

On the 5th and 6th the British S. S. *Ixion*, Capt. R. N. Hodgson, Hong Kong for Manila, had a very high sea and heavy NE. swell. The *Ixion* was on the 5th upwards of 400 miles from the estimated position of the center of the typhoon.

This typhoon was closely followed by another, the track of which during the earlier part of its history can, however, only be conjectured. The first report of this second typhoon appears in a warning issued by the Japanese meteorological service on the 11th, in which the center was placed in latitude  $21^{\circ}$  N., longitude  $126^{\circ}$  E., depth 29.45 inches, direction N. During the 12th and 13th it moved in a northeasterly direction, the last warning issued placing the center at 6 a. m. of the 13th in latitude  $34^{\circ}$  N., longitude  $146^{\circ}$  E., depth 29.61 inches, direction ENE.

It is not improbable that this second typhoon had its origin in the same region as the first one mentioned, that is, near the Caroline Islands. On November 2 the S. S. *Bali*, which two days before had passed not far from the center of the first typhoon, experienced a high ENE. swell, the wind going to NE. and becoming strong. Heavy rain occurred between moments of absolutely clear sky, conditions identical with those as observed on October 30. In the *Bali's* report it is stated that the inference was that another typhoon was passing, this time to the southward. It would have been possible for a typhoon so located to travel in a northwesterly direction and appear to the east of Formosa on the 11th, where the second typhoon was discovered on that date.

While these typhoons prevailed in Asiatic waters conditions were very active in the higher latitudes of the North Pacific, although the reports at hand are not sufficiently numerous to permit of describing the situation over the entire ocean in detail. This activity continued throughout the remainder of the month and into December.

The outstanding features of these extratropical storms were the extraordinarily low pressures recorded in mid-ocean on the 13th and 14th and the intensity of the southwest gale which swept the American coast near the end of the month. This gale caused the wreck on the 26th of the Peruvian barge *W. J. Pirrie*, which went ashore near the mouth of the Quillayute River, and is generally considered to have been one of the worst in the history of the coast.

The British S. S. *Monteagle*, Capt. A. J. Hosken, Yokohama for Victoria, experienced heavy weather during much of the voyage, lasting from the 5th to the 21st. From the 13th to the 15th, during a strong gale, the ship's barometer showed abnormally low readings, 28.30 inches at 8 a. m. of the 14th, 28.12 inches at noon, 28.04 inches at 8 p. m., and 28.06 inches on the morning of the 15th. The *Monteagle*, during the time, was in latitude  $50^{\circ}$ - $51^{\circ}$  N., longitude,  $170^{\circ}$ - $161^{\circ}$  W. The lowest barometer observed was 27.98 inches. The correction for

instrumental error of the barometer, an aneroid, is  $-0.13$  inch, which would make the lowest pressure 27.85 inches. Press reports of the *Monteagle's* voyage state that this was the lowest barometer within the memory of the oldest officer aboard.

On the 14th the Japanese S. S. *Manila Maru*, Capt. T. Somekawa, also from Yokohama for Victoria, when in latitude  $50^{\circ} 19'$  N., longitude  $162^{\circ} 6'$  W., recorded a barometer reading of 27.70 inches. The correction for the barometer used, an aneroid, is  $+0.11$  inch, which makes the actual pressure 27.81 inches.

At Dutch Harbor (latitude  $53^{\circ} 30'$  N.,  $166^{\circ} 55'$  W.), the pressure at the morning observation on the 15th was 28.46 inches. Lower readings have been recorded at that station on several occasions since its establishment in 1911. The lowest reading of record is 27.68 inches, reported as occurring in the afternoon of November 16, 1912.

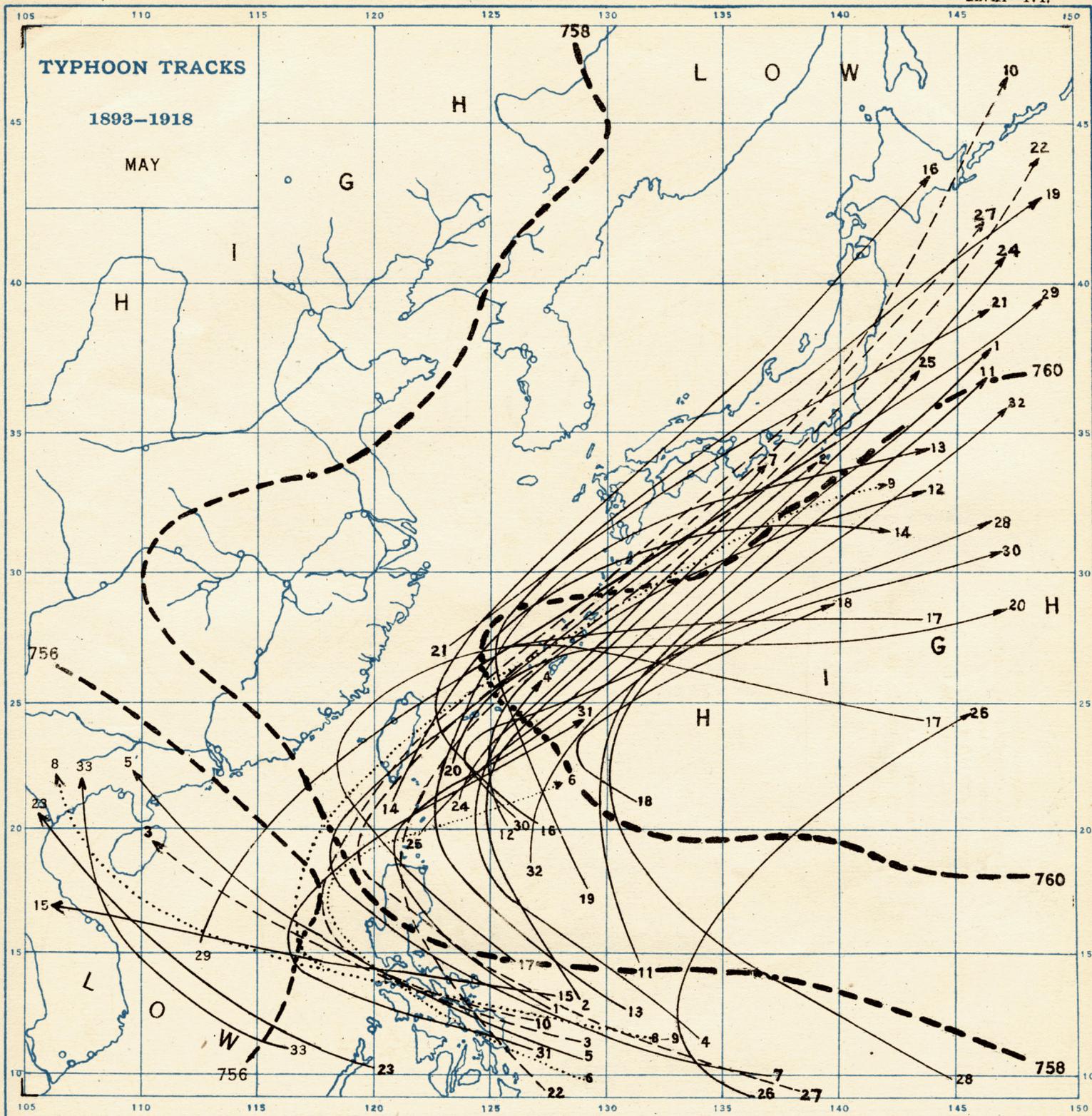
While these abnormally low pressures were being recorded on the North Pacific, correspondingly low readings were being made in the North Atlantic, the Danish S. S. *H. P. Holmblad*, reporting a barometer of 27.86 inches on the 14th, when in latitude  $58^{\circ} 30'$  N., longitude  $15^{\circ} 10'$  W. Reference thereto will be found in the report of weather of the North Atlantic Ocean.

There had been some recovery in pressure in the Aleutian area following the great depression of the 14th and the 15th and at Dutch Harbor readings were slightly above normal from the 17th to 19th. By the 21st, however, the barometer had fallen to 29.04 inches and at the evening observation of the 23d to 28.94 inches. At this time there was a single depression overlying the Aleutian Islands. On the morning of the 24th two centers appeared, one over the Gulf of Alaska, another centered near Dutch Harbor. This condition held throughout the 24th, but had disappeared by the morning of the 25th, when the weather map showed a single center over the eastern part of the Gulf of Alaska, the point of lowest pressure being Sitka with a barometer of 28.82 inches. During the 25th, 26th, and 27th this depression developed to the southeastward causing dangerous southeast to southwest gales on the American coast during the 26th and 27th, reaching a velocity of 93 miles an hour from the south at Tatoosh Island at 3.25 p. m. of the 26th, exceeding all previous records at that station. A velocity of 68 miles from the south was recorded at North Head on the same date.

#### CHARTS OF TYPHOON TRACKS.

In the section devoted to charts in this issue of the REVIEW will be found charts of typhoon tracks in the Far East for the months of May and June, reproduced from Atlas of the Tracks of 620 Typhoons, 1893-1918, by Louis Froc, S. J., Director Zi-ka-wei Observatory, Shanghai, China.

November, 1920. M. W. R.



MAY.—Single chart: 33 tracks; a little more than one case every year.

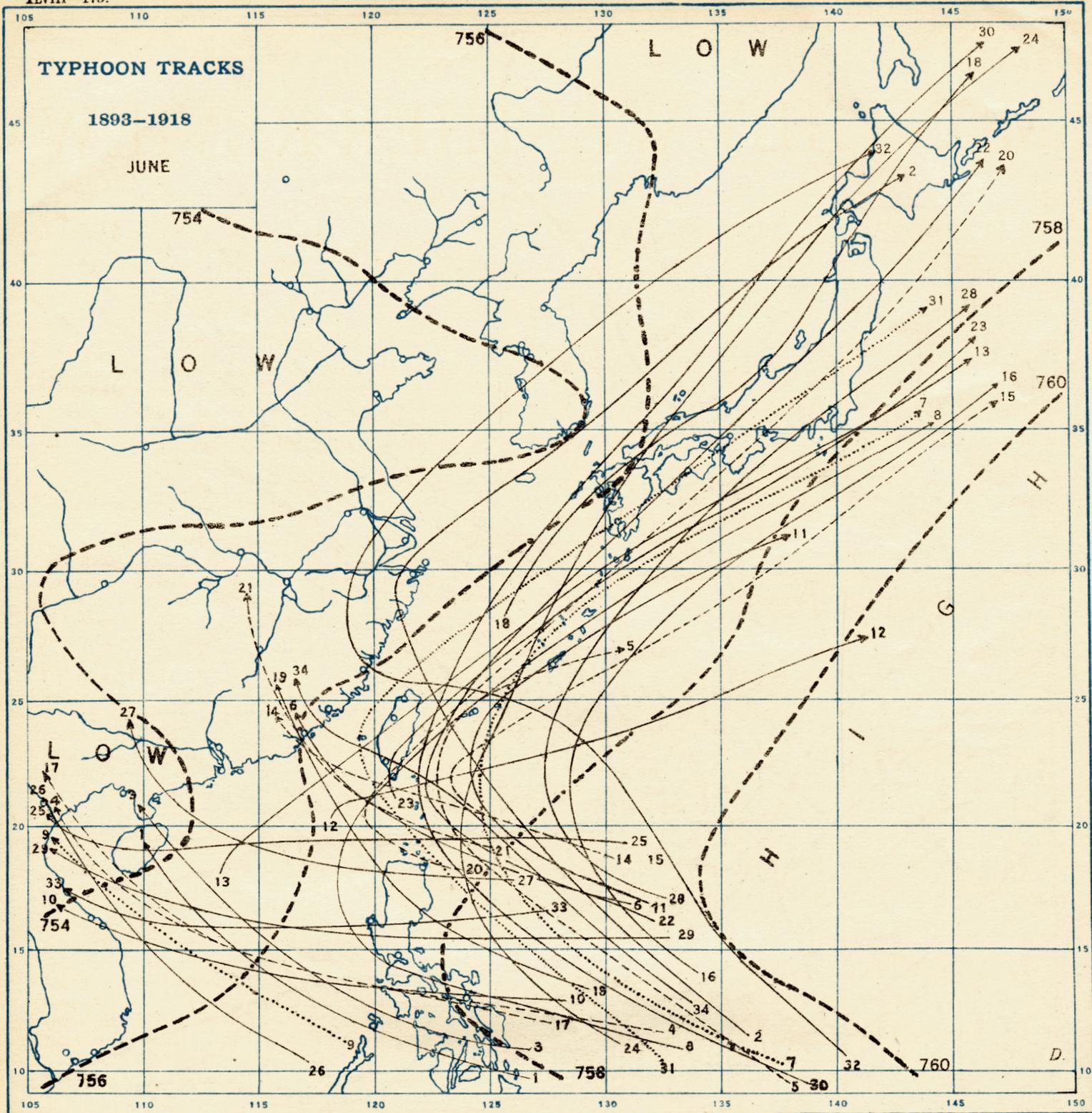
**Remarks.**—A very significant change has taken place: while the number of the perturbations has more than doubled, their trajectories make a considerable bound towards the W, where their wanderings become easier for the reason that the great continental maximum is weakened and has retired a long way towards Siberia. The tracks begin to invade the Philippines and even the China Sea and after recurving towards the NE, form a dense bundle between Formosa and the Loochoos.

Several curves are turning on the China Sea, off western Luzon, not far from the Macclesfield bank; others have their recurving apex to the S. of the Meiac-Sima group. The Sea of Japan and the Eastern Sea are still relatively free of their incursions, but a characteristic feature of the month is the invasion of the China Sea: no less than 6 typhoons, increasing in violence, are seen to strike the coast between Tourane and Kwang-chow-wan, crossing sometimes the Gulf of Tongking.

The birth-place of the storms has gained ground northwards and chiefly westwards: if we look to the converging point of the prolonged tracks, we see that they are mostly issued from the occidental Carolines, in the region of Yap. It is the opening of the true typhoons season.

[Reproduced from Atlas of the Tracks of 620 Typhoons, 1893-1918, by Louis Froc, S. J., Director Zi-ka-wei Observatory, Zi-ka-wei-Chang-hai, 1920.]

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JUNE.—Single chart: 34 tracks; a little more than one case every year.

**Remarks.**—The tropical storms have not much increased in numbers, but the translation of their movement towards the NW is asserting itself more and more. The Philippines are crossed freely, Hainan and the Gulf of Tongking receive more numerous visits, but the more interesting feature for us is that the coast of China is no more invulnerable; the typhoons may strike Kwangtung and even two instances give the warning that they can rise up to Foochow, and pay a visit, after recurving inland, to the mouth of the Yang-tze kiang.

The recurving of the trajectories takes place, with a fair degree of regularity, in the neighborhood of the Ballintang and the Bashi Channels about the 20<sup>th</sup> parallel, in the great curve of islands formed by the Meiac-Simas, Formosa and northern Luzon. Thence the tracks are seen to start towards the NE, in great numbers, to sweep over the Loochoos, Kuishu and Nippon: a few begin even to cross the Sea of Japan.

The corresponding arrangement of the pressures deserves to be noticed: a distinct minimum has replaced the high plateau of the cold season on the Continent, as far as Mongolic, and on the other side, the maximum of the middle Pacific is throwing forward a spur that invades the Philippines. There is a striking parallelism between the so called "parabolas" of the typhoons and the isobaric lines surrounding the W end of the oceanic maximum.

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