

2. Note on the Excretory Cells of the Ascaridae.

By Arthur E. Shipley, Cambridge.

eingeg. 10. August 1897¹.

At the end of a somewhat long critique on Professor NASSONOW'S interesting discovery that certain large cells in the body of *Ascaris megalocephala* take up granules of carmine and Indian ink, when these substances are injected into the body-cavity, Professor SPENGLER writes as follows: 'Thatsächlich finden sich diese Zellen, was den sämtlichen früheren Beobachtern entgangen ist, nicht immer seitlich, zwischen dem Darm und den Seitenlinien, sondern manchmal auch median, auf oder unter dem Darm. Das ist die einzige Beobachtung, um die ich bei dieser Gelegenheit die Kenntnis von diesen merkwürdigen Zellen vermehren will'. —

It is perhaps not a matter of any great importance, but I should like to point out that these giant cells whose function Professor NASSONOW has been the first to experimentally determine, have been described and figured in the position indicated by Professor SPENGLER by Dr. HESSE², who calls them »Gewebeepolstern«, in *Ascaris megalocephala* and by myself³ in *Ascaris transfuga*. In the last named species they are three in number, one situated dorsally and two ventrally on the intestine just at the level where the mid-gut passes into the proctodeum.

From his article one is led to the conclusion that Professor SPENGLER knows more about these peculiar giant-cells in Nematodes and one cannot but regret that his only contribution to the increase of our knowledge of these remarkable cells is one that has been so recently described and figured in such well known periodicals as the Zeitschrift für wissenschaftliche Zoologie and the Proceedings of the Zoological Society.

3. On the Notochord of Cephalodiscus.

By Sidney F. Harmer, M. A. Cambridge.

eingeg. 27. August 1897.

Mr. A. T. MASTERMAN has just published an important memoir¹ on the anatomy of *Actinotrocha* and of *Cephalodiscus*. If we may accept

¹ Durch Zufall erst am 12. Sept. in meine Hände gekommen. Carus.

² Zeitschr. f. wiss. Zool. Vol. LIV. 1892. p. 548.

³ Proc. Zoological Society, London, 1894. p. 531.

¹ On the Diplochorda. 1. The Structure of *Actinotrocha*. 2. The Structure of *Cephalodiscus*. Quart. Journ. Mic. Sc. Vol. 40. Part 2 (Aug. 1897). p. 281; following on preliminary notices in Proc. Roy. Soc. Edinburgh, 1895—1896. p. 59, 129.

the general accuracy of the description, it appears to me that he has gone far towards proving that *Phoronis* is related to *Balanoglossus*, using this name in its widest sense. The similarity is shown in the existence, in *Actinotrocha*, of divisions of the coelom corresponding with the first, second and third body-cavities of *Balanoglossus*, the proboscis-cavity being connected with the exterior by paired proboscis-pores, and in the fundamental identity of the nervous and vascular systems of the two types. Mr. Masterman is greatly to be congratulated on the fresh light which he has thus thrown on the systematic position of *Phoronis*.

Mr. Masterman states that in his opinion the organ which I formerly described² as the notochord of *Cephalodiscus* is not homologous with the notochord (Spengel's »Eicheldarm«) of *Balanoglossus*, but he regards it as the representative of a structure which he describes in *Actinotrocha* as the »sub-neural gland«. The latter is supposed to correspond with the organ of the same name in Ascidians and probably with the hypophysis of the Vertebrata, and to be represented in *Balanoglossus* by the proboscis-vesicle (Spengel's »Herzblase«). It is further concluded that *Cephalodiscus* and *Actinotrocha* possess paired notochords, which in the later phylogenetic stage represented by *Balanoglossus* have fused together to form a single median organ.

I find myself unable to agree with the above-stated conclusions in several respects; and my views may be formulated as follows:

- 1) The median notochord of *Cephalodiscus* is really the homologue of the »Eicheldarm« of *Balanoglossus*.
- 2) The comparison of the median notochord of *Cephalodiscus* with the proboscis-vesicle or heart-vesicle of *Balanoglossus* is untenable.
- 3) The proof of the homology of the so-called paired notochords of *Cephalodiscus* and *Actinotrocha* with the notochord of higher Chordata is not convincing.

1. Mr. Masterman remarks (p. 351) that the median notochord of *Cephalodiscus* »presents no histological features resembling those of every other notochord yet described«. If allowance be made for the small size of *Cephalodiscus*, it is hardly surprising that its notochord exhibits a comparatively simple structure; but I think that there is no essential histological difference between this organ and the slender anterior portion of the notochord in *Schizocardium* and *Glandiceps*, as described by Professor Spengel³. This fact by itself might be a mere coincidence, but taking into account the relations of the notochord to

² Challenger Reports Vol. XX. Part 62, 1887. p. 40.

³ Fauna und Flora G. v. Neapel, 18. Monogr., 1893. See p. 195, 196. Pl. XII. fig. 2, Pl. XX. fig. 1, and elsewhere.

neighbouring organs and particularly to the heart-vesicle described below, I cannot admit that Mr. Masterman has given any valid reasons for disputing the homology of the notochord of *Cephalodiscus*, with that of *Balanoglossus*.

2. I have re-examined sections of *Cephalodiscus*, since reading Mr. Masterman's paper; and I am able to assert that this animal possesses a well developed heart-vesicle, which is moreover clearly figured by Mr. Masterman himself. If this is the case, it is obvious that the median notochord of *Cephalodiscus* cannot be the representative of the heart-vesicle of *Balanoglossus*.

In Pl. XXIV. fig. 14, Mr. Masterman figures a sagittal section through the anterior end of *Cephalodiscus*. A space termed the »subneural sinus« is coloured red, since it is supposed to be a part of the vascular system. It lies on the dorsal and anterior side of the notochord, its ventral wall together with the notochord limiting a space which is said (p. 352) to be continuous with the anterior body-cavity. This space, uncoloured in the figure, is separated from the »subneural sinus« by a wall which is »thickened and contractile«. In the transverse sections shown in Pl. XXIII. figs. 2 and 3 the uncoloured space, with its thickened wall, is completely surrounded by the »subneural sinus«, an arrangement which is readily intelligible from the fact that it projects forwards into that space, and that the transverse sections do not pass through the base of the organ resting on the notochord.

I can quite confirm the accuracy of Mr. Masterman's description in most of the above points, but I believe that his »subneural sinus« is the heart-vesicle, and therefore not a part of the vascular system (following Spengel's account⁴ of the arrangement of these parts in *Balanoglossus*); and that the structure which projects into it (uncoloured in figs. 2, 3 and 14) is the »central blood-space« of Spengel, which in *Balanoglossus* communicates with the dorsal vessel. On Mr. Masterman's own showing, there is the closest similarity between the »subneural sinus« with the layer of muscles on its ventral wall (see his fig. 14) and the arrangement described by Spengel in the heart-vesicle of *Balanoglossus*.

This heart-vesicle of *Cephalodiscus* is a very obvious and well-marked space lying in front of the tip of the notochord. It occurs both in the adults and in the buds, in which it appears at a very early age as a sharply marked vesicle. I cannot find any evidence that it opens into the vascular system (or into the anterior body-cavity), nor

⁴ T. cit. p. 26, 624, and elsewhere.

can I confirm Mr. Masterman's statement (p. 352) that what I have termed the central blood-space opens into the anterior body-cavity. I must however admit that I have not been able to convince myself with certainty that the central blood-space opens into any other vessels, although I have some slight evidence pointing in that direction.

The small size of the parts in question makes it very easy, to be misled with regard to the way in which one space communicates with another; but while Mr. Masterman is probably right in colouring certain parts of figs. 6—9 red, to indicate that they belong to the vascular system, I believe that the only part which should have been coloured red in figs. 2—4 is the uncoloured space in the interior of the »subneural sinus«. Fig. 1 and probably fig. 5 also show the »subneural sinus«.

If this point has been demonstrated, additional support is given to the view that the median notochord of *Cephalodiscus* is homologous with that of *Balanoglossus*. The view is further strengthened if I am right in thinking that there is some indication of the proboscis gland (Spengel's »glomerules«) on the ventral side of the base of the notochord, in the position indicated by radiating lines in figs. 8—10 of Mr. Masterman's paper. The principal reason given for rejecting the homology discussed above appears to be that the »subneural gland« of *Actinotrocha* is formed in the immediate neighbourhood of the mouth. Although our knowledge of the development of this structure in *Balanoglossus* is by no means complete, what evidence there is indicates that the notochord of the metamorphosing *Tornaria*⁵ appears in precisely the same position as the »subneural gland« of *Actinotrocha*.

3. What view then are we to take of Mr. Masterman's »lateral notochords«? It is easy to convince oneself of the existence, in *Cephalodiscus*, of paired dorso-lateral regions of the pharynx, which have the position and the appearance shown by Mr. Masterman in Pl. XXIV. fig. 13 and Pl. XXV. figs. 16, 17 and 19. It will be observed that these structures are not sac-like diverticula, but are long grooves of the pharynx, extending »throughout its whole length«. Their epithelium is further identical in character with the epithelium of the gill-sacs. Mr. Masterman's description and figures (especially figs. 17 and 22) seem to lead to the interesting conclusion that the pharynx of *Cephalodiscus* is divided, like that of some species of *Balanoglossus*, into a dorsal, branchial and a ventral, alimentary portion. The former has a histological character of its epithelium, not greatly differing from what has been described by Spengel⁶ for *Balanoglossus*, which is re-

⁵ See Morgan, Journ. of Morphol. V. 1891. p. 423. Pl. XXVI. fig. 40.

⁶ T. cit. Pl. II. fig. 7, Pl. XX. fig. 11.

garded as supporting the theory of the »lateral notochords«. I have already shown that I cannot admit any relation between these parts of the pharynx and the »Eicheldarm« of *Balanoglossus*, and without establishing that homology, I do not see that Mr. Masterman has much reason for regarding them as notochords at all.

The morphology of the »lateral notochords« of *Actinotrocha* is a more difficult question. It seems to me that Mr. Masterman has hardly sufficient evidence to justify him in concluding that the pigmented appearance of these organs described by earlier observers, and supposed to indicate hepatic functions, was due to the presence of minute vesicles in which the dark appearance is »formed in the same way as the black rim of an air-bubble under the microscope«. If, however, the »lateral notochords« are really represented in *Cephalodiscus* and *Balanoglossus*, they might either be regarded as rudimentary gill-slits (a possibility considered, but rejected, by Mr. Masterman) or they might correspond with the dorsal branchial part of the pharynx in those forms.

The transition from these »notochords« to the arrangement found in the higher Chordata is believed to be afforded by *Balanoglossus*. If I have shown that *Cephalodiscus* affords no support to the theory of the originally paired character of the notochord of *Balanoglossus*, an important part of Mr. Masterman's arguments is removed. Under these circumstances it appears to me that the name Diplochorda, proposed by him for the reception of *Phoronis*, *Cephalodiscus* and *Rhabdopleura*, is a misleading one, which should not be allowed a permanent place in Zoological literature.

Kings College, Cambridge, August 25, 1897.

4. Über einige myrmecophile Acarinen.

Von E. Wasmann S. J. (Exaeten b. Roermond).

Zweite Mittheilung¹.

eingeg. 29. August 1897.

Über Hypopen in Ameisennestern.

Durch die Freundlichkeit von Herrn A. D. Michael (London) war es mir möglich, über die Hypopen in meinen Beobachtungsnestern etwas mehr Klarheit zu erhalten, worüber hier ein kurzer Bericht gegeben werden soll.

Bezüglich der Acarinen in dem großen Beobachtungsnest von

¹ Vgl. Zool. Anz. No. 531.

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Artikel/Article: [3. On the Notochord of Cephalodiscus 342-346](#)