

the kidney of the Pteropoda is azygous and asymmetrical, whilst in the Cephalopoda there are two (four in *Nautilus*) symmetrical kidneys, isolated or in communication.

C. As regards the *genital organs*, we may first remark that the Cephalopods are dioecious, whilst the Pteropods are hermaphrodite.

The genital ducts differ very widely in the two groups—in the Cephalopoda the genital gland is isolated in a kind of cœlomic space, and has no direct continuity with the genital duct, which is only continuous with the wall of the cavity just mentioned. In the Pteropoda, on the contrary, the genital duct is continuous with the envelope of the gland, and, further, these animals have only a single asymmetrical genital duct, whilst in the Cephalopoda there are numerous indications of paired symmetrical ducts—in *Nautilus* in both sexes,¹ in the females of the Octopoda and of *Ommatostrephes*; and finally in *Rossia* and *Spirula*, the oviduct is on the right (as is the functional oviduct in *Nautilus*), whilst in the other Decapoda it is on the left, which proves that originally it was bilaterally symmetrical.

Lastly, the copulatory organ of the Pteropoda is situated on the head, far from the genital aperture, and is not morphologically comparable with the penis of the Cephalopoda.

D. *Nervous System*.—The nervous system of the Pteropoda differs from that of the Cephalopoda mainly in the absence of symmetry in the visceral portion. When there is an apparent symmetry in the disposition of the ganglionic visceral nervous elements, there is real asymmetry in the origin of the nerves. Furthermore, there is in the Cephalopoda a concentration of the central nervous system, so great that the commissures and connectives have almost disappeared; and there exists in all these animals a pair of "brachial" ganglia which are entirely wanting in the Pteropoda. As regards the nervous system, as in other groups there is no indication of direct relation between the Pteropods and Cephalopods.

The osphradium (Spengel's olfactory organ) is paired in those Cephalopoda which possess it;² it is unpaired in the Pteropoda.

The otocysts of the Cephalopoda (except *Nautilus*) enclose a single otolith; in all the Pteropoda there are many otoliths.

E. The Cephalopoda have two symmetrical columellar muscles (formed by the union of the retractor capitis and retractor pedis of either side), whilst the Pteropoda have only a single median columellar muscle.

F. *Ontogeny*.—If after examining the adult animal we consider its ontogenetic development comparatively in the two groups, we find constant and clear differences. The segmentation of the ovum, which is complete in the Pteropoda, is only partial in the Cephalopoda. In the original development of the Pteropoda there is observed at the commencement the primitive symmetry of all Mollusca, but during the whole larval

¹ Ray Lankester and Bourne, On the Existence of Spengel's Olfactory Organ and of Paired Genital Ducts in the Pearly *Nautilus*, *Quart. Journ. Micr. Sci.*, vol. xxiii., N. S., p. 345.

² *Ibid.*, p. 340; see also Zernoff, Ueber das Geruchsorgan der Cephalopoden, *Bull. Soc. Nat. Moscou*, 1869, p. 71, pls. i., ii.