

slope of the Rocky Mountains. On this date rain fell in areas from southern Minnesota to northwestern Texas, high north-west winds prevailed in South Dakota, heavy wind, rain, and thunderstorms occurred in eastern Kansas, and thunderstorms were reported in northwestern Texas.

VI.—Developed in the Saskatchewan Valley on the 14th, and at the evening report was central north of eastern Montana, with pressure below 29.70. On this date high wind and thunderstorms were reported in South Dakota. On the 15th the center advanced to western South Dakota, without evidence of marked strength, and remained nearly stationary over South Dakota during the 16th and 17th, with rain in the Dakotas, and the highest temperature of the month over the middle plateau region and on the northeast slope of the Rocky Mountains. During the 18th the storm-center moved north of Lake Superior, with a slight increase in energy, and from the 16th to the 18th the highest temperature of the month was recorded in the upper lake region. By the evening of the 19th the center had advanced to the region north of the lower Saint Lawrence valley, with showers from the Ohio Valley over the lower lakes and western New England, and thunderstorms in the Ohio Valley, and thence over western New York and northwestern Pennsylvania.

VII.—Apparently developed over the lower Missouri valley on the 23d. On this date rain fell between the Mississippi River and the Rocky Mountains, in the upper lake region, and the Southern States. On the 24th this low area moved to the western lower lake region, rain fell generally from the Mississippi River over the Lake region and the middle and south Atlantic states, and thunderstorms were reported in the southern lake region. By the evening of the 25th the center had

advanced to eastern New York, with rain from the Lake region to the middle Atlantic and New England coasts, the rainfall being unusually heavy in northern and western New York. The morning report of the 26th showed the low area central off the New Jersey coast, the abnormal southerly movement being due to high pressure to the eastward, and by the evening of that date the center had apparently been forced southward off the Virginia coast. Rain fell from the lower lakes to the middle Atlantic and New England coasts, and brisk to high northeasterly winds prevailed along the New England coast during that and the succeeding date.

VIII.—Was central over the eastern Saskatchewan valley the morning of the 26th, with pressure below 29.70, and rain in northeastern Montana. During the 27th the center advanced to South Dakota, with pressure falling to 29.60, and rain in the extreme northwest. By the evening of the 28th the center of disturbance had passed to southwestern Kansas. On this date rain fell over a large part of the region between the Mississippi River and the Rocky Mountains, and thunderstorms were reported in the west Gulf states and Kansas. During the 29th the low area moved northeastward to the upper Mississippi valley, rain fell in areas in the central valleys, and thunderstorms were reported in the lower Missouri and upper Mississippi valleys. During the 30th the storm-center passed over the upper lake region, rain fell between the Mississippi River and the Alleghany Mountains, and destructive gales prevailed over the upper lakes. By the evening of the 31st the center of disturbance had reached the lower Saint Lawrence valley, the rain area had passed east of the Alleghany Mountains, and thunderstorms were reported in New Jersey and North Carolina.

Tabulated statement showing principal characteristics of areas of high and low pressure.

Barometer.	First observed.			Last observed.			Duration.	Velocity per hour.	Maximum pressure change in 12 hours, maximum abnormal temperature change in 12 hours, and maximum wind velocity.											
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.	Days.			Miles.	Station.	Rise.	Date.	Station.	Fall.	Date.	Station.	Direction.	Miles per hour.	Date.	
High areas.		o	o	o	o															
I.....	1	43	95	37	83	2.0	21	White River, Ont.....	-20	1	Columbus, Ohio.....	13	1	Vicksburg, Miss.....	ne.	26	1			
II.....	3	48	97	39	82	2.0	24	Winnipeg, Man.....	-26	2	North Platte, Nebr.....	17	3	Kittyhawk, N. C.....	w.	14	5			
III.....	11	48	93	38	79	6.0	19	White River, Ont.....	-20	12	Atlanta, Ga.....	11	16	Sioux City, Iowa.....	n.	38	14			
IV.....	17	49	125	47	86	3.0	35	do.....	-46	19	Miles City, Mont.....	24	17	Chicago, Ill.....	ne.	35	19			
V.....	20	52	112	45	71	3.0	31	Sydney, C. B. I.....	-34	22	Rapid City, S. Dak.....	18	20	Kittyhawk, N. C.....	se.	35	25			
VI.....	25	42	95	41	66	5.0	17	Father Point, Quebec.....	-30	25	Rochester, N. Y.....	13	25	Charleston, S. C.....	nw.	20	25			
VII.....	27	48	124	41	89	4.5	22	Helena, Mont.....	-34	27	do.....	13	25	do.....						
								Sault Ste. Marie, Mich.....	-34	31	Denver, Colo.....	23	28	Pensacola, Fla.....	ne.	36	31			
Mean.....						3.6	24		-30			17					29			
Low areas.																				
I.....	1	54	113	51	65	3.5	26	Minnedosa, Man.....	-42	1	Rapid City, S. Dak.....	20	1	Prince Albert, N. W. T....	w.	35	1			
II.....	3	53	113	50	64	3.0	33	Calgary, N. W. T.....	-35	3	Calgary, N. W. T.....	21	2	Chicago, Ill.....	s.	40	800			
III.....	9	51	113	47	67	4.0	25	do.....	-46	5	Havre, Mont.....	22	5	do.....	s.	40	9			
IV.....	9	46	96	42	69	2.5	19	Nantucket, Mass.....	-22	12	Columbus, Ohio.....	7	9	Dubuque, Iowa.....	w.	44	9			
V.....	11	51	114	46	102	1.5	28	Fort Buford, N. Dak.....	-24	11	Havre, Mont.....	24	10	Oklahoma, Okla.....	ne.	54	13			
VI.....	14	52	107	51	69	5.0	19	Medicine Hat, N. W. T....	-32	13	do.....	24	15	Havre, Mont.....	ne.	48	14			
VII.....	23	46	93	36	72	3.0	21	Oswego, N. Y.....	-24	25	Boston, Mass.....	7	24	Block Island, R. I.....	ne.	52	26			
VIII.....	26	53	105	50	82	5.5	26	Marquette, Mich.....	-28	30	Miles City, Mont.....	12	26	Amarillo, Tex.....	n.	42	29			
Mean.....						3.5	25		-32			17					44			

NORTH ATLANTIC STORMS FOR AUGUST, 1892 (pressure in inches and millimeters; wind-force by Beaufort scale).

The paths of storms that appeared over the west part of the north Atlantic Ocean during August, 1892, are shown on Chart I. These paths have been determined from reports of observations by shipmasters received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

The north Atlantic normal pressure for August is highest in an area extending from the Azores south of west to the 48th meridian, where it is above 30.20 (767); it is lowest in an area extending from Iceland northeastward over Jan Mayen, where it is below 29.70 (754). There is usually a decrease of pres-

sure over the north Atlantic in August, a slight increase being shown only from the Banks of Newfoundland to the New England and middle Atlantic coasts and over Greenland. The most marked decrease in normal pressure occurs over eastern mid-ocean from the 10th to the 60th parallels, where it is more than .05 inch, and the increase exceeds .10 inch over northern Greenland.

The storms of August usually pass eastward over the ocean in high latitudes, and are seldom severely felt along the trans-Atlantic steamship routes. The storms of this month have an average velocity of 19 statute miles per hour, and an average

of less than 2 storms per month traverse the ocean from coast to coast in August. In the West Indies August marks the height of the cyclone season, and records of past years show that storms of this class have averaged about 2 per month in August. These storms generally recurve in the longitude of the western Bahamas, but in a number of instances have advanced over the Gulf of Mexico and the Southern States, attended by enormous loss of life and property.

The most important storm of the current month was the West India cyclone which advanced from the Virgin Islands, West Indies, to Newfoundland from the 16th to the 22d. This storm recurved east of the Bahamas, and passed west of Bermuda, its influence extending to the coast of the United States only in the form of high tides and heavy surf from the Carolinas to New Jersey. Two storms, low areas II and IV, traversed the ocean from coast to coast, the period of transit being in each instance 5 days. The influence of the West India cyclone referred to was also felt over the northern part of the British Isles from the 25th to the 28th.

The month opened with high pressure and fine weather from coast to coast. These conditions continued until the 5th, when low area I passed north of the Gulf of Saint Lawrence. This storm was followed the night of the 6th by low area II, which reached northern Newfoundland the morning of the 7th. On the 8th this storm occupied the region north of the Banks of Newfoundland, and by the 9th had advanced to the 40th meridian in high latitudes. Moving slowly eastward the storm-center reached the ocean west of Ireland on the 12th, with pressure below 29.70 (754). On the 13th pressure below 29.20 (742) and west gales of force 8 were reported east of the 25th meridian, and on the 14th west to northwest gales of force 8 to 10 were encountered between the 10th and 15th meridians. During the 15th this storm passed north of the British Isles.

The afternoon of the 16th the weather was threatening at Saint Thomas, W. I., and the barometer fell to 29.80 (757), a fall of .22 inch in 48 hours. At 7 a. m. of the 17th the barometer at Saint Thomas stood at 29.80 (757), with west wind and heavy rains. A report from Tortola stated that the cyclone passed that place at 9 a. m. During the 18th and 19th the storm recurved east of the Bahamas, and at 5 p. m. of the latter-named date the barometer had fallen to 29.91 (760), with southeast wind of force 4 at Bermuda. During the early morning of the 20th the center of disturbance moved northward west of Bermuda. At that station the barometer fell to 29.71 (755) from 4.30 to 6 a. m., with southwest wind of force 8. Moving thence north-northeast the storm-center reached Newfoundland on the 22d, attended by northwest to north gales of hurricane force along the trans-Atlantic steamship routes between the 50th and 65th meridians. Moving eastward over the ocean in high latitudes this storm apparently passed north of Scotland on the 25th.

The following extracts from the reports of shipmasters indicate the character of this storm: August 15th, German s.s. "Francia," in N. 26° 23', W. 54° 16', wind southeast, force 4 to 8, barometer 30.16 (766) to 30.08 (764), heavy sea and swell from southeast to south; 16th, in N. 21° 39', W. 57° 22', wind southeast to south, force 4, barometer 30.12 (765) to 30.08 (764), heavy swell and sea, shipped much water; 17th, in N. 21° 39', W. 60° 07', wind southeast, force 4 to 9, barometer 30.04 (763), heavy sea, ship labored heavily, shipping much water, wind shifted to south and southwest; 18th, in N. 19° 15', W. 61° 52', wind south, force 3 to 6, barometer 30.12 (765), heavy south to southwest sea moderating.

The British s.s. "Duart Castle" left Bermuda for Saint Thomas the morning of the 16th, with light south-southeast wind; 17th, in N. 27° 48', W. 65° 42', wind east; 4 p. m., fresh breeze and threatening weather; 8 p. m., every indication of a cyclone, heavy wind squalls and sea rising. 18th, in N. 24° 19', W. 65° 22', wind east, barometer 29.85 (758); 8 a. m., hove to, heavy gale and high sea; noon, gale increasing, with high cross seas; 4 p. m., gale increasing and hauling to south and southeast; 8 p. m., gale blowing with increasing violence;

8 to 10 p. m., ship labored heavily and shipped great quantities of water, one lifeboat stove in and others started from their chocks, tarpaulins, hatches, and deckload shifted, injuring 6 men. 19th, in N. 25° 01', W. 66° 09', in morning, shipped heavy seas, which caused considerable damage, and ship listed 12° to starboard; at 2 p. m. resumed course.

On the 16th low area IV advanced over Newfoundland, and on the 17th was central north of Newfoundland, with pressure below 29.70 (754). By the 19th this storm had moved to mid-ocean, with pressure about 29.50 (749) and north to northwest gales of force 9 to 11 near the 40th meridian, and on the 20th gales of force 8 were encountered near the 30th meridian. From the 21st to 23d the storm apparently moved slowly eastward over the British Isles.

The night of the 25th low area VII passed southward off the south New England coast, this abnormal course being caused by high pressure to the eastward. By the night of the 26th the storm-center had been forced southward off the Virginia coast, and by the morning of the 27th had recurved northward off the New Jersey coast. During the next 24 hours the storm remained nearly stationary off the New England coast, and by the 29th apparently dissipated south of Nova Scotia. On the 27th a storm of marked strength appeared over mid-ocean, with pressure below 29.40 (747), and northerly gales of force 9 to 10 between the 30th and 40th meridians. This storm moved slightly to the southeastward by the 28th, and north-northeast gales of force 8 were encountered near the 20th meridian. By the 29th the center of disturbance had advanced southwest of the British Isles, and gales of force 8 to 11 were reported east of the 20th meridian. During the 29th and 30th this storm apparently moved eastward over the southern part of the British Isles.

OCEAN ICE IN AUGUST.

The following table shows the southern and eastern limits of the region within which icebergs or field ice were reported for August during the last 11 years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
August, 1882.....	46 50	46 00	August, 1882.....	46 50	46 00
August, 1883.....	43 26	51 47	August, 1883.....	48 00	44 00
August, 1884.....	43 24	48 44	August, 1884.....	47 50	43 50
August, 1885.....	43 48	52 04	August, 1885.....	48 03	42 45
August, 1886.....	48 35	48 46	August, 1886.....	50 00	48 00
August, 1887.....	42 21	49 51	August, 1887.....	48 06	40 00
August, 1888.....	Straits of Belle Isle		August, 1888.....	51 33	55 00
August, 1889.....	43 34	48 38	August, 1889*.....	53 00	45 00
August, 1890.....	42 30	50 21	August, 1890.....	50 13	39 10
August, 1891.....	44 07	52 05	August, 1891.....	47 32	42 45
August, 1892.....	46 45	53 00	August, 1892.....	48 43	44 49
Mean.....	45 10	50 39	Mean.....	49 04	44 40

* Isolated field ice in N. 58°, W. 40°.

The above table shows that for August, 1892, ice was reported about 1½° north of the average southern limit of ice for the corresponding month of the last 11 years. The position of the easternmost ice reported for the current month about corresponded with the average eastern limit for August. The southernmost ice reported, an iceberg on the 1st and another on the 8th, was noted off Cape Race, and the easternmost ice, an iceberg, was observed on the 3d in the position given in the table. The ice reported for the current month was greatly deficient, as compared with the average quantity noted for August of preceding years, and on three dates only were icebergs or field ice noted south of the 50th parallel.

The limits of the region within which icebergs or field ice were reported for August, 1892, are shown on Chart I by ruled shading.

OCEAN FOG IN AUGUST.

The limits of fog belts west of the 40th meridian, as reported by shipmasters, are shown on Chart I by dotted shading. Near the Banks of Newfoundland fog was reported on 19

dates; between the 55th and 65th meridians on 17 dates; and west of the 65th meridian on 14 dates. Compared with the corresponding month of the last 4 years, the dates of occurrence of fog near the Grand Banks numbered 3 less than the average; between the 55th and 65th meridians 6 more than the

average; and west of the 65th meridian 5 more than the average. The fog noted by shipmasters and that reported by observers of the Weather Bureau on the New England and middle Atlantic coasts generally attended the advance or passage of general storms.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

The distribution of mean temperature over the United States and Canada for August, 1892, is exhibited on Chart II by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departure from the normal are given for regular stations of the Weather Bureau. The figures opposite the names of the geographical districts in the columns for mean temperature and departure 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 temperature is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Weather Bureau represents the mean of the maximum and minimum temperatures.

The mean temperature was highest in the Colorado Desert, California, and in the lower Gila valley, Arizona, where it was 95 and above, and the mean readings were above 80 in the central valleys of California, in the lower Colorado and Gila valleys, over the greater part of Texas, along the coast of the Gulf of Mexico, and in the south Atlantic states and Florida. The mean temperature was lowest in the mountains of Colorado, where it was below 55, and the mean values were below 60 along the immediate Pacific coast from San Francisco, Cal., northward, and in the northern Saskatchewan and lower Saint Lawrence valleys.

DEVIATIONS FROM NORMAL TEMPERATURE.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for August for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for August, 1892; (4) the departure of the current month from the normal; (5) and the extreme monthly mean for August during the period of observation and the years of occurrence:

State and station.	(1) Normal for the month of Aug.	(2) Length of record.	(3) Mean for Aug., 1892.	(4) Departure from normal.	(5) Extreme monthly mean for August.			
					Highest.	Year.	Lowest.	Year.
<i>Arizona.</i>	°	Years	°	°	°		°	
Fort Apache.....	72.5	19	70.6	- 1.9	77.1	1877	67.9	1884
Fort Mohave.....	93.6	21	94.2	+ 0.6	93.8	1875	89.9	1890
Whipple Barracks.....	72.5	21	73.4	+ 0.9	78.9	1879	67.5	1891
<i>Arkansas.</i>								
Keesees Ferry.....	77.9	10	77.7	- 0.2	81.0	1886	75.5	1882
<i>California.</i>								
Fort Bidwell.....	70.4	21	68.6	- 1.8	73.9	1878	62.6	1876
Riverside.....	77.7	10	.....	.....	81.5	1885	73.6	1887
<i>Colorado.</i>								
Las Animas.....	73.6	9	73.2	- 0.4	77.1	1889	70.4	1884
<i>Florida.</i>								
Merritts Island.....	81.4	10	77.9	- 3.5	83.8	1883	77.9	1892
<i>Georgia.</i>								
Forsyth.....	78.8	18	79.7	+ 0.9	82.4	1878	73.2	1885
<i>Idaho.</i>								
Boise Barracks.....	72.4	8	69.4	- 3.0	75.1	1878	67.3	1881
Fort Sherman.....	66.2	8	66.4	+ 0.2	68.0	1891	63.7	1889
<i>Illinois.</i>								
Centralia.....	75.9	10	.....	.....	84.0	1881	71.0	1882
<i>Indiana.</i>								
Lafayette.....	70.2	10	72.5	+ 2.3	74.0	1886	68.2	1885
<i>Indian Territory.</i>								
Fort Supply.....	79.3	13	77.0	- 2.3	90.8	1874	76.0	1882
<i>Iowa.</i>								
Cresco.....	68.7	19	68.3	- 0.4	72.6	1881	63.1	1885
<i>Kansas.</i>								
Eureka Ranch.....	77.4	9	75.6	- 1.8	80.8	1889	74.2	1891
Independence.....	77.7	20	80.0	+ 2.3	85.8	1874	72.8	1884
Salina.....	77.6	10	76.6	- 1.0	81.7	1888	74.2	1883

Deviations from normal temperature—Continued.

State and station.	(1) Normal for the month of Aug.	(2) Length of record.	(3) Mean for Aug., 1892.	(4) Departure from normal.	(5) Extreme monthly mean for August.			
					Highest.	Year.	Lowest.	Year.
<i>Louisiana.</i>	°	Years	°	°	°		°	
Grand Coteau.....	81.3	8	79.9	- 1.4	83.6	1883	78.9	1889
<i>Maine.</i>								
Orono.....	65.3	22	66.4	+ 1.1	67.5	1881	63.1	1874
<i>Maryland.</i>								
Cumberland.....	71.3	21	75.2	+ 3.9	75.7	1871, 1872	68.5	1883
<i>Michigan.</i>								
Kalamazoo.....	69.2	15	71.7	+ 2.5	73.0	1881	63.8	1885
<i>Missouri.</i>								
Sedalia.....	77.0	11	77.4	+ 0.4	85.4	1881	72.6	1891
<i>Montana.</i>								
Fort Custer.....	69.8	12	.....	.....	73.8	1891	66.2	1885
<i>Nebraska.</i>								
Fort Robinson.....	69.9	9	70.2	+ 0.3	74.3	1886	64.7	1888
Genoa (near).....	72.5	16	72.0	- 0.5	77.6	1881	68.5	1885
<i>Nevada.</i>								
Browns.....	80.0	20	84.3	+ 4.3	84.3	1892	76.5	1871
Carson City.....	69.3	16	69.3	0.0	72.4	1878	63.8	1876
<i>New Hampshire.</i>								
Hanover.....	66.2	19	66.0	- 0.2	70.4	1881	59.2	1885
<i>New Mexico.</i>								
Deming.....	83.4	10	85.0	+ 0.7	91.5	1888	80.9	1891
Fort Wingate.....	70.2	21	71.3	+ 1.1	76.7	1877	65.8	1887
<i>New York.</i>								
Cooperstown.....	66.4	21	65.4	- 1.0	71.5	1877	62.4	1889
Plattsburg Barracks.....	67.7	21	66.6	- 1.1	71.3	1872	64.3	1885, 1888
<i>North Carolina.</i>								
Lenoir.....	73.2	19	73.1	- 0.1	77.0	1877	70.0	1890
<i>Oklahoma.</i>								
Fort Reno.....	78.6	9	.....	.....	83.2	1886	76.4	1884, 1891
Fort Sill.....	80.9	20	75.0	- 5.9	91.0	1874	75.0	1892
<i>Oregon.</i>								
Bandon.....	57.6	8	57.0	- 0.6	61.1	1891	54.4	1886
Eola.....	64.8	21	65.4	+ 0.6	67.6	1875	61.2	1881
<i>Pennsylvania.</i>								
Dyberry.....	64.9	21	65.9	+ 1.0	68.3	1872	61.2	1889
Grampan.....	67.8	21	69.4	+ 1.6	73.1	1881	64.4	1873
Wellsboro.....	65.4	13	64.0	- 1.4	71.3	1881	62.0	1891
<i>South Carolina.</i>								
Statesburg.....	76.6	11	77.8	+ 1.2	79.7	1881	73.5	1889
<i>South Dakota.</i>								
Fort Sully.....	72.9	21	75.2	+ 2.3	77.4	1871	67.6	1885
<i>Texas.</i>								
Austin.....	83.8	19	81.7	- 2.1	86.5	1874, 1886	80.0	1880
Silver Falls.....	78.8	6	77.4	- 1.4	81.4	1887	74.8	1888
<i>Utah.</i>								
Terrace.....	77.2	18	81.3	+ 4.1	83.8	1888	65.6	1872
<i>Vermont.</i>								
Strafford.....	67.5	19	65.4	- 2.1	72.6	1884	63.9	1885
<i>Virginia.</i>								
Dale Enterprise.....	74.3	12	77.0	+ 2.7	77.5	1888	67.0	1890
<i>Washington.</i>								
Fort Townsend.....	61.4	19	.....	.....	64.3	1874	58.9	1876
<i>West Virginia.</i>								
Parkersburg.....	75.2	11	71.6	- 3.6	87.6	1881	67.8	1885
<i>Wisconsin.</i>								
Embarrass.....	67.6	21	67.0	- 0.6	73.0	1876	64.0	1885, 1890
Madison.....	69.3	16	70.2	+ 0.9	73.1	1886	64.2	1885
<i>Wyoming.</i>								
Fort Washakie.....	68.7	10	65.3	- 3.4	72.2	1881	64.1	1888

DEPARTURES FROM NORMAL TEMPERATURE.

The mean temperature was generally above the normal, except in the interior of the west Gulf states and Texas, along the middle and south Pacific coasts, on the northeast slope of the Rocky Mountains, and in the Saint Lawrence Valley. The greatest departure above the normal temperature was noted in Virginia, Upper Michigan, and north-central Nebraska, where it exceeded 3, and the monthly mean was 2 or more above the normal at Chatham, N. B., Yarmouth, N. S., over the east part of the middle Atlantic states, generally in the Lake region, in the Red River of the North and extreme upper Mississippi valleys, and over a part of the middle-eastern slope of the Rocky Mountains. The most marked departure below the normal temperature was reported in northern