

p. 521; p. 268: *Hapale argentata* etc. — *Simia argentata*, Linné, Mantissa plant., 2, Holm., 1771, p. 521.

Ich kann noch hinzufügen, daß auch andere Autoren, z. B. Erxleben und Kerr immer Linné's Mantissa II sehr correct citiert haben.

#### 4. On the Nervous System of Cestodes<sup>1</sup>.

By Wm. L. Tower, Cambridge, Mass., U. S. A.

eingeg. 27. Mai 1896.

Having been engaged during the past winter in studying the nervous system of certain Cestodes, I have naturally made use of several of the modern methods of demonstrating nervous tissue. While my results with the Golgi and methylen-blue methods have proved to be of very little value, I have been more successful in the use of vom Rath's killing fluid and have succeeded by the aid of it in getting a more satisfactory knowledge of some portions of the nervous system than is afforded by the accounts hitherto published. In the matter of nerve terminations, however, I have not made much progress, although my studies supplement in some other ways the recent interesting accounts by Blochmann (1895) and by Zerneck (1895).

The demonstration of the value of vom Rath's fixative in work of this kind, the nature of the material employed, and the determination of some new morphological and histological facts will, I trust, make a short preliminary account of my results worth publishing.

The Cestodes which I have studied are *Moniezia expansa* and *M. planissima* from the sheep. This material was taken from the small intestine within twenty minutes after the sheep were killed, and placed in warm normal salt solution (30—35° C.), in which it remained for thirty minutes, while being taken to the laboratory; it was then put into the following vom Rath's mixture:

500 cc. sat. aq. sol. picric acid, filtered.

3 cc. glacial acetic acid.

5 grm. platinic chloride in 5 cc. dist. water,

2 grm. osmic acid crystals.

The worms were allowed to remain in this mixture ten hours, were then removed and cut into pieces from one to three cm. long; these were put into crude pyroligneous acid for six to ten hours, and then into 70% alcohol for twenty-four hours. After dehydration, the pieces were soaked in xylol for twenty-four hours, and then imbedded

<sup>1</sup> Contributions from the Zoölogical Laboratory of the Museum of Comparative Zoölogy at Harvard College, under the direction of E. L. Mark, No. LXVI.

in paraffin. By this treatment, nervous tissue is differentiated from muscular and connective tissue, the nerves being colored greyish blue, whereas the more highly refractive muscles become brownish, and the connective tissue remains paler than either of the two other tissues.

None of the previous workers upon the nervous system of Cestodes have been able to find any transverse connections between the large longitudinal nerves of the two margins of the proglottides. Even Blochmann and Zernecke have not shown any transverse connection, and indeed both observers have denied that such connections exist in the forms which they have studied; but with vom Rath's killing mixture, I have been able to demonstrate in both *Moniezia expansa* and *M. planissima* certain well defined commissures.

The lateral nerve trunk (Fig. 1 *n.l.*) of these Cestodes is elliptical in cross section, the longer diameter having a dorso-ventral direction. The course of the nerve, as is well known, is nearly parallel to the longitudinal excretory tube (Fig. 1 *va.exc.lg.*). Near the posterior end of each proglottis the lateral nerve becomes enlarged, forming a distinct ganglionic mass, which I have called the posterior lateral ganglion (Fig. 1 *gn.l.p.*). The dorso-ventral diameter of this ganglion is somewhat greater than the diameter of the longitudinal excretory tube, but its antero-posterior extension is still greater, whereas in the direction of the transverse diameter of the proglottis it measures considerably less than in the dorso-ventral direction.

There are two kinds of ganglionic cells in these enlargements. The larger cells occupy the central portions of the ganglion; the smaller ones are at the periphery. A description of these, with other histological details, will be given in a final paper accompanied by illustrations.

From the outer side of each of these ganglia arises a large nerve (Fig. 1 *n.marg.*), which passes off from the ganglion towards the margin of the proglottis, — at first in a direction nearly perpendicular to the course of the lateral nerve, — and then turns with a broad curve and runs forward for about two thirds or three-fourths of the length of the proglottis. This nerve is distributed to the lateral margin of the proglottis and gives off nerve fibres along its entire length. I have named it the marginal nerve. From the same region of the ganglion and from the beginning of the marginal nerve arise several small nerves, which are distributed to the marginal portions of the posterior end of the proglottis. In addition, there arises from the posterior outer margin of the ganglion a short, rather stout nerve, which is distributed to the margin of the anterior portion of the following proglottis. Although this nerve takes a course which would suggest that it may anastomose

with the anterior end of the marginal nerve in the following proglottis, I have not been able to demonstrate any such connection.

From the dorsal surface of the posterior lateral ganglion arises a large nerve, which curves around the longitudinal excretory tube and passes directly across the proglottis to join the corresponding part of

Fig. 1.

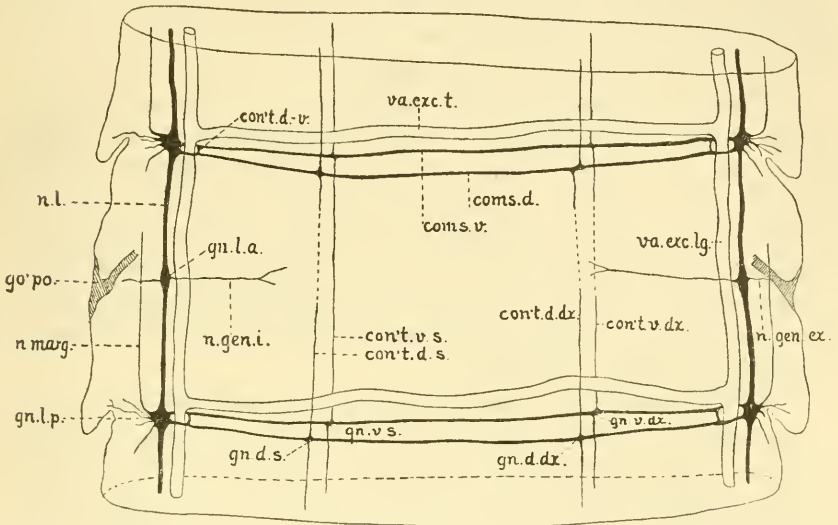
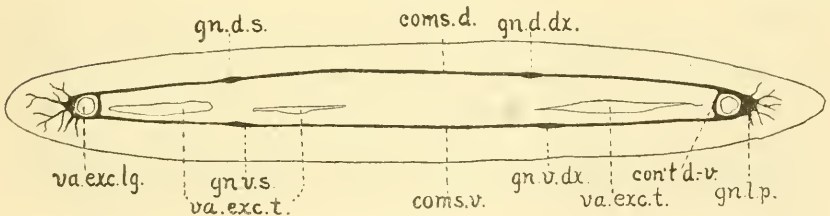


Fig 2.



Figs. 1 and 2. *coms.d.* Dorsal commissure. *coms.v.* Ventral commissure. *cont.d.dx.* Right dorsal connective. *cont.d.s.* Left dorsal connective. *cont.d.-v.* Dorso-ventral connective. *cont.v.dx.* Right ventral connective. *cont.v.s.* Left ventral connective. *gn.* Gonopore. *gn.d.dx.* Right dorsal ganglion. *gn.d.s.* Left dorsal ganglion. *gn.l.a.* Anterior lateral ganglion. *gn.l.p.* Posterior lateral ganglion. *gn.v.dx.* Right ventral ganglion. *gn.v.s.* Left ventral ganglion. *n.gen.ex.* External genital nerve. *n.gen.i.* Internal genital nerve. *n.l.* Lateral nerve. *n.marg.* Marginal nerve. *va.exc.lg.* Longitudinal excretory tube. *va.exc.t.* Transverse excretory tube.

the posterior lateral ganglion of the opposite side of the body. This I have called the dorsal commissure (Figs. 1, 2 *coms.d.*). A nerve corresponding in size, position, and connections likewise unites the ventral surfaces of the two posterior lateral ganglia. This I have called

the ventral commissure (Figs. 1, 2 *coms.v.*). These two commissures with the two ganglia constitute an elongated ring embracing both of the longitudinal excretory tubes. In this way the lateral nerve of each side of the body is connected by a double, or ring-like, commissure with its fellow of the opposite side near the posterior margin of each proglottis. These two commissural nerves are band-like, being flattened dorso-ventrally; along their whole length occur ganglionic nerve cells, either singly or grouped into clusters at the places where nerve fibres are given off from the commissures.

The two commissural nerves are united with each other by means of two dorso-ventral nerves, — one near each margin of the proglottis, — which are situated close to the median side of the longitudinal excretory tubes. I have named them the dorso-ventral connectives (*con't.d.-v.*); one of these connectives, together with the corresponding posterior lateral ganglion and the corresponding ends of the two commissural nerves, constitutes a small nerve ring which closely encircles the longitudinal excretory tube immediately behind the transverse excretory tube (Figs. 1 and 2).

In the lateral nerve trunk, about mid-way between the posterior lateral ganglion of each proglottis and that of the preceding proglottis, there is a second enlargement containing ganglionic cells, the anterior lateral ganglion (Fig. 1 *gn.l.a.*). It is situated near the region where the lateral nerve crosses the sexual ducts in their passage to the gonopore.

From this ganglion there arises a single nerve trunk, which passes obliquely inward and dorsad for a short distance and then divides; one branch turning outward becomes the external genital nerve (Fig. 1 *n.gen.ex.*) and is distributed to the region of the gonopore, while the other branch continues its inward course, becoming the internal genital nerve (Fig. 1 *n.gen.i.*), which is distributed to the ovaries and uterus.

Upon both dorsal and ventral commissures, there are two enlargements containing characteristic ganglionic cells. These ganglia are situated about mid-way between the posterior lateral ganglion and the median plane of the proglottis. The ganglia of the dorsal commissure which occupy the right and left halves of the proglottis I have called the right and left dorsal ganglia, respectively (Figs. 1, and 2 *gn.d.dx.* and *gn.d.s.*); those of the ventral commissure, the right and left ventral ganglia, respectively (*gn.v.dx.* and *gn.v.s.*). From each of these ganglia there arise two nerves, one running forward, the other backward; together, they traverse the greater part of the proglottis, and I believe that through them the commissural ganglia of one pro-

glottis are connected to the corresponding ganglia of the preceding and of the following proglottides. I have, therefore, named them provisionally the dorsal and ventral connectives (Fig. 1 *cont.d.dx*; *con't.d.s* etc). However, I have not been able to trace this connection satisfactorily except in one case (the left ventral connective, Fig. 1 *con't.v.s.*), because it is exceedingly difficult to distinguish the nerve from the longitudinal musclefibres among which it is located. The probable connections are indicated in Figure 1 by broken lines. There is the greater reason for believing in the continuity of these nerves because they are without doubt the equivalents of the two dorsal and two ventral nerves described by Niemiec (1885) as occurring in *Taenia coenurus*, *T. serrata* and other Cestodes. I have been able to demonstrate in the scolex of both of these Cestodes — *Moniezia expansa* and *M. planissima* — the presence of these four longitudinal nerves in addition to the two large lateral nerve trunks. They occupy the position assigned to them by Niemiec, which corresponds well with that of the connectives arising from the dorsal and ventral ganglia of the commissures; but I have not yet traced continuously the passage of these nerves through the neck region till they merge in the supposed connectives.

Cambridge, May 15, 1896.

#### Bibliography.

- Blochmann, F., 1895. Über freie Nervenendigungen und Sinneszellen bei Bandwürmern. Biol. Centralb. 15. Bd. p. 14—25. 1. Jan.
- Niemiec, J., 1885. Recherches sur le Système Nerveux des Taenias. Recueil Zool. Suisse. tom. II. p. 589—648.
- Rath, O. vom, 1893. Beiträge zur Kenntnis der Spermatogenese von *Salamandra maculosa*. Zeitschr. f. wiss. Zool. Bd. 57. p. 97—185.
- Rath, O. vom, 1895. Zur Conservierungstechnik. Anat. Anzeiger. 11. Bd. p. 280—288.
- Zernecke, E., 1895. Untersuchungen über den feineren Bau der Cestoden. Zool. Jahrbücher. Abth. f. Morphol. 9. Bd. Heft 1. p. 92—161. Taf. 8—15. 25. Nov.

### 5. Beitrag zur Kenntnis der Gattung *Myobia* v. Heyden.

Von S. A. Poppe in Vegesack.

eingeg. 26. Mai 1896.

Seitdem uns Claparède 1869 in seinen Studien an Acariden<sup>1</sup> mit dem schon 1781 von F. Paula von Schrank<sup>2</sup> beschriebenen *Pediculus muris musculi*, für den v. Heyden<sup>3</sup> 1826 das Genus *Myobia* schuf, und seiner Entwicklungsgeschichte bekannt gemacht hat, sind folgende Arten desselben beschrieben worden:

<sup>1</sup> Zeitschr. f. wiss. Zool. 18. Bd. 4. Hft. 1869.

<sup>2</sup> Enumeratio insector. Austriae indigen. p. 501. Tab. I fig. 5—7. 1781.

<sup>3</sup> Versuch einer system. Eintheilung der Acariden. in: Isis, 1826. p. 613.

# ZOBODAT - [www.zobodat.at](http://www.zobodat.at)

Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: [Zoologischer Anzeiger](#)

Jahr/Year: 1896

Band/Volume: [19](#)

Autor(en)/Author(s): Tower W. L.

Artikel/Article: [4. On the Nervous System of Cestodes 323-327](#)