

remarkable feature was the prevalence of fog in the Gulf of Mexico where it was observed on nine days.

On the 1st and 2d there occurred the only well-developed and severe disturbance in the immediate vicinity of the British Isles, and on the latter date moderate to strong gales were reported from a limited area between the 45th and 60th parallels. Storm log:

British S. S. *New-York City*.

Gale began on February 29th, wind WNW. Lowest barometer 28.87 inches at 8 a. m. on the 2d, wind WNW., 8, in latitude 50° 54' N., longitude 15° W. End on the 2d, wind NNW. Highest force of wind 9, WNW.; shifts WNW.-NW.-N.

From the 3d to the 7th the region between the Azores and Bermudas was covered by an area of low pressure, and during this period heavy weather was reported by a number of vessels between the 30th and 45th parallels. storm log:

American S. S. *Coelleda*:

Gale began on the 3d, wind NW. Lowest barometer 29.74 inches at 4 p. m. on the 3d, wind NW. 7, in latitude 38° 22' N., longitude 65° W. End on the 6th, wind NW. Highest force of wind, 9, NW.; steady NW.

On the 8th a LOW was central near latitude 42° N., longitude 62° W.; its progress is shown on Maps VIII to XIII, which cover the period from the 9th to 14th, inclusive, when especially heavy weather prevailed over a large part of the ocean. Storm logs:

American S. S. *West Haven*:

Gale began on the 7th, wind NW. Lowest barometer 29.47 inches at 4 a. m. on the 9th, wind NW., 9, in latitude 38° 19' N., longitude 66° 54' W. End on the 10th, wind NNW. Highest force of wind 11; steady NW.

American S. S. *Radiant*:

Gale began on the 10th, wind SE. Lowest barometer 29.23 inches at 7 a. m. on the 10th, wind SE., 6, in latitude 33° 40' N., longitude 75° 30' W. End on the 12th, wind NW. Highest force of wind 11; shifts SE.-WNW.

American S. S. *Collingsworth*:

Gale began on the 11th, wind W. Lowest barometer 29.64 inches at 10 a. m. on the 11th, wind W., 7, in latitude 26° 23' N., longitude 70° 22' W. End on the 13th, wind WNW. Highest force of wind 10; shifts SW.-W.

American S. S. *F. H. Hillman*:

Gale began on the 13th, wind SSW. Lowest barometer 29.61 inches at 10 a. m. on the 13th, wind SW., 8, in latitude 29° 10' N., longitude 48° 15' W. End on the 15th, wind WSW. Highest force of wind, 10 WNW.; shifts SW.-WSW.

From the 15th to the 19th there was a well-developed LOW in the vicinity of Newfoundland, that moved but little during this period, and a number of vessels between the 40th meridian and the American coast encountered moderate to strong gales, accompanied by hail and snow.

Charts XIV and XV show the conditions on the 21st and 22d, respectively, when a severe disturbance prevailed between the Bermudas and Hatteras that is described elsewhere in the REVIEW. These maps also show a second and much deeper depression northwest of the Azores, which was attended by moderate to strong gales. Storm log:

British S. S. *Maryland*:

Gale began on the 22d. Lowest barometer 28.42 inches at 3 p. m. on the 22d, wind SSE., in latitude 46° 28' N., longitude 32° 40' W. End at midnight on the 22d, wind NNW. Highest force of wind 9; shifts SSE.-NNW.

By the 23d the western LOW was central near latitude 40° N., longitude 45° W., while the second depression was somewhere between the 30th meridian and the coast of Great Britain. Storm log:

American S. S. *Balsam*:

Gale began on the 22d, wind NE. Lowest barometer 29.31 inches at noon on the 22d, wind NE., 7, in latitude 39° 44' N., longitude 60° 46' W. End on the 25th, wind NE., 9. Highest force of wind 9, NE.; shifts NE.-N.-NE.

On the 27th there was a disturbance central about 200 miles south of Halifax and moderate to strong gales prevailed as far south as the Bermudas; by the 28th it was over Newfoundland, while the storm area had contracted considerably in extent. Storm log:

British S. S. *Maryland*:

Gale began on the 27th, wind SW. Lowest barometer 29.11 inches at 6 p. m. on the 27th, wind W., in latitude 40° 59' N., longitude 63° 30' W. End on the 28th, wind WNW. Highest force of wind 10, WNW.; shifts W.-WNW.

On the 29th Hatteras was in the southeastern quadrant of a LOW that moved east-northeastward, and on the 30th was central a short distance southeast of Nantucket, while by the 31st it was near St. Johns, Newfoundland. Storm log:

Italian S. S. *Posillipo*:

Gale began on the 29th, wind SW. Lowest barometer 29.68 inches at 12:30 a. m. on the 29th, wind SW., 9, in latitude 37° N., longitude 66° 05' W. End on the 30th, wind WNW. Highest force of wind 10, SW.; shifts SW.-WNW.

On the 30th there was a second disturbance near latitude 48° N., longitude 45° W., that moved rapidly eastward and by the 31st was in the vicinity of latitude 50° N., longitude 35° W. Storm log:

Belgian S. S. *Menapier*:

Gale began on the 30th, wind SSE., 3. Lowest barometer 29.75 inches at 5 a. m. on the 30th, wind S., 11, in latitude 44° 44' N., longitude 37° 37' W. End on the 31st, wind W. Highest force of wind 11, SSW.; shifts S.-SSW.

551.506 (265.2) NORTH PACIFIC OCEAN

By WILLIS E. HURD

Fine weather prevailed over most of the middle latitudes of the north Pacific Ocean during March, so that vessels following the central and southern routes as a rule experienced smooth sailing. Neither was the weather altogether rough and disagreeable along the northern routes, although gales occurred daily over some portion of the upper waters of the sea.

One factor which contributed largely to the generally settled weather over the eastern part of the ocean was the permanence of the great high-pressure area bridging Hawaii and the American coast. During several preceding months this anticyclone had been frequently and seriously disturbed, but in March it persisted with scarcely a break throughout the month, only fluctuating somewhat with the changing conditions surrounding it.

Hawaii experienced nearly normal weather, except that the rainfall was considerably deficient. The wind velocity averaged 9.4 miles an hour, and maximum velocities exceeded 25 miles per hour on six days, the highest being 34 miles from the east on the 1st. The trades were very steady in this region, and there were few departures from easterly and northeasterly directions. These departures were generally on the 21st to 24th during the prevalence of a depression to the eastward and northward of Midway Island. A slight disturbance appeared to the northeastward of Hawaii on the 28th to 30th, but no gales were reported from it.

Naturally the greater number of storm winds resulted from the activities of the Aleutian LOW. This cyclone was well developed during the first two decades of March, though oscillating north and south and east and west over a considerable area. The average center was nearly over or to the westward of Dutch Harbor. From

the 21st to the 27th more high than low pressure covered this region and Alaska, while cyclone centers ran in lower latitudes than they had earlier in the month. By the close of March, however, the Aleutian low had once more developed and was central over Bering Sea.

The marked low pressure which set in at Dutch Harbor on February 17, as noted in the review of the weather of that month, continued almost without interruption until March 21. The average daily departure for the first 20 days of the month was -0.45 inch. Moderately high pressure then prevailed until the 30th. The average daily pressure for the month (28 days), based on p. m. observations, was 29.48 inches. The normal is 29.77. The highest pressure reported was 30.36, occurring on the 22d; the lowest, 28.80, on the 10th. Absolute range, 1.56 inches. At Midway Island pressure was somewhat above normal during the first two decades and below during the last decade. The average for the month (29 days) was 30.06 inches; normal, 30.10. The highest reading, 30.16, was recorded on the 9th and 13th; the lowest, 29.88, on the 20th and 22d. At Honolulu pressure was above normal from the 1st to the 14th and from the 25th to the 30th. The average for the month (p. m. observations) was 30.06; normal, 30.04. The highest reading, 30.19, was recorded on the 12th; the lowest 29.91, on the 20th.

The high-pressure area overlying the China coast during the greater part of the month caused a quite steady monsoon current that at times increased to gale strength down the Formosa Channel and to the eastward of Taiwan.

Several Manchurian cyclones crossed Japan, and on the night of the 21st-22d hurricane velocities were recorded by the American S. S. *Ensley City* southeast of Yokohama, during the passage of one of these storms.

In tropical waters, both east and west, no disturbances seem to have figured this month. And no gales have been reported by vessels crossing even that place of winds, the Gulf of Tehuantepec, off the south coast of Mexico.

The periods of greatest storm violence over the sea area were those of the 5th to the 10th, 13th to 15th, and the 21st to the 23d. These dates are those on which wind velocities of force 11 or 12 were recorded by ships' observers.

The most troubled region generally was in mid-ocean to the southward of the central Aleutians, but hurricane winds occurred also far to the westward. Forces of 9 or 10 were noted on several dates on which higher velocities did not occur, and these were the strongest winds reported from the eastern high pressure area, as well as from the Gulf of Alaska.

On the 3d and 4th, while the Aleutian low was farthest eastward, the American S. S. *Stockton*, bound for Portland, Oreg., while near 50° N., and running between 145° and 138° W., encountered gales of force 10 coming from south-southwest to south-southeast, and observed a minimum pressure of 29.35 inches.

On the 5th a cyclone of moderate energy entered upon the ocean from Japan. It caused gales along the coast on the 5th and 6th and to the northward of the Bonin Islands on the 7th. On the 7th, 8th, and 9th, with the eastward passage of this storm, now intensified, whole gales to hurricane winds swept over an area extending roughly between latitudes 40° and 50° N., longitudes 150° E. and 175° W.

The American S. S. *Ethan Allen*, bound from Manila toward San Pedro, Calif., entered the southern influence of this cyclone, or storm belt, on the 6th, when near 44°

N., 170° E. Pressure fell constantly throughout the 7th, and from 10 a. m. until after 6 p. m. the winds attained force 10 to a full hurricane. The lowest pressure, 28.16 inches, was read between midnight of the 7th and 2 a. m. of the 8th, while the vessel was in the midst of light east-southeasterly winds, and probably near the center of the disturbance, in latitude $44^{\circ} 36'$ N., longitude $175^{\circ} 12'$ E. This reading of the barometer is the lowest thus far recorded for the month. Storm winds, with few interruptions, were experienced by the *Ethan Allen* until mid-afternoon of the 8th, and pressures approximating 29 inches or below were observed on board the vessel until the morning of the 9th, when she was near 45° N., 173° W.

There were other vessels experiencing the violence of this general storm area. The Canadian S. S. *City of Vancouver* was hove to from "7.50 p. m. of the 7th until noon of the 8th, during which time the engines were going slow astern." During this period she was near $46^{\circ} 36'$ N., 178° to 179° E., experiencing southeasterly to southwesterly winds, force 9 to 10, lowest pressure 28.63 inches.

On the 8th and 9th the British S. S. *Benmacdhui*, Portland toward Shanghai, Capt. T. J. Smith, met with very rough weather at or near 48° N., 165° E., lowest pressure 28.75. The observer, W. E. Barrett, second officer, noted:

8th. Wind increasing to gale force, backing to NW. by W., with squalls, force 11. Overcast, continuous sleet; rough, confused sea; westerly swell.

9th. Whole gale, decreasing to strong squalls, force 10; wind backing to SW. 8; very rough and confused sea; westerly swell. Decks covered with thick ice.

The British S. S. *Knockfierna*, westward bound, after crossing the area already mentioned, on the 7th and 8th, encountered whole gales to hurricane winds from north to northwest on the 9th, in $44^{\circ} 30'$ N., $157^{\circ} 46'$ E. The observed temperature at 10:30 p. m. of the 9th (local time) was 23° F., with heavy snow falling.

In west longitudes, during this general period, the American S. S. *Bessemer City* recorded the easternmost appearance of hurricane winds for the month. This was in 40° N., 159° W. The extreme velocity was of brief duration, and the lowest pressure observed was only 29.70 inches. On the 9th and 10th the same vessel experienced violent squalls, the extreme velocity of which attained force 12 on the 9th, in $34^{\circ} 50'$ N., $175^{\circ} 30'$ W., minimum barometer 29.77.

The American S. S. *West Jester* fell in with much foul weather on the 7th to 9th, after crossing the 180th meridian, eastward bound, near the 50th parallel. For two days the steamer was hove to, amidst high seas and long-continued gales of force 11 from southeast to east-northeast. Her lowest observed pressure was 28.71 inches, in 48° N., 179° W., on the 7th.

The British S. S. *Margaret Coughlan* observed a minimum pressure of 28.40 inches, highest wind force 10 E., in $51^{\circ} 43'$ N., $18^{\circ} 46'$ W., on the 9th.

On March 13 a depression left the Japanese coast. It intensified at sea, and on the 14th and 15th caused whole gales far to the eastward. The highest wind velocity reported was 11 SW., by the American S. S. *India Arrow*, lowest pressure 29.22 inches, while in 40° N., 172° E.

On the 16th and 17th, while a low was central over eastern California and vicinity, with the north Pacific high strongly crested at 45° N., 140° W., there was some considerable barometric gradient along the coast.

The American S. S. *Lurline*, shortly before entering San Francisco Harbor, ran into a northwest gale, force 10, pressure 29.68 inches.

On the 18th the American S. S. *Bakersfield* experienced a whole westerly gale, lowest pressure 28.81 inches, in 47° 16' N., 178° 42' E., and on the 22d the Japanese tanker *Kamoi*, Yokohama to San Pedro, met with a north-northeasterly hurricane in 45° N., 179° E., without much depression of the barometer.

During the remaining days of the month there was a slackening in storm intensity, although on the 25th and 26th whole westerly gales were reported from the southward of Dutch Harbor, the barometer on board the American S. S. *Norlina* registering a pressure as low as 28.51 inches, in 50° 13' N., 167° 35' W.

On the 30th whole gales also occurred to the westward of the 180th meridian, the Japanese S. S. *Boston Maru* reporting a southwesterly wind, force 10, in 49° 33' N., 177° 07' E. The lowest observed pressure on this date was 28.64 inches, read on board the American S. S. *West Jessup* during a strong northerly gale, in the midst of a driving snowstorm, in 46° 50' N., 168° 12' E.

There was some slight shifting in the fog area since February. Much less of the phenomenon was observed along the American coast, but there was a slight increase in its occurrence over the general region of the great eastern high pressure area. Scattered fog occurred thence along the northern routes to the 160th meridian of east longitude.

NOTE.—In the February weather review of the north Pacific Ocean the highest noted force of the wind for the month was given as 11. A late report received from the British S. S. *Knockferna* shows that a full southeasterly hurricane was encountered on February 25, while the vessel was in latitude 52° 20' N., longitude 154° 05' W., the minimum pressure read being 28.45 inches.

551.515 (916)

GALES OFF THE AFRICAN COAST AND IN AUSTRALIAN WATERS

By ALBERT J. McCURDY, JR.

Gales of short duration and limited extent prevailed off the north and east African coast throughout March, as indicated by weather reports from vessels traversing shipping routes in that region.

The American S. S. *Nile*, Capt. Charles Olsen, proceeding from Bombay to the United States, via Port Said, on the 4th, while in the Red Sea, encountered a moderate gale with rough seas. Mr. Christian Olsen, second officer, reports that the lowest pressure observed was 29.90 inches (uncorrected), occurring at 2:40 p. m., in 24° 03' N., 36° 11' E. The wind at this time was NNW., force 7.

On the 8th and 9th the British S. S. *Hyson*, Capt. A. S. Blues, proceeding from Singapore to Jeddak, experienced a moderate southerly gale and rough seas off the islands of Perim and Kamaran in the Red Sea. The second and third officers state that the lowest pressure, 29.76 inches (corrected), was observed off Kamaran Island at 2:51 p. m., on the 9th, at which time the wind was S., force 7.

The *Hyson* encountered its second gale of the month north of Port Said on the 16th, while proceeding from Jeddak to Algiers. The second officer reports a rough confused sea with occasional rain squalls. At 8 p. m., while in 33° 30' N., 26° 23' E., the lowest pressure was observed, 29.42 inches (corrected). The wind at this time was SSW., force 7, but later shifted to northwest and increased to a fresh gale. This gale continued until 4 p. m., on the 17th.

The British S. S. *Clan Malcolm*, Capt. C. J. Higgins, Calcutta toward London, was involved in the same storm from the 16th, when proceeding into the Suez Canal, until midnight of the 17th, reporting conditions similar to those experienced by the *Hyson*. The lowest pressure reading, 29.61 inches (uncorrected), occurred at 4 a. m., on the 17th. The wind at this time was W., force 7.

The same vessel again encountered heavy squalls on the 25th, while running up the coast between Port Said and Gibraltar. Captain Higgins states that the lowest pressure was 29.81 inches (uncorrected), occurring at 4 p. m., in 36° 30' N., 2° 18' E. At this time the wind was SW., force 9.

On March 8 there was an area of low pressure south of Australia that drifted slowly northeastward and from the date of its first appearance until the 11th fresh to strong gales prevailed between Australia and the coast of New Zealand.

During the period of maximum intensity of this storm, three vessels encountered fresh to strong gales. These were the American S. S. *Las Vegas*, and the British steamships *Waiotapu* and *Maunganui*.

The *Las Vegas*, Capt. Joseph Fritsch, proceeding from Dunedin, New Zealand, to Melbourne, on March 8 encountered a westerly gale accompanied by heavy rain squalls and rough seas. Mr. A. C. Larsen, second officer, reports that the lowest pressure observed was 29.27 inches, this occurring at 6 a. m., in 42° 50' S., 152° 50' E. The wind increased by the 9th to force 9, NNW., continuing so throughout the day.

On the 9th the *Waiotapu*, Capt. J. F. S. Brown, proceeding from Auckland, New Zealand, to Melbourne, encountered this same gale while in 36° 13' S., 163° 5' E., reporting conditions similar to those experienced by the *Las Vegas*. Mr. B. S. Cave, observer, states that the lowest barometer, 29.30 inches, was recorded at 3:30 p. m., on the 9th. The wind at this time was W. by S., force 8, thence shifted to south by midnight and increased to a whole gale which continued throughout the morning of the 10th.

On the 11th this cyclone had passed over New Zealand and the center was reported to be off Auckland. The *Maunganui*, Capt. L. Worsall, westward bound from Raratonga, came within its influence 85 miles off East Cape, New Zealand, experiencing southwesterly gales, force 10, accompanied by high seas and severe rain squalls. Mr. W. Johnson, second officer, reported that the lowest observed pressure, 29.25 inches, occurred in 37° 37' S., 179° 5' W., about six hours before the gale was experienced. This gale lasted for two days and during that time the wind was steady and blowing from the southwest.