

MONTHLY WEATHER REVIEW,

AUGUST, 1880.

(General Weather Service of the United States.)

WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

GENERAL ORDERS }

No. 63. }

HEADQUARTERS OF THE ARMY,

ADJUTANT GENERAL'S OFFICE,

Washington, August 24, 1880.

The Secretary of War is pained to announce to the Army the death of Brigadier General ALBERT J. MYER, Chief Signal Officer U. S. Army, which took place at Buffalo, New York, this morning.

Entering the Army in 1854 as an Assistant Surgeon on the Texas frontier, where vast stretches of plain offer great facility for communication by vision, General MYER's attention was early turned to the subject of signaling by sight, in which he has since achieved such remarkable success: establishing that branch of the military service, during the late war, on a basis of usefulness and importance that has proved of the greatest benefit and caused its knowledge to become an important part of education, not only for the Army but also for the Navy. The Army is also largely indebted to his efforts for its telegraphic communication with posts on the extreme frontier: five thousand miles of electric telegraph lines having been built under his supervision.

Assigned by the Secretary of War, under the act of February 9, 1870, to the duty of taking meteorological observations and giving public notice of the approach and force of storms, with the assistance of our extensive telegraph system, for the benefit of commerce, he brought to bear remarkable ability for organizing and perfecting this service, and making its usefulness felt, not only in every sea-port but in every hamlet of the land. In this comparatively unexplored field of science and usefulness, General MYER displayed the enterprise of practical investigation and study of meteorology, with the production of useful results which has made his name familiar to every one of his countrymen, and proved of incalculable benefit to various interests. These services have been highly appreciated both at home and in foreign countries. His perseverance, energy and tact, resulting in establishing a uniform international system of simultaneous meteorological observations, affords to the world the only full and satisfactory data extant for the study of meteorology. Struck down at the meridian of his usefulness, the country has lost a most distinguished and promising officer, and the Signal Service an able, efficient and zealous chief.

The officers of the Signal Corps and on duty therewith will wear the usual badge of mourning for thirty days.

BY COMMAND OF GENERAL SHERMAN:

R. C. DRUM,

Adjutant General.

✓ *Areas of Low Barometer.*—During the month sixteen areas of low pressure have occurred within the limits of the Signal Service maps, only ten of which have been sufficiently definite to permit of charting. No storm has been charted entirely across the country. The marked meteorological feature of the month has been the advent of three violent cyclonic storms, a most unusual number. No. V devastated the Texas coast at the mouth of the Rio Grande river, during the 12th and 13th. In its passage over the Gulf of Mexico, the steamer *San Salvador*, long over due, was probably lost. No. X during the 18th, passed over Jamaica, where it caused the loss of several lives and did immense damage to shipping, buildings, crops and other property. No. XVI, the cyclone in which the S. S. *City of Vera Cruz* was lost, moving eastward to the north of the Bahamas on the 28th, crossed northern Florida during the 29th and 30th. This storm strewed the Florida coast with wrecks and did great damage to property and growing crops. As far as has been noted the loss of life was confined to the crew and passengers of the S. S. *City of Vera Cruz*.

No. I.—was a continuation of area No. XII of the July Review. Central the morning of the 1st in Minnesota, at midnight it had reached the northern part of Lake Huron, whence by a northeasterly course, it passed down the valley of the St. Lawrence during the 2nd. On the afternoon of the 1st, Cautionary Signals were ordered for Lake Michigan and the New Jersey coast, and at midnight for Lake Huron and the western half of Lake Erie. These signals were lowered during the 2nd, having been justified: maximum wind velocities, NW. 40 at Milwaukee; N. 45 at Sandusky; N. 26 at Escanaba; S. 34 at Cape May; S. 32 at Chincoteague and Delaware Breakwater; SE. 26 at Cape Henry.

No. II.—This area, apparently developing in the Gulf of Mexico, was central the morning of the 3rd in the Lower Mississippi valley; Vicksburg barometer 0.18 below the normal. Moving slowly eastward it dissipated in Florida during the 4th. In the afternoon of the 3rd, Cautionary Signals were ordered from Cape May southward to Smithville, and were lowered the following morning: maximum velocities, Cape Lookout, S. 27; Cape Hatteras, SE. 27; Kittyhawk, SW. 33; Chincoteague, S. 32.

No. III.—This area, appearing in the Northern Plateau district the morning of the 4th, moved slowly eastward to Dakota, where it was central the morning of the 6th; Bismarck barometer 0.24 below the normal. Its course thence was northeastward and beyond the Signal Service stations until the 9th, when it passed eastward through the Canadian Maritime Provinces over the Atlantic. No signals were ordered nor dangerous winds reported during the passage of this area.

No. IV.—During the night of the 10th a general fall occurred in the Plateau district and in the Pacific coast region. On the afternoon of the 10th, the lowest pressure was reported from Virginia City—0.20 below the normal, and from Ft. Keogh, Montana—0.26 below the normal; by the morning of the 11th, the depression had either filled up or moved northeastward in Manitoba.

No. V.—This storm, evidently cyclonic, apparently, developed in the Caribbean sea previously to the 5th, on which date, the pressure of 29.78, with easterly wind and rain, was reported from Guadaloupe. During the 5th and 6th, strong E. to S. winds, with rain, were reported from St. Thomas, and on the 7th and 8th from Navassa; these two stations were too far northward of the centre to show any decided barometric fall. On the 6th, "a most remarkable fall of the barometer,"

(no figures given) is reported by Mr. Maxwell Hall, at Kingston, Jamaica, with squalls and rain. The steamer *San Salvador* which left Truxillo, Honduras, August 7th, is now twenty-eight days overdue, and is supposed to have been lost in the cyclone. Off Cape San Antonio, August 9th, the steamer *E. B. Ward* lost rudder and had cargo injured; and at same place, ship "Tufa," August — (probably 9th), encountered severe hurricane. On August 10th, brig *Adino* was wrecked on Alecranes reef. During the night of the 10th and the morning of the 11th, the barometer fell slowly at Brownsville, but remained stationary to the northward. From midnight of the 11th the barometer sank rapidly at Brownsville, reaching, at 9:33 p. m. of the 12th, 29.69 or 0.40 below the normal; wind N. 40 miles. By 11:45 p. m. the barometer had fallen to 28.315 (1.38 inches in 2 hours 12 minutes), while the wind increased to hurricane force—anemometer blown down at 10.48 p. m., registering 48 miles; from 11:45 p. m. a calm prevailed for 1 hour, when barometer commenced rising and wind shifted to south, the centre having passed over Matamoras, several miles south of Brownsville. Moving slowly up the valley of the Rio Grande, the area was central at midnight of the 13th in Mexico to the westward of Eagle Pass. Following a northeast course, the depression filled up in western Texas during the 14th. From the 12th to 14th, exceedingly heavy rains fell in connection with this storm, as shown under the heading of *Heavy Rains*. In Brownsville, Tex., a large number of buildings were blown down and great damage otherwise done. At Fort Brown about twenty buildings were blown down, barracks badly damaged, 35 horses and mules killed. In Matamoras, over three hundred houses were blown down or rendered uninhabitable, and many others seriously damaged; two persons were killed and many injured, four seriously. Two steamboats in the Rio Grande river were sunk. At Point Isabel, eight vessels wrecked, three men lost. Ten miles of railway between Brazos, Santiago and Brownsville swept away or badly damaged. Damage in Brownsville and Matamoras and vicinity estimated at one million dollars. Cautionary Signals were displayed at Galveston and Port Eads, the morning of the 12th to the morning of the 14th. On the morning of the 13th, special telegraphic despatches, were sent warning vessels against venturing that day into the southwestern Gulf. Maximum wind velocities of 64 NE. at Indianola, and 29 NE. at Galveston, reported.

No. VI.—During the 14th the barometer fell steadily in southern California, and on the morning of the 15th the lowest pressure was reported from Yuma,—0.21 below the normal. Moving slowly northward the area of lowest pressure on the morning of the 16th was at Los Angeles, —0.24 below the normal. During the day the depression gradually filled up.

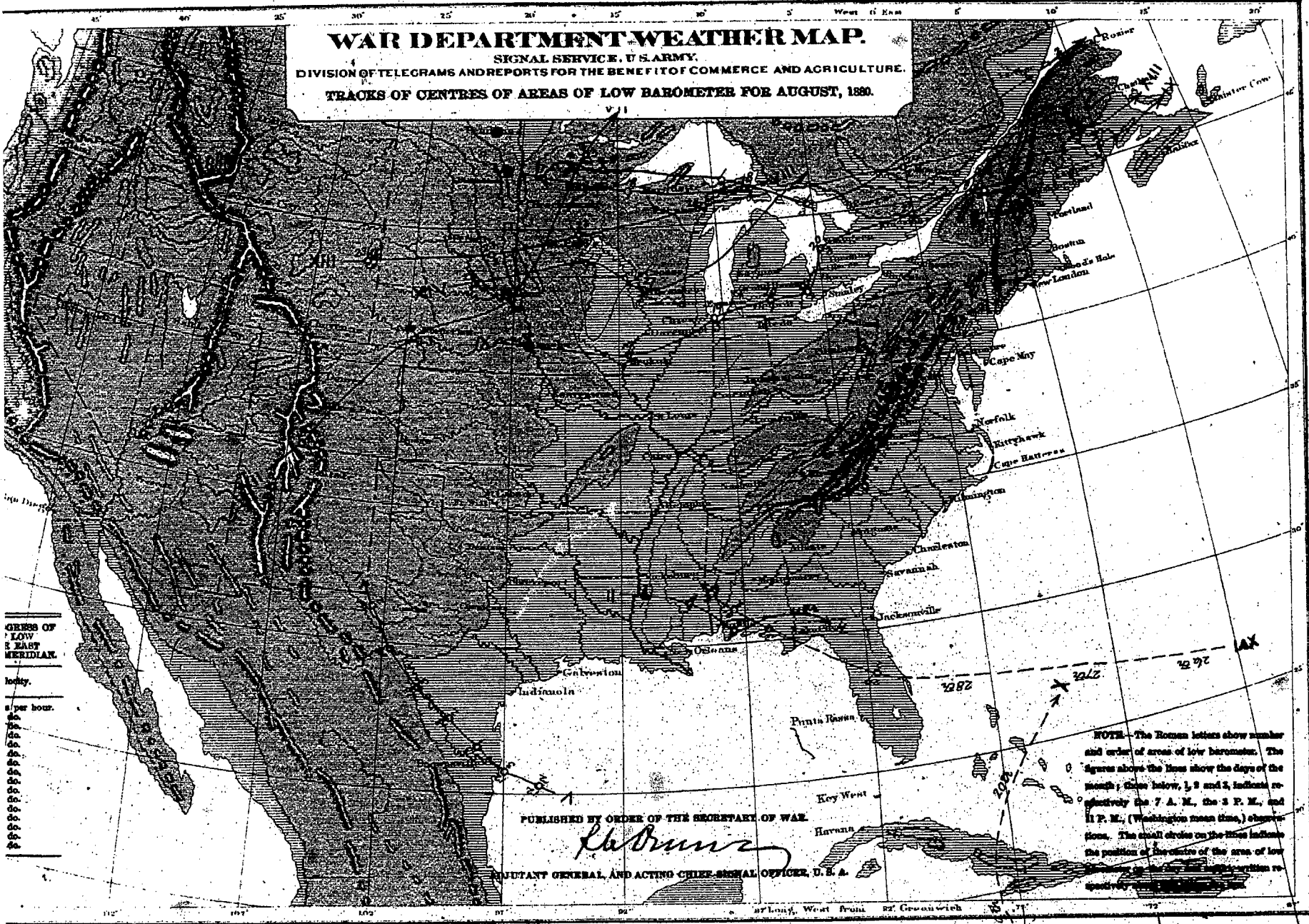
No X—is the West India cyclone which swept with such disastrous results over the island of Jamaica during the night of the 18th of August. Additional interest attaches to this storm on account of the comparative rarity of such visitations to Jamaica. The early history of the storm is at present confined to the account furnished by the log of the *S. S. Nith*, for an extract of which this office is indebted to Mr. Maxwell Hall, of Kingston.

At noon of the 15th of August, the south point of Gaudaloupe bearing north about 3 miles, the wind as observed on board the vessel was fresh from NE., gradually increasing with hard squalls. The 16th commenced with similar conditions; at 8 a. m. the wind was E., at times backing to NE. with heavy overcast sky; at noon the vessel was in $16^{\circ} 1' N.$, $65^{\circ} 55' W.$, with less wind but sea running high and turbulent; afterward hard gale and heavy squalls, which continued, with torrents of rain, during the early portion of the morning of the 17th; toward noon of the 17th the wind moderated and veered from NE. to SE. and S.; at noon of the 17th the vessel was in $16^{\circ} 10' N.$, $70^{\circ} 26' W.$, barometer reading 29.35, wind again heavy, in squalls, with thunder and lightning; toward sunset the storm abated somewhat, but at 9 p. m. it came on with renewed force. August 15th commenced with terrific squalls from E. to SE., torrents of rain and incessant thunder and lightning; toward noon the storm increased in violence and the vessel was headed to the south; at noon she was in $16^{\circ} 27' N.$, $74^{\circ} 57' W.$, the barometer reading 29.15; at 1 p. m. the wind veered to southward and moderated; at 8 p. m. the vessel was put on her course again (toward Jamaica) and at midnight the weather was comparatively fine. Although no barometer observations are given for the 15th and 16th, it is evident that the vessel and the storm vortex were traveling westward along converging paths, the progressive motion of the latter being greater than the speed of the vessel. On the 17th the two paths were rapidly approaching each other, and on the 18th the distance between them must have been quite small. The reports from Barbadoes, Martinique and Navassa, not yet to hand, will undoubtedly throw much light upon this portion of the storm's history. At St. Thomas a slight fall in the barometer was reported on the 15th and 16th, with cloudy weather and light rains; the prevailing easterly winds increased slightly in strength and at the afternoon reports of the above dates are described as "gusty." On the Island of St. Domingo "continuous heavy rains and high winds prevailed from the 15th to the 19th" doing great damage to crops. The *S. S. Atlas*, at Aux Cayes, on the southwest coast of Hayti, left that port on the afternoon of the 18th. The captain states that while in port "the wind set in strong from the NE. and veered around to E. when the barometer (corrected) fell to 29.1. He put out to sea in the direction of Jacmel and allowed the storm to pass." Mr. Maxwell Hall, in transmitting the above, states, "it appears that two cyclones converged on Jamaica on the 18th, the more southerly one traveling at the rate of 12½ knots and the more northerly one at 23 knots an hour," and "that he is collecting material for working out this remarkable disturbance." At Kingston, Jamaica, the barometer had been in a disturbed condition since the 6th, and Mr. Hall had advertised in the daily press that Cautionary Signals would be hoisted when a storm was to be expected. Notice of the present storm, however, was posted by Mr. Hall only six hours before its arrival, for which he gives the following reasons: "(I) for many years these cyclones have passed so far south of Jamaica that they have hardly affected us, and it became necessary to make sure on the 18th that the cyclone was not proceeding as usual; (II) absence of wind; the slow cloud-drift seeming to give another day, but we were really sheltered by the Blue Mountain Ridge, hills 7,000 feet high, to the north of us; (III) a high velocity of progression—15 miles per hour, I believe, being above the average." The sea at this port was disturbed on the evening of the 17th, and still further on the 18th, the waves coming from the east. The barometer at 7 a. m. (18th,) read 29.86; at 3 p. m., 29.69, when a rapid fall set in, the barometer at 9:15 p. m. reading 28.93, after which it rose to 29.40 at 11 p. m., and at 7 a. m. of the 19th had reached 29.82. Up to 8 p. m. of the 18th the wind remained almost calm, light airs, (2 miles per hour), from the NW, being the highest velocity recorded; at 8:15 p. m. it was ENE., 5 miles, increasing to 10 miles at 9:15 p. m.; at 9:30 it had increased to SE., 15 and at 9:45 to S. by E., 20. It then rapidly increased, and at 10 p. m., was S., 60; 10:15, S., 80; 10:30, S., 69; 10:45 to 11, SSW., 70; 11:15, SSW., 50; 11:30 to midnight, WSW., 20. The weather during the 17th, and morning and afternoon of the 18th, was close, warm and cloudy, the clouds moving from the NE; heavy rain set in during the evening and continued to near midnight. The following newspaper items, arranged geographically in three sections, will serve to indicate the severity and path of the storm over the Island of Jamaica. Beginning at the southeast corner and taking the section south of the mountain range we have:—(I.) along the coast—Plantain Garden river—hurricane during the night of the 18th did serious damage. Morant Bay, church, hospital and chapels completely destroyed, three vessels ashore, one life lost. Yallahs, 59 houses destroyed, three lives lost, schooner Kate badly handled off the southeast coast Wednesday night. Port Royal, all wharves destroyed. Port Henderson and Apostles Battery in ruins. Fort Augusta reported under water. Old Harbor Bay, church and houses destroyed. (II.) In the interior from St. Marys in the east, to Manchester in the west. Up Park Camp, near Kingston, military barracks destroyed; \$50,000 damage. Creighton, church blown down. Newcastle, barracks blown down, one man killed. Mt. James district, houses blown down. St. Thomas in the Vale, houses blown down, crops ruined, one life lost. Spanishtown, storm burst about 9 p. m. and passed over with circular sweep, buildings and trees damaged. St. Dorothy district, storm severe, two distinct earth-quake shocks, six places of worship destroyed. St. John's, 40 houses and crops destroyed. Chapelton, rained all day, at 6 p. m. began blowing from a northerly direction, and changing to NW, continued to 2 a. m. on the 19th; violent from 9 p. m. to midnight, buildings and crops destroyed. Alley P. O., Vere Co., north breeze, blowing down canes, river very high, rainfall during storm 0.85 in.; during 18th, 1.54 inch. Maudeville, 18th, slow rain; evening, increasing wind; 8 to 9 p. m., cyclone commenced; midnight, lilled, buildings damaged. In the mountains—Trinityville, Blue Mountain valley, gale experienced in all its severity; when day dawned the district was a scene of desolation, few houses standing, &c. At Cinchona plantation, elevation 5,000 feet, near the head of the Yallahs river—August 17th,

high wind, 2.44 in. rain: 18th, morning, wind N. and NW., strong gusts, heavy rain: afternoon, wind higher and sweeping with heavy rain from NE.: 3:30 p. m., barometer, un-reduced., Negretti and Zambra's, 25.11: 4:30 p. m., 25.00, temperature 65°: 7 p. m., gale: 7.15 p. m., 24.80, 64°: 8 p. m., 24.75, 60°, lull; stables and out-buildings blown down: 11 p. m., gale moderated, but shortly after blew with increased force from E. to SE: 19th, 3 a. m., lull succeeded by heavy downpours of rain till nearly day-light: rain-fall during the 19th was 20 inches. (III.) Along the north coast, beginning at the east:—Manchioneal, storm raged: Port Antonio, strong wind during 17th and morning of 18th; 2 p. m., of latter date, increased to full hurricane: 3 to 4 p. m., violent rain-storm; 6 p. m., houses blown over; 7 p. m., hurricane, wind about E. by N., force increasing to 11 p. m.: 19th, 12.20 a. m., wind had changed to SW., decreasing; 1 a. m., finished by a strong blow from S. The *S. S. Tropic* in San Antonio harbor, made the following record:—18th, 6 a. m., barometer 30.00, wind E. fresh; 11 a. m., 29.90; 12 m., 29.80; 1 p. m., 29.40; 2 p. m., 29.00, heavy rains; 2:30 p. m., 28.90, wind veering to southerly; 4 p. m., 28.60, SE., heavy gale; 11 p. m., 28.40, S; heavy gale; 12 midnight, storm-centre passed to southward, barometer rising rapidly—heaviest wind from southward lasting one hour. Portland, severe storm, acres of trees and several peasant's houses blown down. Buff Bay, severe hurricane on night of 18th, destroying all houses; St. George district, 116 houses wrecked, 2 persons drowned. Annotto Bay, terrible hurricane all Wednesday night, numbers of houses in ruins. Port Maria, awful time from 7 p. m., 18th to 3 a. m., 19th, boats ashore, houses blown down, banana cultivation ruined for 12 miles around. Richmond, St. Mary's, houses blown down by hundreds, 4 lives lost. Ocho Rios, tremendous damage by cyclone, loss estimated by thousands of pounds sterling. St. Ann's Bay, 18th, wind strong from N., all day; 11 a. m., barometer 29.80; 4.45 p. m., 29.56; 9 p. m., fearful hurricane until near day-light; five coasting vessels driven ashore, wharves washed away and buildings damaged. A second report from St. Ann's says the gale increased in violence until about 12.30 a. m., 19th, when a lull took place; at 1 a. m. the wind veered to WSW., and lasted, as violently as before, until 4 a. m.; during storm rumbling sounds were heard which were attributed to two distinct shocks of earthquake. Dry Harbor, two boats wrecked and several houses blown down. Falmouth, 3 sloops ashore and buildings damaged. Montego Bay, terrible storm on 18th. These reports show the whole of the eastern portion of the Island to have been swept by the hurricane, while the extreme west and southwest portions, namely, the counties of Hanover, Westmoreland and St. Elizabeth, appear to have escaped. The storm area was probably limited on the west by a line running from Portland Point, through Mandeville to Montego Bay. P. Benito Vines, S. J., of Havana, forwards the following observations made at Manzanillo and Santa Cruz, on the south coast, and at Nuevitas, on the north coast of Cuba, which, he says “refer to the cyclone that crossed the eastern Provinces of this Island on the 19th.” Manzanillo, 18th, 9 p. m., barometer 29.95, wind NE., force 2, light rain commenced; 19th, 7 a. m., 29.55, NE., 3, squally; 8:10 a. m., 29.30, E., 1, ugly; 8:15 a. m., 29.30, SE., 3 and 4, squally; 9:15 a. m., 29.40, S., 2, squally; noon, 29.70, SW., 1, cloudy. Santa Cruz, 18th, midnight, 29.92, NE., hard and variable; 19th, 8 a. m., 29.74, N., hard; at 9 a. m., NNW., fresh and 10 a. m., NW.; noon, barometer 29.71, after which it rose and at night-fall-read 29.85, wind W., fresh. Nuevitas, 19th, 11 a. m., 29.40, NE., hurricane; noon, 29.50, NE., hurricane; 4:30 p. m., 29.50, S., light, the hurricane having passed northwards. Mr. Chas. Hasselbrink, Havana, reported on August 21st, as follows: “Since the 14th, we have been under the influence of light or moderate cyclonic movements; on the night of the 16th and on the 17th, sudden anti-cyclonic rise of the barometer, with fresh breeze; on the 19th, light squalls and clouds coming with moderate rapidity from the E; night of 19th, clear sky.” On the 20th, the reports from the Signal Service stations in Florida, seemed to indicate the existence of a barometric depression at some distance to the eastward, and on the 21st, the barometer at the Bermudas fell to 29.85.

No. XVI.—A sufficient number of reports have not been received at this date (September 13th) to enable the accurate charting and description of this storm. No Signal Service reports from August 29th to 31st south of Jacksonville are yet at hand. This storm evidently formed to the northward of San Domingo and passed eastward to the north of the Bahamas. The hurricane which passed over the Bermudas on the 29th and 30th may possibly have been an offshoot of this area, but this is hardly probable, as on August 25th, in latitude $25^{\circ} 30'$ N. the brig *M. A. Doran* reported heavy NNE. gale veering to NW., with barometer rapidly falling from 30.40 to 29.50; bearing southward she avoided the hurricane but met at midnight heavy squalls and bad sea. On the succeeding day, August 26th, schooner *S. A. Snow* was wrecked by this hurricane 128 miles SE., of the Bermudas. On the same day brig *St. Jose* was dismasted "south of Bermudas," no position given. Ship *Sunrise* on the 26th, in 26° N., 69° W., fell into the SW. quadrant of a violent hurricane, moving NNW. These reports indicate that the Bermuda hurricane originated south of 25° N., and to the eastward of 61° W., and curved southward of the Bermudas. The Florida hurricane was located on the 27th in $25^{\circ} 50'$ N., $74^{\circ} 10'$ W., where it overtook the steamship *Santiago* at noon; hurricane wind NNW., NE. sea; barometer 29.80. At midnight wind shifted to very heavy SW., and high cross seas; barometer 29.40; after which wind and sea moderated. On the 28th the steamship *New Orleans* was struck by the cyclone at 8 p. m., 40 miles ENE., of Jupiter Inlet about 27° N. In both these cases winds backed from NNW. to SE., showing that the hurricane passed to the northward. On the same date the *Morgan City*, of Florida coast, experienced a hurricane from the W., backing to SE., and lasting till the 29th; barometer fell from 30.00 to 28.70. On the 29th the steamer *Vera Cruz* foundered on the Florida coast off the St. John's river, many lives lost. A number of other vessels were wrecked or disabled on the Florida coast between Jupiter Inlet and St. John's river. During the 29th and 30th the hurricane passed across Florida. At Cedar Keys the storm was one of the worst ever known. On the morning of the 30th the wind reached its maximum,—64 miles NE. registered, after which time the registering apparatus was disabled. During the 30th and 31st, 6.73 inches of rain fell. The lowest barometer reading reported was 29.40 at 2 p. m., of the 30th. One vessel, the bark *Proteus*, at Cedar Keys, was dismasted and otherwise damaged. Several buildings were blown down and others damaged; on the railway between Cedar Keys and Fernandina several serious washouts occurred. During the 31st the storm moved slowly northeastward through Florida into Alabama with rapidly increasing pressure and decreasing violence. At Pensacola the highest wind SW. 32 and lowest barometer 29.33 were reported on the 31st. At midnight of the 28th Cautionary Signals were ordered for all Florida stations except Pensacola, and on the following day for Pensacola, Mobile, Port Eads, and as far north as Sandy Hook. Owing to interruption of telegraphic communication, signal orders failed to reach Cedar Keys and Key West. On the 29th special messages announcing the cyclone were sent to all Atlantic and Eastern Gulf seaports. The signals from Savannah to Wilmington and Norfolk were lowered on the 30th, and at other stations on the 31st. These signals were justified, except on the North Carolina coast; maximum wind velocities were reported as follows: Cedar Keys, NE., 64; Barnegat, NE., 42; Pensacola, SW., 36; Cape May, NE., 36; Delaware Breakwater and Jacksonville, NE., 32; Key West, SW. 32.

WAR DEPARTMENT WEATHER MAP.
 SIGNAL SERVICE, U. S. ARMY.
 DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.
TRACKS OF CENTRES OF AREAS OF LOW BAROMETER FOR AUGUST, 1880.



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PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

LeBrun

LIEUTENANT GENERAL AND ACTING CHIEF SIGNAL OFFICER, U. S. A.

NOTE—The Roman letters show number and order of areas of low barometer. The squares above the lines show the days of the month; those below, 1, 2 and 3, indicate respectively the 7 A. M., the 3 P. M., and 11 P. M. (Washington mean time,) observations. The small circles on the lines indicate the position of the centre of the area of low barometer on the day and hour specified respectively.

1772
 1682

On chart No. IV, are shown, as well as is at present possible, the tracks of storm centres over the North Atlantic and adjacent land areas, during the month of August, 1880. Five of them are tropical cyclones, three of which, Nos. IV, VI and IX, were described in the August REVIEW. No. X was experienced in 21° N., 46° W., by Brig. *Dorothea* on the 26th and 27th of August, but the report of this storm is somewhat doubtful. If, however, it should be sustained by other reports, it may possibly be the same area as No. XIII, which passed over the Bermudas during the night of August 29th, 1880, and compares in severity with the hurricanes of 1839 and 1878. As will be seen by the track on chart No. IV these islands were only a short distance from the centre of the hurricane during its curvature towards the north and northeast. The following accounts of this storm will indicate its general features: Brig. *Lorne*, from Halifax to Jamaica, on August 28th had squally weather, with heavy sea-swell from the eastward; on the 29th, 8 a. m., fresh ENE. breeze; at noon, in $32^{\circ} 40'$ N., $62^{\circ} 40'$ W., hurricane commenced from NNE.; 2 p. m., hurricane increased rapidly, with a tremendous sea, and at 4 p. m., shifted to NNW., throwing the vessel on her beam ends; 30th, gale moderated. At the *Bermudas*, the following observations were made. Commencing at the southern extremity, we have the following record, by Mr. J. Perinchief, of observations made at *Gibbs' Hill* Light station (elevation of barometer above sea, 246 feet): August 29th, a. m., very threatening, sea rising with long heavy swells, wind steadily increasing from NNE., barometer falling; noon, barometer 29.920, wind NNE. (force 6) increasing, very heavy clouds from NE. and E., with distant thunder, sea very rough and breaking heavily; 3 p. m., NNE. increasing, heavy looking weather to the eastward; 5 p. m., NNE., barometer 29.790; 6:30 p. m., very stormy looking, wind backing, barometer 29.730; about this time, the storm was thought to be passing to the westward, but at 10 p. m., the wind was NW., heavy gale, barometer 29.500; and near midnight, NW., hurricane, barometer 29.240, "vibration (of light house), and howling of the storm was fearful;" at 1 a. m. of the 30th, the barometer reached the lowest point, 29.140; 2 a. m., storm fearful; 3 a. m., wind more to westward, storm lull a little; 6 a. m., barometer 29.170; barometer continued to rise during the morning and the wind to back to SW; noon, barometer 29.550, SW, strong gale, force 9, rain, storm passed off to the northwest. *Hamilton* (aneroid barometer), 29th, during morning, wind NE.; 4 p. m., drifting rain; 6 p. m., barometer 30.00; 10 p. m., wind NE. in very heavy gusts; 11:30 p. m., 29.45; 30th, 1.50 a. m., 29.28; 2 to 4 a. m., highest winds; 3 a. m., lowest barometer, 29.24; 4 a. m., barometer 29.35 rising, wind veered to SW. and continued in that quarter all day, with heavy seas and "sheets of rain;" 7 a. m., barometer 29.60; 2 p. m., 29.80. *Nonsuch Island*, 29th, 7 p. m., NE. gale set in; 30th, 2 a. m., wind drawing to NW. with some force; "felt several earthquake shocks." *St. David's Island* (Mount Hill Lighthouse), 29th, morning, cloudy; noon, wind E., threatening; 4 p. m., NE., squally, fine rain, heavy sea rolling in from eastward; 8 p. m., gale gradually backing to N., where it remained until midnight, when it increased to a hurricane; 30th, 1.45 a. m., wind shifted in tremendous squall from N. to NW.; 3.30 to 3.45 a. m., "wind again shifted in a more tremendous squall, accompanied by the sound of an earthquake or tornado from NW. to SW.;" 4 a. m., wind abating slightly, but still blowing very hard with heavy rain; 4 p. m., bright spots in sky to west—storm breaking; "the true hurricane was from midnight of the 29th to 4 a. m. of the 30th." Much injury to buildings, trees and small sailing craft resulted, but was mostly confined to the northeastern portions of the Islands. The following valuable report of the S. S. *Bermuda*, from New York, August 24th, deserves special attention: August 29th, 12 a. m., barometer 30.45; 4 a. m., 30.44; 8 a. m., 30.40; noon, $33^{\circ} 20'$ N., $66^{\circ} 15'$ W., barometer 30.37, weather fine and clear; 3 p. m. heavy gray cumuli rising to SE., wind NNE. rapidly increasing, prepared vessel for storm; 4 p. m., 30.28, wind increasing and sky covered with hard looking cumuli; 8 p. m., 30.22, barometer rapidly falling; NNE. gale, occasional showers; estimated position of vessel about 23 miles NW. by W. of *North Rock*, Bermudas, and hauled ship off to the northward for one hour; 9 p. m., N. moderate gale; midnight, 30.04, N. violent gale, constantly backing westerly; 30th, 4 a. m., barometer 29.82 rapidly falling, wind NW.; 6 a. m., perfect hurricane, wind still backing, heading ship to north; 8 a. m., 29.64 falling rapidly; noon, 29.40, full hurricane; 2 p. m., 29.32 stationary; 3 p. m., barometer rising; 4 p. m., 29.34, SW., storm apparently abating; 5 p. m., suddenly calm, weather clearing slightly, "sea and sky entirely ablaze with a lurid yellow and greenish glare, having a most unearthly and terrifying appearance;" 5:20 p. m., hurricane burst upon us with redoubled violence from SSW., barometer falling fast; 8 p. m., 29.10, "ship buried on port side from sheer force of wind, atmosphere one mass of flying water—every thing blown away;" midnight, lowest barometric reading 28.85; 31st, 4 a. m., barometer rising, wind abating slightly; 6 a. m., 29.00; 8 a. m., 29.18; 10 a. m., 29.40; noon, 29.64, weather moderating, gusts of hurricane violence with very heavy rain; 4 p. m., WSW., moderating; 8 p. m., position (estimated) about 45 miles northeast of *St. David's Head*, wind W., sea gone down, day ends fine and clear; September 1st, 7:30 a. m.,—N. $63^{\circ} 08'$ W. or about 72 miles east of *St. David's Head*, NW. breeze, easterly swell; 10:30 a. m., steering west; noon, $33^{\circ} 11'$ N. $63^{\circ} 23'$ W. Barque *Eliza Barss*, August 29th, morning, $36^{\circ} 3'$ N. $68^{\circ} 9'$ W., quite calm; 2 p. m., NW., light breeze gradually hauling to NE.; 30th, 6 a. m., $34^{\circ} 40'$ N. $66^{\circ} 50'$ W., NE. moderate, fine and clear; 9 a. m., barometer 29.90 falling, SE. squall; noon, 29.85, NE. increasing; light rain squalls; 6 p. m., 29.85, very heavy SE. swell; 8 p. m., 29.60, wind commenced to back and blow harder, rain squalls; 9 p. m., 29.58, NNW; midnight, 29.60, NW; 31st, 2 a. m., 29.65; 6 a. m., 29.70, WNW., sky very clear to westward, but hard ugly looking clouds to northeast; 8 a. m., wind

W; noon, Bermuda, bearing ESE. Brig *Twilight* left Shelbourne, N. S., August 27th bound to Trinidad, Jamaica, on August 31st, in $38^{\circ} 26' N. 62^{\circ} 05' W.$, had fresh gale from N. veering to SE., heavy sea from SSW. increasing with every indication of approaching hurricane: September 1st, ENE., increasing with very heavy sea; 2nd, NNE. hurricane, vessel on beam ends, decks swept; 10 p. m., cut away foremast; 11 p. m., $35^{\circ} 06' N. 60^{\circ} 15' W.$; 3rd, NNE., "blowing terrific;" 2 1/2 a. m. moderated; 3 a. m., wind hauled to SE. men lashed to deck; midnight, gale abated; 4th, SW. light breeze, fine weather. In regard to the storm areas located between the 45th and 55th parallels little requires to be said, except that they were probably accompanied by somewhat higher winds than those of the preceding month of July. In general, however, the weather over this portion of the ocean continued fair throughout most of the month. Severe storms, however, were experienced more to the northward near the 60th parallel, and, in the vicinity of the Straits of Davis and Belle Isle, by schooner *Delia Hodgkins* and steamer *Gulnare*, the former vessel, in sailing from $63^{\circ} 30' N., 35^{\circ} W.$ on August 1st to the Straits of Belle Isle on the 25th, reporting no less than seven barometric minima, with winds on the 5th, 13th, 17th and 28th, of force 8 and 9. The only severe winds reported between the 45th and 55th parallels accompanied the storm traced as No. V and are as follows:—Bark *Ivigtut*, August 11th, $43^{\circ} N., 59^{\circ} W.$, 8 p. m. to 11:30 p. m., thunderstorm working from W. to E.; at 9:30 p. m. a strong squall of force 8. S. S. *Pennsylvania*, August 12th, $42^{\circ} N., 45^{\circ} W.$, barometer 29.94, wind SW. force 8, heavy rain and SW. sea. S. S. *Scythia*, August 12th, about 9:30 a. m., ship's time, $47^{\circ} N. 36^{\circ} W.$, barometer 30.12, SSW., force 4; 4 p. m., 30.05, SW., moderate breezes, with heavy, gloomy and cloudy weather; 7 p. m. 29.75, wind and sea increasing; 8 p. m., 29.55, SW. fresh gale, very hard squalls and heavy rising sea running NNE., barometer falling; 9:15 p. m., very heavy rain, wind suddenly shifted to NW., barometer indicating a rise: 10 p. m., 29.80, wind and sea decreasing; midnight, 29.87, sea still high and irregular; 13th, 4 a. m., NNW., moderate wind, and sea decreasing; 9:30 a. m., $45^{\circ} N. 42^{\circ} W.$

The following is a short account of a severe storm encountered by U. S. S. *Scutawa*, off the east coast of Nippon, August 25th and 26th, 1880:—August 25th, noon, $37^{\circ} 19' N. 141^{\circ} 30' E.$, barometer 29.79 falling, wind S. by W., force 3; 6 p. m., 29.72, S. 6, rough sea; 9 p. m., 29.66, S. by E. 7; 10 p. m. 29.62, S. 7 to 8, rain ship to NNE.; 11 p. m., 29.58, SE. by S. 7 to 8, light rain: midnight, 29.54, S. 9, in heavy squalls, the wind gradually backing around to SW. and blowing a strong gale, force 9 to 10; 26th, 4 a. m., 29.44, after which barometer rose steadily and wind gradually decreased; noon, 29.65, SW. 6 to 7, heavy sea. The report adds:—"The storm traveled southward and westward and then turned and went to the northward and eastward." During the passage of this storm the following observations were made at the U. S. Naval Hospital at Yokohama, Japan; August 24th, 7:35 a. m., Washington mean time, (10 p. m. local,) 29.79, SW. 6, cloudy; 25th, same hour, 29.49, SW. 8, squally and rainy, rainfall 0.84 inch.; 26th, same hour, 29.74, calm and clear.

Upon chart No. V are shown for the month of *January*, 1879, the mean pressure, mean temperature, mean force and prevailing direction of winds at 7:35 a. m., Washington mean time (0:43 p. m. Greenwich mean time) for the northern hemisphere, and at a few stations in the southern hemisphere. In America *northwesterly* winds generally prevailed; in Europe they were from *northeast* to *southeast*, except in Spain and Portugal, where they were *southwesterly*; in Algeria they were *northwesterly*; in Asia, *calms* or light *easterly* winds prevailed in Siberia; *north* winds along the eastern coast, and *northerly* winds in India; over the Atlantic ocean, north of parallel 40° and east of $40^{\circ} W.$, *southwesterly* winds prevailed, while to the eastward of the meridian named they varied from *northwest* to *southwest*; these winds were particularly strong between parallels 40° and 50° and meridians 30° and 50° . High pressures (30.20 inches, or 767.1 mm., and above) covered in Asia, the interior of that continent; in Europe, the greater part of Russia; in America, (the United States) the South Atlantic and Gulf States, the Ohio and Lower Missouri valleys and a portion of the Oregon coast. Over the Atlantic ocean a narrow belt of high pressure between latitudes 20° and 35° , extended from $45^{\circ} W.$, northeastward to the African coast. Low pressures (29.80 in., or 756.9 mm. and below) covered the greater part of the Atlantic ocean north of latitude 40° and west of longitude $15^{\circ} W.$ Comprised within this area were Iceland, Greenland, and the Canadian Maritime Provinces. An undefined area of low pressure also existed over Behring's sea. The highest mean pressure prevailed at Barnaul, Siberia, 30.50 or 774.8 mm.; the lowest, at Godthaab, 29.36, or 745.8. Of barometric readings the highest noted was at Barnaul, Russia, on the 19th, 795.5 mm., or 31.32 inches. The lowest 703 mm., or 27.68 inches, (reported to the *Deutsche Seewarte*,) was made on the BERG, in $59^{\circ} N. 24^{\circ} W.$, 10 p. m., 17th, from a *reliable aneroid*. The lowest land pressure was at St. Paul's Island, Behring's Sea, where a most unusual monthly range occurred from 27.987 inches or 710.9 mm. on the 1st, to 30.462 or 773.7 on the 18th. While very low temperatures prevailed as usual over the interior of Asia, yet the lowest mean occurred at York Factory—28.98 F., or —33.98 C. The lowest temperature noted during the month was on the 20th at Barnaul, Russia, —49.4 C., or —56.9 F. In general, an excess of barometric pressure, with corresponding deficiency of temperature prevailed over the British Isles and the greater part of the United States. As compared with the chart of similar means for *January*, 1878, lower pressures, and in general, higher temperatures are found in Algeria, Belgium, and the greater part of France, Portugal, Spain, and the northeastern part of Canada. The following differences are noted: *Algeria*, Geriville —0.24 in., +6°; *Belgium*, Brussels, —0.13, +6°; *France*, Clermont Ferrand, —0.29, +6°;

Azores, Angra, -0.24 ; *Spain*, Bilboa, -0.35 , $+6.92$; *Canada*, Sydney, -0.25 . Higher pressures and lower temperatures are found in the British Isles, Norway, Russia, Sweden, the United States, and Hudson Bay Territory. The most notable changes are: *British Isles*, Sandwick, $+0.16$ in., -5.04 ; *Norway*, Brono, $+0.40$, -2.05 ; *Russia*, Moscow, $+0.44$, -4.01 ; *Sweden*, Haparanda, $+0.44$, $+0.02$; the *United States*, Roseburg, $+0.28$, -7.0 , Pembina and Chicago, -12.0 . *Hudson Bay Territory*, York Factory, $+0.08$, -18.06 . In general, since the preceding month (*December*, 1878), the mean pressure has greatly increased over Europe and the Atlantic ocean east of 30° and south of 40° . The greatest increase of pressure occurred over Norway and Sweden; Haparanda, Hernosand and Stockholm, $+0.56$ in. The most decided diminution was over the northwestern Atlantic, Heart's Content -0.16 ; Stykkisholm, -0.42 and Godthaab, -0.57 .

On chart No. VI are traced the paths of 33 of the principal storm-areas of the northern hemisphere, during the month of *January*, 1880. Of these, four, Nos. IX, XX, XXIV and XXXII, are located along the eastern coast of Asia; seven, Nos. II, XII, XVII, XVIII, XXVIII, XXIX and XXXI, over the Behring's Sea region, and the rest, 22 in number, over the North American and European continents and North Atlantic Ocean. Thirteen of the last first appeared over or in the neighborhood of North America, of which six were already well developed areas when first noticed over Washington Territory or Manitoba. All of the American storms can be traced for some distance off the eastern coast, moving in an easterly or northeasterly track over the western portion of the Atlantic, but it is only possible to carry three, Nos. XI, XVI and XXIII, over to the European coast. Striking similarities occur in the paths of these three storms, notably, the southeasterly paths of areas Nos. XVI and XXIII, from the centre of the ocean to the Mediterranean. Five storms, Nos. I, IV, XIII, XIV and XVI, appear to have originated over the Atlantic, but the development of these is intimately connected with areas of low pressure preceding and to the northwest of their places of origin. All the European storms, with the exception of area No. X, came from the ocean.

The four tracks shown along the eastern coast of Asia are those of unusually well-defined areas, both as regards their extent and their progressive motion. Of the four, the one designated as No. XX was the best marked, and a short description of it will serve to point out the general characteristics of the whole as a class. The following table shows the lowest barometric readings observed, with the time of observation reduced to Washington mean time, and the direction of wind at the time of lowest barometer and at the next preceding and succeeding observations:

STATIONS.	Date.	Washington	Barometer.	Winds.
		mean time,		
	<i>January.</i>	<i>h. m.</i>	<i>Inches.</i>	
Nertschinsk.....	13th	8:33 p. m.	30.21	Calm—Calm—(—)
Pekin.....	15th	7:35 a. m.	30.04	Calm—Calm—NW.
Tientsin.....	14th	7:35 a. m.	29.99	SSE—Calm—SSE.
Maeno.....	14th	7:35 a. m.	30.05	NE.—ESE.—E.
Shanghai.....	14th	2:46 p. m.	29.94	SSE.—S.—S.
Nagasaki.....	14th	7:42 p. m.	29.84	SE.—SSW.—W.
Hiroshima.....	15th	1:52 a. m.	29.71	NE.—(—)—N.
Yokohama.....	15th	7:35 a. m.	29.66	Calm—SW.—WSW.
Tokio.....	15th	5:28 p. m.	29.45	NNW.—NNW.—WNW.
Vladovostok.....	15th	5:04 p. m.	29.94	N.—N.—N.
44° N. 160° E.....	16th	7:35 a. m.	30.07	Variable—S.—S.
Nikolaievsk.....	17th	4:28 p. m.	29.64	NW.—W.—W.

At Peking the barometer on the morning of the 14th read 30.07, and on the 15th was evidently rising rapidly, as on the morning of the 16th the barometer reading was 30.47. The difference in the time of lowest barometer at Yokohama and Tokio is due to the fact that at the former station there is only one daily observation reported. The lowest barometric readings of the month at Tientsin, Shanghai, Nagasaki, Hiroshima, Yokohama, Tokio, Vladovostok, (except 29.90 on the 4th) and Nikolaievsk on the Amoor, occurred during the passage of this area. The average progressive velocity of the centre was about 25 miles per hour, which was probably about the same as that of the other areas.