

the seven requiring notice, the first or Lhwyd's fossil has been shown to be almost wholly undefined; and it is as little qualified to be the basis of a species as it was before stated to be that of a genus. In the case of *L. striatum* the difficulties are increased by quoting Parkinson in addition to Lhwyd. No. 2 differs from the assigned characters of Dr. Fleming's fossil in the nature of the direct centre; and the comparison cannot be extended to the other internal structures. No. 4, *Astrea arachnoïdes*, is a doubtful coral, and does not admit of an identification with any one of those with which it is associated till full information is published; while No. 8, *Cyathophyllum basaltiforme*, also differs from *L. striatum* in the composition of its centre, and the comparison must be limited to that portion of the interior. Lastly, Nos. 11, 13 and 14 appear to have inseparable corallites; and it is not known if the published internal compositions exist in the *Lithostrotion* of Lhwyd and Dr. Fleming.

XXXVIII.—*Observations on the Genus Rhizochilus of Steenstrup.*
By J. E. GRAY, Esq., F.R.S., V.P.Z.S. &c.

[With a Plate.]

IN the Proceedings of the Royal Danish Academy for May 1850, Professor Steenstrup has described a very interesting genus of univalve shells under the name of *Rhizochilus*, found attached to the axis of *Antipathes ericoides*.

Mr. Cuming, knowing the interest I take in the physiology of Mollusca, has most kindly allowed me to examine the three specimens which he has received from Dr. Steenstrup. The shell of this genus while the animal is growing is free, and would be considered in this state as belonging to the genus *Rapana*, nearly allied to *R. papyracea*, but of a more solid consistence; but when the animals have arrived at their full development, two or more congregate together in groups, each animal forming a more or less irregular, opaque, white, solid shelly extension of the outer and inner lip, clasping the axis of the coral or the neighbouring shells, or both, and at length entirely closing the mouth of the shell, and firmly attaching the shells to the coral, or to one another, in such a manner that the animal is completely surrounded by a solid shelly case having no communication with the outer world but through the case of the anterior siphon of the mantle, which, by the contraction of the mouth of the shell, has been converted into a shelly tube. (See Pl. XVII. B. figs. 1, 2.)

This self-immurement of the animal within its shell has not been described in any other mollusk, and one is led to inquire

if by so doing the animal commits voluntary suicide, or has a prolonged existence; if the latter, one should expect that it must be of a very torpid or lingering description, as the animal is entirely precluded from procuring its usual or indeed any other food for its subsistence, and the supply of water for respiration which can enter by the single siphon must be of a very limited quantity, there being only one aperture for its entrance and exit, in comparison with the continued current which usually circulates over the gills when the two apertures (one for entrance and the other for exit), which always exist in all Mollusca, are open for the purpose.

Many gill-bearing univalve mollusks are stationary; some, as the *Magilli* for example, live in holes like the bivalves in massive corals; and the *Vermeti* in tubes attached to the surface of marine bodies; but these animals keep themselves on a level with the surface of these bodies, even when enlarging like corals. The genera *Hipponyx* and *Calyptra* form a free cup-like base beneath their foot, and the genera *Pedicularia*, *Sabia*, *Tectura* and *Patella* sink pits into the surface of the shell or coral on which they happen to be attached; but all these animals retain the power, like the bivalve mollusks, of having two apertures for the water to their branchial cavity; but I cannot find in either of the two closed specimens of the genus *Rhizochilus* in Mr. Cuming's collection any trace of a second aperture.

Many of the lung-breathing Mollusca cover the mouth of their shell after the animal is withdrawn during the very dry, warm, or cold weather with a membranaceous or calcareous epiphragma, the animal during the time sinking into a torpid condition; but these animals have the power, at the first recurrence of damp weather, to remove this cover, which is not the case with the hard shelly secretions which cover up the mouth of the shell of *Rhizochilus*.

Many years ago I observed a somewhat similar phænomenon to that noticed by Dr. Steenstrup in a species of *Vermetus*, but I did not describe it, hoping to obtain more certain information, as I could not then assure myself that the contraction of the mouth of the tubular shell was the work of the animal which formed it, or of a parasite which adopted it as an habitation after the mollusk was dead.

These Worm-shells are of a dark brown colour, cancellated on the surface, much contorted together, with a free, erect end and a circular aperture. The mouth of many of these erect tubes are covered over with a thin, convex, shelly arch, with only a small hole in its centre not more than one-tenth part of the size of the mouth of the open tubes (Pl. XVII. B. figs. 4, 5, 6). They were brought from the African coast of the Mediterranean,

and very much resemble the *Vermetus subcancellatus*, Philippi, Moll. Sicil. i. 172. t. 9. f. 20, who observes it is very frequent in Sicily; but Dr. Philippi does not describe the contraction of the mouth of the tubes, and hence it may be a different species. He refers to Chiaje's continuation of Poli, t. 57. f. 18, as giving a good figure of the animal of his species.

Chiaje, who gives no description to the plates, figures three specimens; two of them exhibit the animal of a *Vermetus* (given in more detail in fig. 19 of the same plate), and one which has a rather contracted mouth to the shell, with what appears to be an Annelide coming out of it. It was the knowledge of this figure that induced me to defer the account of this structure, but the interesting discovery of Professor Steenstrup leads me to believe that it is a peculiarity of the species, which has appeared to me to be most probably the case, as the shelly matter which covers up the mouth of the shell is of the same colour, texture, and structure as the rest of the shell, and only differs from it in being less strong and thick. These arched cases must as completely immure the animal as that of *Rhizochilus*.

Many species of *Ammonites* more or less completely contract and arch over the mouth of their shells when the animal has attained its full development; several specimens with the mouth so contracted are figured by D'Orbigny in his 'Paléontologie Française,' as *Ammonites Martinsii*, t. 125; *A. Braikenridgii*, t. 135 (copied Pl. XVII. B. fig. 3); *A. linguiferus*, t. 156; *A. Sauzei*, t. 139; *A. Bakeriæ*, t. 149; *A. bullatus* and *A. microstoma*, t. 142, &c. Mr. Owen, in his Lectures on Invertebrata (p. 332), mentions one with the mouth so closed which he observed in Mr. Pratt's collection. This species is from Normandy, and much resembles *A. Bakeriæ*. The mouths of the shells of the genera *Baculites* and *Scaphites* are also partially contracted.

It is to be observed that the *Vermeti* are attached the greater part of their life; the *Rhizochili* only become attached when the mouth is closed, but the *Ammonites* and *Baculites* and *Scaphites* remain free after the mouth is contracted or closed.

EXPLANATION OF PLATE XVII. B.

Figs. 1, 2. *Rhizochilus antipathicus*, from a drawing by Dr. Steenstrup, showing the shell with the mouth closed.

Fig. 3. *Ammonites Braikenridgii*, from D'Orbigny, Ter. Jurass. t. 135. fig. 5.

Fig. 4. *Vermetus subcancellatus*?, natural size.

Figs. 5 & 6. The same, magnified, to show the arch over the mouth.



Gray, John Edward. 1851. "XXXVIII.—Observations on the genus *Rhizochilus* of Steenstrup." *The Annals and magazine of natural history; zoology, botany, and geology* 8, 477–479. <https://doi.org/10.1080/03745486109495006>.

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