

The temperature of the water at the bottom in this section was generally the same as that at 1400 fathoms, viz.,  $35^{\circ}3$ , from which it appears probable that this portion of the Pacific Ocean is cut off from the general circulation by a ridge joining Japan with the Admiralty group through the chain of small islands stretching in an almost continuous line from Japan through the Bonin, Ladrone, and Caroline Islands to the Equator.

The surface temperature, which at the Admiralty Islands was  $83^{\circ}7$ , continued above  $80^{\circ}$  for nearly 1000 miles, and even as far north as the 22nd parallel was over  $78^{\circ}$ . Between the 22nd and 25th parallel it fell  $8^{\circ}$ , and continued at an average of  $69^{\circ}5$  to the 30th parallel, after which it varied between  $56^{\circ}$  and  $68^{\circ}$  to the coast of Japan, being  $55^{\circ}$  in Yokohama Bay.

The serial temperatures showed that from the Admiralty Islands to the 14th parallel of north latitude, a mass of warm water above the temperature of  $80^{\circ}$  extended from the surface to the depth of from 50 to 90 fathoms. Below this warm surface stratum the temperature decreased very rapidly (on one occasion altering  $15^{\circ}$  in 11 fathoms), until at 300 fathoms it appeared to be very nearly constant at  $45^{\circ}$ . The isotherm of  $45^{\circ}$  remained at the depth of 300 fathoms from the Admiralty Islands to the 15th parallel, northward of which it sank to 400 fathoms. Between the 15th and 26th parallels the isotherm of  $40^{\circ}$  was constant at 500 fathoms; northward of the 26th parallel it rose towards the surface, as did also the isotherm of  $45^{\circ}$  (see Diagram 16). The isotherm of  $45^{\circ}$  was also at the depth of 300 fathoms in the Banda, Celebes, and China Seas; and the isotherm of  $40^{\circ}$  was found at a depth of 500 fathoms in the China Sea in January.

Anemometer observations were taken daily during the passage, from which it appeared that between the 1st and 6th parallels of north latitude, the mean velocity of the trade wind was only 6 miles per hour. North of the 6th parallel the velocity gradually increased, until in  $10^{\circ}$  N. it was 22 miles per hour, which was the maximum attained; it then gradually decreased to 8 miles per hour in  $17^{\circ}$  N., and from that parallel to  $20^{\circ}$  N. only averaged 5 miles per hour. After losing the trade, the velocity of the wind varied considerably, but it never exceeded a rate of 22 miles per hour.

No current observations were taken except the surface set, which was ascertained by frequent astronomical observations.

In April, when nearing Japan, the temperature of the surface water fell from  $70^{\circ}$  to  $64^{\circ}$  between 6 P.M. on the 8th and 1 A.M. on the 9th, so the ship having apparently entered the Japan Stream, a sounding was taken at 5.30 A.M. in 2250 fathoms, but little or no current was observed, the position at this time being lat.  $31^{\circ} 8' N.$ , long.  $137^{\circ} 8' E.$

After completing the sounding the vessel proceeded to the northward, the surface temperature varying from  $63^{\circ}$  to  $64\frac{1}{2}^{\circ}$  until 6 A.M. on the 10th April, when in lat.  $32^{\circ} 35' N.$ , long.  $137^{\circ} 45' E.$ , it rose suddenly to  $68^{\circ}$ . At noon the ship's position was lat.  $32^{\circ} 55' N.$ , long.  $138^{\circ} 25' E.$ , and a current of 42 miles N.  $22^{\circ}$  E. (true) had been experienced since noon on the 9th. This position was fixed by meridian altitude, and