

3. *Aspidogaster conchicola*.

Preliminary Note.

By J. Stafford, Zool. Lab. Leipzig.

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Having been occupied for some months with researches into the structure and development of *Aspidogaster conchicola*, I desire to state here, as briefly as the subject permits, a few of my results. Details will appear in a future paper.

Cross sections of the adult animal show a transverse muscular septum separating the intestine, vitellaria, and end organs of the sexual system above from the large vessels of the excretory system, the lateral nerves and the hermaphrodite genital glands below. At the posterior end of the intestine the septum thins out and its individual fibres are lost in the parenchym, so that here the infra- and supra-septal portions of the body pass directly into one another. Underlying the infraseptal division and separated from it by a limiting membrane is the ventral disk — a highly complex sucker-apparatus. Into the structure of this as well as of the body parenchym and musculature I do not purpose here to enter. I only mention the above stated facts to indicate the relative positions of the chief organs of the body, since Voeltzkow states that the »Expulsionsschlauch« and the lateral nerves lie in the »Saugscheibe« and posteriorly pass out of it into the body. They are in fact situated right and left from ovary and testis, from which they are separated only by parenchym; above them stretches the septum and below them the limiting membrane of the ventral disk. Voeltzkow could not have meant to call the whole infraseptal part a »Bauchscheibe«, for then the sexual organs would be in the sucker. The part of the animal below where the septum joins the body walls on the sides and front, however, adapts itself to the conditions of contraction and expansion of the ventral sucker, being sometimes much lengthened while sometimes it is much broader than the upper part of the body. It acts so much as a unit, that one is tempted to give it the particular name of foot in contradistinction to the neck and supra-septal part.

On each side, in the ventral sucker, is a longitudinal nerve with a collateral plexus system, the whole in communication with the marginal sense organs by means of thick lateral branches.

Both Voeltzkow — in his work of 1887 — and Zacharias in a publication of the beginning of the present year state that they were unable to find »Trichterorgane«. This I had already done before the publication of the latter work. As near as I can judge, the three

blindly ending capillaries described by the former author, instead of ending blindly, as he thought, divide again in threes, each one of which latter branches is terminated by a »Trichter«. The capillaries are without cilia. The ciliary cone of the funnel is shorter and, relatively to its length, broader than that of the vessels and at its base is a nucleated funnel-cell. The whole funnel-organ is so far characteristic that when one has educated his eye to it one can find them quite easily and can at once distinguish the »Flimmerung« of a »Trichter« from that of the conducting vessels. I will only state further in this connection that in the embryo before it leaves the shell there are at least two pairs of funnels present — immediately behind the anterior and in front of the posterior suckers — and that in the adult there are two pori excretorii.

Regarding the genital organs I find that the »dreieckiger Raum« is not the ootype. Its cilia extend from the opening of the unpaired vitelline duct to the tuba and act in this direction. The receptaculum vitelli with its duct are the Laurer's canal. Pursuing the oviduct outwards, at a distance from the opening of the vitelline duct equal to that of the latter from the Laurer's canal, one finds the shell-gland with its radiating ducts, and immediately succeeding it a widening in the oviduct with thickened walls, the ootype. Beyond this is generally a contracted portion with again an expansion filled to distention, in the sexually adult animal, with sperm-cells. The latter is the part designated by Looss »Receptaculum seminis uterinum«. These organs have been hitherto overlooked.

The penis is a highly complex organ and decoyed Voeltzkow into numerous errors. Between the »Penisschlauch« and the ductus ejaculatorius is no epithelium and no space filled with a watery fluid but a continuous parenchym. The bulbus is, at least as to its essential structure, a large papilla-like forward growth into the greatly widened ductus from the posterior end of the »Penisschlauch« through the centre of which passes the continuation of the vesicula seminalis opening at the anterior tip of the bulbus. The walls of the ductus are posteriorly incorporated into the bulbus structure but along its outer surface are a number of longitudinal infoldings where the ducts from the prostate gland grow inwards carrying with them the parenchym. These infoldings meet with the outer walls of the forwardly projecting papilla and coalesce with it forming the septa figured, but incorrectly, by Voeltzkow. At the broadest part of the bulbus there are about a dozen septa between which are somewhat wide canals, the latter receiving the ends of the prostate ducts. More anteriorly the septa fail and the intervening canals fuse

into a space completely encircling the tip of the bulbus. Through the septa the parenchym surrounding the ductus meets with that of the bulbus proper.

This complexity of structure can of course only be clearly exhibited by drawings.

I shall make mention of only one more organ—namely the vitellaria which consist of a longitudinal canal on each side of the intestine from whose sides pass off numerous short ducts, the necks of the flask-shaped follicles: about two thirds of its length from the anterior end each longitudinal canal bends downwards and gives off the transverse canals figured by Voeltzkow and which unite at the vitelline sac to form the unpaired vitelline duct.

4. On the Conjugation of *Cambarus*.

By E. A. Andrews, Baltimore.

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Some observations upon the breeding habits of *Cambarus affinis* show that there are important differences between the American crayfish, *Cambarus*, and the European crayfish *Astacus* and that certain structures hitherto known only as specific and generic characters are necessary accessory reproductive organs.

1) When kept in confinement *Cambarus affinis* conjugated in November and in February, March and April.

2) The process lasts several hours.

3) The male exhibits great skill and persistency and is visibly excited throughout the process while the female is from the first passive and inert and shows scarcely any evidence of excitement.

4) The sperm is introduced into the cavity in the **annulus**, which thus serves as a sperm receptacle as in the lobster, *Homarus americanus*, as described by Professor Bumpus (*Journal of Morphology*, V. 1891.)

5) The well known hook on the ischiopodite of the third walking leg of the male is used in the process of conjugation to firmly attach the male to the female. The tip of the hook depresses the membrane between the coxopodite and the basiopodite of the fourth walking leg of the female and the hook catches firmly against a stiff ridge on the basiopodite.

6) The sperm is conveyed down the groove of the stylet or first pleopod of the male from the penis-like everted end of the vas deferens into the cavity of the annulus of the female. The annulus becomes filled and a plug of sperm and protective secretion projects from its orifice after conjugation.

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