

1864, and many since made, have convinced me that, so far as regards the British flora, the raphidian diagnosis is not only quite true, but very natural. Yet, as formerly noticed, this character might more easily escape attention in Galiaceæ than in the other orders.

Finally, the propriety of retaining *Leea* under Vitaceæ has been disputed; and the present observations will tend to support the conclusion of those botanists who, with Adrien de Jussieu and Lindley, persist that this genus ought not to be separated from Vitaceæ.

Edenbridge, July 17, 1865.

[To be continued.]

XIII.—*On the Operculum and its Mantle* (lobus operculigerus, pomatochlamys). By Dr. O. A. L. MÖRCH.

ADANSON* regarded the operculum of univalve shells as answering to the second valve of the bivalves—an opinion maintained by Oken and lately by Dr. Gray† and Prof. Macdonald‡. In this point of view the *lobus operculigerus* (Lovén), or “the opercular mantle,” would correspond with one moiety of the mantle of bivalves.

Prof. Lovén regards the bivalve shell as produced by a cloven or bipartite mantle, and the operculum as homologous with the byssus.

Prof. Keferstein§ supports Lovén’s opinion, considering the slit in *Emarginula* and *Tenagodus* as a trace of division. The porous slit of *Haliotis*, *Tenagodus*, &c., corresponds with the notch or channel in canaliferous shells (*Entostomata*, Blv.). There is, however, a more important trace of division in many univalves—for instance, the dentated furrow in *Monoceros*, *Pseudoliva*, *Ancillaria*, and some species of *Murex* (*Cerastes*), but chiefly in *Carinaria*. In this last genus the keel is formed by the two sides of the shell, which are pressed against each other in such manner that a piece of paper can be introduced into the middle of the keel as far as the foetal shell. In *Onustus* (Humphr.) the two sides are cemented together, but the union can be clearly seen. *Akera bullata* shows something similar in

* Hist. Naturelle du Sénégal.

† J. E. Gray “On the Operculum of Gasteropodous Mollusca, and an attempt to prove that it is homologous or identical with the second valve of Conchifera” (Annals and Mag. of Nat. Hist. ser. 2. v. p. 476; and Phil. Trans. 1833).

‡ “On the Homologies of the so-called univalve shell and its Operculum” (Proc. Linn. Soc. v. 1860).

§ Bronn u. Keferstein, Die Klassen u. Ordnungen des Thierreichs.

the line of suture. The shell of the young *Dentalium* is also split throughout its whole length. The best proof of analogy would perhaps be the carapace of *Limnadia* and *Estheria*, among Crustacea, which is bivalve, while that of closely allied genera, as *Nebalia* and *Apus*, is univalve.

Pinna saccata, L., has both valves united in the adult state; but it has never been observed that the two valves have their origin in the division of a single shell: on the contrary, the division is manifest in the larval shell.

Nearly all organs are double in the Acephala: there are thus two ovaria with distinct external orifices, two kidneys (organs of Bojanus) with distinct external orifices, two pairs of labial palpi, two pairs of gills. It seems to me therefore probable that the Acephala also have two shells originating in the same way as the other organs above mentioned. This duplicity of the organs is very indistinct among the univalves, as in *Dentalium* and *Chiton*, and it becomes rarer and rarer among the higher Mollusca.

The larva (*Glochidium*) of *Anodonta* has in each shell a distinct byssus-bundle ("cordons ombilicaux," Quatrefages*), and a distinct intestinal channel with distinct oral orifices†; in other words, it is a true *Diplozoon* in the larval state. This curious fact is perhaps not quite solitary among Mollusca. Thus, according to Koren and Danielssen‡, several eggs (from 1 to 100) are, in *Buccinum undatum*, united to form a single embryo. The difference is chiefly that in the much lower mollusk, *Anodonta*, the amalgamation takes place in a more advanced state of the embryos, so that some organs, the intestinal channel and the byssus, are united into one, and the other organs are kept in their original condition. The animal would then be composed of two "zonites," reminding us of the "egg-producing process" of *Hydra*, regarded by Prof. Huxley as a reduced individual, or an organ homologous with an individual§. An Acephalous mollusk must therefore be considered an individual in the same sense as a plant or flower composed of individuals (leaves) reduced to organs. The question is, Does the opercular lobe with its operculum represent one lobe of the mantle and its shell in the bivalves, or is it something different?

The epipodial line of Huxley ("manteau inférieur," Lacaze-

* Ann. des Sc. Nat. tom. iv. (1835) p. 283, and tom. v. (1836) p. 321, &c.

† Von Siebold, Vergleichende Anatomie, Wirbellose Thiere, p. 294.

‡ Bidrag til Pectinibranchiernes Udviklingshistorie; "On the Development of *Buccinum undatum*" (Athenæum, 1852, p. 1066).

§ Lecture upon Animal Individuality, Royal Institution (Ann. Nat. Hist. ser. 2. vol. ix. p. 505).

Duthiers*) often produces *posteriorly* a shell (*operculum*) analogous to the shell of the true mantle; *laterally* it can be developed into fins, as in *Aplysia* and Gymnosomata (*Pneumodermon*, &c.), analogous to the pallial fins of the Cephalopoda; it can form a fimbriated or undulated edge, as in *Haliotis*, *Trochidæ*, *Elysiidæ*, and *Philine*†; it can form a siphon, as in Cephalopoda or in the American *Ampullariæ*, analogous to the mantle-siphon of *Buccinidæ*; perhaps it forms *anteriorly* the tentacula, ommatophores‡, and intertentacular lobes of *Trochidæ*, corresponding to the mantle-edge of *Pectines*, *Solenes*, *Galeomma*, &c. The epipodium is attached to the foot; but it is not quite clear that it is a part of it. One author considers the foot homologous with the adductor muscle of the Acephala; but it must be remembered that the foot of the Acephala is homologous with that of the Gasteropoda. Dr. Gray regards the muscles which connect the columella and the operculum as homologous with the adductor muscles of bivalves.

Prof. Lovén considers the operculum homologous with the byssus; but, as this organ is found in several univalves, even in those with an operculum, this opinion cannot be adopted, as was pointed out by Prof. Macdonald. It must also be remembered that it is not known how the byssus of univalves is formed. Swainson (Treatise, p. 186, f. 29) represents *Cyclostoma suspensum*, Gould, and A. Adams (Voyage of Samarang, p. 44, t. 13. f. 3), *Cerithidea obtusa*, Lam., as attached to a branch by a byssus during the æstivation. According to Macdonald, *Planaxis*, and to Gray, *Rissoa parva*, spin a byssus. It is possible, from its resemblance to that of *Mytilus*, that the deep posterior groove in the footsole of *Cerithiopsis tubercularis* (Forb. & Hanl. Brit. Moll.) produces the byssus. The nature of the slimy thread of *Litiopa*, too, is very doubtful; perhaps it only corresponds to the thread of *Limax filans*, Hoy. The "float" of *Ianthina*, which attaches the animal to the surface of the water, is probably homologous with the byssus §, judging from its ventral position ||.

* "Mémoire sur le Système nerveux de l'*Haliotide*" (Ann. des Sc. Nat. Zoolog. 1858, sér. 4. vol. xii. p. 226).

† Mörch, Journal de Conchyliologie, 1863, p. 39.

‡ The double-eyed monstrosities of *Emarginula* and *Patella vulgata*, the latter of which, with a double tentacle, described by Fischer, are not without importance for this comparison (Journal de Conchyliol. tom. v. p. 230, tom. xii. p. 89). Lacaze-Duthiers, "Sur les Monstres doubles de la *Bullea aperta*" (Compt. Rend. Acad. Sc. tome xli. 1855, pp. 1247-1250).

§ Mörch, Journal de Conchyliologie, 1860, Juillet.

Macdonald, "On the Homologies, &c." (Proc. Linn. Soc. vol. v. Nov. 14, 1860, p. 209).

|| In the young *Cyclas* the byssus has, however, a posterior position.

It has a remarkable analogy to the singular vesicular development of the cement-tissue of the peduncle of *Lepas* (*Dosima*) *fascicularis*, Sol. & Ellis*.

The byssus in the *Acephala* is generally corneous; but in *Anomia* it forms a calcareous plate (the plug), possibly corresponding with the opercular valve in *Hipponyx* and *Lithedaphus*, which may be considered a calcareous secretion of the ventral face of the foot. The epiphragm of the *Helices* would also be homologous, if this plate be really a secretion of the foot, as M. P. Fischer states; but it is probably secreted by the mantle, like the septa of *Vermeti*, *Runcina decollata*, &c. To this category belong probably the tubes of *Teredo*, *Gastrochaena*, *Clavagella*, &c., and the accessorial valves of *Pholades*. The two pallets in *Teredo*, which have a striking analogy to the opercula of some *Serpulæ* (*Hydroides norvegica*, Gunn.), might perhaps be compared with the posterior supplementary shells of *Talona*.

The shell of *Argonauta*, considered by Mr. Adams to be homologous with the egg-cases of *Murex*, agrees with *Nautilus* in its position and the black colour of the carina; but it seems to be formed by the arms only. Its homology is therefore uncertain. It appears that all parts of the skin in Mollusca can secrete a shell. There are likewise found calcareous spicula or grains in all parts of the body, in the clypeus in Gymnobranchia, the tentacula of *Pleurobranchus*, and even in the intestinal channel. In the *Bullidæ* and some Pellibranchiata there are thick calcareous plates in the stomach.

Note. The ligament is a thickening of the epidermis, which is part of the skin of the animal, but not specially of the shell. This seems evident to me from examining, for instance, a specimen of *Mya truncata* in spirit. The connexion of the two valves by the ligament proves, therefore, not that the valves were originally one only, but that the bivalve shell is formed in the same manner as the two lateral mandibles of the *Æolidæ*.

XIV.—*Notes on some Amphibians.*

By JOHN HOGG, M.A., F.R.S., F.L.S. &c.

DR. J. E. GRAY, in his paper "On the Clawed Toads (*Dactylethra*) of Africa," published in the 'Annals and Magazine of Natural History' (vol. xv. p. 334), well observes, that this kind has "large webbed hinder feet, some of the toes of which are armed with very distinct horny black claws—a peculiarity of structure that is quite an exception amongst the Batrachian animals."

* Darwin's 'Cirripeds,' p. 96.



Mørch, Otto Andreas Lowson. 1865. "XIII.—On the operculum and its mantle (lobus operculigerus, pomatochlamys)." *The Annals and magazine of natural history; zoology, botany, and geology* 16, 117–120.

View This Item Online: <https://www.biodiversitylibrary.org/item/72304>

Permalink: <https://www.biodiversitylibrary.org/partpdf/61393>

Holding Institution

University of Toronto - Gerstein Science Information Centre

Sponsored by

University of Toronto

Copyright & Reuse

Copyright Status: NOT_IN_COPYRIGHT

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.