ON THE GENUS HALIA OF RISSO.

BY WM. H. DALL.

The systematic position of the genus *Halia*, a curious deep water gastropod discovered in the last century, has long been contested. Lamarck (who knew it only by the shell) put it among the land-shells like *Achatina*, Martyn referred it to the whelks (*Buccinidæ*), Jay and Sacco classified it in the vicinity of *Struthiolaria*, and Sowerby near *Purpura*. Fischer, in 1858, was the first to examine it anatomically and concluded that it was one of the *Toxifera*, related to *Pleurotoma*. The paper was one of his earliest and rather crude; though it added materially to our knowledge, the conclusions were not altogether satisfactory to students of molluscan anatomy. Nevertheless his view has been accepted so late as 1896 by M. Cossmann, one of the leading paleontologists of France. In 1885 Poirier, of the Paris Museum, was lucky enough to obtain a specimen, a female, like that of Fischer, dredged in fifty fathoms at the mouth of the Gambia River. His discussion of the dissection[1] added very considerably to our acquaintance with the macroscopic anatomy and that of the nervous system. He was, however, little less unfortunate than Fischer in his examination of the most important systematic character, the radula, and reported an extraordinary duplication of the œsophagus, such as is quite unknown elsewhere in mollusks, and which would require the most conclusive confirmation to receive credence from anatomists. Poirier reverted to the opinion of Martyn that *Halia* is Buccinoid, which being interpreted into systematic language, means that he recognized in it the characteristics of a rhachiglossate Prosobranch, which is essentially correct. The true relations of this remarkable form were first recognized by Kobelt in a later publication[2] which has unfortunately remained unfinished and has attracted no attention from anatomists. In view of the fact that the early errors have obtained such a wide currency and that, even in Fischer's Manual, the characters of the nearest allied form are incorrectly

[1] Bull. Malac. Soc. de France, July, 1885, pp. 17–50, pl. II–IV.

[2] Inconographie der schalentragenden europ. Meeresconchylien, II, p. 6.

given, it seems worth while to restate the latest and most trustworthy conclusions.

Each tooth of *Halia* is shaped much like a "wish-bone," the prongs forming an arched divergent base and the central projecting portion at the junction, the cusp. The attached bases of the arch are turned up a little and indistinctly notched on the edges; the main part of the arch is free and very prominent. When the cover glass of the microscopic slide is pressed down upon the radula the pillars of the arch break away from the cusp at their junction, which led Poirier to regard them as a separate series of lateral teeth on each side, and Fischer, not noticing Troschel's explanation of this part of one of his figures, has been led into the same error in regard to the analogous radula of *Volutomitra*. Poirier took the notched bases of the broken off lateral portions of the single tooth as the distal ends or cusps of his supposed laterals, directly reversing their true position. There is only a single row of teeth.

The position of *Halia* is unquestionably among the *Volutacea*. The radula of *Scaphella Turneri* as figured by Gray, is almost identical, and that of *Volutomitra gronlandica* is closely similar. *Halia* wants the siphonal appendage of the typical Volutes and so does *Volutomitra*. Both *Scaphella* and *Volutomitra* are without operculum, like *Halia*. The external form of the foot and head is essentially similar in all three. The texture of the shell of *Halia*, and also its color and color-pattern, are essentially identical with those of *Scaphella* (*Aurinia*) *dubia* Brod., which has the pillar and plaits degenerate. The process of degeneration, aided by the more ample whorls of *Halia*, has completed the effacement of the plaits and the enfeeblement of the pillar or central axis of the shell. The specimen of *Halia* at my disposal for study is somewhat worn at the apex, but the form of the nucleus indicates that, like *Scaphella* and *Volutomitra*, its nepionic shell was membranous, and has left a rough scar on the surface of the initial shelly coil, a view confirmed by Cossmann's figure of the nucleus of a fossil species. In *Aurinia* the degenerate radula is edentulous, but the type, which began in the Eocene, and has retained its color pattern and general characters ever since, is abundant in the Pliocene, and may readily have thrown off the aberrant *Halia* at that period from which it is known to date.

Halia was erected into a family by Kobelt, but it can hardly be said to possess family characteristics, its essential features being

negative and due to degeneration from the normal type of the group to which it belongs. The characters of the latter, however, fully justify us in separating, from the operculate *Volutidæ* with their calcareous nepionic shell and Buccinoid dentition, the family *Scaphellidæ*, destitute of an operculum, with a membranous nepionic shell and the peculiar dentition above described. This latter group will include *Caricella*, *Scaphella*, *Cymbiola*, *Eopsephœa*, *Aurinia*, *Halia*, *Volutomitra* and their allies.

The recent *Halia* has been dredged along the eastern margin of the Atlantic from the Bay of Biscay to Senegal. The genus is represented in the Pliocene of Italy by one or two forms which have received distinct specific names. The type was first named by Meuschen in the Museum Gronovianum in 1778, and was erected into a separate genus by Risso in 1826.