

changed, the centre described only 375 miles in two days. When started in a northeasterly direction its motion became gradually faster. From 8 a. m. of the 21st to 8 a. m. of the 22d it passed over 970 miles, or a little more than forty miles an hour. While the low was in the southern part of its path there was a high of 30.2 inches covering part of North Carolina, South Carolina, and Georgia, and extending into the ocean. Around this high area the low seemed to move. Throughout the whole course of the low area there were heavy rainfalls and high winds around the centre. The rainfall in southern part of Louisiana and Mississippi for the month was excessive, a great deal of it occurring in connection with this storm. On the 16th the wind reached sixty miles an hour at Point Jupiter on the Florida coast, and the rainfall was 2.02 inches. On the 18th the rain area extended up the Mississippi and Ohio River valleys. The winds were very strong on the Gulf coast on the 19th and 20th, reaching sixty miles an hour at Pensacola and fifty-five miles at Mobile on the southeast side of the low at a distance of 300 miles from the centre. At New Orleans the rainfall measured at 8 a. m. for previous twelve hours was 7.9 inches, and the wind was estimated to have blown at the rate of ninety miles an hour from 3.30 to 4 a. m. The anemometer connection with self-register was broken by the storm. Great damage was done by the storm in the city and vicinity. The further course of the storm was marked by heavy rainfalls over extensive areas, as for instance 2.0 inches from Louisville to Cincinnati and 3.25 inches at Norfolk. High winds also occurred at a greater number of stations as the storm advanced. There was a wind velocity of fifty miles an hour at Nashville and Knoxville, and forty miles at Norfolk and Block Island, and high winds all along the intermediate coast on the 21st. High northerly winds also prevailed in the Lake region on the 21st and 22d, reaching thirty-five miles an hour at Port Huron and Chicago and thirty miles at Oswego. These winds on the lakes were probably related also to the high area number iii. On the 22d there was a velocity of fifty miles an hour at Eastport and Block Island, and thirty-five miles an hour at New York. On the 21st, in connection with this low and to the east of it, there was a series of tornadoes in eastern Maryland, accompanied by intense thunder and lightning. A marked feature of the air in the surrounding country just before the occurrence of the tornadoes was the excessive humidity. At Baltimore it was 95 per cent. of saturation. The maximum temperature was not so very high. Late in the afternoon it was only 82°.4. There were no very marked twenty-hour falls in temperature in the country over which the cyclone passed.

IV.—This area was a typical cyclone, which described very nearly a parabolic path. Its apex was in southern Louisiana. One branch extended thence to the south of Florida and the other in a northeasterly direction across the United States and to the northeast of Nova Scotia. This area was first perceived off the southeast coast of Florida on the morning of the 16th. It moved in a direction 10° north of west for 950 miles before changing its course to the northeast. Its motion in this part of its path was only 11.3 miles per hour, much slower than in the other part of its path, where it was on the average 30.2 miles while moving in a northeasterly direction. Near the apex of parabola, where its direction of motion

1.—This storm was remarkable both on account of its exceptional energy and by reason of the abnormal path it pursued after having advanced to the westward of the eightieth meridian. The first information relative to its advance was communicated by Captain Edwards, of the s. s. "Jamaican," who experienced a violent hurricane on the 31st of August, one hundred and fifty miles northeast of Sombrero Island, and who calculated that its vortex had passed one hundred and twenty miles north of the Virgin Islands on a north by west course, or between west and west by north, and estimated its diameter at five hundred miles. At noon (Greenwich time) of September 1st the hurricane centre was apparently located north of the western extremity of Puerto Rico. On the 2d a hurricane devastated Turks Islands, where the minimum pressure, 28.95 (735.3), was noted at about 5 p. m. (Greenwich time). Twenty-one lives were lost; more than two hundred and fifty houses of the peasantry and over 400,000 bushels of salt were entirely destroyed, and nearly every house left standing was more or less damaged. In the morning the weather was threatening, with falling barometer and northeast wind; subsequent to the passage of the storm-centre the wind shifted to southerly and the barometer rose rapidly. By noon (Greenwich time) of the 3d the centre had moved to the northward of Great Inagua Island, in which locality the barometer fell to about 28.70 (729.0). On this date the wind at Santiago de Cuba began at northwest and backed to southwest, and at 5 p. m. was from south-southwest, blowing fresh. At Boca de Sagua the barometer fell, with heavily clouded and rainy horizon and northerly squalls. At Santa Clara the barometer fell during the afternoon and evening to 29.38 (746.2) at 11 p. m. At 5 p. m. heavy rain was falling in the first, and one point of the second, quadrant, which changed into a short vigorous rain from north-northwest, with strong squalls from the same direction. The sky then cleared somewhat up to 10 p. m., at which hour the rain-squalls came again in greater strength from the same direction as before, flying around to east-southeast, and although of short duration, covered the first two quadrants and left the wind at south-southwest. The cyclone affected the barometer in Jamaica on the 3d, and the upper cloud-drift was west. At noon (Greenwich time) of the 4th the centre had arrived off the Cuban coast somewhat to the eastward of Sagua, where the barometer fell to 28.90 (734.0) at 9.10 a. m., and the wind attained a velocity of one hundred and twenty miles an hour.

During this and the early part of the following date the depression moved westward over Cuba, and passed somewhat to the southward of Havana at about 2 a. m. of the 5th, where the minimum pressure was 29.20 (741.7), and the wind reached a velocity of ninety miles an hour. Advancing in a south of west course the centre left the western extremity of the island during the 5th. Attending the passage of the storm-centre over Cuba the losses by destruction of property and crops amounted to millions of dollars, and about eight hundred lives were lost. The principal buildings of the large cities were demolished, and whole towns situated near the seaboard were entirely destroyed by the gigantic waves that swept inland. After leaving Cuba the vortex apparently moved in a nearly west-southwest direction over or off the northern coast of Yucatan, and reached the Mexican coast between Vera Cruz and Coatzacoalcos during the night of the 7-8th, where it ex-

hibited great strength and occasioned considerable damage to property and shipping.

The paths of storms of this class hitherto plotted have trended to the north of west, and finally recurved to the northward or northeastward, their course subsequent to the recurvature generally causing the paths to describe a parabolic curve. The movement of the vortex of this storm after the 4th presented a marked departure from the general meteorological laws which govern the movements of West Indian hurricanes which can only be accounted for by the supposition that there existed abnormal atmospheric conditions whereby the deviation from a practically fixed law was occasioned.

Assuming that these conditions would be apparent attending the advance of the cyclone previous to, and accompanying, the southward deflection of its path, it would appear that a study of the general atmospheric movements and conditions over the North American continent and adjacent waters during the prevalence of this and other storms of the same type would materially aid in determining the nature of the disturbing causes which existed during the advance of the cyclone under consideration. It is known that areas of high barometer will deflect or retard storms when situated in their line of advance. In the present instance an area of unusually high barometer swept eastward over the United States from the 4th to the 6th, inclusive, and was preceded by an area of high which advanced eastward over Nova Scotia during the 4th. It is further shown that, owing to the abnormally high barometer readings within the second of the areas of high pressure referred to, an unusually steep gradient existed from the West Indies northward. Admitting that the steepness of this gradient would largely contribute to prevent the storm-vortex from making the usual recurve to the northward, it remains to consider, so far as reports will permit, any additional marked meteorological phenomena which appeared during that period. On the 6th and 7th a cyclonic area of moderate energy, which had followed a general course similar to the one which reached Cuba on the 4th, was central over the Bahama Islands. As regards the possible influence that this storm may have exerted in causing the abnormal southerly movement of its predecessor, it may be stated that, in the several instances noted in which storms of this class have closely followed one another, this result has not been shown. An important feature is presented in reliable advices from Jamaica, to the effect that while the large cyclone was passing north of Cuba a very shallow barometric depression crossed Jamaica September 3d. It moved west-northwest at the rate of fifteen miles an hour, and passed the centre of the island at 2 p. m., and it is thought that after it left Jamaica it developed into a cyclone. A reference to the foregoing report from Santa Clara, will show that the wind-directions at that place were evidently influenced by this depression at about 10 p. m. of the 3d.

As cyclonic depressions not infrequently unite and form one system, which fact would seem to indicate that they possess an attraction for others of their kind, it is not unreasonable to suppose that, attending the advance and subsequent strong development of a cyclone to the south and west of the principal storm herein considered, an influence was exerted, which, taken in connection with the very marked barometric gradient to the northward, may have occasioned the anomalous course of this remarkable hurricane.

States and portions of Kentucky, Tennessee, and Georgia. During the following week a low area of high pressure was situated over the States of Montana, Idaho, and Wyoming, and a low area of high pressure was situated over the States of Virginia, North Carolina, and South Carolina.

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VI.—This low area caused along the middle Atlantic and New England coasts a succession of violent gales, which were not only the most severe of the month, but also among the most

notable in the records of the past eighteen years. The depression was a West Indies hurricane, of that type or class which spends itself over the ocean without passing over the land area of the United States. Hurricanes of this class are especially dangerous to shipping plying along the Atlantic coast, since these storms approach the coast from the south-eastward, their coming heralded at first only by a slight decrease of barometric pressure along the immediate coast line. When stations of observations were maintained in the greater and lesser Antilles, the Signal Service had timely warning of the advent of these storms, but since the discontinuance of these important stations, the Service is left scant time in which to issue warnings after the first storm indications are detected. The marine reports between the 18th and 22d indicate that this disturbance existed as a West Indies hurricane, moving directly westward to the south of, and near, the 25th parallel, between the sixtieth and seventy-seventh meridians, west of Greenwich. Near the seventy-seventh meridian the course of movement changed to the northward, and during the 23d and 24th the regular telegraphic weather reports of the Signal Service suggested the presence of a severe storm off the coast of Florida. Although the centre of this storm passed northward, nearly parallel to, and about two hundred miles east of, the middle and south Atlantic coasts, until it reached the vicinity of Nantucket, Mass., timely warnings were issued to the coast stations. These warnings were based upon observations taken on the extreme western edge of the low area at stations within the limits of the United States, but the indications were of so feeble and uncertain character that, without the wide experience of the Indications Officer in dealing with storms of this class in previous years, they would have been neglected and unheeded.

Cautionary signals were displayed at the southern New England ports at 9.40 p. m. of the 23d, at which time they were changed from storm to cautionary owing to the dying out of a previous storm resulting from a high area to the northward, and they were continued as cautionary on the southern New England coast on account of the threatening conditions on the south Atlantic coast at that time. At 11.45 a. m. of the 24th cautionary northeast signals were changed to storm northeast on the North Carolina coast, and cautionary northeast hoisted at Norfolk, and the following message sent: "Brisk to high northeast winds indicated for the North Carolina coast." The storm was then apparently central some distance to the east of Florida. At 9.45 p. m. of the 24th cautionary northeast were changed to storm northeast at Narragansett section, Wood's Holl, and Wood's Holl section, and cautionary northeast hoisted at New Haven, New London, Newport section, Boston, and Boston section, and Sandy Hook, and cautionary northwest at Atlantic City, Breakwater, and Fort Monroe. Messages: "Storm central south of Hatteras, apparently moving northeastward, strong northeast winds are indicated for the southern New England coast." "Brisk to high northerly winds for the middle Atlantic coast." When these signals were ordered the winds were light on the New England coast from Boston northward. At 10.20 a. m. of the 25th cautionary northeast were changed to storm northeast at Boston, Boston section, and Sandy Hook. Message: "Storm central southeast of New England and off the middle Atlantic coast, moving northeast. Dangerous gales are indicated for the middle Atlantic and New England coasts to-day or to-night."

From the above it will be seen that New England was warned while the storm was central near the southern Florida coast. The accompanying charts show the position of the storm centre at 8 a. m., Washington time, from the 23d to the 28th, inclusive, and the accompanying extracts from the reports of Signal Service observers and marine reporters serve to show the severity of the storm and the loss of life and property. These reports indicate that the storm apparently attained its maximum energy when the centre was south of New England and east of New Jersey, and they also indicate that the storm centre moved slowly to the northward

after reaching the latitude of Hatteras, N. C., increasing in energy until it passed the southern New England coast, when it filled up rapidly. It apparently changed direction to the eastward, and by the 29th it existed as a feeble disturbance north of Nova Scotia. The intensity of the storm was apparently increased by the advance of an area of decidedly high pressure over the Saint Lawrence Valley immediately to the north of the disturbance. This area of high pressure was moving slightly to the south of east in rear of an extended area of low pressure in the north Atlantic. The barometer continued to rise in the lower Saint Lawrence valley until the afternoon of the 25th, reaching 30.80 when this storm was central east of Norfolk, Va. The centre of the area of high pressure passed to the northeast of the storm centre, causing an unusual gradient in the northern quadrants of the storm which resulted in destructive gales, these gales continuing until the centre of disturbance reached the land, when, as is usually the case, the intensity of the storm diminished.

The following are abstracts of reports made by Signal Service observers relative to this storm:

Hatteras, N. C., 25th: the high wind which prevailed throughout the day attained a maximum velocity of sixty-six miles per hour from the north at 6.10 a. m. The gale caused some damage to shipping.

Norfolk, Va., 25-26th: a storm began on the 25th and continued throughout the following day; the maximum velocity of wind, fifty miles per hour from the northwest, occurring at 6.55 p. m., 26th. The storm was very destructive; telegraph lines were prostrated, vessels blown from their moorings, and much damage to other property resulted. The tide was very high, flooding the lower portion of the city.

Kitty Hawk, N. C., 24th: a severe northeast storm has continued without cessation since 7 a. m. of the 20th. The wind continued in northeast until 3 p. m. to-day, when it backed to the north and increased in force, blowing steadily at about sixty miles per hour.

Atlantic City, N. J., 26th: high northwest wind; barometer very low, falling to 28.96 at 2 p. m.; high tide caused much damage.

New York City, 25-26th: high northwest winds prevailed throughout the 25th and 26th; maximum velocity forty miles per hour, on the 26th. Numerous houses along the coast were carried away by the wind, and hotels were flooded. The Coney Island railway was seriously damaged by washouts. The damage in this vicinity will amount to millions of dollars.

New Haven, Conn., 25-27th: a northeasterly gale began at 12.30 a. m., 25th, and continued until noon of the 27th, attaining a maximum velocity of fifty-one miles per hour from the northeast at 10.20 p. m., 25th, the highest velocity ever recorded at this station; snow began at 8.40 a. m., and changed to sleet at 4.10 p. m., 25th, and changed to rain during the night following. The storm caused much damage to property; two houses were blown over, and the telephone and telegraph wires sustained severe injury.

Block Island, R. I., 24-27th: the storm which began at 6.30 a. m., 24th, continued until 11.50 a. m., 27th; maximum velocity, eighty-four miles per hour, occurred at 3.25 a. m., 26th. The storm was very destructive to telegraph lines, and caused some damage to shipping. The barometer reached a minimum of 28.91 at about noon, 27th.

Vineyard Haven, Mass., 24-27th: high easterly and northeasterly winds, accompanied by heavy rains, at intervals, prevailed from 8 p. m., 24th, until 6.30 p. m., 27th. All boats in the harbor dragged anchors; smaller craft were torn from their moorings and driven ashore, and numerous wrecks are reported.

Wood's Holl, Mass., 25-27th: high northeasterly winds began at 8 p. m., 25th, and continued until the evening of the 27th; maximum velocity, forty-eight miles per hour, occurred at 2 p. m., 27th. Heavy rain fell at intervals. The telegraph wires sustained some injury.

Portland, Me., 25-27th: high northeasterly winds, accom-

panied by snow, sleet, and rain, prevailed during the 25th, 26th, and 27th; maximum velocity of wind, thirty-six miles per hour from the northeast, on the 26th.

Eastport, Me., 25-27th: high northeasterly winds began on the 25th and ended at 4.45 a. m., 27th, attaining a maximum velocity of sixty-four miles per hour from the northeast; the gale was accompanied by snow, sleet, and heavy rain; much damage was caused to fences and buildings.

Boston, Mass., 25-27th: the barometer fell steadily during the 25th, reading 29.88 at 8 p. m.; snow fell during a greater part of the day, changing to rain in the morning and evening. The wind at 8 a. m. was blowing twenty-eight miles per hour from the northeast, and had been as high as thirty-eight miles per hour from the northeast during the preceding night. From 8 a. m. it increased gradually in velocity to forty-two miles, and continued to blow from thirty-six to forty-two miles from the north and northeast throughout the day and evening. The local weather conditions were almost identical with those of the "great blizzard" of March 11-13th, 1888. On the 26th the barometer fell slowly to 29.45 at 8 p. m. The wind blew in violent gales all night, the maximum velocity being sixty miles from the northeast at 1.35 a. m. It then moderated slightly, and at 8 a. m. was blowing thirty-six miles from the northeast, after which it again increased and blew heavy gales all day, with a maximum velocity of forty-eight miles from the northeast and north. After 3 p. m. it moderated. Dense fog hung over the harbor at night, and the afternoon steamers delayed sailing on account of the violence of the storm and the thick weather.

The following reports by shipmasters refer to this storm: *

17th.—Captain Metzenthin, of the s. s. "Ascania," reports a storm from the 16th to 18th; wind shifted from ne. to sse.; highest force of wind, 11 to 12; lowest barometer, 29.81, at 4 p. m. of the 17th, in N. 25° 1', W. 57° 46'.

20th.—Capt. S. de Felleria, of the s. s. "Auskaro," reports a gale during the 19th and 20th; wind shifted from ene. to nne. and n.; highest force of wind, 8; lowest barometer, 29.56, at 3.30 a. m. of the 20th, in N. 26° 45', W. 66° 07'. Captain Spratly, of the s. s. "Mozart," reports a storm from the 17th to the 25th; wind shifted from nnw. to ne.; highest force, 10 to 11; lowest barometer, 29.75, at noon of the 20th, in N. 28° 28', W. 67° 08'.

21st-22d.—Captain Catherine, of the s. s. "City of Augusta," reports a strong gale from ne. to n.; lowest barometer, 29.97, at 5 a. m. of the 20th, in N. 36° 20', W. 75° 00'.

22d.—Captain Barber, of the s. s. "Tropic," reports a nnw. gale, of hurricane force, on the 22d; lowest barometer, 29.94, at noon, in N. 26° 6', W. 80° 7'.

23d.—Captain Pearson, of the s. s. "Fort William," reports a whole n. to nw. gale on the 23d; lowest barometer, 29.71, at noon, in N. 27° 20', 79° 25'. Captain Norton, of the s. s. "Fanita," reports a n. gale of hurricane force; lowest barometer, 29.55, at 7.50 p. m., off Frying Pan Shoals. Captain Henderson, of the s. s. "Colon," reports a violent gale, attaining force 11 on the 23d, on which date the lowest barometer, 29.40, occurred at 6 a. m., in N. 30° 06', W. 74° 10'.

24th.—Captain Wallace, of the bk. "Monsita," reports a gale, attaining force 11, at noon of the 24th, in N. 32° 14', W. 75° 29'; direction of wind at time of maximum velocity, wsw. Captain Stevens, of the s. s. "Manhattan," reports a gale attaining force 9 on the 24th; wind shifted from ne. to n.; lowest barometer, 29.94, at noon, in N. 29° 45', W. 80° 22'. The gale commenced the day after leaving New York, November 22d, and lasted until noon of the 25th. The wind seemed to follow the trend of the coast from Hatteras to Jupiter, as it was dead aft all the time, blowing seventy-five or eighty miles per hour at times, with a very heavy, breaking sea, especially off Frying Pan and Romaine.

25th.—Captain Wilder, of the s. s. "City of San Antonio," reports a nnw. gale of force 10; lowest barometer, 29.06, at 5 p. m., in N. 36° 46', W. 73° 54'. Captain Wass, of the schr. "Morancy," reports a nw. storm of force 11; lowest barometer,

29.01, at midnight, in N. 37° 27', W. 73° 39'. Captain Boaz, of the s. s. "Wyanoke," reports a nne. storm on the 25th; lowest barometer, 28.96, at 4 p. m., off Hog Island, Va. Captain Daggett, of the s. s. "Chattahooche," reports a n. storm; lowest barometer, 29.11, at 4 a. m., twenty-five miles ene. from Cape Henry.

26th.—Captain Crosby, of the s. s. "Effective," reports: noon, in N. 38° 35' W. 71° 49', 1 a. m., wind ne., barometer, 28.80, strong gale and high increasing sea; 5 a. m., very heavy gale, ship headed bow to sea; noon, wind e., hard gale, barometer, 28.60; 5 p. m., wind nne., hard revolving gale, barometer, 28.20; midnight, wind w., barometer, 28.20. Captain Le Gallias, of the s. s. "Grecian," reports a nw. hurricane; lowest barometer, 28.74, at 9 a. m., in N. 38° 10', W. 72° 45'. Captain McCarthy, of the pilot boat "J. F. Loubat," reports strong gales from the 23d to the 26th; lowest barometer, 28.80, at 10 a. m., of the 26th, in N. 38° 00', W. 73° 50'. Captain Jenney, of the s. s. "Richmond," reports a nw. gale on the 26th; lowest barometer, 28.93, one hundred miles off Cape Henry. Capt. Andrew Jackson, of "Light Vessel No. 45," in N. 37° 57', W. 75° 05', reports a nnw. to nw. hurricane; lowest barometer, 29.42, at 5 p. m.

27th.—Captain Bussius, of the s. s. "Werra," reports a gale veering from ese. to s.; lowest barometer, 29.27, at 5 p. m., in N. 40° 33', W. 71° 40'.

The following is a report by the Boston Chamber of Commerce, forwarded through the Signal Service observer at Boston, of vessels wrecked during this storm. The list does not include the names of vessels damaged or which went ashore and afterwards floated:

S. S. "Allentown." Barks "Alexander Campbell," "Hannah." Brigs "Wilhelmina," "Golconda," "Alice." Schooners "Amazon," "Abbie S. Emery," "Albert H. Cross," "Clara," "E. L. Higgins," "Elizabeth," "Ethel M. Davis," "Edward H. Norton" (fisherman), "Emma," "G. W. Rawley," "J. and J. Locke," "John Mettler" (fisherman), "Lena Breed," "Marshall O. Wells," "Nellie Florence" (fisherman), "Robert Dority," "Robert Ripley," "Sasanoa," "T. A. Lambert," "William McLean," "Mountain Fawn."

On chart vii will be found the tracks of the centres of some of the principal storms of similar character occurring between 1873 and 1888, which caused more or less damage to shipping of the United States, and which might, in a measure, have been prevented had this service had regular meteorological stations in the West Indies and Bermudas, and provision made for telegraphic communication with them during the stormy season. While a number of these storms passed along the Atlantic coast without producing severe gales at the coast stations, reliable reports from the Bermudas and West Indies might enable this service to warn vessels about to leave port of the existence of dangerous storms, and of their probable direction of movement. Two such storms occurred in August, 1887, one in August, 1886, and one in August, 1879. While the storms of August, 1881, and September, 1876, approached the south Atlantic coast from the West Indies they disappeared soon after their centres reached the continent.

Referring to the severe storm of August, 1873, which caused the loss of probably 600 lives and over 1,000 vessels, involving losses aggregating \$3,500,000, and seriously crippling the fishing interests of the United States and Canada, the English Meteorological Office, in a report covering a history of this storm, states that "its existence was known on the 18th at Saint Thomas, a week before the damage was done on the American coast, and on the 21st the residents of Bermuda were fully aware of its existence and could have foretold its track. From both of these places warnings might have been sent to America if telegraphic communication had existed."

In August, 1886, a storm appeared to the eastward of the Barbadoes on the 15th, and thence passed westward over the Carribean Sea to about N. 14°, W. 76°, and during the 22d passed northward over Cuba, in about W. 81°; it then moved northeastward along the course of the Gulf Stream to New-

*In reports of shipmasters, force of wind is given on scale of 0 to 12 (Beaufort scale).

foundland by the 28th. This storm was particularly severe, causing loss of life and destroying crops and property of immense aggregate value.

In August, 1887, two severe storms advanced northward from the West Indies. One apparently originated to the eastward of the Windward Islands and moved northwestward to about N. 22°, W. 63°, by the 16th; moving slightly north of west, the depression was central on the 19th off the east coast of southern Florida, whence it recurved northward and followed the course of the Gulf Stream until the 23d, on which date it was central in N. 50°, W. 31°. During the passage of this storm along the coast of the United States it was attended by hurricanes of exceptional violence. During this month the presence of a second storm was indicated to the eastward of the Windward Islands on the 19th; by the 20th the centre of depression had moved west-northwest to about N. 22°, W. 66°, whence it is traced to N. 26°, W. 76°, by the 21st. On this

date south to west gales of hurricane force prevailed over the eastern portion of the Bahama Islands; in the vicinity of the thirtieth parallel fresh easterly gales were reported, while off the Florida coast strong northerly gales prevailed. During the 22d and 23d the storm recurved slowly northward, with a marked decrease in energy; by the 24th it had advanced to N. 32°, W. 76°, and during its northeast passage along the course of the Gulf Stream during the next two days it was attended by hurricanes of great violence.

By extending telegraphic communication with Bermuda and availing ourselves of that now existing in the West Indies it would become possible for this Service to greatly extend its usefulness to the shipping interests of the country, and with proper arrangements for the distribution of storm signals, warnings could be issued which in a single year might save from destruction property the value of which would exceed the cost of maintaining this Service for many years.

8.—This storm (number vi) was a hurricane of tropical origin. It is first located northeast of the Windward Islands under date of the 17th; from this position it is given an approximate path westward to the Bahama Islands, where it arrived on the 22d; during that and the following date the storm-centre recurved slowly to the northward, and, pursuing an abnormal northerly course, advanced to the south New England coast by the night of the 25-26th, after which it moved slowly along the New England coast, over eastern Maine, New Brunswick, and the southern part of the Gulf of Saint Lawrence to the vicinity of Cape Race, N. F., by the 30th. This storm was attended by very destructive gales off the coast of the United States from the 21st to the 27th, inclusive. On the 22d its influence extended to the fortieth parallel, and after its recurve over the Bahama Islands it augmented in energy until the 26th, when minimum pressure falling below 29.00 (737.0) was reported, after which there was a marked diminution in strength until the 30th, when the depression exhibited small energy. Storms of this class at this season generally follow the trend of the Gulf Stream after recurving to the northward. In the present instance the abnormal westerly movement may possibly be due to the very high barometric pressure which prevailed over and south of Newfoundland during the advance of the storm northward from the Bahamas. On the 26th there was a gradient of about two inches between the storm-centre's position and southern Newfoundland; subsequent to which date the storm gradually lost energy and a marked decrease in pressure occurred over and near Newfoundland. The conditions attending the unusual course of this storm give color to the belief that a storm's course is largely governed by the movements and position of areas of high pressure. Some of the most destructive storms noted along the Atlantic coast of the United States have appeared as depressions deflected westward to, or near, the coast by some undefined cause, which possibly may have been areas of high pressure located over, and south of, Newfoundland.