

MISCELLANEOUS.

On some Points in the Anatomy of the Common Mussel (Mytilus edulis).

By M. A. SABATIER.

IN the mussel the apparatuses of circulation, respiration, and urinary excretion present arrangements which differ in some respects from those observed in the Lamellibranchiate Mollusca generally.

The central apparatus of circulation consists of a heart with two auricles, which does not furnish an aorta at its posterior extremity. This aorta springs from the anterior aorta at the lower surface of the aortic bulb, and passes backward to supply the stomach and intestine. The anterior aorta furnishes the hepatic and tentacular arteries and especially the great parallel arteries which are distributed over the outer surface of the mantle.

The return passages of the blood to the heart are very complex, and vary according to the organs. On each side of the body there is a great vessel, running obliquely from above downwards and from the front backwards, which opens directly into the auricle; this is the *oblique afferent vein*. Its lower extremity opens into a large longitudinal cavity, situated at the level of the adherent margin of the mantle and composed of two parts, a *posterior* and an *anterior longitudinal vein*.

The veins of the mantle are placed on the inner surface. They ascend towards the adherent margin of the mantle, and anastomose below this margin to form a large, zigzag, horizontal vein. From the superior angles of this sinuous trunk spring vertical trunks, which soon subdivide into small canals to penetrate into some special organs, which I shall describe under the name of *plaited* or *frilled organs*. The blood which has traversed these organs penetrates in part into the vascular network of the *corpus Bojani*, and in part into the anterior longitudinal vein. The blood coming from the liver and the anterior visceral mass penetrates directly into the *corpus Bojani*. A small portion of the blood from the mantle passes, also directly, into the oblique afferent vein, and another portion directly into the anterior longitudinal vein.

The *corpus Bojani* is far from presenting the characters seen in it in most Lamellibranchiate Mollusca. It does not form a clearly distinct organ as in these Mollusca; but neither is it entirely composed, as has been asserted, of plates of Bojanian tissue lining the walls of the large veins and auricles. In fact we can distinguish in the *corpus Bojani* of the mussel two different parts—one *autonomous*, the other dependent on the large veins. The autonomous part is anterior, and is to be seen on the lateral portions of the liver, in the furrow which separates that organ from the base of the branchiæ; it is formed of a series of vertical membranous folds, and is of a greenish brown colour. The folds enclose cavities which open successively by their superior extremities into a collecting canal, the diameter of which increases rapidly from before backwards, and which is exactly within the afferent vessel of the branchia.

The portion of the *corpus Bojani* which lines the vascular walls occurs on the walls of the auricle, the oblique afferent vein, and the posterior longitudinal vein. This last vessel is only separated from the posterior half of the collecting duct of the *corpus Bojani* by a spongy lamina or septum of Bojanian tissue, which, being pierced by numerous small orifices, allows of communication between the vessel and the collecting-duct.

The cells constituting the Bojanian tissue are not the same throughout. Those of the autonomous portion and of the septum just mentioned are formed of a very transparent protoplasm, in which there are a very variable number of small green granules; they have no nucleus. Those belonging to the walls of the oblique afferent vein and of the auricle contain, besides the green granules, large colourless nuclei provided with one or two colourless nucleoles; they also contain colourless granules.

The passage from the cells of the first to those of the second kind takes place rather suddenly, which justifies us in thinking that the latter are not exclusively Bojanian, but that they may also fulfil other functions.

The cavity of the pericardium is continuous below, by a passage placed in front of the oblique afferent vein, with the collecting-duct of the *corpus Bojani*. Between the passage and the collecting-duct there is a narrow oblique orifice which allows the passage of a liquid from the passage into the duct, but impedes its return in the opposite direction. The liquid which has traversed the *corpus Bojani* rids itself of certain principles, which are received in the pericardium, the passage, and the collecting-duct. This last communicates with the exterior by a very narrow orifice, placed at the apex of a very small papilla, concealed behind the papillæ of the reproductive organs; the discovery of this orifice is due to M. de Lacaze-Duthiers. The Bojanian collecting-canal receives in part the blood from the veins of the "bosse de Polichinelle" at the level of the branchial ganglia, and opens posteriorly with a large posterior pallial vein, which serves as a canal of derivation for the blood returning from the mantle at those periods when the pallial circulation is very abundant—that is to say, during the period of reproduction.

The organs of respiration are multiple. They include the branchiæ, the surface of the body, and especially the inner surface of the mantle and the *plaited* or *frilled organs*.

The branchiæ are composed of very small filaments, traversed by a single very narrow canal. These branchial canals originate, for the most part, directly from the Bojanian tissue, others from a branchial afferent vessel of spongy or cavernous structure; they open into an afferent vessel, the diameter of which increases from behind forwards, and which occupies the upper margin of the free lamella of the branchia. This afferent vessel of the branchia receives in front some superficial vessels of the liver, some little veins of the mantle, and the veins of the buccal tentacles, and it opens into the anterior extremity of the anterior longitudinal vein. The branchial

circulation differs greatly in its degree of intensity from the branchial circulation of the other Lamellibranchiate Mollusca; it is very feeble or almost none; branchial injections, moreover, are rarely successful and always very imperfect. This deficiency of circulation depends:—1, on the small calibre of the branchial vessels; 2, on the weakness of the flow of the blood, which only arrives at the branchiæ after having traversed the Bojanian and other capillary networks; and, 3, on the existence of easy return passages, which allow the blood to return to the heart without having traversed the branchiæ.

The mantle plays an important part as an organ of respiration. But during the period of reproduction it is gorged with eggs or spermatozooids, since it contains the reproductive organs; it acquires a great thickness and becomes a very active visceral organ in which hæmotosis does not take place, and in which, on the contrary, the blood becomes charged with carbonic acid in consequence of the activity of the phenomena of nutrition. The respiratory functions are then performed by the *plaited organs*, which are arranged in a close series on the inner surface and near the adherent margin of the mantle. They have been mistaken for simple vessels; but they are hollow laminae, very regularly sinuous, and with very elegant foldings. Their cavity is rendered spongy by a true reticulum of very delicate elastic fibres. Their surface is clothed with vertical series of cells with long vibratile cilia, which effect the renewal of the water; the interspaces of these series of cells are occupied by cells with short cilia. These plaited organs receive the blood which returns from the mantle. I regard them as a respiratory organ, a supplementary branchia, destined to play an important part during the period of reproduction, when the mantle does not respire. This opinion is, moreover, in harmony with the fact that the plaited organs are much more prominent and much better filled with blood at the time when the mantle is occupied by the reproductive elements. These plaited organs are therefore neither a part of the *corpus Bojani*, as Siebold believed, nor simple vessels detached from the mantle, as has also been supposed.—*Comptes Rendus*, August 31, 1874, vol. lxxix. pp. 581–584.

Note on Herpeton tentaculatum.

M. Albert Morice, surgeon in the French navy, has kindly communicated to me that he has succeeded in bringing a living example of this snake to the Zoological Garden in Paris. He observed it in the south-eastern provinces of Camboja; and writes as follows:—

“*Herpeton tentaculatum* is ovo-viviparous, bringing forth six young ones at a birth, which are 0·28 m. long. Its food is mixed; it feeds on tadpoles and small fish, and also on an aquatic plant called by the natives ‘Rân giua,’ or *Jussiaea repens* of botanists.”

A. GÜNTHER.



Sabatier, Armand. 1875. "On some points in the anatomy of the common mussel (*Mytilus edulis*).*" The Annals and magazine of natural history; zoology, botany, and geology* 15, 157–159. <https://doi.org/10.1080/00222937508681046>.

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