

The Growth of Vegetable Plankton in the Sea.

THE changes in the plankton and their relationship to chemical and physical factors has long been a subject of inquiry, which is now being actively prosecuted along several lines. At the moment of writing, two research vessels on cruises round the world are investigating the distribution of manurial salts in the ocean waters and their relation to the quantity of planktonic life; the *Meteor* expedition in the South Atlantic has collected numerous data, and investigations are in progress on the Norwegian coast, off Heligoland, in the English Channel, and will shortly be instituted on the Great Barrier Reef upon varying facets of the same question.

Until recently it was only in isolated cases that more than a general relationship has been made out.

out, to be followed by a succession of further flowerings. Each outburst was accompanied by an increase in oxygen, a fall in carbon dioxide—lowering the hydrogen ion concentration—and a fall in phosphate content of the water in the upper layers. A noticeable lag occurs between the commencement of a flowering and a fall in phosphate, and was also apparent with the changes in oxygen and carbon dioxide content of the water.

It is remarkable that the April outburst dies away and a week elapses before the second outburst starts in May, although phosphate available for growth remained in the upper layers. Again, the paucity of diatoms from June 4 until June 29 is not accompanied by a complete lack of phosphate.

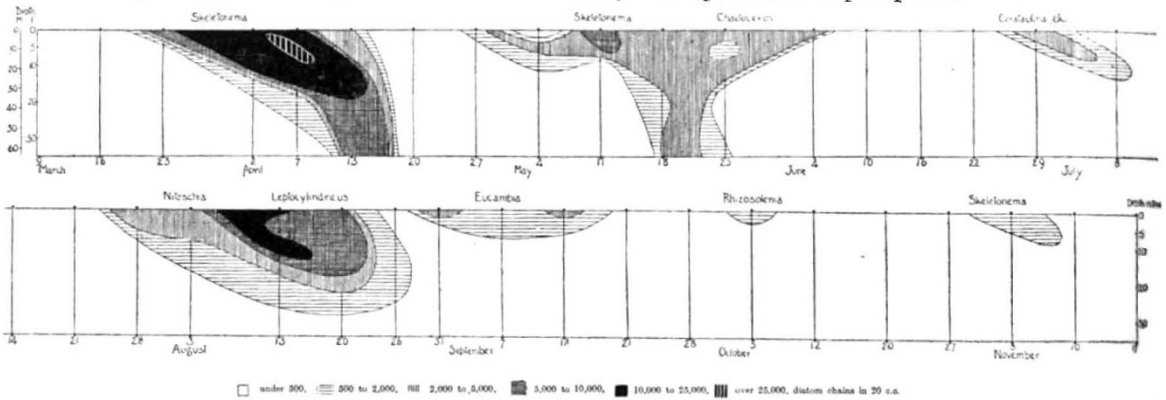


FIG. 1.—Diagram of the Diatoms at Clapochlar in 1926.

The work of Marshall and Orr¹ in Loch Striven, on the west coast of Scotland, during 1926 and previous years, has afforded a noteworthy addition to our knowledge of the physical and chemical conditions which accompany the outbursts of diatom growth in the sea—complementary to the work of Gran and his co-workers, and to that of Sereiber, which were proceeding at the same time from a similar biological viewpoint.

Loch Striven lent itself readily to such an investigation, since it was found, from general surveys, that the outbursts of diatoms were similar in kind and in time to the outbursts in other positions in the Clyde sea area. The water is not polluted by any village on the shore, and the land area draining into it is only twice the area of the loch itself. The loch was visited weekly during 1926, when the diatoms occurring at various depths were ascertained, together with the phosphate, oxygen, and salt content of the water, its temperature and hydrogen ion concentration. Nitrate and nitrite were always found in the water, but the presence of iron oxide in the water, washed down from the hills, was thought to vitiate the method of nitrate analysis employed.

The successive growths or 'flowerings' of diatoms is clearly shown in Fig. 1. They commenced near the surface, extending into deeper water and then dying

Provided there was also nitrate available for their growth, these intervals indicate that the diatoms require some other factor besides light and nutrient salts, or possibly that they excrete some substance inimical to their future growth, as was suggested by Nathansohn in 1909, but for which there is no definite evidence.

The succession of outbursts in the loch during summer are more numerous than the 'usual' outbursts in the open sea, and this is attributed to vertical mixing during the summer months, caused by strong winds blowing up or down the loch, and refreshing the phosphate-depleted upper water stratum.

Another point of difference from the open sea is that the spring outburst of diatoms has been shown to depend largely upon the amount of sunshine in the early part of the year in the English Channel and near the Isle of Man, whereas in Loch Striven during the years investigated it actually occurred latest in the year with most early sunshine.

Dinoflagellates occurred irregularly but were never numerous, except in the surface layers during the summer months, appearing and disappearing suddenly. They were most numerous near the head of the loch and their development was apparently related to changes in temperature and dilution with rain-water. They caused no noticeable change in carbon dioxide or oxygen content of the water.

H. W. H.

Wool and Wool Fibres.

RECENT activities of the British Research Association for the Woollen and Worsted Industries have included a visit by two members of its staff to certain of the textile centres of Belgium, France, and Germany. The Association has by this means endeavoured to secure first-hand information of the

scientific work in connexion with wool and wool fibres which is being undertaken in those countries. It has also sought certain statistical information relating to the industry.

A report recently published by the Association gives an account of the institutions which were

¹ "The Relation of the Plankton to some Chemical and Physical Factors in the Clyde Sea Area," by S. M. Marshall and A. P. Orr. *Jour. Marine Biological Association*, vol. 14, pp. 837-868; 1927.