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On the Nephridia of Branchiobdella varians (var. astaci). By D. N. VOINOV, Morphological Laboratory at Bucharest.

During the year 1895 I have studied the excretory apparatus of *Branchiobdella varians* (var. *astaci*), a parasite which I have found in great quantities occasionally upon the branchiæ of crayfish brought to the market of Bucharest.

Despite the labours of Henle, Keferstein, Dörner, Lemoine, Voigt, &c. on the general organization of this animal, the excretory organ is still insufficiently understood. All that was known was that each nephridium is composed of five regions, which are from within outwards:—(1) the vibratile funnel; (2) the red gland (of Odier); (3) the canalicular chain; (4) the excretory canal (efferent); (5) the terminal vesicle. The structure and true relation of these various parts were, however, unknown; in a word, no general interpretation of this complicated organ has ever been given.

I have studied the excretory apparatus by transmitted light in the living animal and by means of microscopic sections; the results arrived at may be briefly summarized as follows:—

The funnel is composed of a body—the funnel properly so-called—and of a peduncle, which is a continuation of it. It is placed on the ventral side of the animal, and opens partly into the general cavity of the animal and partly into the red gland, with which it communicates by the peduncle. This first part of the nephridium is provided with a continuous ciliary covering, the movement of which is towards the red gland. The form of the funnel so-called is that of a cup with straight ciliated edges; its longitudinal diameter is 0.10 millim. and its greatest transverse diameter is 0.075 millim. The funnel and its peduncle are capable of movement in all directions in the interior of the cavity of the segment around their base of attachment.

The red gland of Odier is a lobulated body, of a red-brown colour in the adult animal. By reason of its structure and connexions I have named it *capsule*, after the name of the corresponding region in the nephridia of the Hirudineæ. In this gland there are to be distinguished two kinds of structures:—(1) a system of irregular lacunæ, communicating one with another, traversing it in all directions, and giving it a spongy appearance; (2) a system of regular canals. The former belong properly to the capsule, being excavated in its substance, whilst the latter only traverse it, establishing communication between the capsule and the third part of the nephridium, that is to say, the canalicular chain.

The peduncle of the funnel opens into a lacuna of the capsule. One of these lacunæ, greatly enlarged, contains in its interior a compact cellular mass, analogous to the contents of the capsule in the Hirudineæ, in which are gathered a quantity of pigmentary granules of a red-brown colour. The flagella are fixed to the walls of the lacunæ, turned in all directions, thus indicating a great complicity in the direction of the movement of the lacunar fluid. In

the sections the capsule is seen to be divided into distinct lobes, pressed one against the other, showing that it is formed by a rolled-up canal, the walls of which have fused.

The canalicular chain corresponds with the region which German naturalists have named "Schleipenorgan" in the excretory apparatus of the Hirudineæ. It is traversed throughout its whole length by four canals, which communicate two and two, at its free extremity. This caused Lemoine (1880) to believe that it is formed by two pairs of united canals. In reality the direction of the current indicated by the flagella in the interior of these canals, as well as their relation to the canalicular structures of the capsule, oblige us to consider the "Schleipenorgan" as a single and distinct canal. After taking its origin in the lacunar system of the capsule, it is folded four times on itself, its faces of contact are fused together, and is continued into the excretory canal.

The communication one with another of these supposed four canals, as well as the continuation of the "Schleipenorgan" into the excretory canal, takes place in the capsule. Contrary to the assertions of the authorities previously cited, the internal cavity of the excretory canal is completely bare of vibratile cilia and flagella.

The terminal vesicle, oval in form, opens directly on the exterior by the excretory orifice; it has a longitudinal diameter of 80-90 μ in a state of extension. It is formed by an invagination of the integument. Its wall is made up of three successive layers, which are, from within out, an epithelial coat, clothed by a cuticle which represents the ectoderm; a middle muscular coat, formed by the circular fibres of the body-wall; and a delicate external membrane. There are no vibratile cilia in the interior.

The excretory apparatus of *Branchiobdella* has the same structure as the corresponding apparatus in the Hirudineæ, and appears to be of an intracellular character; the protoplasm presents around the cavities well-marked radial striations. The nuclei are distributed in its interior, but no limiting membrane of the cellular masses exists.

The whole surface of the nephridium is enveloped in the peritoneum, which constitutes ligaments and exhibits in certain places large granular peritoneal cells.

I have made no direct experiments to determine the physiological rôle of the nephridia of *Branchiobdella* (I propose to attack this question shortly), but observations made upon the living animal enable me to assert that, besides liquid excreta, these organs absorb solid matters. These latter arise from the breaking down of the chloragogenic cells, detached from the intestine, and of too large a size to penetrate into the vibratile funnel. I have never seen solid bodies in the interior of the "Schleipenorgan" nor in the terminal vesicle. The solid particles which have penetrated through the funnel are stopped in the capsular lacunæ, where probably they are destroyed. It is possible that the accumulation of pigment in the cellular mass, which I have described, in the capsule arises from this destruction.—*Comptes Rendus*, 1896, t. cxxii. pp. 1069-1071.