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II. Wissenschaftliche Mittheilungen.

1. Further notes upon the reproductive organs of Eudrilus.

By F. E. Beddard, London.

eingeg. 6. October 1888.

The investigations of Perrier[1], Horst[2] and myself[3] have shown that the reproductive organs of *Eudrilus* present certain noteworthy differences from those of other genera of *Oligochaeta*.

Of the male organs the testes and vesiculae seminales are perfectly normal: but the efferent ducts and the terminal apparatus are, in many points, unlike those of any other earthworm, excepting only the genus *Teleudrilus* recently described by Rosa[4]. The female organs are chiefly remarkable on account of the continuity of the ovary and oviduct, and the communication between the oviduct and the spermatheca. *Teleudrilus* is somewhat intermediate in these particulars between *Eudrilus* and other earthworms; the discovery of this genus, as Dr. Rosa points out, renders less necessary the separation of *Eudrilus* into a distinct group. At the same time I do not think that Dr. Rosa is inclined to lay sufficient stress upon some of the peculiarities in the organisation of these two types; and I cannot agree with the way in which he has interpreted some of my own statements of fact.

With regard to the female generative apparatus the differences between *Eudrilus* and *Teleudrilus* are greater than would appear from

[1] Nouv. Arch. d. Museum. t. VIII. 1872.
[2] Notes from the Leyden Museum. Vol. IX.
[3] Proc. Zool. Soc. 1887.
[4] Ann. Mus. Civ. Genova. Vol. VI. 1888.

a comparison of Dr. Rosa's paper with my own. In my paper I described and figured a pair of problematic bodies in the 13th segment which are contained in a muscular sac prolonged into a duct lined with epithelium. I was unable at that time to find the opening of this duct; I have now ascertained that it communicates with the duct of the spermatheca close to the opening of the glandular body attached to the latter.

I regarded the bodies attached to the anterior wall of the 13th segment as being probably ovaries, although they consisted only of small cells uniform in size and not distinctive in appearance; this supposition is greatly strengthened by Rosa's description of a pair of similar structures[5], which are placed in an identical situation in *Teleudrilus* and contain nearly mature ova. These bodies in *Teleudrilus* are contained in a sac which is prolonged into a duct communicating with the receptaculum ovorum in the 14th segment. The wall of the sac and duct are extremely delicate, but in the duct the cells lining the lumen are aggregated here and there into heaps; all these facts appear to point to the conclusion that the sac and duct are merely specialised portions of the coelom, in fact a prolongation forward of the receptaculum ovorum which has involved the ovary. Dr. Rosa does not figure the details of the structure of the sac and duct, but I should imagine that the aggregations of cells in the latter are similar to the aggregation of peritoneal cells which occur in other parts of the coelom.

Now the sac which involves the supposed ovary of the 13th segment in *Eudrilus* clearly corresponds to the sac involving the ovary of *Teleudrilus*. Dr. Rosa suggests that the duct also corresponds, and opens into the receptaculum; I must admit that his suggestion, based upon the very imperfect description which I gave of this part of the reproductive system, is not unreasonable. Now however that I am able to record that the duct in question is lined by a single layer of columnar cells and opens into the duct of the spermatheca, it is no longer possible to compare the two structures. The tube by which the ovary of the 13th segment in *Eudrilus* communicates with the exterior is a real duct, while the tube which leads from the ovary to the receptaculum in *Teleudrilus* is simply a coelomic sac.

I now come to the question of the receptaculum ovorum in the two genera. Does the structure which Rosa calls by this name in *Teleudrilus* represent what Perrier, Horst, and myself have called »ovary« in *Eudrilus*? Rosa found that the oviducts of *Teleudrilus*, although opening separately on to the exterior and not in common with

[5] I have since found numerous mature ova in these bodies in *Eudrilus*.

the spermathecae as in *Eudrilus*, were covered with a layer of muscles continuous with the investment of the receptaculum as they are in *Eudrilus*. The receptacula contained only mature ova surrounded by a few cells serving probably for their nutrition, and Rosa suggests that this is also the case with *Eudrilus*. I may refer to my figures of the »developing ova« of *Eudrilus*[6] which do not appear to me to favour any other construction than that they are really developing ova. If the supposed ovary of *Eudrilus* is nothing more than a receptaculum ovorum then the organ in question is anomalous by reason of the fact that the ova undergo within it their whole course of development. This has never been described in any earthworm. If however the egg-sacs of *Stylaria*[7] are the equivalents of the receptacula ovorum the condition of the supposed receptacula of *Eudrilus* is less anomalous than it would otherwise be; but, it must be noted, if this comparison be allowed, it is highly probable that the structure which I have termed ovary in *Eudrilus* is really ovary + receptaculum ovorum. This view, as I stated in my former paper, is an extremely probable one; but it does not affect the anatomical fact that the ovary of *Eudrilus* is continuous with the oviduct. For the matter of that there is, as Rosa points out, a continuity of ovary and oviduct in *Teleudrilus* which is equally direct.

Another difficulty in the way of supposing that the cellular mass with developing ova in segment 14 is really an ovary is its position. The ovaries of segment 13 correspond in position to the testes but not to the supposed ovary of segment 14. The difference however is not a very great one and it hardly appears to exist in *Teleudrilus* judging from Rosa's figure (fig. 3); in specimens of *Eudrilus* it occasionally happened that the position of the ovaries of segment 14 corresponded with those of segment 13; and seeing that the mesentery separating segments 13 and 14 is very imperfect, the ovaries after becoming surrounded by the muscular sac which forms the extremity of the oviduct may easily have shifted in position. The usual difference of position of the ovaries of segment 14 from those of segment 13 must be in fact largely dependent upon the growth of the spermathecae, to which they are closely attached.

The passage of the ova from the gonad into the receptaculum in *Teleudrilus* is of course facilitated by the tube leading directly from the one to the other; in the majority of earthworms it is not easy to understand why the ova pass into the receptaculum instead of to the exterior

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[6] Journ. Anat. Phys. Oct. 1887. Vejdovsky.
[7] System u. Morphol. d. Oligochaeten. Pl. IV Figs. 2, 7.

through the oviduct. In *Eudrilus* it is still more difficult to understand how this is carried out, if the organ of the 14th segment, which I regard as an ovary, be really the receptaculum; the ovary is entirely enclosed by a muscular sac as is also the organ of the 14th segment; it is not therefore at all probable that ova are conveyed from one to the other in the way which must take place in *Lumbricus*. On the other hand it seems improbable that the ova pass down into the spermathecal duct, and then pass up the oviduct into the supposed receptaculum. I am not able to state whether there are cilia in the duct leading from the ovary of the 13th segment; but the spermathecal duct is certainly without cilia as is also the distal half of the oviduct of the 14th segment; the proximal half of the oviduct is abundantly furnished with long cilia; but, if the movement of these is such as to further the exit of ova from the ovary of the 14th segment they would prevent the entrance of ova into the same organ; the passage of ova from the ovary of the 13th segment into the ovary of the 14th segment would also necessitate very complicated changes in the direction of the peristaltic action of the various parts of the female reproductive system.

All these considerations appear to point to the conclusion that in *Eudrilus* there are two pairs of ovaries situated respectively in the 13th and 14th segments; each ovary is enveloped in a muscular sheath which is continuous with the oviduct; the two oviducts of each side open opposite to each other into the spermathecal duct. The muscular sac investing the ovaries is probably equivalent to the receptaculum of other earthworms.

2. Bemerkung zu den Mittheilungen von F. Braem über Süfswasserbryozoen (d. Zeitschr. 1888, No. 288, p. 503 ff).

Von Prof. Dr. K. Kraepelin, Hamburg.

eingeg. 10. October 1888.

Zu den Mittheilungen des Herrn Stud. Braem über die Bryozoen des süßen Wassers hätte ich eine ganze Reihe von Bemerkungen zu machen, die sich theils auf die Art und Weise, wie meine Ansichten citirt sind, theils auf die von Herrn Braem geschilderten Thatsachen beziehen. Da ich aber in dem 2. Theile meiner Monographie der Süßwasserbryozoen Gelegenheit nehmen werde, näher auf diese Puncte einzugehen, so möchte ich an dieser Stelle nur auf eine Thatsache aufmerksam machen, die für mich nicht ohne Werth ist.

Herr Braem sagt in der Einleitung seines Aufsatzes, daß er Resultate gefunden habe, welche »für das richtige Verständnis des Baues