

VI.—This storm was the West India cyclone that visited the south Atlantic coast on the 24th and 25th, and deserves special and particular mention. The morning map of the 23d showed an area of high barometer on the Carolina coast and in Georgia, the barometer being lowest in Colorado, with indications of the formation of a cyclonic storm in the Missouri Valley; an abnormal fall of the barometer of .10 occurred in the upper Mississippi valley, and heavy rains had occurred during the night at Chicago, Illinois, Davenport and Des Moines, Iowa. At Jacksonville and Key West, Florida, light northeast winds had been reported for twenty-four hours. By midnight of the 23d a high area had appeared in Manitoba, with the barometer .10 above the normal, and the cyclonic area extended in a long oval from Colorado to New England, with the barometer from .10 to .20 below the normal. The rain-area was nearly coincident with this low area. The wind was northeast at Jacksonville, Florida, with a fall of .05 in the barometer, and north wind at Key West, Florida, with a rise of .02 in the eight hours. These conditions show how unexpected was the great fall of barometer at Jacksonville, Florida, reported on the morning of the 24th, when an abnormal fall of .15 was reported, with light rain and a fresh wind of sixteen miles. The wind at Key West, Florida, was light northerly, and at Savannah, Georgia, light northeasterly. The long trough continued from Colorado to Nova Scotia, with a high area in the east Gulf states, and the highest barometer in Manitoba. The rain-area continued along the axis of this trough. Fearing that a disturbance might be coming in upon the coast, the Indications Officer called for special midday reports from several of the stations on the south Atlantic coast, upon the receipt of which reports cautionary storm signals were ordered, and notice of the storm was telegraphed to the New York Maritime Exchange. Before the receipt of the order for the cautionary signal at Jacksonville, Florida, the storm itself had already reached there, and the afternoon chart plainly showed the centre of the cyclone to be northeast of this place and south of Savannah, Georgia; at the latter place a brisk northeast wind of nineteen miles, and at the former a gale of forty miles from the west. Perhaps the afternoon charts of the 24th presented some of the most remarkable features ever witnessed, which were about as follows: A West India cyclone was raging on the Georgia coast, with the barometer .30 below the normal, winds increasing in force, and light rains. A long, narrow trough, in which the barometer was .20 to .30 below the normal, extended from northwestern Texas to the Gulf of Saint Lawrence; within this trough were several small depressions bounded by the isobar for 29.70; the barometer was lowest over the Gulf of Saint Lawrence, with the isobar for 29.50 bounding the storm centre; heavy rains and severe thunderstorms marked this trough. The barometer was highest and still rising in Dakota and Manitoba. The temperature was slightly below the normal on the Georgia and South Carolina coast, and was from 5° to 12° above the normal in the southern part of New England, in the middle Atlantic and east Gulf states, the Ohio Valley and Tennessee, and in North Carolina, then again to the north of this region the temperature was from 10° to 20° below the normal.

The midnight map of the 24th showed that the centre of the cyclone had moved slightly northward and was near Savannah, Georgia; 7 a. m. of the 25th it was near Charleston, South Carolina; the afternoon of the 25th it was north of Charleston, South Carolina, and west of Smithville, North Carolina; at midnight it was north-northwest of Wilmington, North Carolina, and west of Hatteras, North Carolina; and by 7 a. m. of

the 26th it had passed off the North Carolina coast near Kitty Hawk, North Carolina. By midnight of the 25th the trough spoken of above had been rapidly filled up, the high area number vi having moved gradually southeastward until the cyclone was forced off the coast, and there was a great rush of cold air from the Northwest over the middle and south Atlantic states. On the morning of the 25th killing frosts were reported in Minnesota and Dakota, and on the morning of the 24th further north. On the 26th snow fell at Haney's Lake and Houtzdale, Pennsylvania. The winds attending the cyclone on the south Atlantic coast were terrible in their force. The Signal Service observers in their journals, and the public press, have fully described them, and also the destruction occasioned by this storm, the influence of which was great even upon the New England and middle Atlantic coasts. The winds over fifty miles per hour are mentioned elsewhere under the heading "High winds;" and winds of over twenty-five miles per hour prevailed at all stations on the coast from Boston, Massachusetts, to the Florida coast.

In closing the description of this cyclone the following extracts are made from the journals of the observers at the following stations:

Jacksonville, Florida, 24th.—"Light rain this a. m. The 7 a. m. reading of the barometer showed that a rapid fall had occurred during the night. \* \* \* The wind increased gradually to a gale at 1 p. m. \* \* \* At 2.25 p. m. up signals received. \* \* \* The wind blew a gale from the west of from 28 to 40 miles from 1 to 6 p. m., after which it gradually moderated."

Savannah, Georgia, 24th.—"Up signals received at 1.30; wind increased in force to 30 miles at midnight; rain fell from 3.20 p. m. to 6.25 p. m.; temperature high and barometer falling slowly. 25th, at 4.30 a. m. wind from nw., 56 miles per hour. The storm was the severest felt here since August 27th, 1881. At Tybee the wind was estimated at 75 miles. There was considerable damage to shipping, and one life was lost, the second officer of the s. s. 'Wm. Lawrence' was drowned."

Charleston, South Carolina, 25th.—"The damage by the storm is estimated at \$1,690,000. Twenty-one lives were lost."

Smithville, North Carolina, 25th.—"At 5.15 p. m. the wind had reached the terrific velocity of 98 miles per hour, when the anemometer was blown away; between 5.15 and 5.45 p. m. it is estimated the wind was blowing 125 miles per hour. The cautionary signal raised yesterday undoubtedly saved much property. It is estimated that \$100,000 will not cover the entire damage done in the town and county."

Wilmington, North Carolina, 25th.—"Gale from the south in the p. m., accompanied by heavy rain, falling barometer and temperature; maximum velocity of wind, 52 miles."

Hatteras, North Carolina, 24th to 26th.—"Thunder-storm; heavy rain; maximum velocity of wind, 52 miles; up signals received at 7.15 p. m., 24th."

Kitty Hawk, North Carolina, 26th.—"A northerly gale prevailed from 2.30 a. m. until 9.45 a. m.; at 4.10 a. m. a velocity of 50 miles per hour was recorded."

It must be recorded here that the reports and information given by the observers at all the stations on the south Atlantic coast to this office and to the general public were of the most valuable character and of the minutest detail.

On the morning of the 26th the centre was about longitude 70° W. and latitude 35° N., and high winds were reported on the coast of the middle Atlantic states.

In connection with this cyclone, it must be remarked that immense benefit would accrue to the Atlantic and Gulf coast shipping interests, and to the cities upon the coast, if the United States should have four stations in the West Indies and four in Mexico operated and reporting in the same way as those very essential and most valuable stations in the Dominion of Canada. The cost of maintaining or assisting such stations would be slight, indeed, compared to the great loss of property at Charleston, South Carolina, and the value would be shown in one season.

3.—This disturbance developed, prior to the 8th, over the ocean between N. 30° and 25°, and W. 60° and 65°. At the present writing the earliest report relative thereto is that of the brig "Lilian," H. F. Schive, commanding, as follows: "on the evening of the 7th (in about N. 30°, W. 60°), wind blowing from ene., having shifted from se., with heavy se. and sse. sea, barometer 29.7 (754.4). The wind continued to increase, accompanied by heavy rain, and, at 4 a. m. of the 8th, ship's time, after blowing away the reefed main-staysail, the vessel was run under bare poles, wind hauling gradually to the northward; at

about 8 a. m., ship's time, in about N. 28° 58', W. 60° 44', the barometer read 29.2 (741.7), wind blowing a hurricane from n., accompanied by heavy rain; at noon the wind was wnw., and had moderated slightly." The s. s. "Picqua," in N. 28° 19', W. 54° 25', on the 7th, had barometer 30.22 (761.1), wind se., force 4, and on the 8th, in N. 28° 0', W. 58° 4', barometer 30.14 (765.5), wind s., force 6. Captain Evans, commanding the above-mentioned steamer, remarks, under date of the 7th: "There appears to have been a revolving storm passing to the northward, south of us."

Captain James F. Avery, commanding the bark "Tropic Bird," in about N. 31°, W. 60°, reported, as follows: "The ship had been running west until 8 a. m. of the 8th, with moderate se. wind, gradually increasing to a gale and veering from ese. to e. and back; then hove-to on the port tack under main spencer; wind blowing a heavy gale from ese., and working into ne.; at 12.30 p. m. it was blowing a hurricane, which continued until 3.30 p. m., when it died out to a calm, leaving a heavy swell running. At 4.30 p. m. it began again with wind from wsw., and blowing at a furious rate, until 8 p. m., when it moderated, but the heavy swell continued to run. The hurricane came on without any warning, and was the heaviest that I ever experienced; the barometer did not begin to fall until 8 a. m., and, in four hours, it fell .8 inch, from 30.0 (762.0) to 29.2 (741.7). The vessel lay with her yards in the water, and the topmasts were cut away to right her. After the hurricane passed the barometer rose to 30.0 (762.0) on the morning of the 9th."

Beyond the heavy swell which was observed during the 8th and 9th the passage of this hurricane does not appear to have affected the Bermudas. In this connection, Captain Garvii, commanding the s. s. "Orinoco," reports: "In making Bermuda on the morning of the 9th; we experienced a very heavy swell from se., with stormy appearance in the se.; barometer, 29.97 (761.2). The natives say that the surf on the shores of the island was the heaviest for several years; we had no wind."

The log of the s. s. "Hexham," T. D. Adams, commanding, shows evidence of the existence of the disturbance on the 7th; on the 7th, in N. 34° 47', W. 54° 45', that vessel had light winds and fine weather throughout the day, although the sky looked threatening to the southward; a very heavy swell from the southward was also experienced, causing the ship to roll heavily at times; barometer, 29.97 (761.2). The 8th began with fine weather and stationary barometer, but as the day advanced it began to look more threatening in the south, with sea-swell becoming higher; after 8 p. m. the wind freshened from the eastward, with rain, and continued until midnight; barometer, 29.95 (760.7); ship's position at noon, N. 34° 43', W. 58° 43'.

The bark "Ludwig Heyne" was towed into Bermuda, disabled, on the 15th, having encountered a hurricane in N. 31° 0', W. 64° 39', on the 8th.

During the 8th the storm-centre appears to have moved northward, and by the 9th its position may be closely approximated from the reports of the steamers "Hexham" and "Wellfield." Captain Adams, of the "Hexham," reported that after midnight of the 8th the wind suddenly increased in force, veering to the left a little, and continued with increasing force and heavy rain until 4 a. m. of the 9th, when it was about ene., barometer falling rapidly; the ship was then hove-to, the rain and spray making it impossible to see two ship's lengths in any direction, and the mastheads were tipped with the usual "St. Elmo's fires"; frequent and vivid lightning was observed until the wind reached its maximum force, when the lightning ceased. At 6 a. m. the wind was ne., blowing a furious gale. At 8 a. m. it was n., when it lulled considerably for about an hour, the barometer being then at its lowest point, 29.22 (742.2); afterwards the wind gradually hauled to the left and suddenly freshened up from wnw., increasing to a furious gale, which lasted until the afternoon, when it gradually lulled, and at midnight it was almost calm; the barometer rose steadily after 8 a. m. The ship's position at noon of the 9th, by account, was N. 35° 10', W. 61° 43'.

Captain J. Balley, commanding the s. s. "Wellfield," encountered a hurricane on the 9th; the lowest barometer (corrected), 28.97 (735.8), was observed at noon, in N. 35° 0', W. 61° 19'; the wind set in from ene., and shifted to ne., n., and nw.

According to newspaper reports the following vessels, viz., barks "Geo. Davis," and "Slieve Bloom," ship "Forest King," and the schooner "Mattie W. Attwood," all between N. 40° and 44°, and W. 53° and 55°, experienced winds of hurricane force in which they sustained damage; in these reports, however, the wind-directions and barometric pressure are not stated.

The storm-centre moved slowly northeastward without any decrease in the force of the gales which accompanied it, and, on the 10th it was near N. 40°, W. 57°. The report of Captain Foote, commanding the s. s. "Greece," is interesting. He states that at the noon observation of the 9th, the weather appeared threatening, the cirro-stratus clouds being particularly noticeable and forming a "mackerel" sky; the wind was then ssw., shifting to sse., with heavy sea-swell from s.; at night a large number of coposants were observed on all the yards. The barometer began to be strongly agitated, rising and falling rapidly, and indicating a decrease of pressure amounting to 1.10 inches (28 m.m.) during the storm that followed. The indexes of the four aneroid barometers moved back and forth like balances, while all the spirit in the sympiesometer was pumped into the larger bulb. The wind gradually increased from midnight of the 9th, and at 6 a. m. of the 10th it was blowing a hurricane; soon after 6 a. m. the wind suddenly lulled for ten minutes and then, backing from se. to nw., it blew from that quarter with increased violence. The barometer reached its minimum, 29.11 (739.4) (not reduced to freezing), at 6 a. m. on the 10th, in N. 40° 53', W. 56° 29'. The gale was of six hours duration.

The bark "Kings County," James Saunders, commanding, at 4 a. m. of the 10th had a fresh s. breeze and overcast sky; at 8 a. m., strong gale with heavy swell from sw.; at noon, terrific squalls of hurricane force, continuing until 8 p. m., when it decreased to a strong breeze. The barometer (corrected) fell from 29.8 (756.9), at 4 a. m., to 28.80 (731.5), at 8 a. m., in N. 42° 09', W. 56° 00'. At noon the barometer had risen again to 29.8 (756.9), the gale increasing as the barometer rose; at 11 a. m. the wind was nw., and at 1 p. m. it was n., where it remained during the day. The s. s. "Polynesia," A. Kuhn, commanding, encountered a hurricane at 7 a. m. of the 10th, and ending at 8 p. m., the lowest barometer, 29.18 (741.2), was observed at 12.30 p. m., in N. 42° 14', W. 53° 35'; the wind set in from sse., veering to s. sw., w. and wnw.; severe thunder and lightning, with heavy rain, continued during the disturbance. The s. s. "Elysia," James Brown, commanding, in N. 44° 7', W. 53° 45', had a fresh to strong gale, with lowest barometer, 29.02 (737.1), at 2 p. m. of the 10th; the gale set in from e. at 6 a. m., and continued from that point, with heavy rain, until 2 p. m., when it fell light, and suddenly shifted to nw., through ne.; at 4 p. m. the barometer began to rise and the weather moderated. The s. s. "City of Chester," Henry Condron, commanding, in N. 45° 35', W. 51° 0', had barometer 29.3 (744.2), at 5 p. m. on the 10th, the wind shifting from se. to ne., and blowing with the force of a whole gale. The bark "Exile," George J. Pearce, commanding, also encountered this storm in N. 44° 05', W. 49° 40'; at 3 p. m. the gale commenced from ssw., barometer 29.62 (752.3), and at 6 p. m. it was blowing in terrific gusts, barometer 29.42 (747.3); at 8 p. m. it moderated to a steady gale, wind veering to w. and wnw.

On the 11th the storm-centre was near N. 47°, W. 44°, the barometer having risen to 29.4 (746.7), although there was no abatement in the force of the winds. The s. s. "Celtic," B. Gleadell, commanding, reported: "At noon of the 10th barometer read 30.0 (762.0); it fell steadily until 2 p. m. of the 11th, and the wind backed from n. to sw. The storm began at se. on the morning of the 11th, increasing to force 7 (Beaufort scale) at 12 m., and suddenly decreasing to force 1 at 1 p. m. and increasing to 7 again at 2 p. m. During the lull confused,

cross-seas were encountered, and the wind suddenly backed to n., blowing with greater fury than before; from 12 m. till 2 p. m. the barometer reached its lowest point, 29.47 (748.5), in N. 48° 15', W. 43° 10'; from this time the barometer rose and the wind gradually moderated, the storm having continued twenty-four hours."

During the 12th, 13th, and 14th the storm-centre continued to move slowly northeastward, with pressure varying from 29.3 (744.2) to 29.4 (746.7), and causing moderate to strong gales from sw. to w. over the ocean between N. 45° and 50°, and W. 30° and 40°, while moderate to strong breezes from e. and ne. prevailed to the northward of the fiftieth parallel. On the 15th the disturbance appeared to be losing energy; the barometer had risen to 29.65 (753.1), and the winds had decreased in force; by the 16th the disturbance had disappeared from the chart.

4.—This depression apparently formed near the southeastern edge of the Banks on the 17th, the barometer falling to 29.2 (741.7) over the region between N. 40° and 45° and W. 45° and 55°. On the 17th the s. s. "Brooklyn City," W. Fitt, commanding, in N. 45° 28', W. 48° 22', at noon, had barometer 29.49 (749.0), wind s. by e., force 6, threatening weather; 3 p. m., barometer 29.44 (747.8), wind ssw., force 5; 8 p. m., barometer 29.34 (745.2); 11 p. m., barometer 29.24 (742.7), wind nw., force 6, increasing to force 9. The s. s. "City of Chicago," F. Watkins, commanding, reported, at 10 a. m. of the 17th, variable winds, hauling to n. at noon, and increasing to fresh gale at 2 p. m.; at 3 p. m. the wind was ne., moderating to fresh breeze at 8 p. m., and then shifting to nw. The lowest barometer was 29.53 (750.0), at noon, in N. 46° 41', W. 49° 27'. The s. s. "Saint Bernard," G. Davey, commanding, took the gale at noon of the 17th, with winds from wsw., veering to s. at 1 p. m.; sw. at 4 p. m.; and variable between 5 and 7 p. m.; at 7 p. m. the wind was nw., shifting to n. during the night and blowing with almost hurricane force, accompanied by heavy rain and vivid lightning. The vessel sustained some damage by the heavy seas; the barometric minimum occurred at 6 p. m. on the 17th, while the wind was variable, the lowest reading being 29.26 (743.2), in N. 47° 13', W. 47° 10'. The s. s. "Zaandam," A. Potjer, commanding, also encountered this storm in N. 45° 32', W. 46° 20', the lowest barometer, 29.36 (745.7), being observed at 2 p. m. on the 17th, with wind shifting from s. through w. to nnw. On the 18th the centre of disturbance was near N. 47°, W. 40°, the barometer having fallen to 29.1 (739.1); during this date strong gales occurred in all quadrants of the depression, but were most violent in the western quadrants. During the 19th and 20th the depression moved slowly northeastward, with but slight decrease in energy, the pressure ranging from 29.2 (741.7), to 29.5 (749.3). On the 21st the disturbance appears to have moved to the southeastward, with increasing pressure, and by the following day it had disappeared from the chart.

7.—This was a continuation of the tropical hurricane which

moved over the Carolinas on the 24th and 25th. It appears to have originated between the Bahamas and the southern coast of Florida on the 23d, but owing to the absence of reports from the above region the exact date of its formation and the location of the centre cannot at present be determined. The following data, however, clearly indicate its presence on the 23d:

The Rev. Benito Viñes, S. J., director of the Belen College Observatory, at Havana, writing to the "Maritime Journal" of Havana, on the 24th, states: " \* \* \* During the 21st and 22d and on the morning of the 23d we were under the influence of a strong anti-cyclone, which apparently passed rapidly to the northwest. Since yesterday afternoon (23d) occasional indications of a cyclone, at a considerable distance to the eastward, have been observed. \* \* \*"

On the 23d the schooner "E. B. Conwell" encountered a hurricane off the Florida Reefs. Captain Foster reported that the hurricane began from ne. on the 23d, the wind going around the compass and ending in a southwest gale, which lasted five hours. During this time the vessel lay on her side, and the masts were cut away to right her.

The s. s. "City of Pueblo," J. Deaken, commanding, left Havana on the 22d and encountered the hurricane on the night of the 23d, in about N. 25°, W. 80°. The gale began at nnw. and nw. at about 8 p. m., increasing in force until, at midnight, it was blowing with hurricane force and the barometer had fallen to 29.6 (751.8); at 2 a. m. of the 24th it had fallen to 29.28 (743.7) and the wind had shifted through west to southwest, continuing to blow with hurricane force, and accompanied by violent rain squalls; at 2 a. m. the ship was hove-to, and at 4 p. m. on the 24th, the barometer having risen to 29.8 (756.9), she was put on her course, the wind being then s. and blowing a fresh gale. Captain Risk, commanding the s. s. "Alamo," reported as follows: "I passed Cape Hatteras Sunday, August 23, at 9.30 p. m., standard time, the weather looking bad, "sun-dogs" all day, sky gray and very heavy. We commenced to meet a heavy sw. swell which, towards morning, grew worse; wind south. On Monday morning wind and sea hauling southwesterly, at times sea-swell at wsw., and wind sw., blowing a good gale; during Monday night, same weather; Tuesday, no change until the evening, when the wind hauled to se. by s., blowing hard and puffy, which lasted until midnight, when the gale broke and the wind hauled back to sw. by s. The barometer fell to 29.83 (757.7) on the 24th." The s. s. "Alamo" was bound from New York to Galveston. Vessels to the eastward of the Bahamas do not appear to have noted any indications of a hurricane on the 22d and 23d.

On the 24th the hurricane entered Florida, whence it moved northward and northeastward over the South Atlantic seaboard states. A description of this hurricane, and the disastrous results of the same during its passage over the above states, will be found under "Cyclonic areas," number vi, in this REVIEW.

The following reports show the violence of the hurricane at sea:

On the 24th the schooner "Florence and Lilian" encountered the hurricane in N. 29° 52', W. 80° 25', and lost sails, deck-load, and sustained damage to deck.

The s. s. "Louisiana," E. V. Gager, commanding, reported a hurricane on the 24th, with wind at s., veering to w. about the time of lowest barometer, which was (corrected) 28.83 (732.3), in N. 31° 30', W. 80° 30', at 1 a. m. on the 25th.

During the 25th, all vessels between N. 30° and 37° and between the United States coast and the seventieth meridian experienced furious gales, reaching at times hurricane force, from ssw., sw., and se., with pressure ranging from 29.03 (737.3) to 29.5 (749.3).

In the early morning of the 26th the winds south of 35° N. shifted to n. and nw., indicating that the storm-centre had passed northeastward off the coast line. At 1 a. m. on the 26th, the s. s. "Haytien Republic," D. T. Compton, commanding, reported that the wind, which at midnight of the 25th was

blowing a heavy gale from sw., struck the ship in a heavy squall from ssw. to nnw., lasting only a few minutes from any one direction; from 2 a. m. to 4 a. m. had very heavy squalls from w. with heavy rain, wind backing to sw. after each squall; from 8 to 10 a. m. heavy squalls from nw., ship's position at noon, N. 34° 42', W. 74° 05'. The s. s. "Fortunatus," G. R. Mawer, commanding, reported that at 2 a. m. the wind moderated, and at 7 a. m. it came out from ne. and increased to a heavy gale with very heavy sea from ene., barometer at 8 a. m., 29.01 (736.8); latitude at noon, 38° 31' N., longitude, 73° 20' W. At 4 a. m. the s. s. "Louis Bucki," R. Mount, commanding, in N. 36° 44', W. 74° 50' had wind from n., remaining steady and blowing with hurricane force. Captain Mount reports "from midnight of 25th to 4 a. m. the wind hauled twice around the compass from sw. by the w. to n., and to s. by e."

The s. s. "City of Puebla" appears to have again entered the southwest quadrant of the disturbance after it had recurred and passed northeastward; that vessel, in about N. 35°, W. 75°, on the 26th, had barometer falling from 29.8 (756.9) to 29.6 (751.8), with wind hauling to nnw. and blowing a gale, with heavy rain; at 10 a. m. the weather began to moderate and the barometer rose.

After reaching the ocean the rate of movement of the storm-centre appears to have increased greatly, and by midnight of the 26th the centre was between W. 60° and 65°, the barometer remaining about 29.1 (739.1), and strong gales were reported in all quadrants of the disturbance.

During the 27th the storm-centre moved rapidly northeastward, the barometer falling as low as 28.8 (731.5) during the passage of the storm-centre, while strong gales were experienced by all vessels between the meridians of 40° and 60° W., and from N. 40° to N. 50°.

On the 28th, the region of least pressure, where the barometer read 29.0 (736.6), was near N. 50°, W. 40°, and moderate to strong w. and sw. gales were now reported on the fiftieth parallel and between W. 30° and 40°.

On the 29th, the pressure had increased to 29.9 (759.4), and the disturbance had disappeared beyond the region covered by the reports.

Time	Lat.	Long.	Bar.	Wind	Sea	Remarks
10	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
11	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
12	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
13	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
14	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
15	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
16	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
17	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
18	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
19	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
20	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
21	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
22	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
23	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
24	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
25	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
26	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
27	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
28	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
29	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
30	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
31	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
1	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
2	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
3	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
4	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
5	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
6	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
7	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
8	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
9	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
10	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
11	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
12	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
13	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
14	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
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28	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
29	33° 00'	72° 00' W.	29.52	W. by N.	3	St. S.
30	33° 00'	72° 00' W.	29.5			

V.—This storm raged on the Texas coast from the 15th to the 20th. The meteorological conditions over the country on the morning of the 15th were as follows: Anti-cyclonic area number iv was central in the Missouri Valley, and generally fair weather prevailed in all districts except in the west Gulf states. The winds were northeasterly on the Texas coast, and rain had fallen during the night of the 14th, and a thunder-storm, with light rain, was reported at Galveston, Texas. The barometer was very near the normal on the coast. By the afternoon of the 15th the wind was due east at both Galveston and Indianola, Texas, and northeast at Rio Grande City, Texas, indicating that the centre of the cyclone was somewhere to the south of these places; a maximum velocity of thirty-two miles was recorded at Indianola, Texas. By the morning of the 16th the rain-area had extended to New Orleans and Shreveport, Louisiana, and the winds were fresh northeasterly in the west Gulf states. This stormy weather continued until the morning of the 18th, when the storm-centre was pretty definitely located southeast of Indianola, Texas, and northeast of Rio Grande City, Texas. The storm-centre moved slowly northeasterly until the afternoon of the 20th. In the next twenty-four hours it had passed easterly across northern Florida and southern Georgia, and in the afternoon was southeast of Savannah, Georgia. This storm was the most protracted and the greatest rain storm in the record of the Galveston signal office, or within the memory of any resident of the city. The bark "Orient," with all her crew, four men and a boy, was lost at the entrance of the harbor on the 18th. The following table and note, taken from a carefully written special report of the observer at Galveston, gives the main features of this remarkable storm.

For twenty-four hours ending at 11 p. m.	Wind.			Mean daily barometer.	Daily rainfall.
	Max. velocity.	Total move- ment.	Prevailing direction.		
	Miles.	Miles.		Inches.	Inches.
September 15.....	15	200	e.	29.985	1.51
16.....	20	266	ne.	29.943	3.20
17.....	22	250	se.	29.977	1.90
18.....	30	560	e.	29.952	2.26
19.....	34	583	e.	29.874	3.39
20.....	35	401	ne.	29.854	4.27

NOTE.—Highest velocity during the storm, 35 miles; total movement of wind, 2,340 miles; highest barometer, 30.019, on the 15th; lowest barometer, 29.823, on the 20th; range of barometer during the storm, 0.196; total rainfall, 16.53 inches.

At Indianola the same condition of affairs existed as at Galveston during the same period of time, and quite a panic prevailed on the 19th. The wind attained a maximum velocity of sixty miles per hour, and 2.44 inches of rain fell during the day. The barometer was only .21 below the normal. High tides were reported on the 17th, 18th, and 19th. By the morning of the 20th all danger was considered past.

On the 20th rain fell generally in the east Gulf and south Atlantic states. On the 20th and 21st heavy rain fell at Smithville, North Carolina, Charleston, South Carolina, Savannah, Georgia, Jacksonville, Florida, and New Orleans, Louisiana. During the night of the 21st and during the 22d this area moved northeasterly along the coast, causing fresh gales. At midnight of the 22d the centre was southeast of Block Island, Rhode Island, where the barometer was .78 below the normal; an abnormal fall of .30 occurred in twenty-four hours. On the morning of the 23d the centre of this area and that of number vi came together near Eastport, Maine, where the barometer was 1.29 below the normal.

storm, and the high series continued to rise, and the wind shifted to the north, and the rain fell in the afternoon, and the storm was over by midnight.

VI.—This area appeared to be central south of Mobile, Alabama, at midnight of the 24th. On the morning of the 26th a severe storm was in progress on the coast, with strong northeasterly winds at Mobile, Alabama, Pensacola, Florida, and New Orleans, Louisiana, and heavy rains fell at these places during the night. The centre seemed to remain nearly stationary until the morning of the 28th, and during the five days, from the 24th to 28th, the rain was almost continuous. By the morning of the 29th the centre was between Pensacola and Cedar Keys, Florida; fresh easterly winds and heavy rains were reported on the 28th and 29th on the south Atlantic and east Gulf coasts. On the morning of the 30th the centre was near Jacksonville, Florida, and by midnight the centre had passed easterly off the coast nearly over Jacksonville, Florida. Fresh northeasterly winds prevailed during the day on the south Atlantic coast. The storm was not of very great violence, although the rains were very heavy; and the barometer ranged about .30 below the normal.

The following table gives the latitude and longitude in which each area was first and last located, and the average hourly velocity:

Cyclonic areas.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
No. I.....	50 45	100 00	51 15	64 30	26.9
II.....	38 15	103 30	41 30	70 15	28.8
III.....	37 45	103 45	51 00	68 00	30.4
IV.....	46 30	110 00	51 00	84 00	26.7
V*.....	22 30	95 30	50 30	61 00	18.6
VI*.....	51 15	101 30	50 30	61 00	28.8
VII.....	28 15	88 15	30 45	81 15	4.5
Mean hourly velocity.....					23.5

\* Centres united in N. 45°, W. 65°.

observed over the northern part of the Gulf of Mexico, and three (3, 8, and 10) over the southern part of the Gulf of Mexico, and 11 appeared over the northern part of the Gulf of Mexico.

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9.—This was a hurricane which developed within the tropics on the 18th; the only data relative thereto, as yet to hand, are the following, and are insufficient to determine the path of the hurricane:

Captain W. H. Stapledon, commanding the s. s. "Sirius," bound from Rio de Janeiro to New York, reported: "At 6 p. m. on September 18th the wind backed from ene. to nnw., strong and squally, with heavy, irregular sea, wind increasing at midnight to a strong gale, with heavy squalls from nw.; lowest barometer (aneroid, corrected), 29.5 (749.3), at 10 p. m. of the 18th, in N. 17° 33', W. 56° 4'. At 6 a. m. of the 19th, moderate ssw. gale, with high, irregular sea, and nothing visible above two hundred yards from the ship but white mist, which continued until the disturbance was past. Morning of the 20th, strong gale and high, irregular sea, with furious squalls and continuous heavy rain; 2 p. m. of the same date, gale moderating; 8 p. m., wind lulled, followed by sudden and violent gusts from w. to sse.; at midnight, strong sse. gale and heavy rain; ship laboring heavily and shipping immense quantities of water. September 21st, 8 a. m. (no position given), blowing a hurricane with heavy rain, barometer 29.7 (754.4), high, irregular sea from sw., sse., and se.; weather thick and misty, and continuing without abatement until midnight of the 21st, when it settled down to a moderate gale from se. by e."

Captain P. J. Fraser, commanding the s. s. "Flamborough," reported that on the 18th, when passing out by Sombrero (Windward Islands), he experienced strong ene. trades and a very heavy se. sea, which continued until the 23d.

The ship "Tsernogora," A. Cann, commanding, in N. 26° 10', W. 63° 36', had barometer (aneroid, error unknown) 29.98 (761.5), wind n. 80° e., force 5, with heavy showers of rain, long and heavy, rolling sea from se.; the barometer had steadily fallen from 30.17 (766.3) on the 17th, in N. 20° 08', W. 56° 5'; the wind also having shifted from se. to ne.

Captain J. S. Garvin, commanding the s. s. "Orinoco," at Bermuda, reported that on the 20th a very heavy sea from se. began to roll in on the beach and continued until the evening of the 22d.



12.—A deep depression, showing considerable storm-energy, appears to have existed between N. 35° and 40° and W. 60° and 65° on the 28th and 29th; the data as yet to hand are insufficient to determine its origin and subsequent course, the following reports, however, indicate its presence over the region above-mentioned:

Captain Delap, commanding the bark "Mistletoe," reported as follows: "28th, strong gale from ne., heavy rains, and a long, heavy swell from sse., barometer gradually falling—at noon, Greenwich time, of the 28th, in N. 42° 30', W. 60° 20', barometer (aneroid, corrected) read 29.85 (758.2), wind ne., force 9—every appearance of a heavy storm; ran the ship w. by s., true, keeping the wind two to three points on the starboard quarter; at midnight (morning of the 29th) wind commenced to gradually haul to the northward; kept the wind three to four points on the starboard quarter; blowing with tremendous force, ship under reefed foresail; very heavy swell from east. Concluding that I was on the nw. edge of a cyclone, I ran the ship until 8 a. m. (ship's time), the wind being then nw. by n., with very high and cross sea. I then hove-to on the port tack, as I concluded that the centre was to the eastward. The barometer fell to 29.11 (739.4), the wind blowing with hurricane force, and accompanied by torrents of rain; the wind gradually hauled to w. at noon, ship's time, when it cleared up and the barometer began to rise; the heavy easterly swell continued from 4 p. m., ship's time, until the 30th." At noon, Greenwich time, of the 29th the barometer read 29.21 (741.9), wind nw., force 10, the ship's position being N. 39° 32', W. 62° 15'.

The s. s. "Warwick," C. F. Lobbett, commanding, had a strong easterly gale on the 28th, increasing to a whole gale from ne. by evening of the 29th, with very heavy sea from se. The lowest barometer was 29.77 (756.1), at 8 a. m. of the 29th, in N. 41° 55', W. 62° 0', the wind shifting to ne. about the time of lowest barometer.

Ship	Commander	Date	Time	Lat.	Long.	Barom.	Wind	Force	Remarks
Mistletoe	Captain Delap	28th	noon	N. 42° 30'	W. 60° 20'	29.85	ne.	9	Heavy rain, swell from sse.
Mistletoe	Captain Delap	29th	midnight				ne.		Wind commencing to haul northward
Mistletoe	Captain Delap	29th	8 a. m.				nw. by n.		Very high and cross sea
Mistletoe	Captain Delap	29th	noon				w.		Wind cleared up, swell continued
Mistletoe	Captain Delap	29th	noon	N. 39° 32'	W. 62° 15'	29.21	nw.	10	Ship's position
Warwick	C. F. Lobbett	28th	evening				ne.		Whole gale, heavy sea from se.
Warwick	C. F. Lobbett	29th	8 a. m.	N. 41° 55'	W. 62° 0'	29.77	ne.		Lowest barometer

a Tullahoma, Tenn., which caused an increase of gradients in

the west, followed by west and high velocity  
over lake region and light snows in the northern

which extended  
therefore

near

IV.—This, the most severe storm of the month, had its origin in the tropics, and when first observed was central southwest of Florida on the morning of the 10th, although the reports from that region indicate that it had its origin to the south or southeast of Cuba; it moved slowly northward over Florida and was well defined as a cyclone on the morning of the 11th. Northeasterly gales and heavy rains were reported on the Florida and Georgia coasts, with the barometer below 29.60. At this report, stations on the Atlantic coast were informed that a cyclonic disturbance was central in Florida and that the storm would probably cause dangerous gales off Cape Hatteras and Cape Henry, which would make it unsafe for vessels to sail south from their ports. The storm continued its northerly course during the 11th and 12th, the centre passing west of Jacksonville, Florida, and Savannah, Georgia, and continuing near the eighty-second meridian until midnight of the 12th, when it was central in southwest Virginia, with danger-

ous northeast gales south of New York. On the morning of the 12th, when the storm was still central in South Carolina, stations on the Atlantic coast were again warned of the approach of this severe storm, and the observers at all stations were directed to inform those interested in shipping that it was not safe for vessels to leave port. At midnight the 12th secondary areas were formed in the upper Mississippi and Ohio Valleys, accompanied by general rains, and by an extension of the low area to the northwest, the storm-centre was transferred to the Ohio Valley on the morning of the 13th; there were steep barometric gradients on the middle Atlantic and New England coasts, the storm-centre being bounded by the isobar for 29.6, which included the entire Ohio Valley and the southern portion of the Lake region. After this deviation of the course to the northwest, the storm passed to the northeastward over the lower lake region and the Saint Lawrence Valley, attended by severe gales in the Lake region and on the Atlantic coast and in the Maritime Provinces. Cautionary signals were displayed from twenty-four to forty-eight hours in advance of this storm, and the observer at New York reports, relative to the severity of the storm, as follows:

Cautionary signals were hoisted at 7.45 p. m., October 11th; the public was notified of the approach of the cyclone by the publication in the morning papers of October 12th of the telegram of October 11th; a special bulletin was issued at 10 a. m., October 12th, in which was incorporated telegram received that morning from office Chief Signal Officer—this bulletin was in the Maritime Exchange, and the public notified by "ticker," and the various steamship companies by telephone from this office. The storm struck here about daylight of October 13th, and is reported to have been very severe on the New Jersey coast, and the most severe gale known on the Sound for twelve years. No disasters have been reported in this vicinity, which is certainly due to the warnings given by the service. On the 13th, the day of the storm, no vessels entered or left this port, it being the first instance of the kind known for twenty-five years.

The following notes by the Signal Service observers refer to this storm:

Cedar Keys, Florida: the barometer fell rapidly during the 10th, with brisk northeasterly winds and light rain, which continued during the 11th; at 12.30 p. m. on the 11th the wind veered to southeast and increased in force, reaching a maximum velocity of forty-eight miles per hour at 4.30 p. m., with barometer at 29.19; at 5.30 p. m. the barometer had risen to 29.24 and the wind had decreased to twenty-four miles, but threatening weather continued during the remainder of the day; the high winds caused the tide to rise to an unusual height; the highest wharves were submerged and many of the principal streets flooded.

Sanford, Florida: the barometer fell throughout the 10th, accompanied by heavy rain and brisk to high northeasterly winds; the rainfall for seventeen hours was 6.09 inches, the heaviest recorded since the establishment of this station; the highest wind-velocity, thirty miles per hour, occurred at 4.30 p. m.; at 9 p. m. the heavy rain ended and light rain continued until 10.05 p. m.; during the morning of the 11th the wind veered to south, and the barometer continued to fall until 3 p. m., when it read 29.50; light rains fell between 10 and 11 a. m. and 4 and 8 p. m. of the 11th.

Jacksonville, Florida: the wind blew in strong gusts from the northeast during the 10th, and at 10.50 p. m. increased to the force of a gale, which continued, at intervals, until 2.45 a. m. of the 11th; at 7 a. m. of the 11th the wind had backed to north and had decreased to four miles per hour; at 11 a. m. it had veered to east and began to increase in force; later the wind veered to south and southwest, increasing to a gale, which continued until 5.30 a. m. of the 12th. The barometer was lowest, 29.42, at 10 p. m. of the 11th, and the highest wind-velocities were thirty-six miles, northeast, at 1.55 a. m. of the 11th, and thirty-six miles, south, at 11.15 p. m. on the same date.

Savannah, Georgia: heavy rain and high northeasterly winds prevailed throughout the 11th. During the morning the barometer fell slowly, but in the afternoon and during the night it fell rapidly, the lowest reading, 29.49, occurring at 1 a. m. of the 12th, afterwards remaining stationary until 7 a. m. At the time of the lowest barometric reading the wind shifted to south

and decreased in force from thirty-two to fifteen miles per hour. The high easterly and northeasterly winds caused the tide to rise to an unusual height, overflowing the adjacent rice fields. The Savannah River rose rapidly from 11 a. m. to 1 p. m., reaching a height eighteen inches above the highest point attained since the flood of August, 1881. Great damage was done to the railroads in this part of the state. No damage to shipping interests have been reported. The warning of the storm's approach was given eleven hours in advance, and enabled those interested to prepare for it.

Smithville, North Carolina: high southeasterly winds began at midnight of the 11-12th and continued, at intervals, until 1 p. m. of the 12th; a maximum velocity of forty-four miles occurred at 7.30 a. m. The timely warning of this storm given by the signal display occasioned much favorable comment.

Fort Macon, North Carolina: a southeasterly gale began at 7.10 p. m. on the 11th and continued until 6.30 a. m. of the 12th, the wind reaching a maximum velocity of fifty-six miles per hour.

Kitty Hawk, North Carolina: a gale began at 3 p. m. of the 12th and continued until about midnight of the 12-13th; a maximum velocity of fifty-three miles, southeast, occurred at 10 p. m. of the 12th.

Cape Henry, Virginia, 12th: a severe storm, from northeast to east, began during the early morning and continued until 2 a. m. on the 13th; the maximum velocity of the wind was forty-eight miles; the lowest reading of the barometer was 29.65.

Norfolk, Virginia: high northeasterly winds prevailed from noon of the 12th until past midnight. Considerable damage was done to unfinished buildings and other property in this vicinity. The signal ordered for this storm was heeded by all outward-bound vessels, and the display was favorably commented upon by the press of this city.

Cape Henlopen, Delaware: the storm which prevailed on the 12th and during the night of the 12-13th is said to have been as severe as the great storm of October, 1877. The timely warning given by the Signal Service of the approach of this storm was of the greatest value to shipping interests.

Barnegat City, New Jersey: a maximum wind-velocity of forty-eight miles, from the southeast, occurred at 9 a. m. the 13th.

Sandy Hook, New Jersey, 13th: an easterly gale, blowing steadily at the rate of from fifty to sixty miles per hour, with heavy rain, prevailed from 6 a. m. to 3.10 p. m.

Oswego, New York: the storm of the 13th began at 2.50 a. m. and continued until 8.10 p. m., the wind reaching a maximum velocity of forty-two miles, southeast, at 9.45 a. m. The storm caused considerable damage in this vicinity.

New Haven, Connecticut: high northeasterly winds prevailed during the 13th, which caused the tides to rise to an unusual height. The schooner "Minnehaha" was partly dismantled off Faulkner's Island.