found abundance of plankton in April 1910, algæ being present in large quantities as deep down as they have been known to occur, that is to say as far down as sufficient light penetrates. We can appreciate the difference between these conditions and the conditions in coastal areas like the Christiania fjord, if we remember that the nutritive substances in the first case may rise up from the deep water, while in the second they are derived from the surface through the admixture of fresh water.

Vertical circulation is regulated by differences in temperature at the surface, due to summer and winter, which are sufficient to increase the density of the upper layers till it equals the density lower down, and if circulation is to have any effect in the open sea, the surface-layers must be able to sink to a depth of at least 200 to 300 metres. The greater the difference in temperature between summer and winter, the more effective will vertical circulation generally be.

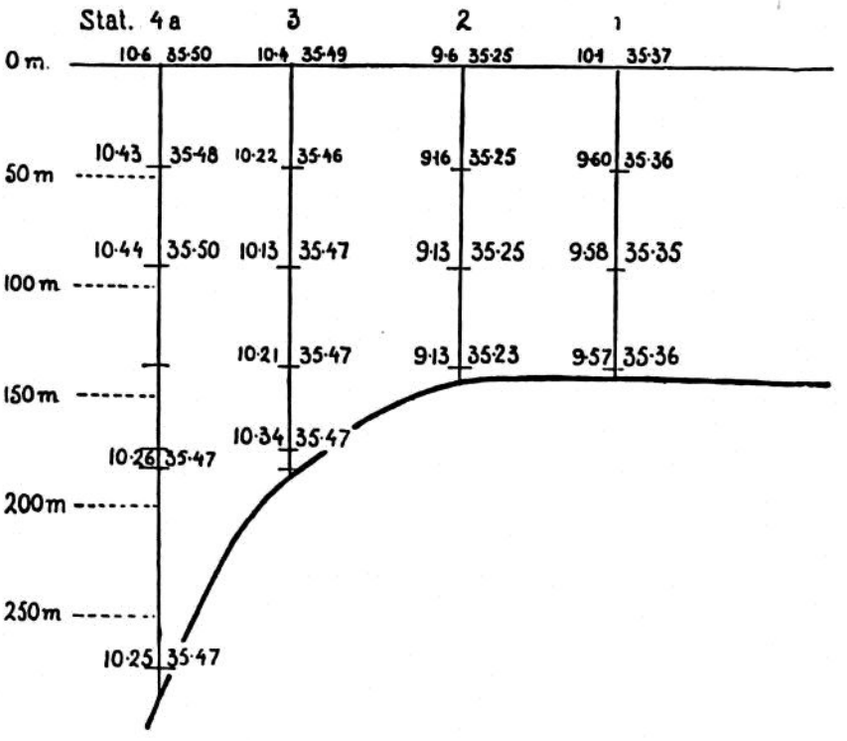

FIG. 252.—HYDROGRAPHICAL SECTION OFF THE IRISH COAST (April 1910).
Temperature and salinity nearly uniform from the surface down to a depth of 250 metres.

Assuming, then, that our view is correct, namely that plant production in the sea is mainly regulated by the amount of dissolved nutritive substances, we must expect to find plankton produced in abundance in coastal areas to which large rivers convey nourishment from the land, and in oceanic areas where vertical circulation takes place on a large scale, or where ascending currents bring up the deeper water-masses. Where vertical circulation is the controlling influence, the greatest profusion will be at seasons when the temperature of the surface reaches its minimum; that is to say, generally in winter, or in higher latitudes in the early months of spring. It would be possible to test the truth of this theory if we could