

sections of the southeastern part of the country it was colder than any month during the past winter. The greatest departures above the average March temperature were noted in eastern Nova Scotia, where they exceeded 4°, and the most marked departures below the average temperature were reported in Illinois and in the British Possessions north of Montana, where they equalled or exceeded 5°. At stations in central Illinois and southeastern Iowa the mean temperature was as low or lower than previously reported for March. At stations in the Atlantic coast and west Gulf states, and over the southeastern slope of the Rocky Mountains the maximum temperature was as high or higher than reported for March of preceding years, and at stations in the south Atlantic states, the Florida Peninsula, the Gulf States, Tennessee, the upper Mississippi and Missouri valleys, the southeastern slope of the Rocky Mountains, the plateau regions, and along the north Pacific coast the minimum temperature was as low or lower than previously reported for March, and in the Atlantic coast states from New England southward, and in the Gulf States the minimum temperature was lower than at any time during the past winter. The cold waves which swept over the southern and southeastern states during the first and middle parts of the month, which were of unprecedented seasonal severity throughout a greater part of this area, were attended by heavy frost throughout the southern tier of states from Texas eastward to the Atlantic coast, which caused considerable damage to growing crops, fruit blooms, and young fruit trees, and light frost was reported as far south as Lee county, Fla., the extreme southern limit of frost ever reported for any month. On the 12th heavy frost injured fruit in the valley of the Gila River, Arizona. The killing frosts of the middle of the month were four to six weeks later in Florida, and one to two weeks later in the southern parts of the east Gulf states, while in the Carolinas the heavy frosts of the middle of the month, and in the Gulf States the killing frost of the first part of the month about corresponded with the average dates of last killing frosts in those regions.

The heaviest monthly precipitation reported was 19.83 inches at Sims, Shasta Co., Cal., and the precipitation exceeded fifteen inches in parts of Humboldt county, Cal., at South Fork, Ky., and Marengo, Ind. In the southwestern part of the southern plateau region, southeastern Arizona, southwestern and southeastern New Mexico, a greater part of southwestern Texas,

within an area extending from the Panhandle of Texas northward over western Kansas, and in north-central Kansas no precipitation was reported. The precipitation was generally in excess of the average for the month from the west Gulf states northward over the upper Mississippi valley and north-eastward over the Ohio Valley, the middle Atlantic states, and New England, over the northeastern slope of the Rocky Mountains, the middle and northern plateau regions, and along the middle and north Pacific coasts; elsewhere the precipitation was deficient. The greatest excesses in precipitation occurred in the northern plateau region, where more than double the usual amount of precipitation was reported, and in New England, the Ohio Valley, Tennessee, the middle plateau region, and the middle Pacific coast, where the precipitation was about 50 per cent. greater than the March average. In the Rio Grande Valley, and over the middle-eastern slope of the Rocky Mountains about one-eighth of the usual amount of precipitation fell; over the southeastern slope of the Rocky Mountains, and on the south Pacific coast about one-fourth; and in the south Atlantic and east Gulf states, and over the southern plateau region about one-half the usual precipitation for March was reported. At stations in New England, the middle Atlantic and west Gulf states, the Ohio Valley and Tennessee, Nebraska, Idaho, and Washington the precipitation was the heaviest, while at stations in Alabama, Kansas, Nebraska, Indian Territory, New Mexico, extreme western Texas, and south-central California the precipitation was the least ever reported for March. The heaviest snowfall of the month was reported along the line of the Central Pacific Railroad in Nevada and Placer counties, Cal., where it amounted to about one hundred and forty inches. The snowfall was heavier than for any month during the past winter in parts of the central Mississippi valley and lower Michigan, and on the 2d the heaviest snow storm since the establishment of the Signal Service station in 1871 occurred at Charleston, S. C.

Unusually brilliant and well-defined solar halos and parhelia were reported on the 2d in parts of New York, Mississippi, Louisiana, Arkansas, Alabama, Wisconsin, and North Dakota, and remarkable lunar halos were noted in Tennessee on the 2d and 3d. A long and protracted drought was reported in the lower Rio Grande valley. Many cattle were dying from thirst, early crops were retarded, and the Rio Grande River was at the lowest stage ever known at Brownsville, Tex.

ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for March, 1890, as determined from observations taken daily at 8 a. m. and 8 p. m. (75th meridian time), is shown on chart ii by isobars. The departure of the mean pressure for March, 1890, obtained from observations taken twice daily at the hours named from that determined from hourly observations, varied at the stations named below, as follows:

Station.	Departure.	Station.	Departure.
Eastport, Me	+ .003	Saint Paul, Minn	+ .002
Boston, Mass	+ .016	Cincinnati, Ohio	+ .001
New York City	+ .012	Memphis, Tenn	-.002
Philadelphia, Pa.	+ .013	Galveston, Tex.	-.007
Washington City	+ .013	Dodge City, Kans.	-.015
Savannah, Ga.	+ .008	Santa Fé, N. Mex.	-.015
Buffalo, N. Y.	+ .007	Denver, Colo.	-.004
Detroit, Mich.	+ .007	Salt Lake City, Utah ..	-.013
Saint Louis, Mo.	+ .004	San Francisco, Cal.	-.015
Chicago, Ill.	+ .005	San Diego, Cal.	-.019

For March, 1890, the mean pressure was highest over north-eastern Florida and the more southern part of the south Atlantic states, where it rose above 30.15, the highest mean reading, 30.16, being noted at Augusta, Ga., and at Jacksonville and Titusville, Fla. The mean pressure was above 30.10 from the east Gulf and south Atlantic coasts northwestward

to Manitoba, and on the middle California coast. The mean pressure was lowest over the Canadian Maritime Provinces, where it fell below 29.90, and at Charlottetown, P. E. I., a mean reading of 29.84 was noted. Over a greater part of New England and the Saint Lawrence Valley, over the southwestern and extreme southeastern parts of the plateau region, on the extreme north Pacific coast, and from the British Possessions north of western Montana southeastward to central Colorado the mean values were below 30.00.

A comparison of the pressure chart for March, 1890, with that of the preceding month, shows that there has been a general increase of pressure from the upper lake region southward over the Ohio and Mississippi valleys, along the immediate Pacific coast, and from Oregon and northern California south-eastward to northwestern New Mexico; elsewhere there has been a decrease in pressure. The increase in pressure in the districts named was generally less than .05, while in extreme eastern New England, Nova Scotia, and New Brunswick, and in north-central Montana and the British Possessions to the northward the decrease in pressure was more than .15. The area of high pressure which occupied the south Atlantic coast in February has contracted to the southward with slight changes in included values; the area of high pressure which extended northward and northwestward from the lower Mis-

souri valley in February has disappeared; slight changes in mean pressure have occurred along the Pacific coast; areas of low pressure have appeared over the Canadian Maritime Provinces and over the northeastern and middle-eastern slopes of the Rocky Mountains, where the most marked decrease in pressure occurred; and there has been a decrease in pressure of .05 to .06 in the western part of the southern plateau region.

The mean pressure was above the normal, except on the north Pacific coast, over the northeastern and southeastern slopes of the Rocky Mountains, over a greater part of Texas, and in upper Michigan. The departures above the normal pressure equalled or exceeded .05 from the upper Mississippi and lower Missouri valleys to the Atlantic coast south of the fortieth parallel, at stations in the lower lake region, and at Red Bluff, Cal. In central Montana and the British Possessions to the northward the departures below the normal pressure were more than .05, while in Texas, on the north Pacific coast, and in upper Michigan the mean pressure varied from .01 to .03 below the normal.

BAROMETRIC RANGES.

The monthly barometric ranges at the several Signal Service stations are shown in the table of miscellaneous meteorological data. The general rule, to which the monthly barometric ranges over the United States are found to conform, is that they increase with the latitude and decrease slightly, though somewhat irregularly, with increasing longitude. In March, 1890, the monthly ranges were greatest over north-central Kansas, where they exceeded 1.50, whence they decreased irregularly eastward to western New England, where they were less than 1.10, and thence increased to more than 1.30 in extreme eastern Maine and southeastern Massachusetts. From Kansas the monthly ranges decreased southeastward to less than .40 over southern Florida; southward to less than 1.00 over eastern Texas, and to more than 1.10 in the lower Rio Grande valley; southwestward to less than .60 in southeastern Arizona and on the south Pacific coast; irregularly westward to the middle Pacific coast, where they varied from .70 to 1.00; northwestward to southern Nevada, where they were less than .80, whence they increased to more than 1.30 in central and northwestern Washington; and northward to less than 1.15 in eastern South Dakota, whence they increased to more than 1.20 over northern North Dakota. Along the Atlantic coast the monthly ranges varied from .37 at Key West, Fla., to 1.38 at Eastport, Me.; between the eighty-second and ninety-second meridians, .36 at Tampa, Fla., and .49 at Cedar Keys, Fla., to 1.40 at Saint Louis, Mo.; between the Mississippi River and the Rocky Mountains, .91 at Galveston, Tex., to 1.52 at Concordia, Kans.; in the Rocky Mountain and plateau regions, .56 at Fort Grant, Ariz., to 1.35 at Walla Walla, Wash.; on the Pacific coast, .52 at San Diego, Cal., to 1.37 at Port Angeles, Wash.

Chart ii shows that in March, 1890, there was a range in mean pressure of .32 from the Gulf of Saint Lawrence to the south Atlantic coast; a range of .30 from the Gulf of Saint Lawrence to the middle Missouri valley; a range of less than .20 from the middle Missouri valley to the northeastern slope of the Rocky Mountains, and to the western part of the middle plateau region; and a range in monthly mean pressure of but .15 from the north Pacific coast to the middle Missouri valley.

AREAS OF HIGH PRESSURE.

Nine areas of high pressure were observed within the limits of the United States: four of which were first observed on the Pacific coast; four were traced from the region north of Montana; while the fifth, which covered the Rocky Mountain region on the 1st, was traced southeastward to Florida. Those observed on the Pacific coast apparently moved to the northeast until passing to the east of the coast line, after which the direction of movement was to the southeast. The mean track of the areas of high pressure for the month is considerably to the south of that of the previous month, the centre of greatest pressure of five of these areas passing eastward over the Mississippi Valley south of the fortieth parallel, while only one

reached the Atlantic coast from the regions north of the fortieth parallel. The direction of movement over the eastern slope of the Rocky Mountains was to the south of east; those appearing to the north of Montana and North Dakota moving more directly to the southward, while those passing eastward over the central Rocky Mountain region passed slightly to the south of east. The direction of movement while passing over the region east of the Mississippi was to the southeast in three cases where the areas passed over the Southern States, and to the east in the cases where the areas reached the Atlantic over the Ohio Valley and Lake region.

The following is a general description of the weather conditions attending the movement of these areas over the field of observation:

I.—At the opening of the month the pressure was unusually high over the western half of the continent, attended by clear and cold weather, while the conditions were unsettled on the Atlantic coast, attended by snow and rain from Florida northward to New England. On the morning of the 1st the pressure was greatest over Utah, and on the morning of the 2d, while the pressure continued greatest in that section, it had declined two-tenths of an inch, and a portion of the area of high pressure had passed to the eastward over the lower Mississippi valley, this portion of the area being central over Arkansas and covering the central valleys and Gulf States. It passed southeastward over the east Gulf states and Florida during the 2d and 3d, attended by killing frosts as far south as central Florida and along the east Gulf coast, the temperature falling lower than previously recorded at any time during the winter in Florida and generally throughout the south Atlantic and east Gulf states. After reaching the northern portion of the east Gulf states the movement was to the southward until the centre reached the west Florida coast, and this movement caused a continuation of the northwest winds over northern Florida, and these winds, being relatively dry and light during the passage of the area over this region, were attended by conditions most favorable to the occurrence of damaging frosts. During the 4th the direction of movement was eastward over Florida, and by the morning of the 5th it had passed over the Atlantic beyond the limits of observation.

II.—This area of high pressure appeared north of Montana on the 3d, and it is the only one observed during the month which passed eastward north of the Lake region. It moved slowly from the region north of Montana to the region north of Lake Huron during the 3d, 4th, and 5th, the centre being located far to the north of the stations of observation while the area extended southward, covering the greater portion of the country east of the Rocky Mountains. After the centre reached the vicinity of Lake Huron on the 2d a westerly movement occurred, which carried the centre to southern Wisconsin on the 8th, after which the easterly movement was resumed, the centre passing over Lake Huron to the upper Saint Lawrence valley, where it was observed on the morning of the 9th, the area at that time covering the entire country east of the Mississippi. After reaching the upper Saint Lawrence valley the direction of movement was again changed, the area passing almost directly southward over the middle Atlantic states. It passed off the middle Atlantic coast during the 10th, and apparently moved in a southeasterly course after leaving the coast line. Reports from the stations on the south Atlantic coast during the 11th and 12th indicate a slow southerly movement of this area over the Atlantic during those dates, and its presence in that region was evident from the reports as late as the 13th.

III and IV.—First appeared over the Pacific west of California on the 10th, when it apparently moved in a northeasterly direction, the telegraphic reports on the 9th indicating the approach of this area of high pressure. It moved northward along the coast during the 10th and 11th, attended by frosts as far south as southern California, and extending eastward over the plateau regions to the Rocky Mountains. After reaching the north Pacific coast the direction of movement

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changed to the southeast on the 12th, and it moved to the central Rocky Mountain region by the 14th, when it included within its limits the greater portion of the country west of the Mississippi. After the centre reached the southern portion of Colorado it apparently moved westward to Utah on the 15th, after which it could be no longer traced, as it became a part of high area iv, which appeared north of Montana on the 13th, when the preceding area covered the central Rocky Mountain region. Number iv passed southeastward to Manitoba, and afterwards almost directly southward to the lower Missouri valley, where it was central on the 15th, and included within its limits the central valleys, extending from the Rocky Mountains to the Atlantic coast. The southerly course continued over the Gulf States, the centre passing to the west of the east Florida coast, causing continued northwest winds, which were attended by killing frosts in northern Florida on the night of the 16th, and light frosts as far south as Point Jupiter. Although the barometric pressure diminished during the transit of this area over the south Atlantic states, its southeast course continued, and reports on the 18th indicate that it was central to the southeast of Florida on that date.

V.—This area of high pressure also appeared to the north of Montana, where it was observed on the 18th as an area of slight intensity and not clearly defined. It moved southeastward over the Missouri Valley, causing no unusual disturbance in the weather conditions, and thence eastward to the Atlantic coast, where it disappeared to the eastward during the 20th.

VI.—Was observed approaching from the Pacific to the west of northern California on the morning of the 20th. It probably reached the coast line during the night of that date, after which it passed eastward over the plateau and central Rocky Mountain regions, the movement being almost directly eastward, the centre reaching the lower Missouri valley on the 22d, when this area included within its limits the entire eastern slope of the Rocky Mountains and also the central valleys. Although this area was well defined during its entire course the pressure was not unusually high, but its movements were distinctly marked by the regular telegraphic reports. It passed eastward along the fortieth parallel from the Pacific to the Atlantic in four days, with almost a uniform velocity, leaving the middle Atlantic coast on the 25th.

VII.—This area of high pressure also appeared on the Pacific coast, it being central to the west of Oregon on the 23d. It passed eastward over the state of Washington on the 24th and thence to the Saskatchewan Valley where it was central on the 25th, the southern half of this area extending southward, including within its limits the entire Rocky Mountain regions within the United States. It moved southeastward over the Missouri Valley during the 25th, decreasing in energy, and disappeared while central over Iowa, by a decrease of pressure, in advance of a severe storm which then existed in the central Rocky Mountain region.

VIII.—Appeared on the north California coast on the 26th, when a well-marked area of low pressure covered the northern and central plateau regions. It passed over northern California during the night of the 26th, and thence southeastward over the central plateau and southern Rocky Mountain regions, reaching northern Texas on the morning of the 28th and the lower Mississippi valley on the morning of the 29th, the barometric pressure near the centre remaining near 30.30 inches during its passage from the Pacific coast. It reached the south Atlantic states on the 29th, after which it could be no longer traced, owing to the decrease of pressure.

IX.—Appeared north of Montana during the 28th, and although it moved slowly to the eastward it continued in that region until the afternoon of the 30th, after which date it moved southward to Minnesota, where it was central at the close of the month.

AREAS OF LOW PRESSURE.

Twelve areas of low pressure were observed within the

limits of the United States during the month of March: six of which first appeared on the north Pacific coast; three apparently developed in the Rio Grande Valley or the central Rocky Mountain region; one in the east Gulf states; one off the south Atlantic coast; and one north of Montana. Six of the depressions observed reached the Atlantic coast north of Hatteras, two passed over the Saint Lawrence Valley, and two passed northeastward over the upper lake region. The direction of these disturbances was generally to the northeast when the centre was east of the Mississippi Valley, those moving over the lower latitudes inclining more to the northward as they approached or passed along the Atlantic coast. With one exception, all areas traced across the Rocky Mountains moved to the south of east in that region, and the change of direction from southeast to northeast generally occurred near the one hundredth meridian. The following is a general description of the more important weather conditions attending the movement of each area of low pressure:

I.—On the afternoon of the 1st this disturbance appeared far to the north of Montana, and reports indicate it may have had its origin to the west of the Rocky Mountains. It passed rapidly eastward north of the stations of observation, reaching the vicinity of Lake Superior on the morning of the 3d, and after apparently moving southward over Lake Michigan it passed eastward, following the course of the Saint Lawrence Valley, during the 4th and 5th, attended by snows throughout the Lake region, the middle Atlantic states, and New England. The pressure at the centre increased during the easterly movement over the Lake region, and it probably disappeared by increase of pressure before reaching the Atlantic.

II.—Probably developed off the south Atlantic coast during the 1st. Its centre was first located on chart i in the vicinity of Cape Hatteras on the morning of the 2d, northerly gales having occurred at that station during the preceding night. It moved rapidly along the Atlantic coast, following the general course of the Gulf Stream until it reached the fortieth parallel, passing near the southeast coast of New England during the night of the 2d, causing severe northeasterly gales and general snows along the coast from Norfolk to Nova Scotia. This storm continued to increase in intensity until the centre of disturbance passed to the north of the forty-fifth parallel near Eastport, Me., after which the area of disturbance increased rapidly, with a corresponding decrease in energy.

III.—This disturbance was first observed in the eastern Gulf states, and it was located in the eastern extremity of a trough of low pressure which extended westward to the Rio Grande Valley and thence northward over the Rocky Mountain districts, bounding the south and west quadrants of the area of high pressure which was at that time central near Lake Superior and covering the greater portion of the country east of the Rocky Mountains. The southerly movement of this area of high pressure apparently forced this disturbance rapidly to the northeastward, and after reaching the middle Atlantic coast on the 6th it developed considerable energy, causing strong gales along the New England and middle Atlantic coasts. It followed the same general course as the preceding storm, and was most severe on the New England coast, although the maximum wind velocities were somewhat less than those reported in the preceding storm. It was last noted as central near the coast of Newfoundland, and reports indicate that it became greatly extended and less severe after it left the Maritime Provinces.

IV and V.—Although this disturbance (number iv) did not reach the eastern portion of the United States, it was attended by strong southerly gales on the north Pacific coast on the 7th and 8th. The barometric pressure was unusually low on the west coast during the 6th and 7th, and this area of low pressure moved eastward to the plateau regions and disappeared, being apparently forced westward by an extended high area then to the eastward, and after this pressure gave way the low area traced as number iv passed to the east of the coast line and thence north of Montana, where it disappeared after the 10th,

leaving, however, in the southern extremity of the barometric trough which attended it, the disturbance traced as number v. This last area of low pressure was located in Colorado on the afternoon of the 9th, and after being forced southward over New Mexico it passed rapidly northeastward over the central Mississippi valley and upper lake region as an extended rain area covering the country east of the Rocky Mountains, except the upper Missouri valley. These rains were especially heavy in the lower Mississippi and the Ohio valleys. After passing to the north of Lake Huron this disturbance became so faintly defined as to render it impossible to locate its centre, but the telegraphic reports indicate that it probably drifted to the eastward over the lower Saint Lawrence valley without causing any marked disturbance.

VI.—Apparently developed in the lower Rio Grande valley during the 11th. It passed eastward over the west Gulf in advance of an area of high pressure which covered the central Rocky Mountain regions, and after the winds shifted to northerly on the west Gulf coast a maximum velocity of 42 miles occurred at Galveston. The track of this disturbance is only approximately given over the Gulf, and it is possible that within the trough of low pressure which was apparently being forced eastward by the high pressure a new centre of disturbance developed in the south Atlantic states on the 14th. As in the case of low areas ii and iii, this disturbance passed to the northeastward near Cape Hatteras, afterward following the general course of the Gulf Stream until the centre reached the vicinity of southern Nova Scotia, the winds increasing in force during the northerly movement. This storm differs from those previously referred to from the fact that it continued to increase in energy after passing over the Maritime Provinces. The minimum barometric pressure observed was 28.62, on the 17th, when the centre was near Anticosti Island, Gulf of Saint Lawrence. Although the area of the storm apparently increased, the gales became more severe and continued until the 18th, when the course of the storm apparently changed to the eastward.

VII.—This storm appeared on the north Pacific coast north of the state of Washington on the 15th. It moved directly south-east, crossing over Montana and Wyoming on the 16th; Colorado and Indian Territory on the 17th and 18th, reaching Arkansas on the afternoon of the 18th, where its course changed to the north of east. On the afternoon of the 18th an extended barometric depression covered the lower Mississippi and Ohio valleys. The general form of this depression was elliptical, and it extended from Virginia to western Texas. During the night of the 18th this entire depression was replaced by an area of high pressure, and the centre of barometric pressure was transferred rapidly to eastern Virginia, and a disturbance of considerable energy developed quickly and passed rapidly off the coast, attended by severe gales and snow along the southern New England and middle Atlantic coasts. This storm apparently passed over the Atlantic, inclining to the northeastward as it approached Nova Scotia.

VIII.—Appeared off the north Pacific coast on the 17th, and although this storm was at no time central within the limits of the United States, from the regular telegraphic reports it has been traced across the continent, the centre of disturbance following approximately the fiftieth parallel of latitude, being slightly to the north of this parallel over the western half of its course, and slightly to the south of it over the eastern half. The transit was made in four days. The barometric pressure was unusually low along the line of this disturbance, and when the centre reached the vicinity of the Lake region the southern half of the disturbance covered the Northern States, over which general rains occurred on the 20th and 21st of the month.

IX.—This storm developed in Texas on the 21st, in the southern portion of a barometric trough which at that time extended northward over the upper lake region, where the storm previously described was central. Previous to the development of this storm southerly gales were reported on the west Gulf coast and high westerly winds from the interior of Texas, New Mexico, and Arizona. When central in eastern Texas a

norther occurred in the upper Rio Grande valley, attended by snow and freezing weather. This storm moved northeastward over Arkansas, Tennessee, and Kentucky during the twenty-four hours following its development, and during the 22d it passed over the middle Atlantic states and southern New England, attended by general rains and high winds. It apparently increased in energy after passing to the east of New England, and the minimum barometric pressure observed during its passage occurred at Sydney, C. B. I., on the 23d, when the centre was near and to the east of that station.

X.—Was central on the north Pacific coast north of the state of Washington on the 22d. It passed southeastward, crossing the Rocky Mountains on the 23d, and reached the Missouri Valley near Yankton, S. Dak., on the morning of the 24th. At this point the direction of movement changed to the northeast and the storm passed over the upper lake region, attended by severe gales and light snows in the Lake region and high winds on the Atlantic coast north of Hatteras, N. C. The course changed to eastward after reaching the vicinity of Lake Huron, and the disturbance passed eastward, crossing the Saint Lawrence Valley near Quebec, the centre being near the northern boundary of Maine on the afternoon of the 26th, after which it apparently moved northeastward.

XI.—This storm was the most marked disturbance which occurred during the month. It probably had its origin over the Pacific, while the depression was first observed to the west of the state of Washington on the 25th. It passed to the east of the coast line on that date, and thence rapidly southeastward to the central Rocky Mountain region, where it was central on the afternoon of the 26th. The low barometric readings observed within the limits of this disturbance, and the unusual energy developed as evinced by high wind velocities reported, attracted the attention of this office, and the threatening conditions caused the Chief Signal Officer to announce the danger by the issue of the following special bulletin on the morning of the 26th, when this storm was central in Kansas, and some hours before the occurrence of the tornadoes which were so destructive both to life and property:

WASHINGTON CITY, March 27, 1890—1 p. m.

At 8 o'clock this morning a severe storm was central in eastern Kansas, with velocities on the eastern side of thirty-six miles, southeast, at Saint Louis; on the southern side of forty-eight miles, west, in northern Texas; on the western side of sixty miles, north, in Colorado; and on the northern side of thirty-six miles, north, in Nebraska and South Dakota, with a severe blizzard and snow in Nebraska. Warnings were sent out this morning for severe local storms in the states of Ohio, Indiana, Illinois, Tennessee, Kentucky, Georgia, and Alabama, and for a severe norther extending from Kansas to northern Texas to-night and to-morrow morning. At noon the storm had moved eastward so as to cover all of Illinois, with high winds; Chicago reporting forty miles; east, and increasing. The storm will be felt on the Atlantic coast to-night or to-morrow morning, producing severe local storms in the interior, easterly gales on the coast from Hatteras to Maine, and high southwest winds on the south Atlantic coast.

These tornadoes occurred in the southeast quadrant of this disturbance, probably two hundred miles from the centre, when the storm was moving over Illinois and Indiana. Although numerous tornadoes are reported, the most destructive occurred at Louisville, relative to which the Signal Service observer at that station has prepared a special report, which is published herewith under the head of "Local storms." This barometric disturbance continued its course eastward, passing over the lower lake region and New England, reaching the New England coast on the 28th, after which it passed northeastward over Nova Scotia, its centre being last located northeast of, and near to, Sydney, C. B. I., on the 29th.

XII.—This depression covered the central plateau region on the 29th, and moved southeastward over Utah and New Mexico, apparently being forced southward by an area of high pressure which was at that time moving southward over the eastern slope of the Rocky Mountains. At the close of the month this disturbance was central over northern Mexico, the pressure being low in the Rio Grande Valley and over the southern plateau regions.

27th

TABLE I.

Barometer.	First observed.			Last observed.		Duration.	Velocity per hour.		Maximum abnormal changes in pressure in twelve hours, with maximum abnormal changes in temperature and maximum wind velocities in connection therewith.											
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.		Days.	Miles.	Inch.	Rise.	Station.	Date.	Full.	Station.	Date.	Miles per hour.	Direction.	Station.	Date.	
High areas.		0	0	0	0							0								
I.....	1	41	108	29	80	3.5	24	.42	Parry Sound, Ont.....	1	26	Raleigh, N. C.....	1	48	n.	Key West, Fla.....				
II.....	3	55	109	35	72	7.0	14	.48	Calgary, N. W. T.....	3	23	Bismarck, N. Dak.....	3	56	n.	Hatteras, N. C.....				
III.....	10	46	127	40	110	5.0	19	.32	Fort Canby, Wash.....	10	26	Calgary, N. W. T.....	10	44	e.	Fort Grant, Ariz.....				
IV.....	13	54	107	27	80	4.5	25	.35	Fort Sully, S. Dak.....	14	28	Des Moines, Iowa.....	14	52	nw.	Hatteras, N. C.....	14			
V.....	18	54	109	38	75	2.0	50	.48	Washington City.....	19	18	Lynchburgh, Va.....	19	36	nw.	Bismarck, N. Dak.....	19			
VI.....	20	41	128	43	60	5.5	30	.58	Lynchburgh, Va.....	23	33	Fort Grant, Ariz.....	20	48	nw.	Fort Custer, Mont.....	20			
VII.....	23	45	127	43	95	3.0	28	.44	Montrose, Colo.....	24	15	Helena, Mont.....	23	60	nw.	Fort Buford, N. Dak.....	21			
VIII.....	26	37	126	33	83	3.5	35	.82	Concordia, Kans.....	27	29	Salt Lake City, Utah.....	26	68	nw.	Fort Elliott, Tex.....	21			
IX.....	28	54	117	45	97	3.5	14	.36	Denver, Colo.....	31	31	Palestine, Tex.....	31	42	nw.	Fort Sill, Ind. T.....	27			
Mean.....		47	118	37	84	4.2	27	.47			25			50						
Low areas.												Rise.								
I.....	1	53	108	43	68	4.0	23	.66	Qu'Appelle, N. W. T.....	1	29	Valentine, Nebr.....	2	34	w.	Buffalo, N. Y.....				
II.....	2	35	73	49	61	1.5	40	.48	Eastport, Me.....	3	10	Yarmouth, N. S.....	3	56	n.	Block Island, R. I.....	4			
III.....	5	33	86	50	58	1.5	54	.46	Anticosti Island, G. of S. L.....	7	11	Jacksonville, Fla.....	5	44	ne.	do.....	3			
IV.....	8	47	128	50	102	2.0	31	.50	Fort Buford, N. Dak.....	8	32	Calgary, N. W. T.....	10	60	se.	Fort Canby, Wash.....	8			
V.....	9	40	104	47	80	2.0	43	.36	Des Moines, Iowa.....	9	23	Leavenworth, Kans.....	10	48	w.	El Paso, Tex.....	8			
VI.....	11	26	101	51	60	6.5	22	.46	Anticosti Island, G. of S. L.....	16	14	Montreal, Quebec.....	17	48	sw.	Montreal, Quebec.....	10			
VII.....	15	52	119	42	67	4.5	44	.62	Chatham, N. B.....	17	14	Fort Buford, N. Dak.....	15	60	ne.	Block Island, R. I.....	17			
VIII.....	17	46	128	48	67	4.0	33	.52	Minnedosa, Man.....	15	27	Saint Vincent, Minn.....	19	46	w.	Denver, Colo.....	19			
IX.....	21	31	100	45	59	2.5	50	.40	Anticosti Island, G. of S. L.....	21	26	Atlanta, Ga.....	21	46	w.	Anticosti, Gulf of St. L.....	19			
X.....	22	50	122	49	57	4.5	34	.70	Halifax, N. S.....	26	22	Fort Sully, S. Dak.....	23	52	se.	Dodge City, Kans.....	23			
XI.....	25	49	130	47	58	4.5	41	.70	Indianapolis, Ind.....	27	22	Norfolk, Va.....	28	68	ne.	Fort Elliott, Tex.....	23			
XII.....	29	43	120	30	107	2.5	25	.26	Montrose, Colo.....	30	16	El Paso, Tex.....	29	44	s.	Chicago, Ill.....	27			
Mean.....		42	110	46	70	3.3	37	.50			21			51						

NORTH ATLANTIC STORMS FOR MARCH, 1890 (pressure in inches and millimetres; wind-force by Beaufort scale).

The paths of the depressions that appeared over the north Atlantic Ocean during March, 1890, are shown on chart i. These paths have been determined from international simultaneous observations by captains of ocean steamships and sailing vessels received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

Ten depressions have been traced for March, 1890, the average number traced for the corresponding month of the last seven years being 9.4. The greatest number of depressions previously traced for March was twelve, in 1889, and the least number was seven, in 1883 and 1888. Of the depressions traced for the current month six advanced eastward over Newfoundland, one apparently developed near Bermuda, one was central southwest of the Azores during the first four days of the month, and two first appeared over mid-ocean east of the thirtieth meridian. One depression advanced from the middle Atlantic coast, where it was central on the morning of the 19th, to the British Isles by the 22d; the remaining depressions which advanced eastward from American waters passed north of the region of observation before reaching the European coast. Over the western part of the ocean the severer storms of the month occurred on the 2d, 3d, 8th to 10th, 17th, 19th, 20th, and 28th. Over mid-ocean, along and north of the trans-Atlantic steamship routes, generally settled weather prevailed until the 10th, after which date there were marked fluctuations in barometric pressure, with gales of varying force, until the close of the month, the 15th, 23d, and 25th being marked by storms of considerable strength. Over the eastern part of the ocean, north of the fiftieth parallel, the pressure was prevailing low from the 4th to 27th. At noon, Greenwich time, of the 16th, the barometer had fallen to 29.08 (739) at Leith, Scotland; on the 15th a reading of 29.15 (740), was reported at Valentia, Ireland; and on the 24th the pressure was below 29.00 (737) northwest of the British Isles. The 7th, 8th, 14th, 17th, 18th, 25th, and

26th were also marked by very low barometric pressure over and near the British Isles.

Mr. B. Cecil, Director General of Telegraph, at Tegucigalpa, Honduras, has made the following report: "On the 1st, at about 4 p. m., a severe hurricane passed over the north coast of Honduras from the northeast. All banana plantations along the line of the hurricane were ruined; houses, etc., were blown down, but no lives were lost. The weather was very cold and rainy, and in Truxillo very heavy winds prevailed. The telegraph line which had just been finished will have to be rebuilt."

Compared with the corresponding month of the last seven years, the depressions traced for March, 1890, while exceeding in number the March average, were not attended by storms of exceptional violence; storms of marked severity were not reported east of the fortieth meridian, and the more violent storms of the month were reported off the coast of the United States on the 2d, over and south of the Canadian Maritime Provinces on the 3d, northeast of Bermuda on the 9th, over and near Newfoundland and the Grand Banks on the 17th, off the American coast north of Cape Hatteras on the 19th, over Newfoundland and the Grand Banks on the 20th, and over and west of the Grand Banks on the 28th. Among the more notable storms of March of preceding years was that of March 11-14th, 1888. This was the most violent storm over the eastern part of the country in a number of years, and was remarkable not only for the abnormal course it pursued and the strength of its attending gales, but also for the heavy precipitation, more especially the heavy snowfall in New England and the more northern part of the middle Atlantic states, the marked and sudden changes in temperature, and the steep barometric gradient noted while the storm was central over and south of southern New England. A detailed description of this storm is given in the MONTHLY WEATHER REVIEW for March, 1888.

The movements of areas of high pressure over the north Atlantic Ocean during the month were as follows: On the 1st an area of high pressure extended from east of the Grand Banks