

that sink to the bottom in the shallow coastal seas, where they rest until conditions of development become favourable again. This has been observed by many naturalists since Schütt first noticed in the Western Baltic that a species which begins to form resting-spores disappears shortly afterwards from the surface-layers. He showed, too, that the resting-spores sink down to the bottom, and, although their germination has not been carefully studied, we may be sure, all the same, that it does take place; further, when we subsequently find the same species once more in abundance, we have every reason for surmising that the resting-spores on the bottom were the principal source from which these forms have been derived.

Resting-spores.

Ability to form resting-spores must be of the utmost importance for the existence of the species in coastal waters. The chief difference between coastal seas and the ocean, so far as hydrographical conditions are concerned, lies in the extreme and rapid changes in such fundamental conditions of existence as salinity and temperature in coastal waters. Resting-spores, therefore, must be the means by which many species continue in coastal seas, notwithstanding the fact that there conditions of existence are only favourable for a limited portion of the year. The arctic diatoms, for instance, which are sometimes to be found in the plankton of the Skagerrack, are very easily affected by a rise in temperature, but their development takes place during the winter months from February to April, when the temperature is at its minimum. In the summer they are not to be seen, but their resting-spores are then most probably on the bottom. In the same way a whole series of warmth-loving species pass through the winter as resting-spores, and are to be found along our shores only in the warmest months of summer and autumn.

The neritic species may often be met with a long way out at sea, still continuing to increase, though they are seldom in any great quantity. One of the few instances that I know of, where we regularly find an immense production of neritic diatoms in the open sea, is in the Gulf Stream north of Shetland and the Faroe Islands during May. I made this discovery as long ago as 1895, and it has often been confirmed since then during the international investigations. When the snows begin to melt in the spring, the surface-layers of water are carried far away out from the land, and the neritic algæ are taken with them. I shall presently show that it just happens to be in the spring that conditions of nourishment favourable

Neritic diatoms in the open sea.