

Die Regeneration kann aber auch zur Bildung eines ganzen neuen Sternes führen, wie der vorstehende Holzschnitt ein Beispiel in natürlicher Größe wiedergibt; in diesem Falle bekommt man zwei mit einander verbundene Sterne, also das Bild eines echten Thierstockes. An dem jungen Sterne des abgebildeten Exemplars fehlen noch die Madreporenplatten, auch war kein Mund von außen sichtbar; um seine Anwesenheit festzustellen, hätten wir den Stern zerstören müssen, und dies wollten wir nicht thun. Wer will aber bezweifeln, daß hier ein neuer Seestern mit allen seinen Organen sich bilden wird? An einem anderen Exemplar, wo ein Armstummel drei neue Arme getrieben hatte, und diese bereits eine beträchtliche Länge (ca. 2 cm) erreicht hatten, glauben wir uns von der Anwesenheit einer ganz kleinen, runden Mundöffnung überzeugen zu können.

Im Ganzen haben wir unter mehr als zweitausend untersuchten Linckien nur drei Exemplare gefunden, welche aus zwei mit einander verbundenen Sternen bestanden. Diese Stockbildungen sind also bei der *Linckia* äußerst seltene Erscheinungen und gewiß als Abnormitäten anzusehen. Da aber zwischen Pathologie und Variabilität keine scharfe Grenze gezogen werden kann (Darwin, Virchow), so gewinnen solche Fälle immerhin Bedeutung. Wenn man sich z. B. vorstellt, die Tendenz zur Stockbildung würde sich bei gewissen Seesternen vererben, so könnten sich im Laufe der Zeit aus solitären Asteriden coloniebildende Formen entwickeln. (Die definitive Arbeit wird demnächst im vierten Hefte unseres Reisewerkes erscheinen.)

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2. On the so called prostate glands of the Oligochaeta.

By F. E. Beddard, London.

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The vasa deferentia of some earthworms (*Lumbricus*, *Urochaeta*, *Microchaeta*, etc.) are not furnished with any special glands, and undergo no modification in structure at their external aperture. In other worms however the terminal extremity of the vas deferens is a highly muscular organ and is furnished with certain glandular appendages. There are two principal forms of glands connected with the orifices of the vasa deferentia.

(1) In *Acanthodrilus*, *Trigaster*, *Pontodrilus* and *Typhocus* these organs take the form of an elongated often contorted tube, of an opaque white colour.

(2) In *Perichaeta*, *Perionyx*, *Megascolex* and some other genera

the glands in question are composed of numerous lobules, more or less loosely connected together, and opening by a number of ductules into a common duct.

By the majority of those, who have occupied themselves with the anatomy of the *Oligochaeta*, these glands have in every case been termed »prostates«.

The questions which are attempted to be answered in the present note are (1) Do these various structures correspond to each other? (2) Are they homologous with any organs found among the lower *Oligochaeta*?

Vejdovský has expressed the opinion¹ that the tubular gland of *Pontodrilus* and of *Eudrilus* is the atrium of the lower *Oligochaeta*; with some little hesitation he suggests that the »prostate« of *Perichaeta* may be the equivalent of the prostates (Cement-Drüsen) of the Tubificidae etc., and therefore by implication not homologous with the gland of *Acanthodrilus*. With the former suggestion I fully agree, but I believe that the »prostate« of *Perichaeta* is the homologue of that of *Acanthodrilus*.

In *Eudrilus* there are a pair of »prostate« glands which I have recently shown to have a minute structure identical with that of *Acanthodrilus*, and, I may add, of *Trigaster*, *Pontodrilus* and *Typhocus*, as regards the epithelial lining; this resemblance is masked by a great development of muscular fibres giving to these organs their peculiar nacreous appearance. In a less degree the same development of muscles has been found by Benham upon the »prostates« of *Trigaster*. In *Eudrilus*² therefore there are a pair of organs which seem to be homologous with the »prostates« of *Acanthodrilus* etc. but the vasa deferentia open into them at about their middle. They are in fact not diverticula of the vas deferens, but for the greater part represent merely a dilatation of the vas deferens on its way to the exterior.

In *Eudrilus* the terminal part of the male efferent apparatus is highly specialised; the vasa deferentia enter the glandular body already referred to, and become continuous with its lumen. The glandular body is divided by a longitudinal septum into two halves³ which are identical in structure and enclosed in a common muscular sheath; they on their part terminate in two muscular tubes which unite to form a projecting penis lodged in a secondary invagination of the integument

¹ System und Morph. der *Oligochaeten*.

² Contributions to the Anatomy of Earthworms. No. I. Proc. Zool. Soc. 1887. p. 383.

³ Proc. Zool. Soc. l. c.

(»Bursa copulatrix« Perrier). This latter I regard as the equivalent of the »penis sheath« of the Tubificidae. The muscular penis evidently corresponds to the penis in the Tubificidae, while the muscular tube leading to it is the homologue of the muscular region of the atrium in these and other »Limicolae«. Vejdvský has rightly pointed out that the glandular part corresponds to the »vesicula seminalis« which is sometimes (e. g. in *Psammoryctes*) sharply marked off from the non-glandular region of the atrium. The condition which characterizes *Pontodrilus* can be derived from *Eudrilus* on the supposition that the vas deferens, which in *Eudrilus* opens some way down the vesicula and not at its apex, has moved still further down, so that the vesicula comes to be a diverticulum, opening in common with the vas deferens into the muscular atrium. In *Typhocus*, I am able to record here for the first time, the vesicula and vas deferens are still further divorced; they penetrate the body wall independently and only unite just beneath the epidermis. This latter fact is to a certain extent confirmatory of Vejdvský's opinion⁴ that a long sac like structure in *Ocnodrilus*, which opens in common with the vas deferens, is really the atrium.

The identity of structure between the glandular bodies appended to the termination of the vas deferens in *Eudrilus*, *Typhocus* etc. leads to the inference that they are homologous, while the relations of the vas deferens to this body in *Eudrilus* clearly favours the supposition that it corresponds to the atrium in the »Limicolae«. The so called »prostate« of *Perichaeta* undoubtedly present certain resemblances to the prostates of many Limicolae e. g. Tubificidae; it consists of groups of glandular cells, each cell furnished with a long prolongation, attached to a series of branching ductules which unite and open into a muscular atrium. In the Limicolae however and in *Moniligaster*⁵ the prostates are formed by a metamorphosis of certain peritoneal cells. In *Perichaeta* the supposed prostate is covered by a continuous layer of peritoneal cells; this disproves any homology between the prostates of *Perichaeta* and those of the »Limicolae»; it is this peritoneal covering of the so called »prostate« in *Perichaeta* which is the real homologue of the prostate of *Moniligaster* and the lower *Oligochaeta*. A peritoneal layer also covers the atrium of *Eudrilus*, *Acanthodrilus* etc. but is nowhere modified to form a prostate. The structure of the gland in question in *Perichaeta* only differs from the atrium of *Acanthodrilus* in the fact that

⁴ l. c. p. 144. Woodeut fig. IV.

⁵ See last paper.

the glandular cells, which in *Acanthodrilus* form a continuous covering to the lining epithelium, are segregated into groups; and this is accompanied by a branching of the cavity; it is important to notice that the vas deferens opens into the conjoined ducts of the glands before the latter becomes continuous with the muscular atrium.

These facts lead to the conclusion that the so called »prostate« of *Perichaeta* is the homologue of the atrium in other earthworms and in the Limicolae. In earthworms therefore there are two organs which have been termed »prostates«. (1) The atrium of *Acanthodrilus*, *Perichaeta* etc. (2) The atrium + prostate of *Moniligaster*⁶.

3. Note on the Reproductive organs of *Moniligaster*.

By F. E. Beddard, London.

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The reproductive organs of this remarkable Lumbricid have been described in three apparently different species by Perrier¹, Horst², and myself³. My description agrees in the main with that of Horst; while we both differ in many important particulars from Perrier.

According to Perrier *M. Deshayesi* is provided with two pairs of male sexual pores, each furnished with its own prostate, vas deferens and testis; the structure of these various organs is described in some detail. Horst and myself find only a single pair of male sexual orifices which correspond in position to the hindmost of the two pairs which Perrier believes to exist in this genus; in the species described by myself these orifices are between segments 9—10, in that of Horst between 11—12.

The anterior pair of orifices, that which opens between segments 7 and 8, is connected in *M. Barwelli* with a spermatheca and not with an anterior pair of vasa deferentia and testes; moreover in that species the aperture is on the boundary line between segments 6 and 7; in *M. Houteni* the structure of the reproductive organs is in this respect more like that of *M. Barwelli* than *M. Deshayesi*. Horst describes a single »kidney shaped pouch« on each side of the intestine in segment 9, which is connected »with a long, slender, coiled tube, communicating with the exterior by . . . the pores between the 8th and 9th ring«. There is, it appears to me, an unlikelihood, from what we know of the structure of

⁶ For the present I do not consider the »atrium« of *Criodrilus*.

¹ Nouv. Arch. d. Mus. t. VIII. (1872.) p. 133.

² Notes fr. Leyden Mus. Vol. IX. p. 98.

³ Ann. and Mag. Nat. Hist. Feb. 1886. p. 95.

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