

exception being *Rotalia ammoniformis*, an outspread modification of the type in which the later whorls are somewhat evolute, that is to say, so far non-embracing as to leave a portion of the earlier convolutions visible on the inferior side.

The umbilicus is sometimes depressed or deeply excavated, but more frequently it is filled with a deposit of clear shell-substance. The aperture of the test, typically, resembles that of the other Rotaline genera—a simple curved chink or fissure on the inferior face of the terminal segment, close to the line of union with the previous convolution, and is usually placed nearer the peripheral than the umbilical margin. The exterior of the test is either entirely smooth (*Rotalia soldanii*), or smooth above and granular beneath (*Rotalia beccarii*); or the sutures are marked externally by raised bands or rows of exogenous beads (*Rotalia ornata*); or, lastly, in rare instances the surface of the shell is ornamented with a network of embossed lines (*Rotalia clathrata*).

The most striking deviation from the normal Rotaline contour occurs in certain species, the tests of which have calcarate or rowelled margins. This condition is produced in two different ways,—either the peripheral ends of the chambers are drawn out so as to form points or projecting angles (*Rotalia calcar*); or else three or four long spines are thrown out by the septa of the first whorl of chambers, and diverge radially from the periphery of the test (*Rotalia pulchella*).

A somewhat anomalous modification of the typical structure, resembling the “Asterigerine” varieties of *Discorbina*, presents itself in *Rotalia carinata* and *Rotalia lobata*,<sup>1</sup> two forms in which “the umbilical lobes of the chambers are separated from the principals by the intervention of a septum, so as to constitute a secondary series of chamberlets, which interdigitate or dovetail themselves between the proper chambers, as do those of the lower surface of *Amphistegina vulgaris* and its varieties, instead of lying in a lower plain like the subsidiary chambers formed by astral flaps in *Discorbina*.”<sup>2</sup>

The microscopic structure of the test of *Rotalia* exhibits a marked advance on that of the allied genera. The walls are of fine texture, and the pores are as minute as those of the average of the NUMMULINIDÆ. In many, perhaps in the majority of species, the septa are double; and in some cases a considerable portion of the shell consists of an intermediate or supplemental skeleton, furnished with a more or less complicated canal-system,—a feature best illustrated by *Rotalia schroeteriana*.

The distribution of the genus may be very briefly indicated. No true *Rotaliæ* have been found within the Arctic or the Antarctic circle, but the genus is represented by one or other of its species in every part of the tropical and temperate zones. It attains its highest structural development, and the individual specimens their largest dimensions, in the shallow water of warm seas. It inhabits brackish pools and estuaries, is abundant in

<sup>1</sup> *Asterigerina carinata*, d'Orbigny, Foram. Cuba, p. 118, pl. v. fig. 25; pl. vi. figs. 1, 2; and *Asterigerina lobata*, ibid., p. 119, pl. v. figs. 19–21.

<sup>2</sup> Carpenter, Introd. Foram., p. 213.