

surface stratum of $37^{\circ}2$ and the cold stratum at 80 fathoms of $32^{\circ}5$, they were unable to record any alteration between those temperatures at greater depths.

The bottom thermometers showed the temperature of immersion on their maximum side, and $32^{\circ}2$ and $32^{\circ}0$ on the minimum. As this is a colder result than any other instrument showed between the surface and 500 fathoms, it is probably justifiable to assume the mean ($32^{\circ}1$) to be the correct bottom temperature at this position.

The result of the foregoing observations may be briefly stated thus:—

On the passage towards Cape Otway the cold intermediate stratum was traced as far north as 54° S., where its temperature was $32^{\circ}5$ at a depth of 80 fathoms. Farther south it decreased until in lat. 66° S. it was 29° from immediately below the surface to a depth of 200 fathoms, or nearly as low as the freezing point of salt water.

The warmer stratum of oceanic water underlying it also gradually decreased in temperature as higher latitudes were reached, and it is possible that farther south the temperature of the water from the surface to the bottom will be found nearly uniform at probably 29° or 30° ; but in that case it is somewhat difficult to account for the rise in temperature of the bottom water to $33^{\circ}5$ in lat. 50° S., long. 123° E., only about 1200 miles from its source, as it is known that this temperature is retained with little alteration for 3000 miles, for Captain Shortland obtained bottom temperatures of $33\frac{1}{2}^{\circ}$ in the Arabian Sea with unprotected thermometers. This will be referred to again when discussing the specific gravity of the sea water of the Southern Ocean.

During the winter season the ice at the surface must necessarily be colder than the water underlying it; it seems therefore highly probable that the cold wedge of water found near the surface is merely the remains of the winter-cooled sea, which has not sufficient time during the short summer to recover its temperature; it is also probable that during winter the solar-heated surface belt is entirely removed, and that the sea as far north, at least, as the 63rd parallel of south latitude becomes frozen over, the frequent gales breaking up the field ice and converting it into pack. It is noticeable that the temperature of the underlying stratum was on each occasion found to be warmer than the surface water. This fact is also confirmed by the observations of Cook, Ross, and Wilkes.

The fact that the cold wedge above referred to extended north just as far as the icebergs did in March 1874 points to there being some connection between the temperature and the presence of melting icebergs. The lowest bottom temperature registered between the Cape of Good Hope and Melbourne, north of the 54th parallel, was $33^{\circ}5$, at the 54th parallel it was $32^{\circ}1$, and at all Stations farther south of this, it cannot be said with absolute certainty what the bottom temperature was, as the thermometers below 300 fathoms came up with exactly the same readings as at that depth.

During the time the ship was near the edge of the pack ice the surface temperature was from 28° to 29° , and remained uniform to a depth of upwards of 200 fathoms,