i>California.</i>									
Red Bluff	1883	2.96							
<i>Colorado.</i>									
Colorado Springs			1874	29	2.92				
Denver			1876	21-22	6.70				
Pike's Peak	1882	12.34	1879	11-12	2.54				
Do.			1882	7-8	4.31				
Ula	1875	10.43	1875		4.30	1875	1	0 00	1.20
<i>Connecticut.</i>									
Canton	1868	18.00							
New Haven			1874	15-16	2.63				
Do.			1883	22	3.32				
New London			1883	22	2.84	1888	29	0 30	0.50
<i>Dakota.</i>									
Deadwood	1883	10.33	1874	2	4.55				
Do.			1882	7-8	3.33				
Do.			1883	17-18	2.77				
Do.			1883	18-19	2.62				
Morristown			1881	16-17	3.40				
Pembina, Fort			1880	26	2.64				
Philip Kerney, Fort	1868	11.10	1868	30-31	3.00				
Randall, Fort			1872	15	6.13				
Rapid City	1883	10.02							
Sully, Fort			1874	1-2	4.55				
Webster						1885	20	1 05	1.34
Do.						1886	8	0 45	1.84
Yankton			1888	27	2.52				
<i>Delaware.</i>									
Delaware, Fort	1865	11.40	1867	13-14	2.90				
Dover			1876	9	2.90				

Table showing for the month of May, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
<i>District of Columbia.</i>		<i>Inches.</i>			<i>Inches.</i>			<i>h. m.</i>	<i>Inches.</i>
Washington City	1886	10.60							
<i>Florida.</i>									
Archer			1888	5	0 35	1888	5	0 15	0.35
Do.			1888			1888			
Barrancas, Fort	1880	10.98	1880	26	4.23				
Biacayne			1877	6	3.00				
Cedar Keys			1887	23	3.04	1882	24	1 00	1.00
Daytona			1874	3	2.87				
Jupiter			1888	9-10	3.18				
Jacksonville			1887	21-22	2.72	1874	4	1 00	1.18
Do.			1875	29	1 42	1888	30	0 50	1.50
Homeland			1874	16	1 30				
Key West			1871	31	3.17	1874	16	1 30	1.50
Do.			1877	14-15	2.55				
Do.			1880	10-11	3.11				
Do.			1882	25-26	3.53				
Do.			1883	11	4.85				
Mayport			1880	3-4	5.53				
Saint Augustine, Fort			1879	7	3.80				
Tallahassee	1888	10.40	1888	20	6.30				
<i>Georgia.</i>									
Athens			1886	29	2.80				
Atlanta			1880	21-22	2.64				
Do.			1886	18	2.77				
Do.			1888	20	3.33				
Augusta			1886	19-20	2.66				
Do.			1888	20-21	2.83				
Bainbridge			1887	1	2.70				
Columbus			1880	22	9.92				
Covington			1883	1	3.55				
Dahlonega						1874	31	0 30	1.40
Forsyth			1887	11	0 30	1887	11	0 30	1.10
Gainesville			1886	19	2.60				
Griffin			1886	19	2.61				
Macon			1887	19	2.95				
Milan			1888	19	3.55	1882	31	1 00	1.00
Quitman			1877	27-28	3.10				
Saint Mary's			1886	30	2.62	1885	30	1 05	1.29
Savannah			1880	10.81					
Thomasville			1886	19	3.96				
Toccoa			1887	12	2.85				
Waynesborough									
<i>Idaho.</i>									
Lewiston	1885	3.02							
<i>Illinois.</i>									
Anna			1875	20-21	3.65	1880	9	1 00	1.21
Augusta			1882	8-9	3.95				
Cairo			1873	1-2	2.82	1888	28	0 19	0.75
Chicago			1879	25	2.77				
Do.			1883	9-10	3.05	1888	23	0 12	1.70
Do.									
Collinsville			1880	26	3.50				
Geneseo			1888	24	3.50				
Gibson			1884	16	2.67				
Griggsville			1875	1	2.70				
Havana			1878	29-30	2.90				
Hennepin			1888	27	2.70				
Hoopeston			1875	22	3.90				
Louisville			1876	20	4.00				
Do.			1880	9	2.70				
Do.			1882	8-9	2.50				
McLeansborough			1888	27	2.77				
Mahomet			1880	6	3.20				
Mount Sterling			1888	18	3.50				
Pana			1888	27	3.50				
Pekin			1880	8	3.94				
Peoria	1858	10.73	1880	26-27	2.70				
Rock Island			1876	18	3.20				
Do.			1874	3	3.88				
Sandwich			1876	28-29	2.88				
Do.			1882	8	2.66	1888	7	1 10	1.88
Springfield	1882	10.59	1882	5	3.35	1888	27	1 06	1.15
Do.			1888	27	2.54				
Do.			1888	26	2.50				
Winchester			1879	25-26	4.75				
<i>Indiana.</i>									
Arlington			1877	20	2.50				
Fort Wayne			1876	6	3.31	1879	26	1 00	1.00
Indianapolis	1880	8.22	1880	21	2.69	1882	4		

Table showing for the month of May, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
<i>Iowa—Continued.</i>									
Corydon		Inches.			Inches	1886	3	h. m.	Inches
Council Bluffs			1875	31	5.00	1888	11	2 00	2.00
Cromwell	1888	10.85	1888	11	2.56	1888	11	2 00	2.56
Davenport			1876	20	2.79	1888	3	0 10	0.50
Denmark			1880	26	1.00	1880	26	1 00	1.75
Des Moines			1879	30	2.62	1879	30	1 00	1.00
Do.			1882	4-5	2.81				
Do.			1883	8-9	2.85				
Dubuque						1876	29	1 00	1.00
Elkader						1886	11	1 00	1.18
Fairfield	1882	10.02	1882	5	3.12	1888	28	1 30	1.39
Fort Madison	1882	10.50				1886	9	1 00	1.00
Glenwood			1880	25	2.50	1878	29	4 00	6.00
Glenwood Mills			1878		6.00				
Keokuk			1875	20	3.83				
Logan	1877	11.00	1878	29	2.50				
Mount Pleasant	1882	10.63							
Nashua			1880	12-13	4.00	1880	13	3 00	3.00
Do.			1880	23	3.00				
Newton			1875	1	3.00	1881	13	1 30	1.83
Do.						1881	27	0 45	1.12
Osage			1880	23-24	5.40				
Smithland	1888	11.20	1888	21	3.40	1879	25	1 00	1.00
Tabor			1878	29	4.16				
<i>Kansas.</i>									
Allison			1884	21-22	2.86				
Clay Centre			1882	26	3.00	1882	26	3 00	3.00
Do.			1882	27	3.02				
Dodge City	1881	12.82	1878	21	3.24				
Do.			1883	16-17	3.65				
East Norway			1888	26-27	2.60				
Ellinwood	1877	10.10	1877	17-18	5.03				
Grainfield			1888	6	3.00				
Hays, Fort			1870	19	1 05	1.75			
Independence	1878	10.06	1878	17-18	2.58				
Larned, Fort			1875	17-18	2.50	1873	12	1 00	1.90
Do.			1877	17-18	3.80				
Lawrence			1883	13	3.50	1883	13	1 45	2.00
Leavenworth, Fort			1867	15-16	3.07				
Do.			1867	26	2.50				
Do.			1870	30	4.38				
Do.			1883	24-25	2.80				
Do.			1884	17	2.90				
Leavenworth			1876	5-6	2.50	1880	25	1 35	1.79
Do.			1880	25-26	2.61	1886	11	0 50	1.80
Do.			1888	22-23	2.60	1888	10	1 00	1.46
Manhattan			1877	20	3.00	1888	26	0 30	1.00
Oberlin			1888	7	2.80				
Pretty Prairie			1883	16-17	3.58				
Riley, Fort			1883	13	2.70	1885	27	1 00	1.40
Do.			1885			1885	13	0 45	2.70
Do.						1885	14	0 20	1.50
Do.						1886	11	0 45	1.28
Do.						1887	16	1 00	2.15
Russell Station			1888	5	3.00				
Topeka			1877	11	2.94				
Sedgwick	1877	16.38	1877	12	4.50	1877	12	2 50	4.50
Do.			1877	30-31	3.50				
Wakeville			1879	30	4.00				
Wallace, Fort			1874	22-23	9.30				
Wellington			1880	14	4.00				
<i>Kentucky.</i>									
Louisville						1888	17	1 00	1.75
Do.						1872	27	1 00	1.32
<i>Louisiana.</i>									
Alexandria			1888	30	4.17				
Cheneyville	1884	13.01	1884	20	2.95				
Minden			1884	2	2.77				
Do.			1884	22	3.50				
Monroe			1884	22	2.94				
New Iberia			1883	26	3.00				
New Orleans	1873	18.68	1873	5-6	3.98	1873	20	1 00	1.47
Do.			1873	20	3.29				
Do.			1873	27-28	4.49				
Do.			1876	7-8	4.09				
Do.			1878	19	3.54				
Shreveport	1884	14.47	1872	23-24	3.21	1872	25	0 50	1.61
Do.			1876	6	7.37				
Do.			1881	8	2.70				
Do.			1884	21	5.45				
Vermillion			1884	20	3.13				
Whiteville	1884	11.34	1884	10	2.81				
Do.			1883	26	2.82				
<i>Maine.</i>									
Bar Harbor			1886	16	2.99				
Eastport	1881	13.22							
Lisbon	1868	11.20							
Perry	1865	11.83							
Preble, Fort	1866	11.08							
Steuben	1868	10.05							
<i>Maryland.</i>									
Baltimore			1886	7	2.99				
Emery Grove			1879	15	5.00	1879	15	3 00	5.00
Fallston			1885	7	2.50				
McHenry, Fort	1876		1876	15	3.02	1882	28	2 15	2.50
Do.			1886	7-8	3.80				
Mount Saint Mary's			1882	28	2.50				
Saint John's Church	1881	12.30							
Sandy Springs			1879	16	4.28				
Woodstock College			1877	21	3.10	1878	19	0 52	2.00

Table showing for the month of May, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
<i>Maryland—Continued.</i>									
Woodstock College		Inches.			Inches	1879	19	3.20	
Do.			1886	7-8	3.01				
<i>Massachusetts.</i>									
Boston			1883	22	3.00				
Independence, Fort	1877	10.80	1864	2-3	4.44				
Do.			1875	1-2	3.10				
Nantucket			1888	25	2.74	1887	28	1 00	1.00
Rowe			1881	15	1.30				1.90
<i>Michigan.</i>									
Alpena			1876	14-15	2.58				
Berlin			1888	26	3.30				
Berrien Springs			1888	28	3.04				
Buchanan			1888	28	2.83				
Coldwater	1883	10.75	1880	22	3.70				
Detroit									1.00
Kalamazoo						1875	9	1 00	1.00
Lansing			1880	21	2.73	1881	31	1 20	1.85
Niles			1880	10	2.80				
Do.			1880	22	3.35				
Northport	1884	19.85	1882	10-11	3.25				
Do.			1882	30-31	2.75				
Do.			1884	2	4.95				
Do.			1884	3-4	3.60				
Do.			1884	13	4.60				
Do.			1884	18	2.85				
<i>Minnesota.</i>									
Burlington	1860	11.55							
Ortonville			1888	4	3.00				
Ripley, Fort			1875	31	3.00				
Saint Vincent			1880	25-26	2.64	1880	16	1 00	1.00
Fort Snelling	1877	14.48	1877	31	5.12	1877	31	2 30	5.12
<i>Mississippi.</i>									
Biloxi			1888	5	2.85				
Brookhaven			1879	31	2.70	1876	26	1 00	1.35
Columbus			1885	27	2.85				
Edwards			1885	2	3.10				
Fayette			1876	7	3.10				
Hernando			1884	4	2.62				
Jackson			1884	2	2.71				
Macon			1885	27	2.65				
Okolona			1887	4	7.50				
Pass Christian			1883	29	3.20				
Vicksburg	1872	13.23	1873	23-24	5.36	1879	23	1 17	1.42
Do.	1884	11.76	1876	7	3.40				
Do.			1880	30	4.27				
<i>Missouri.</i>									
Lamar			1888	17-18	2.54				
Lebanon			1888	31	0 45	1.44			
Maryville	1888	10.50				1878	31	0 45	1.44
Mound City	1888	13.40							
Saint Louis	1844	11.26	1848	17	5.22				
Do.			1860	13	3.23				
Do.			1867	26	3.06				
Do.			1878	27	4.43				
Do.			1886	2	3.26				

Table showing for the month of May, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
<i>North Carolina.</i>									
Charlotte	1886	11.04	1886	18	4.65	1884	24	1 00	1.00
Do			1886	19-20	2.54				
Davidson College	1888	12.89	1888	6	3.91				
Ellsworth	1880	10.43	1880	22	5.50				
Do			1880	22	2.75				
Fayetteville			1878	20	2.50				
Goldsbrough			1876	28	2.75	1876	28	1 00	2.75
Do			1878	21	3.75				
Hatteras			1877	7-8	2.53	1877	8	1 00	1.00
Do			1878	14-15	2.59	1888	14	1 00	1.25
Do			1883	2	3.16				
Do			1883	27	2.67				
Do			1888	10-11	4.80				
Johnston, Fort	1873	12.35							
Do	1885	10.10							
Lenoir	1888	10.00							
Marion	1888	13.99	1888	21	2.75				
New Berne	1885	10.86							
Norfolk			1888	31	3.78				
Portsmouth	1883	10.57							
Salisbury	1886	13.06	1886	19	3.75				
Weldon			1887	10	6.03				
Wilmington			1871	12	2.90	1872	8	1 00	2.00
Do			1871	13	2.54	1873	11	0 55	1.02
Do			1872	17	2.55				
<i>Ohio.</i>									
Bethel			1880	30	3.00				
Canal Dover						1884	27	2 00	2.15
Cincinnati			1879	25-26	2.98	1881	14	0 20	1.14
College Hill			1879	26	3.00	1888	27	0 30	2.38
Mount Auburn			1879	26	3.23				
Do			1880	10-11	2.82				
New Athens	1882	10.61							
Portsmouth			1865	25-26	3.30				
Toledo						1880	20	0 15	1.10
Do						1888	8	0 30	0.50
Do						1888	28	0 03	0.12
<i>Oregon.</i>									
Astoria	1887	7.33							
<i>Pennsylvania.</i>									
Carlisle	1860	11.60	1860	11	2.50				
Do	1868	13.06	1868	13	4.60				
Fallsington			1886	7	2.50				
Girardville			1888	28	2.72				
Mahanoy Plane			1886	7-8	3.95				
Philadelphia						1888	30	0 15	0.31
Reading						1888	28	0 40	1.07
Wellsborough			1884	26-27	2.89	1879	18	0 50	1.20
Do						1879	30	1 00	2.30
Do						1881	14	1 05	1.20
Do						1884	15	1 15	1.25
Zionsville			1886	7-8	3.00				
<i>Rhode Island.</i>									
Block Island	1884	6.39	1881	18	2.56				
Do			1884	6-7	3.04				
Do			1884	7-8	3.18				
Narragansett Pier			1888	12	2.54				
<i>South Carolina.</i>									
Abbeville	1888	10.80							
Allendale			1883	1	2.86				
Anderson	1886	10.39	1886	19	5.12				
Do			1886	20	2.10				
Blackville			1886	20	2.84				
Cedar Springs	1888	10.60							
Charleston			1872	25-26	2.88	1872	25	0 50	1.19
Do			1874	4	2.53	1876	23	1 00	1.95
Do			1875	23	2.78	1883	12	0 17	1.08
Do			1878	26-27	3.38				
Do			1883	1-2	6.38				
Do			1888	10-11	2.67				
Columbia			1886	20	6.90	1880	12	0 20	0.50
Do			1888	20-21	2.80	1888	10	0 30	0.50
Florence			1884	26	3.99				
Graham's Turnout			1888	20	3.00				
Greenville			1886	19	4.00				
Greenwood			1886	20	3.08				
Hardeeville			1883	1	3.05				
Jacksonborough			1883	1	3.18				
Saint Matthew's			1888	10	4.00	1888	10	4 00	4.00
Do			1888	20	3.00				
Spartanburg	1888	11.55	1886	19	5.53				
Trial	1888	11.23							
Yemassee			1883	1	3.70				
Do			1884	26	2.70				
Do			1885	23	2.50				
<i>Tennessee.</i>									
Brownsville			1886	7	3.25				
Chattanooga			1881	9-10	2.51	1880	30	1 35	1.61
Do			1886	6-7	2.66	1886	7	1 00	1.39
Do			1887	25	1.35	1887	25	1 35	2.25
Do			1888	30-31	2.60	1888	30	0 55	*1.54
Do			1888	30	0.30	1888	30	0.60	0.60
Knoxville			1882	28	0.52	1.00			
Memphis	1882	9.14	1876	30-31	2.93	1887	20	0 55	1.22
Do			1882	9	3.22				
Do			1883	30	2.93				
Do			1884	26-27	2.73				
Milan			1883	20	2.92				
Do			1884	4	3.58				
<i>Texas.</i>									
Austin			1870	30	7.60	1884	7	0 48	2.50

Table showing for the month of May, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
<i>Texas—Continued.</i>									
Austin			1876	28-29	2.50				
Do			1877	6	3.00				
Do			1878	10	2.80				
Do			1880	27	3.00				
Belton			1884	21	2.87				
Boerne			1880	28	6.52				
Brackettville			1878	10	3.59				
Brownsville			1882	18-19	2.67	1886	3	2 20	3.48
Do			1884	7	2.66				
Do			1886	2-3	3.49				
Cedar Hill			1888	22	2.50	1888	22	1 20	2.50
Clarksville			1874	10	3.25	1875	1	1 00	1.00
Do			1878	10-11	3.25				
Do			1877	24	2.50				
Do			1878	21	5.50				
Do			1882	7-8	2.75				
Do			1882	9-10	2.50				
Do			1884	1	2.70				
Do			1884	20-21	3.02				
Columbia			1884	22	2.50				
Concho			1884	17	2.50				
Corpus Christi			1888	18-19	3.22	1886	18	1 00	1.15
Do			1888	28	0 25	0.75			
Corsicana			1888	10.32					
Cuero			1887	29	5.50				
Dallas			1884	21	3.49				
Do			1886	10	2.70				
Decatur			1879	5	2.70	1888	9	1 00	1.61
Do			1888	22	1 00	1.62			
Elliott, Fort			1884	29	2.79	1885	27	1 30	1.44
Do			1885	19	3.32				
Do			1887	27-28	3.18				
Fredericksburg			1878	10	3.00				
Galveston			1874	27-28	5.24	1871	24	0 25	1.15
Do			1876	30	3.56	1873	18	0 45	2.00
Do			1888	24	0 45	0.86			
Do			1888	28	0 30	1.05			
Gatesville			1879	5	4.10				
Hearne			1885	26	2.68				
Do			1887	2	2.70				
Do			1887	3	2.97				
Hempstead			1884	3	4.65				
Do			1884	22	3.10				
Houston			1884	3	5.50				
Do			1888	22	2.63				
Huntsville			1884	6	2.60				
Do			1884	22	3.06				
Longview			1887	3	4.00				
Luling			1884	22	3.10				
Mason			1880	1	3.64				
Melissa			1879	4-5	3.80				
New Ulm			1880	1	2.31				
Do			1888	6	2.54				
Palestine			1884	6-7	3.54	1888	18	0 55	1.13
Do			1884	2-3</					

Table showing for the month of May, &amp;c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.				
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.	
Wisconsin—Continued.	Inches.									
La Crosse					Inches	1882	30	h. m.	Inches	
Do.						1888	3	0.55	2.30	
Milwaukee			1875	11	2.83	1878	23	0.15	1.04	
Do.								0.50	0.50	
Wyoming.								0.53	1.13	
Cheyenne	1884	4.83								

\* Two distinct storms.

† Estimated.

The meteorological records of the Signal Service show that monthly rainfalls in excess of ten inches have occurred with greater frequency and over a larger part of the country during May than in the preceding months. The April records show that these monthly rainfalls have occurred at very few stations north of the thirty-fifth parallel, while the May records show that they have occurred locally throughout the northern part of the United States to the eastward of the Rocky Mountains, although a large majority of stations report no such rainfalls, and but few have recorded more than one since the beginning of observations. Eastern Texas and the Carolinas appear to have been most subjected to these excessive monthly rainfalls. On the Pacific coast and in the following-named states (some of which have several stations with long records) rainfalls reaching 10 inches, or more, have not been noted in May, viz., Indiana, Kentucky, New Jersey, Tennessee, Vermont, West Virginia, and Wisconsin. The rainfalls of May, 1887, on the north Pacific coast appear to have been the heaviest that have fallen in that region since the beginning of observations, but no station reports as much as ten inches, Tatoosh Island, Wash., reporting the maximum, 8.85 inches.

Daily rainfalls in excess of two and one-half inches have been much more frequent in May than in any month that has yet been considered since the discussion of these rainfalls was

begun in the REVIEW for October, 1887, and the area of the country subjected to same much more extended. In previous months these heavy daily rainfalls in districts to the eastward of the Rocky Mountains have been confined for the most part to the Southern States, but in the month of May they have occurred with nearly the same frequency in the upper Mississippi and lower Missouri valleys as in the Gulf States. In the lower lake region, New England, Kentucky, and Tennessee, and in portions of Virginia, West Virginia, Pennsylvania, and Ohio, very few daily rainfalls amounting to two and one-half inches have occurred during May in past years. The regions of greatest frequency of excessive daily and monthly rainfalls coincide.

While the number of stations reporting rainfalls of one inch, or more, per hour in May is somewhat greater than for previous months, the records at a majority of stations show that the heaviest rainfalls have not reached that amount. Portions of Iowa, Kansas, Nebraska, Pennsylvania, Tennessee, and eastern Texas appear to have been most subjected to excessive hourly rainfalls. Rainfalls exceeding a rate of one inch per hour have occurred in May four times since 1880 at each of the following-named stations: Wellsborough, Pa.; Chattanooga, Tenn.; Fort Riley, Kans.; 1.50 in twenty minutes (4.50 per hour) on May 14, 1885, at Fort Riley, being the maximum rate for these stations.

Of the heavy rainfalls shown by the records on file in the office of the Chief Signal Officer for the month of May the following are some of the most remarkable: Mobile, Ala., 1.64 in twenty minutes, on the 5th, 1879 (rate per hour, 4.92); Collinsville, Madison Co., Ill., 1.70 in twelve minutes, on the 23d, 1888 (rate per hour, 8.50); Fort McPherson, Lincoln Co. Nebr., 1.50 in five minutes, on 27th, 1868 (rate per hour, 18.00), and during another storm on the same date 2.25 fell in forty minutes; Emory Grove, Baltimore Co., Md., 5.00 in three hours, on 15th, 1879; Fort Snelling, Hennepin Co., Minn., 5.12 in two hours and twelve minutes, on 31st, 1877; Saint Matthew's, Orangeburg Co., S. C., 4.00 in four hours, on the 10th, 1888; Glenwood, Mills Co., Iowa, 6.00 in four hours, on 29th, 1878; Sedgwick, Harvey Co., Kans., 4.50 in two hours and fifty minutes, on 12th, 1877.

## WINDS.

The most frequent directions of the wind during May, 1888, are shown on chart ii by arrows flying with the wind. The prevailing winds were from the north or northwest in the extreme Northwest and Missouri Valley; in the lower lake region and Gulf States they were mostly southerly; in the upper Mississippi valley, upper lake region, Atlantic coast districts, Rocky Mountain region, and on the Pacific coast there were variable.

## HIGH WINDS (in miles per hour).

No maximum velocities of fifty or miles per hour, other than those given in the table of miscellaneous meteorological data, have been reported. The maximum velocity for the month, except at mountain stations, 80 miles per hour from the northeast, occurred at Corpus Christi, Tex., on the 28th.

## LOCAL STORMS.

3d. A severe storm, accompanied by hail, passed north of Texarkana, Miller Co., Ark., during the evening, uprooting trees, etc. It is reported that crops were badly damaged and much stock killed. Reports from Camden, Ouachita Co., Ark., state that a violent storm passed through the eastern part of that county late in the afternoon, the path of the storm being about one hundred and fifty yards wide. Peru, La Salle Co., Ill.: a substantial bridge, about four hundred feet long, across the Illinois River, was wrecked by a severe storm in the evening.

6th. Kansas City, Mo.: reports from Harrisonville, Cass Co., state that one of the severest storms ever experienced occurred

in the southern part of that county. The growing grain was completely destroyed by hail in some portions of the county. The heavy rainfall caused Grand River to rise nine feet within two hours. At Kansas City the storm was of considerable severity, but no damage resulted.

7th. Springfield, Mo.: a thunder-storm, moving from southwest to northeast, began at 2.35 p. m., and was accompanied by heavy hail from 3.35 to 3.42 p. m.; fruit trees and garden vegetables were seriously injured.

9th. Centreville, Montgomery Co., Ohio: at 10 a. m. a tornado passed about two miles to the northwest, its path being about one hundred feet wide. No serious damage resulted. Abilene, Tex.: heavy rain and hail began at 6.10 p. m., the hail-stones being about the size of partridge eggs; at 6.25 p. m. another hail storm occurred, the hail-stones being unusually large, some measuring nine inches in circumference. Newark, Licking Co., Ohio: the southern part of this county was visited by a destructive hail storm on the night of the 9-10th.

10th. Cleveland, Ohio: severe local storms are reported to have occurred at several points in northern Ohio in the afternoon. At West View, Lorain Co., and New Philadelphia, Tuscarawas Co., the storms were of sufficient violence to blow down large trees and cause damage to buildings. Concordia, Kans.: thunder began at 11.55 p. m., and was immediately followed by a heavy fall of large hail, lasting two minutes; some of the hail-stones measured one and a half inches in diameter; many windows were broken and almost all tin roofs in this place were cut through by the hail; estimated damage \$2,000.