viz., that by all three observers the temperature at 100 fathoms was either the same or lower than that at the surface, and was at or below the freezing point of fresh water, whilst at 150 fathoms the mean temperature was only on one occasion less than that of the surface, or below 32°, the mean of the sixteen observations at that depth being 34°·3, and higher than the temperature of the surface. The coldest submarine temperature obtained was by Wilkes, who registered 27½° at a depth of 320 fathoms,[1] but as serial temperatures were not obtained there is no reason for believing that this temperature existed at the depth of 320 fathoms, as the thermometer might, and probably did, pass through a stratum of water at that temperature before it reached the depth of 100 fathoms.

During the voyage of the Challenger from Kerguelen to Australia five serial temperature observations were obtained south of the 60th parallel; and as these observations are highly important, a full notice of them is appended in order to afford every possible facility for future discussion, and also to indicate the data still required as well as the kind of instrument necessary to obtain those data. The general result of the observations seems to show that from the most southerly Station a wedge of cold water stretches northwards for more than twelve degrees of latitude, underlying and overlying strata at a higher temperature than itself. The temperature of the water below the lower warm stratum is uncertain, because it lies between the maximum and minimum observed at lesser depths. These results receive confirmation from the imperfect observations of Cook, Ross, and Wilkes (see Diagram 9).

On the 14th February 1874, in lat. 65° 42′ S., long. 79° 49′ E., the most southerly Station at which temperature observations were obtained, the temperature of the surface water was 29°·5 and that of the air 33°. The ship was about 1½ miles from the edge of the pack ice with many icebergs around, forty-eight being counted within a horizon of 4 miles; the average height of the bergs out of the water was 150 to 200 feet, most of them were tabular, and had changed little from their virgin state, they must, therefore, have extended to a depth of from 200 to 300 fathoms below the surface. The temperature of the water at 50, 100, 200, 300, 500, and 1675 fathoms (bottom) was determined. For this purpose two thermometers, Nos. 66 and 67, were sent successively to each of these depths, having been cooled to a temperature of 30°·2 before immersion. At 50 and 100 fathoms each thermometer registered a slight change in the maximum index, which is probably due either to an error in reading off or to a slight defect in the instruments, as it has been frequently found that the maximum indices alter their positions slightly on entering cold water.[2] The minimum index of each fell to 29° proving that they had entered or passed through a stratum of cold water. At the greater depths of 300, 500, and 1675 fathoms the thermometers registered a decidedly

[1] Wilkes' U. S. Expl. Exp., vol. ii. p. 299, 1845.

[2] Or this may be due to the glass contracting suddenly before the temperature has reached the spirit in the bulb of the thermometer, and so forcing the index up slightly.