

Pelagic forms usually have thinner cell-walls, and the characteristic ornamentations on their silicated valves are not so prominent, though in their case too a high magnifying power will nearly always render them visible. The families that are endowed with locomotion organs are very scantily represented, and even amongst the few that are thus favoured, several species make use of them for quite a different purpose, employing them as organs to secrete mucilage and thus keep the cells united in chains. Most of the pelagic diatoms belong to families that lack organs of locomotion, though by way of compensation various types have highly developed suspension organs, which increase their superficies and consequently their friction against the surrounding water-masses. It is possible, too, that these algæ are able to reduce excess weight by evolving specifically lighter matter, such as fat, within the cells or air-bladders outside them, but this has not yet been properly investigated.

The suspension organs, however, have been most carefully studied, especially by Schütt, who was one of the members of Hensen's Plankton Expedition in 1889, and the different cell-forms, with their numerous contrivances for maintaining a floating existence, may be grouped under four heads:—

(1) *The Bladder Type*.—In these the cell is comparatively large, while the cell-wall and protoplasm are merely thin membranes round a big inner cavity which is filled with a cell-fluid of about the same specific gravity as sea-water. Among diatoms the best instances of this type are species of the genus *Coscinodiscus*, whose structure resembles cylindrical boxes, sometimes fairly flat-shaped, and sometimes more elongated and rounded at the top and bottom. In most forms the cell-wall is quite thin, though it is strengthened by means of a fine mesh-work of more or less regular hexagons. One of the biggest, *Coscinodiscus rex* (*Ethmodiscus rex*, *Antelminellia gigas*), is over a millimetre in diameter, and is quite a common form in the warmer parts of the Atlantic (see Fig. 215). A series of species with stouter structure, and more distinct ornamentations on the cell-wall, occur especially in the deeper water-layers, at about the lowermost limit of plant-life (100 to 200 metres), and belong to a characteristic twilight-flora, of whose existence Schimper became aware during the "Valdivia" Expedition.

(2) *The Ribbon Type*.—The surface is enlarged owing to the cell being flattened down into a plane, which is often bent or twisted to a certain extent. Diatoms of this type (see Fig. 216) are scarce. We have, along the coasts especially, a few species with flat cells, which are associated in ribbon-shaped colonies, such as *Fragilaria* and *Climacodium*. The cell-walls of these species are extremely thin, and not of a particularly distinct structure.

(3) *The Hair Type*.—The cells are very much prolonged in one direction, or else they are united in narrow, elongated colonies. Diatoms

Pelagic forms.

Schütt.

Four types of suspension organs.