

barometer. At 4 a. m. on the 11th the same vessel, near 15° N., 97° W., reported a fresh northeast gale, barometer down to 29.66. On the same day the American steamship *Iowan* met with gales from ESE., force 8-10, near 21° N., 107° W., with slightly depressed barometer. On the 12th the *Iowan* had gales of similar force from the east near 17° N., 101° W.

Radio reports of the 12th received by the French steamship *Texas* from several vessels, and furnished by her to the Weather Bureau, show that fresh gales to hurricane squalls from east, southeast, and southwest directions occurred between 15° and 17° N., 99° and 103° W. On the 13th and 14th the weather was stormy along much of the coast from slightly above Salina Cruz to the mouth of the Gulf of California, with heavy easterly to southeasterly gales reported from Acapulco, Manzanillo, and Mazatlan. On the 13th the cyclone had become undoubtedly severe, with the center localized at near 18° N., 104° W., where the *Texas* encountered a full easterly hurricane with very heavy rain early in the afternoon, lowest barometer 29.39. Later in the day, as she proceeded southward, her pressure rose, with diminishing southeast gales.

On this date the American steamship *Munaires*, bound toward the canal, ran into gales from northeast early in the morning, barometer 29.69, in 17° 20' N., 102° 10' W. Apparently she was hove to for the better part of the day, while the wind changed to east, then southeast, increasing to force 11 at 10 a. m., and decreasing to force 7 at 8 p. m. As the gale rose, however, so did the pressure, according to the report furnished by third officer and observer, O. R. Smith, the barometer reading 29.81 at the height of the storm. "There were no unusual weather conditions," said Mr. Smith, "to give warning of the approach of this storm excepting the heavy seas which were encountered some eight hours before the storm."

During the 14th and 15th no gales were reported higher than force 10, but it was apparent that the central area of the cyclone was moving up the coast and at no great distance from it.

On the 16th, although observations failed to come through from neighboring land stations, the full intensity of the storm at sea became manifest. The American steamship *Willpolo*, Balboa to San Diego, had a barometer of 28.94, wind ESE., 9, at 6 a. m., in 22° 51' N., 109° 53' W. At 6.30 the wind had increased to force 10, barometer 28.74; at 6.40 the wind had become an east hurricane, and at 7 the barometer read 28.32 (corrected). At about 7.30 the hurricane wind changed to north, then went into north-northwest at 8.10, barometer lowest at 28.28. At noon the wind was west, force 10, weather moderating. The American tanker *Nora* reported fresh gales during the afternoon well up in the Gulf of California.

The cyclone swept rapidly northward on the 16th with great loss of intensity, and entered southern California, lowest barometer at San Diego, 29.59. At morning observation of the 17th at this station the temperature attained the extraordinary height of 93°, the record maximum for that hour (4.45 a. m.), with wind off the desert. It was followed by sprinkles during a part of the forenoon, and at 4.10 p. m. by a maximum wind velocity of 28 miles from the southeast, which is the record velocity at San Diego for September. On the 18th all that remained of this Mexican hurricane was a shallow elongated low lying north and south to the eastward of San Francisco.

This is the first cyclone of the Mexican west coast during the 20-year period 1910-1929, known by the writer to have pursued a course thus northward into California. The only other storm of the period, the track of which has actually been traced into the extreme southwestern part of the United States, was that of September, 1921, which passed up the west coast of Mexico, caused damaging rains in southwestern Arizona, then went northeastward as a fully formed cyclone, and before dying out in October nearly crossed the Atlantic Ocean.

#### FURTHER NOTE ON THE PHILIPPINE TYPHOON OF APRIL 25-26, 1929

By WILLIS E. HURD

In the April issue of the REVIEW mention was made of a press report of a typhoon experienced April 25-26, 1929, by the American steamship *Edgefield*, Capt. W. H. Walker, Sagay, P. I., to San Pedro. The Weather Bureau now has Captain Walker's own report of the storm, which he characterized as being of small area but of great intensity and the worst of five typhoons of his experience. He noted that "we were approximately 300 miles from the place where the *Elkton* was lost with all hands in 1927."

At noon of the 24th the *Edgefield* was in latitude 14° 46' N., longitude 126° 50' E., wind NE., 5, barometer 29.62 (uncorrected), rough head sea. Twenty-four hours later she was in 16° 16' N., 128° 41' E., wind ENE., 6, barometer 29.57. At 3 a. m. of the 26th she was in the outer edge of the typhoon center, wind west, 12, barometer 28.10, pressure having fallen exactly 1 inch in two hours. Quoting now from the captain's report:

25th. Wind increasing rapidly as midnight approached and barometer falling, with tremendous confused sea.

26th. Center of typhoon passed over vessel about 3 a. m., with wind practically calm and atmosphere very oppressive. From 1.50 to 2.35 a. m., just before center, vessel refused to steer, owing to force of wind, and fuel oil was pumped overboard in effort to calm seas. After passage of center, weather and sea moderated rapidly.

#### TYPHOONS AND DEPRESSIONS—A DESTRUCTIVE TYPHOON OVER SOUTHERN AND CENTRAL LUZON ON SEPTEMBER 2 AND 3, 1929

By Rev. JOSÉ CORONAS, S. J.

[Weather Bureau, Manila, P. I.]

This is the first destructive typhoon we have had over the Philippines since the *Euzkadi* typhoon of last November. The track followed by this typhoon during the first two days of September was very dangerous for Manila, where all possible precautions had been taken. But fortunately the typhoon, which had been moving west by north, inclined northwestward just in time to save our city from a real calamity.

Our weather map showed the first signs of this typhoon at 6 a. m. of September 1, when the center was situated about 350 miles to the east by south of Manila not far from 127° longitude E. and 14° latitude N. It moved rather slowly westward, with a little inclination to the north, and was severely felt on the 2d in the sub-Province of Catanduanes and the Provinces of Sorsogon, Albay, Camarines Sur, and Camarines Norte. At 6 a. m. of the 3d the center passed very near to the northern coast of Camarines Norte, headed for Polillo Island and Infanta, a municipality of Tayabas Province situated about 45 miles to the east of Manila. Our observer of Infanta reported a barometric minimum of 722 millimeters (28.43 inches, gravity correction not

applied) at 12.15 p. m. of the 3d, and we know from reliable sources that a good aneroid barometer of Polillo fell to 716 millimeters (28.19 inches) while the vortical calm was observed.

As stated above, the typhoon inclined to northwest when the center was practically over Infanta, but after only six hours it took again the former west by north direction, which was kept across the China Sea until the center reached Paracels; then it moved west-northwest, passing at 2 p. m. of the 6th near to the south of the Gulf of Tongking.

As it was to be expected, very intensive damage was done by hurricane winds and heavy floods that followed the typhoon in Infanta and Polillo, thousands of people having been left homeless and destitute, while a good number were either missing or found dead. In other parts of Luzon the losses caused by the winds were not so great as those caused by the floods, which are considered very extraordinary. The water supply of Manila was seriously affected by a break in the water mains as a result of these floods.

Up to the present our stations that reported the heaviest rains are those of Virac and Daet. The observer of Virac reported 488 millimeters (19.21 inches) for the 1st of September and 392 millimeters (15.43 inches) for the 2d: a total of 880 millimeters (34.64 inches) in 48 hours. At Daet the amount of rain collected on the 1st and 2d was 124.9 millimeters (4.92 inches) and 470.7 millimeters (18.53 inches), respectively; a total amount of 595.6 millimeters (23.45 inches) in 48 hours. We will never know the amount of rain falling at Infanta, as the rain gage was carried away by the winds and the floods.

The number of lives lost in this typhoon was over 200. The railroad steamer *Mayon* sunk off the coast of Luzon near Pasacao on September 2. The provinces most severely affected by this typhoon were Tayabas, Albay (including Catanduanes Island), Camarines Norte, Camarines Sur, Sorsogon, Rizal, Bulacan, Pampanga, Nueva Ecija, and Tarlac.

The approximate position of the center on the period September 1 to 6 was as follows:

September 1, 6 a. m., 127° 05' longitude E, 14° 00' latitude N.  
 September 2, 6 a. m., 124° 50' longitude E, 14° 10' latitude N.  
 September 3, 6 a. m., 122° 35' longitude E, 14° 35' latitude N.  
 September 3, 2 p. m., 121° 20' longitude E, 15° 00' latitude N.  
 September 4, 6 a. m., 118° 55' longitude E, 16° 00' latitude N.  
 September 5, 6 a. m., 113° 30' longitude E, 16° 30' latitude N.  
 September 6, 6 a. m., 108° 30' longitude E, 17° 30' latitude N.

Besides the destructive Luzon typhoon of September 2d to 3d, there were in the Far East during the month of September five or six other typhoons of less or no importance for the Philippines.

On September 17 a small typhoon center was noticed over the Camarines Provinces which caused an unprecedented flood in Camarines Sur. It was reported that even the highest ground on the town of Nabua was covered by water to a depth of nearly 3 feet. Other towns

of Camarines Sur were reported also as completely submerged. In Naga, the capital of the Province, the lower parts of the town were covered to a depth of from 2 to 3 feet. The total daily rainfall reported from that place for the 17th was 227.8 millimeters (8.97 inches). The small typhoon moved northwestward and passed to the north of Manila in the morning of the 18th. Across the China Sea it moved almost westward until the afternoon of the 20th, when it moved again northwest not far from the coast of Indo-China. With the exception of the floods of Camarines Sur, not much damage was done by this typhoon.

On September 8 to 9 a well-developed typhoon was recurving northeastward about 300 miles southeast of the Loochoos. Its center was shown in our noon weather map of September 10 as passing southeast of Tokyo near the coast of Japan. The approximate positions of this typhoon at 6 a. m. of September 9 to 11 were as follows:

September 9, 6 a. m., 131° 30' longitude E, 25° 00' latitude N.  
 September 10, 6 a. m., 136° 35' longitude E, 31° 35' latitude N.  
 September 11, 6 a. m., 152° 00' longitude E, 40° 50' latitude N.

Another typhoon center moved northeastward about 300 miles north of Guam on September 6.

Two typhoon centers of a similar track moved first to north-northwest from the Pacific east of Balintang Channel and then recurved eastward in the neighborhood of the northern Loochoos. Both were shown in our weather maps of September 19 to 22, and September 27 to 30, respectively. The approximate positions of these two centers for each day were:

First typhoon:

September 19, 6 a. m., 127° 30' longitude E, 20° 25' latitude N.  
 September 20, 6 a. m., 126° 00' longitude E, 25° 15' latitude N.  
 September 21, 6 a. m., 128° 45' longitude E, 29° 15' latitude N.  
 September 22, 6 a. m., 136° 40' longitude E, 30° 20' latitude N.

Second typhoon:

September 27, 6 a. m., 129° 00' longitude E, 20° 20' latitude N.  
 September 28, 6 a. m., 127° 25' longitude E, 23° 30' latitude N.  
 September 29, 6 a. m., 129° 00' longitude E, 28° 00' latitude N.  
 September 30, 6 a. m., 136° 00' longitude E, 28° 10' latitude N.

Finally, our weather maps showed a small typhoon center which followed a very peculiar track from September 5 to 10. It moved almost north over the Pacific more than 400 miles east of Balintang Channel and Formosa, and then recurved gradually to northwest, west, southwest, and south-southwest in the neighborhood of Naha, Loochoo Islands. The approximate position of the center day by day from September 5 to 10 was as follows:

September 5, 6 a. m., 130° 05' longitude E, 20° 05' latitude N.  
 September 6, 6 a. m., 129° 15' longitude E, 24° 35' latitude N.  
 September 7, 6 a. m., 128° 00' longitude E, 27° 00' latitude N.  
 September 8, 6 a. m., 125° 05' longitude E, 24° 50' latitude N.  
 September 9, 6 a. m., 122° 00' longitude E, 21° 55' latitude N.  
 September 10, 6 a. m., 120° 00' longitude E, 18° 45' latitude N.

On the 9th and 10th the typhoon was filling up gradually while continuing moving south-southwest. It had disappeared already on the 11th.