

miles per hour, from the northeast. At 8.30 a. m. the barometer stood at 29.43, wind from the north and veering, and shortly after was from the northwest, when the barometer began rising slowly. At 8.05 a. m. and at 8.40 a. m. the wind was fifty miles per hour, from the north. Owing to the high east and northeast wind the water in the Gulf front rose to such an extent that there were fears of a repetition of the overflow of 1875, but the wind backing to northwest cleared the bay and prevented what might have been a serious disaster. The storm was particularly dangerous to light shipping in the harbor, many of the smaller craft being considerably damaged. Along the beach the street car and the Texas Mexican railroad lines were washed out and a dwelling house, two saloons, and numerous bath-houses were completely demolished. Rain fell at intervals during the storm.

Orange, Orange county, Texas: a very heavy northeast gale blew here all day on the 14th, doing much damage to crops and vegetation. The storm was accompanied by very heavy rainfall.

Sabine Pass, Jefferson county, Texas: between Taylor Bayou and this place eight miles of the railroad track were washed out by the storm of the 14th. Several residences, warehouses, and all the wharves at Sabine City were either blown or washed away. The water rose seven feet above the ordinary high-tide level, submerging the entire town and the country for miles in its rear. Cattle suffered severely for fresh water, as all the inland lakes and pools were impregnated with the saline waters of the Gulf.

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IV.—This storm was apparently central south of Brownsville, Texas, and to the east of the coast line, on the 13th, and the succeeding reports on the 13th and 14th indicate that it moved northward, parallel with the coast line, until it reached Galveston, Texas, on the morning of the 14th; the wind reached a maximum velocity of fifty miles from the northeast at that station on the morning of the 14th, the barometer reading 29.47. The wind shifted to the west during the 14th, when the centre was apparently near the north Gulf coast, after which it was not possible to trace the movement of this low area. This storm was very destructive in the vicinity of Galveston, Texas.

The following notes relative to this storm have been received:

Galveston, Texas: on the morning of the 13th the barometer was low, and continued falling all day, with brisk east winds. At 11.15 p. m. a gale of twenty-seven miles per hour set in and continued, gradually increasing in force. At 5.50 a. m. of the 14th the gale had attained its maximum velocity of fifty

VIII.—The reports received from the West Indies show that severe gales occurred south of Cuba and west of Jamaica on the 19th, but these reports are not sufficient to justify the extension of the track of this storm south of the twenty-fifth parallel, where it was probably central, near the eighty-seventh meridian, on the morning of the 20th. This storm moved directly northward over western Florida, causing a

severe southerly gale at Key West and Cedar Keys, and dangerous easterly winds along the south Atlantic coast on the 20th, 21st, and 22d. It moved over the south Atlantic states, inclining slightly to the eastward, and passed off the middle Atlantic coast, attended by dangerous winds south of New York. After reaching the New Jersey coast the storm apparently decreased in energy and the direction of movement changed to the eastward. It was last marked as central south of Long Island, near the fortieth parallel.

The Signal Service observer at Cedar Keys, Florida, reports as follows:

At 8.35 p. m. of the 20th a heavy rain storm, accompanied by violent east and northeast winds, prevailed at this place, and continued with considerable energy all night. The wind came in squalls, blowing at times during the night at the rate of seventy-five to ninety miles per hour, shaking the strongest houses in the town and prostrating trees, telegraph poles, and signs. Between 10 and 11 p. m. the wind blew from the east sixty-eight miles per hour; this is the highest velocity ever recorded here, but owing to the direction from which it came but little damage was done.

The following information in regard to this storm has been obtained from Cuban newspapers forwarded to this office by the Rev. Benito Viñes, Director of the Belin College Observatory, Havana, Cuba:

HAVANA, CUBA, June 21, 1886.—The heavy rain storm which prevailed during the last few days began on the 17th and 18th, in the immediate vicinity of the Yucatan Canal and in the adjacent portion east of the Gulf, where it remained about stationary during four consecutive days. The rains were copious and persistent from the central part of the island to Cape San Antonio, on the coast of Yucatan, and in the Gulf States. The rain caused heavy floods, and various localities were inundated.—*Diario de la Marine*, June 21, 1886.

Rev. Benito Viñes, of the Belin College Observatory, also furnishes the following:

HAVANA, June 28, 1886.—The heavy rain which fell in Vuelta Abajo from June 17th to June 24th has been unexampled in Havana during the month of June for the last twenty-nine years.

XI.—This storm approached the east Gulf coast during the 30th, attended by severe gales and heavy rains. The reports received from vessels and from stations in the West Indies indicate that it existed to the south of Cuba on the 27th and 28th, and that it passed northward, probably crossing the twenty-fifth parallel near the eighty-ninth meridian on the 29th. The track of the centre of this storm is approximately given on chart i.

Rev. Benito Viñes, director of the Belin College Observatory, Havana, Cuba, has collected, and forwarded to the Chief Signal Officer, information relative to this storm, as follows:

Immediately after the 26th the barometer rose to an extraordinary height, indicating the approach of a cyclonic disturbance. On the 27th the disturbance, it seems, had existed in the sea south of the island, and during that and the succeeding day it came rapidly upon us, through the third quadrant, with heavy squalls, from the east and southeast, in the central and western provinces of the island. On the 29th the cyclonic disturbance probably crossed to the extreme west of the island.

According to a dispatch received from the mayor of Batabano, dated the

28th, 2.30 p. m., a very heavy wind from the southeast prevailed at that place, causing some damage to boats in the harbor.

The commanding officer of Fort San Fernando states that during the 28th the American schooner "Siggal" was lost and two sailors drowned: the remainder of the crew (seven in number) were saved and cared for at Fort San Fernando.

"The Guojiro of Sancti Spiritus" states that on Wednesday, June 30th, Capt. Charles W. Hunter arrived in the port at Tunas and made the following statement: Sailed with the English schooner "Daizy," the 26th; on the evening of the same date, in lat. 19° 34', long. 79° 10', the wind was from the east; at 10 a. m. the day following, being west of Jamaica, the hurricane was at its greatest force and the sea very high. On Monday the wind calmed.

The "Diario de la Marine" (published at Havana), of June 30, 1886, contained an extract from the "El Diario de Cienfuegos," of June 28th, as follows:

At 8 o'clock this morning heavy gusts of wind from the southeast prevailed; the wind, which was moderate in force during the first hours, increased in force up to 2 p. m., blowing from the same quarter. The "El Gloria" which sailed this morning at 10 o'clock for Trinidad, arrived there at 1.30 p. m. Captain Muniategui states that the wind was very severe and the sea high. The barometer was very high and remained stationary for twenty-four hours.

The following observations made at Coloma, Cuba, by Manuel Yago, Adjutant of Marines, were also forwarded by Rev. B. Viñes:

Time of observation.	Barometer.		Temperature.		Wind.		Sky.	Horizon.	Weather.
	Inches.	Millimetres.	Fahrenheit.	Centigrade.	Force, 0-10.	Direction.			
28th, 5 p. m. ...	30.12	765.0	75.8	26.0	6	n.	cs.	Covered..	Heavy squalls.
6 p. m. ...	29.02	760.0	75.2	24.0	6	n.w.	ks.	Covered..	Heavy squalls.
7 p. m. ...	29.80	757.0	71.6	22.0	9	n.w.	ks.	Covered..	Heavy rain squalls.
8 p. m. ...	29.63	752.5	75.2	24.0	9	w., sw.	ks.	Covered..	Heavy squalls.
9 p. m. ...	29.49	749.0	71.6	22.0	8	w.	ks.	Covered..	Heavy squalls.
10 p. m. ...	29.57	751.0	73.4	23.0	9	sw.	ks.	Covered..	Heavy squalls.
11 p. m. ...	29.92	760.0	75.2	24.0	10	ssw.	ks.	Covered..	Heavy squalls.
12 p. m. ...	30.04	763.0	77.0	25.0	10	s.	ks.	Covered..	Heavy squalls.
29th, 1 a. m. ...	30.04	763.0	77.0	25.0	6	s.	ks.	Covered..	Heavy squalls.
2 a. m. ...	30.04	763.0	77.0	25.0	9	ssw.	ks.	Covered..	Heavy squalls.
3 a. m. ...	30.04	763.0	77.0	25.0	7	sse.	ks.	Covered..	Heavy squalls.
4 a. m. ...	30.04	763.0	77.0	25.0	6	se.	n.	.....	Clear in 2d quadrant.
5 a. m. ...	30.04	763.0	77.0	25.0	5	se.	cs.	.....	Clear in 2d and 3d quadrants; thunder.
6 a. m. ...	30.04	763.0	77.0	25.0	5	se.	cs.	.....	Clear in 2d, 3d, and 4th quadrants.
7 a. m. ...	30.08	764.0	75.2	24.0	5	se.	cs.	Clear....	Clearing.
8 a. m. ...	30.12	765.0	75.2	24.0	5	se.	ck.	Clear....	Clearing.
9 a. m. ...	30.08	764.0	75.2	24.0	5	se.	ck.	Clear....	Clearing.

The following notes indicate the severity of this storm during its passage over the Florida Peninsula:

Tallahassee, Florida: on the 30th a disastrous gale occurred at this place and over the adjacent country. Rain began to fall about 4.00 a. m. and continued until midday, with occasional gusts of wind; about 12 m. a violent southeast gale set in accompanied by heavy rain, which continued until after 6 p. m. It is estimated that the wind blew at the rate of eighty miles per hour. The damage to this town, mostly to roofs, fences, windows, and shrubbery, was not very great, but considerable damage was done to crops in the country; at Ocklockonee, eight miles west of Tallahassee, two large lumber sheds and a mill were demolished; fences were blown down and corn broken off. Little River Bridge on the Mobile and Pensacola Railroad was partly undermined. In Jefferson county four houses were blown down and one man was killed.

Cedar Keys, Florida: during the afternoon of the 30th the wind blew hard from the east-northeast, and increased steadily in velocity until 10.30 p. m., when it veered to the east and attained the velocity of a high gale, and continued blowing with great energy during the night. The damage done by the storm was light, the display of cautionary signals causing the few vessels in harbor to take extra precautions. Some injury to roads was done by high tides, and one warehouse was blown from its foundation.

Appalachicola, Florida: a very heavy gale of almost hurricane force occurred here on the 30th. About 10 a. m. the wind commenced to blow a light gale from the southeast, and by 1 p. m. it had increased to seventy miles per hour; at 4.30 p. m. there was a lull in the storm and the wind suddenly changed from the southeast to the opposite direction, and blew with great force, unroofing houses, throwing down smoke-stacks, and destroying frame structures. The greatest damage was done to shipping in the bay; several vessels were capsized, some were sunk, and nearly every one in the harbor was more or less injured; several lives were lost. Along the river above Appalachicola large trees were blown down, corn broken off; and crops generally were greatly damaged.

Savannah, Georgia: during the afternoon and night of the 30th a very heavy gale and rain prevailed over southern Georgia. It was very destructive to corn and cotton crops and fencing throughout the country. The fol-

Following note, relative to this storm, is from the "Georgia Crop Report" of July, 1886:

"A destructive wind storm, with heavy rain, occurred on the 30th of June in east and southwest Georgia, doing great damage to crops. The storm passed over Washington, Twiggs, Brooks, Thomas, and Dougherty counties, covering in its track the width of several counties in the extreme northwestern part of the state."

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VII.—The development of this area was first observed on the morning of the 18th in the Gulf of Mexico, and approximately located as having the centre of disturbance about one hundred and fifty miles south of Pensacola, Florida. It moved eastward slowly on that date and the morning map of the 19th showed it central over Jacksonville, Florida. Brisk to high southerly winds prevailed at Key West on the 18th and 19th, with light rains extending from Key West to South Carolina. It moved slowly along the coast, attended with light rains, but apparently decreasing in energy after leaving the Gulf, and disappeared into the Atlantic off the coast of Virginia on the 20th.

The following extracts, relative to this storm, have been obtained from Cuban newspapers forwarded to this office by the Rev. Benito Viñes, director of the Belen College Observatory, Havana, Cuba :

HAVANA, *July 13, 1886.*—Since the day before yesterday there have been indications of a cyclonic disturbance in the South Sea; it passed from the second to the third quadrant, and will pass us by the west. The storm has also been indicated in the higher regions by faint solar and lunar halos.

HAVANA, *July 16, 1886.*—The cyclonic disturbance which I mentioned in my last communication, after having advanced slowly by the west, has passed us by the fourth quadrant, and is probably at present advancing in a northeasterly direction, and will penetrate the United States by entering at Mobile and Key West. The slowness by which the phenomenon has been characterized, induces me to suspect that the storm has made a recurve to the west of the island, where it will remain but a very short time. To-day, copious rains have fallen in Vuelta-Abajo.

HAVANA, *July 17, 1886.*—The thunder in the southwest, west, and north-

west, which has prevailed during the day, is usually followed by a storm in the south, the influence of which commences to be felt at present in the United States, where precautionary dispatches were sent during the 13th, 15th, and 16th. Since this morning no dispatch has been received from the province of Pinar del Rio, there having been heavy thunder and squalls in the south-west and west, where the storm seems to be far more severe than at Havana.

The following dispatches were received by the Rev. Benito Viñes, during the prevalence of the storm:

Pinar del Rio, July 16th, 9 a. m.: cloudy; copious rains from 7.30 to 8.30 a. m.

Consolacion del Sur, July 16th: at 4.27, aneroid, 29.92 (760.0 mm.); thermometer, 76°.1 Fahr. (24°.5 Cent.); wind sw., in general threatening and heavy squalls from the w.

MENÉNDEZ.

Consolacion del Sur, July 16th, 8.30 a. m.: notable and rapid fall; aneroid, 29.87 (758.8 mm.); 78°.8 Fahr. (26° Cent.); very threatening; raining in the sw.; weather squally.

MENÉNDEZ.

Mantua, July 16th, 8 a. m.: aneroid barometer, — (— mm.); thermometer, 84°.2 Fahr. (29° Cent.); clouds low, with violent gale in the west; the sea agitated; the storm commences to be felt; wind variable from the se.

Coloma, July 17th, 8 a. m.: aneroid barometer, 30.12 (765.0 mm.); thermometer, 71°.6 Fahr. (22° Cent.); winds se., fresh; direction of the lower clouds nw.; sea smooth.

Pinar del Rio, July 17th, 8.30 a. m.: the weather continues cloudy and rainy.

Consolacion del Sur, July 17th, 8 a. m.: aneroid barometer, 29.96 (761.0 mm.); thermometer, 75°.2 Fahr. (24° Cent.); winds sw.; it rains since yesterday, without interruption, from sw. and s.; very gloomy; thunder from the sw. and s.

MENÉNDEZ.

Mantua, July 17th, 8 a. m.: since 8 o'clock yesterday morning the weather has been close, although it continues to rain at this hour; wind from e. to w., velocity, 20 metres; copious rains; horizon cloudy; barometer, — (— mm.); thermometer, 95°.0 Fahr. (35° Cent.); light thunder; direction steady from 10 to 15 minutes at a time. At 10 a. m. the same.

Mantua, July 18th, 8 a. m.: barometer, — (— mm.); thermometer, 62°.6 Fahr. (17° Cent.); horizon obscure; no wind.

Coloma, July 18th, 8 a. m.: aneroid barometer, 30.12 (765.0 mm.); thermometer, 78°.8 Fahr. (26° Cent.); wind force, 6; direction of lower clouds, n.

Pinar del Rio, 18th, 9 a. m.: at 3 a. m., surrounded by water; severe hurricane with copious rains; at this hour the weather has moderated.

Consolacion del Sur, July 18th, 8 a. m.: aneroid barometer, 29.96 (761.0 mm.); thermometer, 78°.8 Fahr. (26°.0 Cent.); wind se.; gloomy; raining from the sw.

MENÉNDEZ.

Consolacion del Sur, July 18th, 6 p. m.: barometer, 29.96 (761.0 mm.); thermometer, 78°.8 Fahr. (26°.0 Cent.); very threatening the whole day; continuous squalls w. and sw.

Bahia Honda, July 17th, 8 a. m.: wind se., slack; covered with water; aneroid barometer, 30.08 (764.0 mm.).

Bahia, Honda, July 18th, 8 a. m.: atmosphere clear; winds fresh; aneroid barometer, 30.12 (765.0 mm.).

Cienfuegas, July 18th, 8 a. m.: barometer, 30.06 (763.5 mm.); thermometer, 83° Fahr. (28°.3 Cent.); sky covered; wind fresh, s.; sea calm.

Cardenas, July 17th, 8 a. m.: wind in the south, calm; sea smooth; barometer, 30.12 (765.0 mm.); thermometer, 79° Fahr. (26°.1 Cent.); the aspect gloomy.

Cardenas, July 18th, 9.30 a. m.: weather squally; wind south, calming; sea smooth; barometer, 30.12 (765.0 mm.); thermometer, 81° Fahr. (27°.2 Cent.).

M. NEBOT.

Consolacion del Sur, July 19th, 10 a. m.: aneroid barometer, 30.12 (765.0 mm.); thermometer, 78°.8 Fahr. (26° Cent.); wind very variable from the third to the fourth quadrant; very threatening, persisting wind, sw. and s.; continuous squalls, tenaciously from the sw.; the rivers overflow.

The following dispatch was received from Batabano:

Batabano, July 17th, 10.45 a. m.: barometer has a tendency to fall; strong wind ese. and variable; heavy sea swell; gloomy; rain continues; thunder; dark.

It is to be noted that the cyclonic disturbances of June and July have all, up to the present time, passed by the south and west of the island to the fourth quadrant, attacking the United States by the Gulf States, as can be seen on the daily "weather maps," published by the Signal Service at Washington, the tracks of these storms seems to follow those of the October hurricanes.

The following is an extract from the "New York Herald" of July 19, 1886:

KEY WEST, FLORIDA, July 18, 1886. — The effects of the gale, which evidently passed to the westward from this place, have been severely felt during past twenty-four hours. A strong southerly wind which prevailed during the night shifted to southwest to-day, and obtained a velocity of fifty-two miles an hour, and was accompanied by spiteful rain squalls. The barometer fell dur-

ing the night to 29.87. It rose this morning, but became depressed again during the afternoon. Two steamers which should have sailed this morning are still weather-bound to-night. Shipping sustained no damage.

VIII.—The first indication of this depression is given by the steamship "San Marcos," of the Mallory Line, which plies between New York City and Galveston, Texas. This steamer left the latter port on the 18th. On the following day, in 27° 55' N., 91° 22' W., the following observation was made: barometer, 29.84; temperature, 84°; wind, east; force, 6; frequent squalls with very heavy southeast swell. Owing to the rough weather very little headway was made, so that on the 20th the ship was in 27° 23' N., 89° 21' W., where the barometer read 29.92, temperature 84°, wind southeast by east, force 4; frequent squalls with long east-southeast swell.

On the morning of the 19th the winds at stations on the west Gulf coast had shifted to northerly and increased from light to brisk. By midnight the wind fell to a dead calm at Galveston, Texas, but increased to forty miles per hour from the northeast at Indianola, Texas, where the barometer registered 29.76, a fall of .09 since 7 a. m. At Brownsville, Texas, the barometer read 29.69, a fall of .15 since 7 a. m. At the expiration of the next eight hours the barometer fell to 28.89 at Indianola, Texas, a change of .87, wind northeast, seventy-two miles. The building occupied by the observer was crushed to pieces, causing the death of the latter. The whole town was given over to the fury of the elements, and not a building was left standing when the storm cleared away.

While the storm was thus raging at Indianola (7 a. m. of the 20th), the surrounding stations rendered the following reports: Galveston, barometer, 29.67; wind, northeast; forty-nine miles; clear; maximum velocity since midnight, fifty-three miles. Brownsville, barometer, 29.63; temperature, 78°; wind, northwest; eight miles; fair. Rio Grande City, barometer, 29.71; thermometer, 77°; wind, northwest; eight miles; cloudy. San Antonio, barometer, 29.69; temperature, 79°; wind, northeast; twenty miles; cloudy.

The storm had now left the Gulf and was moving northward over Texas, in the direction of San Antonio, at which place by 11.30 a. m. (20th) the wind increased to a gale from the northeast and the barometer fell to 28.74, a change of .95 since 7 a. m. At 12.30 p. m. the barometer read 28.59; at 1.30 p. m., 28.35; at 2.30 p. m., 28.03, and at 2.40 p. m., when shortly after the building was nearly destroyed, the barometer read 28.02, and the velocity of the wind was estimated at over eighty miles per hour. The storm passed away with southeasterly winds. No lives were lost in San Antonio, but property was damaged to the extent of about \$60,000.

At 3 p. m., while the storm-centre was over San Antonio, the following observations were made at surrounding stations: Galveston, east of storm-centre, barometer 29.81, or +0.14 inch in eight hours; temperature, 77°; wind, southeast, thirty miles; raining; the maximum in past eight hours being fifty miles. Brownsville, southeast of centre, barometer, 29.69, +0.06 inch in eight hours; temperature, 91°; wind, south, twelve miles; cloudy. Rio Grande City, south of centre, barometer, 29.70, -0.01 inch; temperature, 98°; wind, northwest, six miles; fair. Palestine, northeast of centre, barometer, 29.88, -0.01 inch; temperature, 81°; wind, east, eleven miles; threatening. Abilene, northwest of centre, barometer, 29.86, -0.04 inch; temperature, 82°; wind, east, eighteen miles; cloudy. Fort Davis, west of centre, barometer, 29.80, -0.06 inch; temperature, 85°; wind, north, sixteen miles; cloudy. El Paso, west of centre, barometer, 29.77, -0.07 inch; temperature, 92°; wind, east-northeast, light; clear.

By 10 p. m. of the 20th the barometer had risen 1.06 at San Antonio, wind southeast, brisk, cloudy. At other stations to the eastward the increase in pressure ranged from .05 to .11,

while to the westward the fall ranged from .02 to .10, with threatening weather and rain, the greatest change taking place at Abilene, located due northwest of San Antonio, where the wind had shifted to northerly and increased in velocity from eighteen to thirty-seven miles per hour.

By morning of the 21st the barometer had risen decidedly at all stations throughout Texas, the greatest change taking place at Abilene, near the centre of the state, where the rise in the past eight hours was .24. In the next eight hours a decided fall had taken place in west Texas and southeastern New Mexico, the circulation and the increased velocity of the winds, together with the precipitation, indicating the presence of the depression, which by this time was rapidly diminishing in energy. From the afternoon of the 21st to morning of the 22d heavy rains and high winds prevailed in the Panhandle of Texas and eastern New Mexico. The depression now rapidly filled up and entirely disappeared during the 22d. During its passage through Texas the depression was accompanied by violent local storms in the central and northern portions of the state.

The following notes from Signal Service observers and other sources will serve to show the severity of this storm:

Galveston, Texas: the storm which prevailed here during the night of the 19th and morning of the 20th was even more destructive to life and property than the noted storms of 1867 and 1875. The following description of this storm is furnished by the observer at Galveston:

During the 19th the barometer fell quite rapidly but did not get dangerously low, standing at 29.78 at 10 p. m. The lowest noted during the storm was at 7 a. m. of the 20th, 29.67, at which time it began rising and went up even more rapidly than it fell.

On the 19th the wind was from the northeast and east, attaining a storm velocity of twenty-seven miles per hour at 2.10 p. m., then lulling awhile it again set in with renewed violence, attaining a maximum velocity of fifty-three miles from the northeast at 6.40 a. m. of the 20th, after which it decreased very slowly in velocity, the gale ending at 10.45 p. m. On the morning of the 20th the wind backed to east and southeast, continuing brisk until 3 p. m. of the 21st. The weather was fair to cloudy on the 19th, with rain from 10.25 to 11.05 p. m. Rain again began during the night and continued, with varying intervals of cessation, until 10.10 p. m. of the 20th. The wind of the 19th caused the water in the Gulf to become very high, and the cars of the street railroads stopped running about 7 p. m. The water continued to increase in depth, reaching its maximum, four to six feet, at 7 a. m. of the 20th, and remained nearly stationary until 9 a. m., when it rapidly subsided.

The high tide in the Gulf led many to expect an overflow and to prepare for it. Few persons slept that night, and when their fears were realized by the water reaching yards, and then entering houses, the inhabitants set out for places of safety, some in boats and others in hastily constructed rafts. Daylight found the water running in streams across the island from the Gulf of Mexico to Galveston Bay, carrying with it the debris of fences, houses, trees, clothing, furniture, etc. During the storm more than one hundred and sixty houses were more or less damaged, some carried away; a large building used as a skating rink was demolished, loss \$5,000; as were also the surf bath-houses, the Mexican Cable Company's building, and a large building called the Pagoda. The Texas-Mexican and street railroad lines were badly damaged; the tracks of the Santa Fé and Missouri Pacific Railroads were washed out at their approaches to the bridge, and on the mainland several miles of track were washed out or otherwise badly damaged. No telegraph connection could be made until late in the afternoon of the 20th. Many of the telephone wires in the city were broken, and the lines of the fire-alarm system disordered. The schooner "Livonia Perkins," forty tons, engaged in the lumber trade, was capsized at 9 p. m. of the 19th and two men were drowned. The schooner "S. W. Perry" was wrecked and two men drowned. The schooner "Ella Elliott" was stranded and wrecked, loss \$30,000, besides cargo of ice. Numerous other smaller vessels and yachts were capsized and otherwise damaged. The entire loss of property is estimated at \$150,000. No trains arrived or left the city from the night of the 19th until 9 p. m. of the 21st.

Indianola, Texas: during the afternoon of the 19th the weather was threatening and the wind strong from the northeast; at 8 p. m. the wind moderated somewhat, but soon rose again, becoming strong enough at 9 p. m. to cause some alarm. From that time the force of the wind gradually increased, veering slightly, and about daylight the water in the bay commenced to rise rapidly; at this time the wind was blowing at the rate of seventy-two miles per hour and the Signal Office building gave way; in attempting to escape, the observer, I. A. Reed, was killed by falling timber. A lamp in the office set fire to the building and, although rain was falling heavily, it was burned, and also more than a block of buildings on both sides of the street. Shortly after daylight the wind grew stronger, blowing from the east; about 5 a. m. of the 20th most of the damage to property was done. Houses were falling and floating from their foundations, and the people were crowded together in such places as were considered most secure, unable to do anything to save their property. More than

twenty lives were lost at Indianola, and it is believed that the number would have been much larger but for the fact that the worst of the storm did not come until after daylight. About 11 a. m. the wind had moderated perceptibly and by night was only a light south breeze. The water receded very slowly, however, and it was not until the afternoon of the 22d that the main street was free from water. The appearance of the town after the storm was one of universal wreck. Not a house remained uninjured, and most of those that were left standing were in an unsafe condition. Many were washed away completely and scattered over the plains back of the town; others were lifted from their foundations and moved bodily over considerable distances. Nearly three miles of the Gulf, Western Texas, and Pacific railroad track were torn up and scattered on the prairie. Over all this strip of low ground, as far as could be seen, were the wrecks of houses, carriages, personal property of all kinds, and a great many dead animals. Very few people were able to save anything whatever, and as the houses which were left were scarcely habitable the town was deserted as fast as possible.

San Antonio, Texas: the morning of the 20th opened with light rain and brisk northeasterly winds. Light rain continued until 9 a. m., when high northerly wind and heavy rain set in; the wind gradually increased in force until shortly after 11 p. m. it had attained the velocity of a gale, unroofing several buildings, including the signal station; with the latter roof, the anemometer and wind vane were carried away. The wind attained its highest velocity at 2 p. m.; estimated velocity eighty miles per hour. Much damage was done in this town and vicinity by the violence of the wind; the quartermaster's corral was completely demolished, and a considerable quantity of grain and hay destroyed. All telegraph and telephone communication was cut off. Small hail-stones fell from 2 to 2.15 p. m.; amount of rainfall 4.40 inches. After the centre of the storm had passed the wind backed to northeast, east, and southeast, where it remained stationary during the afternoon and evening.

Corpus Christi, Texas: a hurricane passed over this place on the night of the 19-20th, doing much damage to property. Four buildings, including a church, were destroyed, and telegraph communication was completely cut off. At Luling the storm commenced about daylight, and was accompanied by unusually heavy rain. Several houses were destroyed, numerous trees were blown down, and cotton was stripped from the stalk and blown over the fields. At Beeville many houses in course of construction were demolished, and numerous other buildings unroofed or otherwise injured.

Abilene, Texas: the morning of the 20th opened with cloudy weather and gentle wind from the south; during the day the wind increased in force, attaining at night a velocity of thirty-three miles per hour, and backing to the northeast. Rain began falling at 7.20 p. m. During the early morning of the 21st the wind veered from northeast to southeast and continued blowing a gale, reaching a maximum velocity of forty-eight miles per hour about 4 a. m., after which it began to subside, at the same time veering toward the southwest. Only slight damage was done by the storm.

Seguin, Guadalupe county, Texas: at 6.30 a. m. of the 20th rain began falling, with light wind from the north. At 8 a. m. the wind began to increase in force, shifting to the northeast at 10 a. m., and continuing to increase in velocity until, from 11 a. m. to 1 p. m., it blew at the estimated rate of eighty-five miles per hour. A number of buildings and trees were blown down and numerous dwellings unroofed. Moderate rain fell during the storm, but no thunder or lightning occurred.

Houston, Texas: the storm of the 19th and 20th began here about 7 p. m. of the 19th and continued to increase in violence during the night. Rain began falling at 11 p. m. At 9 p. m. the wind reached its greatest velocity, breaking numerous trees, but doing no damage to buildings. The water in Buffalo Bayou was higher than ever known before, being forced up by the high water of the Gulf.

Victoria, Victoria county, Texas: a very severe storm prevailed here at 5 a. m. of the 20th. The wind blew with hurricane force, and much property was destroyed. Forty buildings, including six churches, were completely destroyed. The estimated value of the property destroyed in the town and county is \$100,000.

Cuero, De Witt county, Texas: a severe storm of wind and rain prevailed here between 5 and 11.30 a. m. of the 20th. Numerous buildings were wrecked and property of all kinds damaged.

6.—This was a cyclone of tropical origin, and was first reported to the eastward of the Barbadoes, under date of the 15th. Passing westward through the Caribbean Sea to about N. 14°, W. 76° by noon (Greenwich mean time) of the 19th the storm-area circled to the northwest and passed north over Cuba, in about W. 81°, during the 22d; it then moved north-eastward along the track of the Gulf Stream, and united with depression number 12 northeast of Newfoundland on the 28th. This storm was particularly severe, causing loss of life, and destroying crops and property of immense aggregate value.

The following reports illustrate its general character:

Captain Locke, of the s. s. "Muriel," from the Barbadoes, states that a severe cyclone was experienced at Saint Vincent on the 16th, doing much damage; estimated width twenty to thirty miles. It passed over the island from northeast to sw., the whole of the southern part of the island being laid waste. A number of people were killed and many injured. A steamship from Europe reported a hurricane, lasting eight hours, on the night of the 15th, ninety miles northeast of the Barbadoes.

The bark "Kestrel," in N. 12° 40', W. 69° 30', had a heavy gale, lasting four hours, during which sails were lost and split, cabin windows stove in, and cabin flooded; lowest barometer 28.90 (734.0). On the 17th a heavy gale from the west, veering to southeast, passed over Curacoa, causing much damage on the island.

Capt. T. M. MacKnight, commanding the s. s. "Claribel," makes the following report: "Laying in Morant Bay, inside reefs, August 19th, 8 a. m.; barometer 29.76 (755.9), and gradu-

ally falling. Several indications of a hurricane were absent until 11 p. m., when barometer was 29.48 (748.8), and falling; made all preparations for standing to sea, when the wind shifted from 11 p. m. of 19th to 1.50 a. m. of 20th, and increased, blowing a terrific hurricane as the centre passed to the southward; barometer at 1.30 a. m., 28.86 (733.0); 2.30 a. m., barometer 29.16 (740.7), with wind hauling rapidly to se.; 3.30 a. m., barometer 29.36 (745.7), with tremendous sea running dead on to the land. Having swung clear of the reef, with seas breaking all around the ship, weighed both anchors at once and steamed out full speed, with wind force 11; at 4.30 a. m. was well clear of broken water and stood to southward until 9 a. m., when barometer stood 29.66 (753.4), then bore away for Kingston. The red sunsets and sunrise were absent previous to this storm, as also were the feathery cirrus until the very last. The nimbus clouds were well defined and the scud flew in true horizontal lines; the cirro-stratus clouds converged at one time to the centre, but were lost as the centre approached. I calculate that the centre must have passed one hundred and twenty miles from our position, and I think the storm was one of large diameter. During the height of the storm I had two anchors down, and, steaming at full speed, did not drive at all. At commencement of storm wind set in from ne., changing to ene., e., se., and s. Lowest barometer, 28.86 (733.0), at 1.50 a. m. of the 20th; force of gale, at its height, over 12."

Captain Shackford, commanding the s. s. "Newport," reports: "Experienced a storm of unusual severity on the 19th, soon after leaving the island of Navassa. During the afternoon the sea grew rough and rain fell in torrents, while a strong wind from the northeast increased to a gale. About 6 p. m. the steamer rolled and pitched at a fearful rate. At 8 p. m. the barometer continued to fall and the vessel was headed to the eastward, away from the vortex of the storm, which by that hour had developed all the symptoms of a well-defined cyclone. The wind had increased to a hurricane and the seas were fearful. Before morning the storm-centre had passed to the westward and northward, and the ship again laid her course for Colon."

The s. s. "Alvo," Captain Williams, commanding, August 19th and 20th, at Navassa, had a heavy blow from sw. The s. s. "City of Para," Capt. Frederick Henderson, commanding, experienced a strong gale, force 9, commencing in a. m. of the 19th, and continuing until the p. m. of the 20th; wind set in from ne., backing to nw., w., sw., s., se., ese., during, and continuing easterly after the passage of the depression; lowest barometer, 29.40 (746.7), at 1.30 p. m. of the 19th, when in N. 15° 36', W. 75° 52'. A heavy ne. swell continued from the 19th to 23d. Advices from Jamaica state that during the hurricane of the 19th the entire pimento crop was blown off the trees, nearly all the coffee crop for this year destroyed, several parishes of the island denuded of trees, banana plantations destroyed, and ships in the harbor of Kingston damaged.

The s. s. "Ailsa," Capt. J. W. Sansom, commanding, had a whole gale to hurricane on the 19th and 20th; from ene. veering to sse.; lowest barometer, 29.48 (748.8), at 4 a. m. of the 20th, in N. 18° 35', W. 76° 20'. On the 23d, in N. 25° 0', W. 74° 0', had a fresh gale from se., with very confused sea; barometer oscillated between 29.72 (754.9) and 29.80 (756.9) in the space of fifteen minutes; heavy mass of clouds to the westward, and scud flying from s.; had every appearance of a hurricane to the westward travelling to northward.

August 20th a cyclone passed near Montego Bay, Jamaica. Wind set in from ene., with rain-squalls, shifting to une., n., nw., and wsw.; lowest barometer, 29.61 (752.1), at 10 a. m.; greatest wind force from nw. from 9.30 to 10.30 a. m. On the 17th the lower clouds were moving to a cyclone north of Sanago; the upper were moving to the cyclone coming. On the 18th the cirrus from n. or ne. indicated a disturbance. This cyclone caused much injury to property and crops on the island.

A hurricane swept over the island of New Providence on the

night of the 22d. The gale was from the southeast and blew with great violence for several hours. A number of houses were blown down and many damaged. Sailing vessels dragged their anchors and went ashore or were driven over the bar and out to sea. Reports from the Berry Islands and Andros state that the storm there was very heavy, and that many sponging and fishing vessels were wrecked. Some loss of life is also reported.

The bark "Flash Light," Captain Dexter, commanding, on the 24th, in N. 34°, W. 74°, had a hurricane from se., veering to w., blowing with terrific fury; considerable damage caused to vessel. On the same date the schooner "Gertie M. Ricker-son," Captain Anderson, commanding, in N. 34°, W. 73°, took a hurricane from sse. to sw. and w., lasting eight hours. The bark "J. B. Newcombe," Capt. J. B. Newcombe, commanding, on the 24th and 25th, in N. 36°, W. 72° (at 3.30 a. m. of the 25th), had a terrific hurricane from sse. to w., lasting twenty-four hours. The bark "Mohican," Capt. B. F. Berry, commanding, in N. 37° 10', W. 71° 24' (at 6 a. m. of the 25th), had a whole gale from sse. to wsw. The s. s. "Canada," in N. 40° 28', W. 67° 12' (at 12 midnight of the 25th), had a gale from e., backing to n., with very heavy rain; lowest barometer 29.44 (747.8).

The schooner "L. A. Plummer," Capt. Ezra Howes, commanding, on the 25th, in N. 40° 50', W. 69° 10' (at 8 p. m.), had a hurricane from ene., backing to nw. The ship "Emily F. Whitney," Captain Rollins, commanding, on the 25th, in N. 39° 48', W. 69° 15' (at noon), had a hurricane from se., commencing at 10 p. m., with heavy seas; vessel shipped large quantities of water; hurricane continued on the 26th in N. 39° 29', W. 69° 51' (at noon), backing to e., ne., and nw., and moderated at 6 p. m.; barometer at noon of the 26th was 29.85 (758.2). The bark "Benj. F. Hunt, jr.," Capt. J. N. Pritchard, commanding, on the 25th, in N. 34° 22', W. 69° 48' (at noon), had a terrific gale from s., commencing at 10 p. m., and continued on the 26th, the wind shifting to w. and nw., and moderating after 4 p. m. The bark "John H. Pearson" had a heavy gale from e., backing to n. on the 25th, in N. 40° 40', W. 68° 20'.

Capt. William Cassidy, commanding the bark "Harvester," reports: "August 25th, in N. 40° 33', W. 66° 08' (at noon), at 7 p. m., strong south breeze with very heavy thunder and lightning and rain; wind shifted to se.; wore ship on starboard tack, expecting a hurricane. 26th, at 9 a. m., gale increased; wind se., with a heavy sea, also a heavy sea coming up from the wsw., and breaking; at 1 p. m. the wind increased to hurricane force, with a very heavy sea, wsw., breaking. I thought it would drive the stern in; got two oil bags over which smoothed the sea to dead swell, and which I believe was the means of saving the ship. The hurricane lasted about eight hours, gradually drawing to the westward and from there to nw. in a strong gale, decreasing in violence. The lowest barometer reached was 29.20 (741.7). The s. s. "Camellia," Captain Buck, commanding, on the 25th, in N. 39° 20', W. 69° 42', had a very strong ene. gale shifting to n., and lasting from noon until 8 p. m.; barometer 29.48 (748.8); heavy squalls of wind and rain, and heavy seas.

VII.—This is the only tropical storm that occurred during the month; the track is approximately traced northward along the west Gulf coast near the mouth of the Rio

Grande River. The records from Brownsville, Texas, show that easterly gales occurred during the night of the 22d, the barometer reaching a minimum of 29.15, and the wind a velocity of fifty miles from the northeast at the 11 p. m. report. The winds shifted to west through north, and a velocity of thirty-six miles, west, was reported at the 7 a. m. report of the 23d. The rainfall which occurred at Brownsville, Texas, during the prevalence of this storm from the 20th to 23d, amounted to 25.98 inches. The barometer rose rapidly as this storm moved over the land, and it was difficult to locate the centre of disturbance after it had reached the interior of Texas.

The following notes from Signal Service observers indicate the severity of this storm during its presence in Texas:

Galveston, Texas: light and heavy rain fell during the greater part of the 21st and 22d. At 1.20 p. m. of the 22d an easterly gale of twenty-seven miles per hour set in; heavy rain and gale continued throughout the night. Light rain fell during the 23d; at 11.35 p. m. a southerly gale set in and continued until 9.40 a. m. of the 24th; maximum velocity thirty-four miles per hour. At Corpus Christi the storm was more severe than at Galveston; at 3 p. m. of the 24th the gale attained a velocity of sixty-eight miles per hour from the northeast, and was accompanied by very heavy rain. The tide was very high, overflowing the lower portion of the town and carrying away thousands of ties from the Mexican-National and Aransas Pass railways.

Brownsville, Texas: on the 21st heavy rain set in at 12.18 a. m. and continued, with short intervals of light rain, all day; total rainfall in twenty-four hours 10.32 inches. During the night of the 21st-22d high easterly winds prevailed, attaining at 10 p. m. a velocity of twenty-four miles per hour. Light and heavy rain continued during the 22d; total amount for twenty-four hours 11.91 inches. Fresh and high easterly winds prevailed during the day. At 1.30 p. m. the barometer began falling rapidly, reading 29.54 inches at 3 p. m. and 29.15 inches at 11 p. m. During the afternoon the wind increased in force, attaining at 9.30 p. m. a velocity of sixty-eight miles per hour from the east. The easterly gale continued until 12.30 a. m. of the 23d, when the wind lulled and the barometer began to rise. At 2 a. m. the wind veered to west and began blowing hard, attaining between 3 and 9.45 a. m. the force of a gale; maximum velocity thirty-nine miles. The heavy rain ended at 7.48 a. m., but the sky remained overcast until 4.53 p. m., when it began to clear. The gale did considerable damage by blowing down trees, fences, and telegraph poles; much property was also destroyed by flood. During the four days that this storm prevailed, 20th, 21st, 22d, and 23d, 25.98 inches of rain fell.

the northern part of which filled the northern area of low pressure, previous to the 10th, and the 10th developed a well-marked trough.

IV.—This area was first observed in the Gulf of Mexico on the 8th, south of Cuba, and passed southward between Capes Catoche and San Antonio. The track of the storm-centre is as closely approximated as the rather meagre vessel reports would permit. It is the only tropical disturbance occurring during the month. On the 12th the centre of disturbance approached Galveston, Texas, where the barometer fell rapidly, and a high northwesterly gale set in, reaching a velocity of fifty-five miles per hour at 10.15 p. m. of that date. It then turned northward and on the 13th lost the marked energy which had hitherto characterized its motion. It filled up by gradual increase of pressure and was merged in the trough of low pressure which extended from Lake Superior to northern Louisiana. In this trough the most energetic disturbance of the month originated, and is herein described as number vi.

The following notes from Signal Service observers are of interest in connection with this storm:

Sanford, Florida: heavy rain began falling at 12.15 a. m. of the 10th and continued until 3.15 p. m. of the 11th; total precipitation, 4.24 inches. The barometer fell slowly during the 10th and rose on the 11th; brisk easterly winds prevailed on both days.

New Orleans, Louisiana: on the 11th a wind-storm from the east began at 8.15 p. m.; maximum velocity, thirty-eight miles per hour from the northeast at 11.35 p. m.; the high wind continued until 4.30 p. m. of the 12th. Considerable damage was done in the city and surrounding country by the high tide, causing numerous breaks in the navigation and drainage canals. In the Parish of Plaquemines, forty miles below the city, the waters from the Gulf were backed up over the rice fields for a distance of thirty-five miles inland. At the Mississippi quarantine station the storm was very severe, the wind blowing a northeasterly gale for thirty-six hours, causing a high tide which broke the levees and flooded many miles of rice plantations and orange groves.

Port Eads, Plaquemines parish, Louisiana: widespread damage was done by the storm of the 11th and 12th. The wind blew hard on the 10th, and by the morning of the 11th had increased in force, attaining at noon the velocity of a high gale. The water of the Gulf was very high on the 10th and continued to rise on the 11th until Port Eads and the surrounding country was completely submerged to a depth of two and one-half feet. On the east side of the river, between Point a la Hache and Port Eads, all crops were almost completely destroyed; the damage in this vicinity is estimated at \$200,000.

Galveston, Texas: the barometer fell slowly during the 11th and morning of the 12th, accompanied by brisk northeast winds. During the afternoon of the 12th the wind backed from the north to northwest, and increased in force, attaining at 10.15 p. m. a velocity of fifty-five miles per hour, at the same time the tide was very high and the lower part of the city overflowed although the usual effect of a northwest wind is to lower the water in the bay. After 11 p. m. the wind decreased in force, and at 7 a. m. of the 13th was blowing from the southwest at the rate of sixteen miles per hour. The only damage done at Galveston was to the smaller vessels, several of which were grounded.

13.—This depression is first charted in N. 25°, W. 67° on the 23d, although scattering vessel reports indicated the presence of a cyclonic disturbance in the vicinity of Hayti on the 22d. The storm moved northeastward during the 23d and 24th, after which its course cannot be traced, owing to an absence of reports.

The following reports show the character of this depression and the disturbances attending it:

Capt. A. Alexander, commanding the s. s. "L. & W. Armstrong," reports: "22d, in N. 21° 11', W. 64° 20' (at noon); at 22 hours, barometer falling slowly; heavy cloud bank lying low from se. to ssw.; noon, barometer 29.70 (754.4); wind sse., force 6. 23d, in N. 23° 50', W. 64° 54' (at noon); 3 hours, barometer 29.60 (751.8); wind force 6 to 7; sea rising, rain squalls; 5 hours, heavy rain squalls, with thunder and lightning; barometer falling slowly; wind force 7; sea high, but regular. 10 hours, barometer 29.51 (749.5); wind sse., force 7; heavy sea and squally. 12 hours, wind sse., force 7 to 8; heavy rain keeping the sea down; barometer 29.50 (749.3). 15 hours, barometer 29.40 (746.7); wind sse., force 8 to 9; sea high, but regular; 15 hours 20 minutes, after a very heavy rain squall, with thunder and lightning, the wind hauled to sw. after a few moments lull. We had been steering north, hoping to clear the storm-track; now we had to steer ne., finding the se. sea dangerous; at 16 hours 30 minutes, hove ship to on starboard tack; barometer 29.30 (744.2); 18 hours, slight breaking away of clouds to the eastward, a heavy, dark gray bank of clouds in the westward, extending from s. to wnw.; clear overhead; barometer rising; wind hauled to ssw. and w. and barometer rose slowly; sea going down, and wind decreasing."

A. L. Shaube, mate of the bark "Essex," Captain Hall, commanding, reports: "On the 23d, in N. 26° 17', W. 64° 58' (at noon), had a strong gale from ese., with rain and squalls; wind backed to ne. at 8 p. m., with heavy rain squalls, and moderated at midnight." H. O. Marshall, observer on the ship "Magellan," Capt. E. S. Manion, commanding, reports: "24th, in N. 27° 49', W. 62° 31', a heavy gale from e. to ne.; barometer 29.45 (748.0) to 29.80 (756.9); lightning all around the compass; gale lasted, with heavy rain and high sea, twenty-four hours."

Mate Oliver Anderson, of the bark "Lilian B. Jones," Capt. E. F. Petrie, commanding, reports: "October 25th, in N. 25° 31', W. 58° 7' (at noon); at 2 a. m. a brisk gale began from ssw.; increased at 1 p. m. to hard gale ssw., with heavy seas; hove ship to; 5 p. m., heavy squall struck ship and hove her on beam ends; hard gale continued, shifting to n. at 9 a. m. of 26th, in N. 25° 38', W. 58° 33' (at noon), and continued a brisk gale till midnight, then moderated; lowest barometer, 29.78 (756.4), at 4 p. m. of the 25th." Captain Arnold, of the s. s. "Yorkshire," experienced a strong gale from ne., backing to wsw. on the 24th, in N. 34° 27', W. 63° 0'.