

Sub-family 4. *Cycloclypeinæ*.*Cycloclypeus*, Carpenter.*Cycloclypeus*, Carpenter [1856], Carter, Martin, Brady.

The genus *Cycloclypeus* was instituted by Carpenter for the reception of certain discoidal Foraminifera of very large dimensions "dredged by Sir Edward Belcher from a considerable depth of water off the coast of Borneo." Since the publication of the original memoir containing the account of these recent specimens,¹ the structure and affinities of the genus have been further elucidated by the researches of Carter² and Martin,³ upon a number of fossil species. Unfortunately the Challenger collections afford but little material bearing upon the subject. A few examples of a small but very interesting variety, however, have been met with in one of the dredgings, which may be best introduced by a brief indication of the prominent characters of the genus.

The test of *Cycloclypeus* is a circular disk, either regularly biconvex, or umbonate at the centre, with a thin, sharp, peripheral edge. It is composed of concentric annuli, the boundaries of which, as well as those of the constituent chambers, are to a greater or less extent visible externally, being marked, especially near the margin, either by raised bands or by lines of clear shell-substance. The centre of the disk on both sides is often studded with raised beads or tubercles. The general aperture takes the form of a row of marginal pores. The texture of the shell of recent specimens is conspicuously hyaline and finely porous.

Examined by means of sections, the test is found to be composed of three distinct portions, a central disk formed of a layer of chambers arranged in concentric zones, and two lateral plates of compact shell-substance, one on either side, enclosing it more or less completely.

The chambers of the successive annuli of the central disk alternate in position more or less regularly, like those of an Orbitolite. The adjacent chambers of the same annulus do not communicate directly with each other, but each chamber communicates with two chambers of the preceding and two of the succeeding zone. The proportionate length and breadth of the chambers vary in different species and even in different specimens of the same species.

The shelly plates which enclose the median disk above and below are variously developed, but always thickest at the centre. They sometimes attain twice or three times the thickness of the central layer, and in such cases the test assumes the form of a

¹ *Phil. Trans.*, 1856, p. 555. See also *Introd. Foram.*, 1862, p. 292.

² *Ann. and Mag. Nat. Hist.*, ser. 3, vol. viii. pp. 332, 461.

³ *Untersuchungen über die Organisation von Cycloclypeus, Carp. und Orbitoides, d'Orb.*, von Dr. K. Martin, *Niederländisches Archiv für Zoologie*, vol. v. pp. 185-204, pls. xiii., xiv.