

and cannot be mistaken. The filmy shell or section is never really transparent, however thin; and it has a uniform yellowish or light brown tint, very distinct from the nearly colourless perforate structure exhibited under similar circumstances by the vitreous types.

There are, however, numerous modifications of the typical structure, some of which are hereditary and characteristic of species, whilst others depend in part at least upon external influences. The most important of these arise from the tendency evinced under certain conditions to incorporate sand with the calcareous matter of the shell-wall, and the construction in such cases of a composite or arenaceous test, in place of the normal homogeneous shell. In some species (*Nubecularia lucifuga*, Pl. I. fig. 12, &c., *Miliolina agglutinans*, *Miliolina crassatina*, and *Miliolina triquetra*, Pl. VIII. figs. 5-10) very coarse sand-grains are so employed, and the resulting test is indistinguishable in external texture from the rougher *Lituolæ*; in others (*Planispirina celata*, Pl. VIII. figs. 1, 2) a uniform fine sand is the material selected, and the exterior corresponds more nearly with that of the *Trochamminæ*. Nevertheless in all cases, however thick the sandy incrustation, there is a distinct, imperforate, calcareous shell, of the typical porcellanous structure underneath, immediately surrounding the animal. This may be easily traced in either the transverse or longitudinal section of the test. In the sandy forms the mouth is usually free from incrustation, and is encircled by a smooth, white, shelly rim.

In brackish water, where the supply of earthy salts in solution is smaller than in the open sea, the chemical and physical characters of the shells of such species as survive the changed conditions are considerably modified. They become by degrees less calcareous as the water grows less saline, until eventually a point is reached at which the investment is little more than a chitinous or horny membrane, strengthened by the incorporation of minute siliceous grains, but containing so little carbonate of lime that it is scarcely altered by treatment with acids.¹

A still more remarkable modification occurs in specimens from the abyssal depths of the North Pacific explored during the Challenger cruise. A few *Miliolæ*, from soundings taken at a depth of 3950 fathoms (about four miles and a half), with somewhat inflated segments, scarcely distinguishable in form from young thin-shelled specimens of a common littoral species, were found to be unaffected by treatment with acids, and upon further examination it became apparent that the normal calcareous shell had given place to a delicate, homogeneous, siliceous investment. Whilst immersed in fluid the shell-wall had the appearance of a nearly transparent film, and when dried was at first somewhat iridescent. The parietes of some of the specimens were so thin that they collapsed on drying, but the stronger shells retained their form, and became white and more or less opaque by exposure to the air.

Of the essentially imperforate nature of the shell throughout the Family there is no

¹ *Miliolina (Quinqueloculina) fusca*. H. B. Brady, On Brackish-water Foraminifera. *Ann. and Mag. Nat. Hist.*, 1870, ser. 4, vol. vi. p 286, pl. xi. fig. 2.