

sind nur der Trichter, die zwei radialen Hauptstämme, welche durch dichotomische Theilung die vier interradialen und acht adradialen Stämme hervorgehen lassen, das Trichtergefäß bis zu seiner Gabeltheilung unter dem Sinneskörper und die Tentakelgefäße bis zu ihrem Verlauf an den Tentakelapparat. Die Wimperrosetten kommen nie in der verdickten Gefäßpartie vor. Sie sind aus zwei Lagen von Zellen zusammengesetzt, von denen die dem Gefäßlumen zugekehrte Lage kräftig strudelnde Cilien besitzt, indess die ihr aufliegende Partie die Cilien langsam in der Gallerte graben lässt.

Für die Vertheilung der im Entoderm entstehenden Geschlechtsproducte gilt als allgemeines Gesetz für sämtliche Ctenophoren, dass die einander zugekehrten Hälften zweier peripherischer Gefäße stets gleichartige Geschlechtsproducte produciren und zwar derart, dass Magengefäße und Tentakelapparat von den Ovarialseiten, die im Winkel von 45° dazu stehenden Partieen von den Spermalseiten je zweier Gefäße eingerahmt werden.

4. On certain points in the Anatomy of *Peripatus Capensis*¹⁾.

By Mr. F. M. Balfour, M. A., F. R. S.

The discovery by Mr. Moseley²⁾ of a tracheal system in *Peripatus* must be reckoned as one of the most interesting results obtained by the naturalists of the Challenger. The discovery clearly proves that the genus *Peripatus*, which is widely distributed over the globe, is the persisting remnant of what was probably a large group of forms, from which the present tracheate Arthropoda are descended.

The affinities of *Peripatus* render any further light on its anatomy a matter of some interest; and through the kindness of Mr. Moseley I have had an opportunity of making investigations on some well preserved examples of *Peripatus Capensis*, a few of the results of which I propose to give a short account of.

I shall confine my observations to three organs. (1) The segmental organs, (2) the nervous system, (3) the so-called fat bodies of Mr. Moseley.

In all the segments of the body, with the exception of the first two or three postoral ones, there are present glandular bodies apparently equivalent to the segmental organs of Annelids.

1) The substance of the following paper was presented to the Cambridge Philosophical Society.

2) »On the structure and development of *Peripatus Capensis*«, Phil. Trans., Vol. CLXIV. 1874.

These organs have not completely escaped the attention of previous observers. The anterior of them were noticed by Grube³⁾, but their relations were not made out. By Saenger⁴⁾, as I gather from Leuckart's Bericht for the years 1868/69, these structures were also noticed, and they were interpreted as segmental organs. Their external openings were correctly identified. They are not mentioned by Mo-seley, and no notice of them is to be found in the text-books. The observations of Grube and Saenger seem, in fact, to have been completely forgotten.

The organs are placed at the bases of the feet in two lateral divisions of the body-cavity shut off from the main median division of the body-cavity by longitudinal septa of transverse muscles.

Each fully developed organ consists of three parts:

- (1) A dilated vesicle opening externally at the base of a foot.
- (2) A coiled glandular tube connected with this, and subdivided again into several minor divisions.
- (3) A short terminal portion opening at one extremity into the coiled tube (2) and at the other, as I believe, into the body-cavity. This section becomes very conspicuous in stained preparations by the intensity with which the nuclei of its walls absorb the colouring matter.

The segmental organs of *Peripatus*, though formed on a type of their own, more nearly resemble those of the Leech than of any other form with which I am acquainted. The annelidan affinities shown by their presence are of some interest. Around the segmental organs in the feet are peculiar cells richly supplied with tracheae, which appear to me to be similar to the fat bodies in insects. There are two glandular bodies in the feet in addition to the segmental organs; both of which have their external openings on the ventral surface of the feet.

The more obvious features of the nervous system have been fully made out by previous observers, who have shown that it consists of large paired supraoesophageal ganglia connected with two widely separated ventral cords, — stated by them not to be ganglionated. Grube describes the two cords as falling into one another behind the anus — a feature the presence of which is erroneously denied by Saenger. The lateral cords are united by numerous (5 or 6 for each segment) transverse cords.

The nervous system would appear at first sight to be very lowly organized, but the new points I believe myself to have made out, as well as certain previously known features in it, appear to me to show that this is not the case.

3) »Bau von *Perip. Edwardsii*«, Archiv f. Anat. u. Phys. 1853.

4) Moskauer Naturforscher-Sammlung, Abth. Zool., 1869.

The following is a summary of the fresh points I have observed in the nervous system:

(1) Immediately underneath the oesophagus the oesophageal commissures dilate and form a pair of ganglia equivalent to the annelidan and arthropodan suboesophageal ganglia. These ganglia are closely approximated and united by 5 or 6 commissures. They give off large nerves to the oral papillae.

(2) The ventral nerve cords are covered on their ventral side by a thick ganglionic layer⁵⁾, and at each pair of feet they dilate into a small but distinct ganglionic swelling. From each ganglionic swelling are given off a pair of large nerves⁶⁾ to the feet; and the ganglionic swellings of the two cords are connected together by a pair of commissures containing ganglion cells⁷⁾. The other commissures connecting the two cords together do not contain ganglion cells.

The chief feature in which the nervous system of *Peripatus* was supposed to differ from normal Arthropoda and Annelida, viz. the absence of ganglia on the ventral cords, does not really exist. In most particulars, as in the amount of nerve cells in the ventral cords and the completeness of the commissural connection between the two cords, etc., the organization of the nervous system of *Peripatus* ranks distinctly high. The nervous system lies within the circular and longitudinal muscles, and is thus not in proximity with the skin. In this respect also *Peripatus* shews no signs of a primitive condition of the nervous system.

A median nerve is given off from the posterior border of the supra-oesophageal ganglion to the oesophagus which probably forms a rudimentary sympathetic system. I believe also that I have found traces of a paired sympathetic system.

The organ doubtfully spoken of by Mr. Moseley as a fat body, and by Grube as a lateral canal, is in reality a glandular tube, lined by beautiful columnar cells, which opens by means of a non-glandular duct into the mouth. It forms a perfectly simple tube close above the ventral nerve cord in a lateral compartment of the body-cavity, and extends backwards for a varying distance.

This organ may perhaps be best compared with the simple salivary-gland of *Julus*. It is not to be confused with the slime-glands of Mr.

5) This was known to Grube, loc. cit.

6) These nerves were noticed by Milne-Edwards, but Grube failed to observe that they were much larger than the nerves given off between the feet.

7) These commissures were perhaps observed by Saenger (loc. cit.).

Moseley which have their opening in the oral 'papillae. If I am correct in regarding it as homologous with the salivary glands so widely distributed amongst the Tracheata, its presence indicates a hitherto unnoticed arthropodan affinity in *Peripatus*.

IV. Personal-Notizen.

United States of North America. S. Cambridge, Mass.

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