**Description:**

Plates circular, with a very small central depression and minute perforation, inner limb flat. Coccosphaera always spherical in form, except when undergoing division, its average diameter being about 17 μ. The skeleton consists of a number of minute circular plates with an apparent central boss, the plates overlapping one another at their edges. Each plate, or coccolith, as it is called, is seen to possess a central clear area from the edge of which radiate a number of beautiful striae which run to the edge of the plate (figs. 1 and 2). This central clear area has at its middle a small but distinct perforation (figs. 1 and 2) passing...
through the substance of the plate. The central clear area, as is discovered in a profile view of the plate, is really a slight depression, and in some coccuspheres the striae which run from the edge of the plate can be traced down into the depression, giving to the plate the appearance shown in figs 4 and 5. In far the larger number of coccuspheres, however, the striae either do not run down the walls of the depression, or are too close together to be visible, and the depression appears in surface view merely as a clear area.

The exact form of the coccolith can be best made out in a profile view after separation from its surrounding plates. Fig. 5a, shows a sectional view of a free plate; for such a minute object, it has a somewhat elaborate structure. The coccolith is seen to possess two distinct limbs joined together by a central thick-walled collar. The outer limb is a round plate, convexo-concave in section, very like an inverted shallow watch-glass; the inner limb is a small circular flat plate; the two plates are joined together by the central collar. On the convex free surface of the outer plate there is a minute circular depression appearing in surface view as a clear area. The bottom of this depression is perforated by a canal which leads through the collar and opens out on the free surface of the lower limb. This canal is so very minute that if it had not been possible to fill it with staining material, its existence could only have been suspected from analogy with the larger plates of *Coccosphaera pelagica*. The two limbs are free at their edges (fig. 5a) being connected only in their central parts by the collar.

Although the exact relation of the coccoliths to one another in the skeleton of the organism is difficult to make out, owing to their transparency and close arrangement, a study of coccuspheres in optical section leads to the conviction that the plates overlap one another by their outer limbs alone, the edge of the outer limb of one plate being wedged between the edges of the outer and inner limbs of a neighbouring plate. We have given in fig. 3, a diagrammatic representation of a coccusphere as seen in optical section. Such a system of interlocking plates must prove a very effective protection to the organism.

The number of plates in a single coccusphere varies very considerably (cf. figs. 2 and 5). A computation of the total number of plates from the appearance of different specimens in surface view, gives a number which varies with the individuals from 20 to 50.

Within the skeleton lies a central protoplasmic body, round which however no distinct cell-wall could be observed. (The protoplasmic body is shown contracted in fig. 2). When the organism is observed living the centre of the cell is seen to be occupied by a single more or less round chromatophore of a distinct green colour through with a slight yellow tint (fig. 6). Imbedded in the chromatophore there may be observed a few small refractive granules, presumably oil globules (fig. 7).

Owing to the small size of the objects, and the somewhat contracted condition of most of the fixed material, it has not hitherto been found possible to bring to view a nucleus in the cell. Considering the size of the cell, the nucleus, if it exists, must be excessively minute. We have hopes, however, that we may later, by the aid of other material, be able to distinguish such a structure. All that we can establish at present is that the interior is filled with a protoplasmic body, in the centre of which lies a single yellow-green chromatophore.

The central channels in each plate naturally suggest protoplasmic protrusions from the cell, though no trace of them was observed in any of the specimens. That the protoplasm passes at least into the canal of the plate is suggested by analogy with *Rhabdosphaera tubifer*; and further, the fact that the external depression and canal within the plate sometimes become filled with colour under the action of gentian violet, also points in the same direction. The stain, however, may have been held in the minute cavity only by capillarity.

The only evidence we can bring forward as to the method of reproduction of *Coccosphaera leptopora* is an isolated observation of an individual which was obviously undergoing fission into two (fig. 7). The body was large and oval in form, and had become slightly but distinctly pinched in on one side, the chromatophore had already divided into two, and the plates were considerably increased in number, as one would expect. The organism must obviously increase in size by the intercalation of new plates between the old ones, but no trace of small or immature plates was observed in any of the specimens examined.
Remarks:

The coccosphere which we have described as *C. leptopora* differs considerably from the coccospheres described by Wallich and Haeckel, since it is not only a much smaller structure, but its constituent plates (coccoliths) are round, and much smaller and more delicate than the usually oval coccoliths described from the deep sea deposits by Huxley, Wallich and Haeckel.

Type level:

Recent.

Type locality:

Atlantic Ocean.

Depository:

Not given.

Author:

Murray G. and Blackman V. H., 1898, pp. 430-432, 439; pl. 15, figs. 1-7.

Reference: