

idea of the unity of the functions of reproduction in plants—an idea, however, which he ascribes to M. Sachs, who put it forward in his 'Lehrbuch der Botanik,' published at Leipzig in 1868. Whatever value we may attach to his conclusions, this memoir of M. Millardet's possesses great interest. It is only to be regretted that the plates, which the author intends publishing hereafter in a scientific periodical, do not accompany the memoir itself.—*Notice of a work published at Strasbourg in 1869; from Bibl. Univ. March 15, 1870, Bull. Sci. p. 275.*

Morphological Researches on the Mollusca. (First Memoir: Gastropods.) By M. LACAZE-DUTHIERS.

One of the most difficult types of the Mollusca to reduce to a theoretical plan is undoubtedly that of the Gastropods. I propose to show that, by taking the relations of the organs and of the nervous system, it is always possible to refer the various forms to a single plan.

Let us reduce the body of the Gastropod, for the sake of simplicity, to four parts—the *head*, the *foot*, the *visceral mass*, and the *mantle*. If we unroll the body of a species with a turbinated shell, we shall have beneath the head and behind and below the foot a reversed cone containing the viscera*.

The relations of these parts are essentially variable. Thus the head is often separated from the visceral mass by a true neck. As to the mantle, its morphology is difficult.

The study of the embryo of *Ancylus* enables us with ease to recognize this organ from its origin. In fact, upon the embryonic sphere, the head first betrays itself by the formation of the mouth. Soon two disks, bounded by a circular cushion, show themselves, the one near, the other opposite to the mouth: the former is the foot, the latter the mantle. At this moment the *Ancylus* represents the ideal being with the four principal parts.

Starting from this state, we may vary the forms and explain the modifications of the Gastropod-type. But, in the first place, to have an exact idea of the mantle, let us suppose the embryonal disk from which it is derived eminently elastic and extensible; let us assume, further, a traction exerted upon its centre and directed backwards, and we shall obtain a reversed cone, of which the apex will be the point of application of the force of traction, and the base the part of the body bounded by the circular cushion of the primitive disk. The intestines will penetrate by traction into the cone thus formed; but the foot and the head will remain without. These four parts will be deformed, but their relations will remain constant.

It is then easy to account for some forms which are very different in appearance. For example, in the *Limaces* the foot increases

* To understand this, the animal is supposed to have the head above, the foot in front, and the apex of the spire and the mantle behind and below.

sufficiently below to lodge the viscera, and the mantle forms nothing more than a little disk or buckler; in the *Testacellæ* and the *Bulleæ* the foot follows the neck in its excessive development, and the mantle remains rudimentary at the end of the body; in the *Aplysiæ* the foot and the neck become much developed upward, but the foot still increases sufficiently in its lower part to cover with its two lobes the back and even the mantle, with which it has been erroneously confounded.

The criterion which I propose enables us to determine the homologous parts.

Four groups of nervous ganglia characterize the Mollusca in general and the Gasteropoda in particular: these are, first, the *stomato-gastric*, the *cerebroid*, and the *pedal* ganglia. The fourth group, intermediate between the latter two, always placed a little behind and below the pedal centre, is *unsymmetrical*—that is to say, formed by an uneven number of ganglia, generally five. It characterizes the Gasteropod group, and, except the head, the neck, the foot, and the viscera, it innervates all the organs. The name which would best designate its relations would be that of *branchio-cardio-pallio-genital*; but I shall simply call it the *median* or *inferior centre*. It varies much: sometimes it forms a very small ring, sometimes an extremely long curve which seems to modify and change all the relations. Thus in the *Limnææ*, the *Planorbæ*, and the *Ancylæ*, although its ganglia are a little disjointed, it is very close to the other centres. Again, in the *Helices*, the *Testacellæ*, the *Limaces*, &c. its five ganglia lie upon the pedal centre, and are united to it in such a manner by a common conjunctive tissue that they have been described as the posterior pedal ganglia.

In the *Aplysiæ*, the *Bulleæ*, all the *Pectinibranchia*, the *Haliotides*, and the *Cyclostomata*, the commissure which unites the inferior ganglia is long and twisted, and the homologous parts are difficult to recognize. Notwithstanding this, the general connexions remain constantly fixed.

With regard to the mantle, the following facts leave no doubt. By numerous dissections of the most different types, I believe I am able to establish that this part of the body is exclusively innervated by the inferior centre, and that henceforward we may define it thus:—*Any fold or cutaneous part of the body of the Gasteropod receiving nerves from the inferior or unsymmetrical centre is either the mantle or a dependence of the mantle.* The forms of the pallial fold may vary infinitely, their connexions never. How, therefore, can we, in *Aplysia*, regard the two large lobes which ascend at the back and at each side upon its back as being dependences of the mantle, when their nerves all come from the pedal ganglia? These lobes are the foot itself, and they serve for swimming.

The dorsal shield of the *Limaces* is the mantle very slightly developed; it receives all its nerves from the inferior centre; and the part which is drawn out along the lower part of the body and contains the viscera, is the foot, for its nerves are derived from the anterior centre. Again, in the *Testacellæ*, it is the upper part of the

neck and of the foot which becomes developed and lodges the organs. The connexions of the nerves show the mantle reduced to that inferior part which covers the shell.

These examples suffice to prove the utility of this principle, which will lead us to a single scheme, the true theoretical and ideal archetype of the Gasteropod.—*Comptes Rendus*, December 27, 1869, tome lxix. p. 1344.

A new British Land-Shell. By J. GWYN JEFFREYS, F.R.S.

My correspondent, Mr. Thomas Rogers of Manchester, has added another species to this well-worked department of our fauna. Specimens of a *Zonites* which he has now sent me, collected by him under stones at Marple Wood, in Cheshire, prove to be the *Helix glabra* of Studer, Fér. Prodr. No. 215. *Z. glaber* has a wide range on the Continent, from Normandy (where I have taken it), through France, Savoy, Switzerland, Germany, and Dalmatia, to Epirus in Greece. I also found the same species in 1846 at Grassmere, and in 1857 at Barmouth, but had overlooked it. Mr. Rogers's specimens being alive, I subjoin a description of the animal.

Body dark bluish grey, striped like a zebra on each side in front, and irregularly mottled behind; in one of the specimens the hinder part of the foot is minutely speckled with yellowish-brown dots; two narrow and slight parallel grooves run along the neck from the head to the upper lip of the shell; the surface is more or less wrinkled, and has a few large but indistinct lozenge-shaped markings: *mantle* very thick and dark at the mouth of the shell, over which its edges are folded: *tentacles*, upper pair rather long, and finely granulated; lower pair very short: *eyes* small, placed on the upper part, but not at the tips, of the tentacular bulbs: *respiratory orifice* round, occupying the centre of the pallial fold: *foot* very long and slender; the sole appears as if separated from the upper part of the foot, being defined by a darker line: *slime* thin and nearly transparent. I could not detect any smell of garlic (so peculiar to *Z. alliarius*), although I frequently irritated the animals.

The shell is three times the size of that of its nearest congener, *Z. alliarius*, and is of a reddish-brown or waxy colour; the whorls are more convex or swollen, the lower part of the shell is not so much arched, the mouth is larger, the umbilicus is smaller and narrower, and the colour underneath is sometimes whitish.

27 April, 1870.

On the presence of peculiar Organs belonging to the Branchial Apparatus in the Rays of the Genus Cephaloptera. By M. A. DUMÉRIL.

Having ascertained, in a large species (*Cephaloptera Kuhlii*) from the Indian Ocean, which is wanting in the Neapolitan Museum, the presence of the *prebranchial appendages* which Prof. P. Panceri, of Naples, was the first to see in one of the Mediterranean species (*C.*



Lacaze-Duthiers, Henri de. 1870. "Morphological researches on the Mollusca. (First Memoir: Gasteropods)." *The Annals and magazine of natural history; zoology, botany, and geology* 5, 383–385.

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