

The mean surface temperature north of the 13th parallel was $77^{\circ}5$, after which it gradually increased to 80° at 10° N., and continued at 80° to 81° to the 6th parallel of north latitude; it then decreased to 77° near the Equator, where the current was running at the rate of 3 miles per hour to the westward, rose to 79° in 6° S., and then gradually decreased to 77° at Tahiti.

The serial temperature soundings show that the isothermal lines above 55° all rise slightly from the Sandwich Islands to the parallel of 9° N., but afterwards all descend steadily to Tahiti. The rise of these isotherms in 9° N. is very remarkable, as they are there considerably higher than either to the north or south. This is probably due to excessive rainfall, for it is known that at this season of the year (August) the northeast trade only extends to 10° N.; from thence to 6° N., where the southeast trade commences, light winds with cloudy weather and much rain are experienced. These heavy rains, combined with the cloudy weather, affect the specific gravity of the surface water to a considerable extent, so that at 9° N. it is only 1.025, whilst on each side of that parallel it is 1.026, hence the surface water does not sink and consequently does not impart its heat to the water beneath. The isotherm of 40° , which is at a depth of 500 fathoms at Hilo, descends to 650 fathoms at 2° N., and then varies from 500 to 600 fathoms to Tahiti. The isotherms of 45° and 50° follow, but not very closely, the curve of that of 40° (see Diagram 19).

The currents between the Sandwich and the Society Islands ran with considerable force. From Hawaii Island to the 10th parallel the direction of the current was N. 60° W., and its average velocity 18 miles per day, ranging from 10 to 23 miles. From the 10th to the 6th parallel its direction was easterly, and its average velocity 31 miles per day, ranging from 7 to 54 miles. From the 6th parallel of north latitude to the 10th parallel of south latitude, the direction was again westerly, and the average velocity 35 miles per day, ranging from 17 to 70 miles per day. From thence to Tahiti the general tendency of the current was westerly, but its velocity was variable. The axis of greatest velocity of the Counter Equatorial Current was between the 7th and 8th parallels of north latitude (see Sheet 38).

The axis of greatest velocity of the Equatorial Current was on the parallel of 2° N., where its speed amounted to 3 miles per hour. Such an exceptional velocity has, so far as is known, only been recorded once before, viz., by the French corvette "Eurydice" in August 1857. The astronomical observations taken at frequent intervals showed even a greater velocity than 3 miles per hour. By those observations it appeared that the vessel was in the still water between the Equatorial and Counter Currents on the 2nd September in lat. $5^{\circ} 54'$ N., long. $147^{\circ} 2'$ W. From this position to lat. $4^{\circ} 32'$ N., long. $147^{\circ} 38'$ W., the velocity of the Equatorial Current was $\frac{3}{4}$ mile per hour S. 53° W.; from thence to lat. $3^{\circ} 55'$ N., long. $148^{\circ} 10'$ W., its velocity was $1\frac{1}{2}$ miles per hour; thence to lat. $3^{\circ} 32'$ N. its velocity was $1\frac{3}{4}$ miles per hour; thence to lat. $2^{\circ} 34'$ N., long.