

If it be admitted that cephalic appendages may surround the buccal aperture and unite below the alimentary canal (as is demanded by the arguments of von Jhering and of Grobben), then it ought also to be allowed that pedal appendages, such as those of *Vermetus*, may encroach upon the sides of the mouth and unite above the œsophagus, and embryology teaches us that this is what must have taken place in the case of the Cephalopoda.

IV. If, now, these appendages should undergo great development, it is natural that a pair of special ganglia (the brachial ganglia) should be formed for their innervation at the expense of the pedal ganglia. The formation of accessory ganglia in consequence of the great development of certain organs is often observed in the Mollusca, and here we find a case almost identical with that of the Cephalopoda.

In two groups of Gastropoda we find that the head carries a muscular mass as large in proportion as the brachial mass of the Cephalopoda; these are the Bullidæ ("Acères" of Cuvier) and the Naticidæ.

1. In the Bullidæ there is a "cephalic hood," which seems to be analogous to the hood of the *Nautilus* and to the dorsal arms of the Dibranchia; it arises from the fusion of the four tentacles (two labial and two nuchal) of the *Euthyneura*, and assists these animals in digging. The cephalic nature of the hood is thus beyond doubt.

Is then the nervous system of the Bullidæ similar to that of the Cephalopoda, and do we find there in front of the pedal ganglia other subœsophageal ganglia which innervate this cephalic mass? By no means. Here, as in *Ampullaria*, the innervation of this mass has its source in the supræœsophageal or cerebral ganglia.

On other grounds, too, it is impossible to regard the arms of the Cephalopoda as similar in origin to the cephalic tentacles of the Gastropoda. For even if the tentacles do not any longer exist in the adult Dibranchia, I may point out that they are still present in *Nautilus* (which is incontestably more primitive), though their homology has not hitherto been perceived. The structures in question are the ophthalmic tentacles, situated in front of and behind each eye; as a matter of fact these tentacles are innervated by the supræœsophageal ganglia,¹ whilst all the other appendages (whose mass corresponds morphologically to the arms of the Dibranchia) are innervated by the anterior infraœsophageal ganglia, which also give off the nerves to the funnel.

2. In *Natica* the muscular mass which covers the head can be reflected in front so as to expose the buccal opening. It is the anterior part of the foot, but physiologically is the same part as the cephalic hood of the Bullidæ, and like it aids in burrowing.

¹ Valenciennes, Nouvelles recherches sur le Nautille flambé, *Archives Mus. Hist. Nat. Paris*, t. ii. p. 288, pl. viii. figs. 2, 3, 6 and 7. It is inaccurate to state, as does von Jhering (*Vergleichende Anatomie*, &c., p. 262), that the anterior ophthalmic tentacle is innervated by the anterior infraœsophageal ganglion, as also the olfactory organ. Its nerve issues from the extreme lateral part of the supræœsophageal ganglion. Compare the figures of Valenciennes above quoted.