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On a species of Tachina occurring on the tracheal system of Carabus

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and through the cesophagus, stomach, and intestine. As the sections approach the rectum, however, the mass gradually ceases to take staining, and is much more distinctly marked out from the intestinal wall, having had all the organic matter digested out, and consisting only of the inorganic remains, which do not stain. The alimentary matter of *Salpæ* is composed of animal and vegetal elements in nearly equal proportions, and the microscope reveals the calcareous shells of Foraminifera, the beautifully sculptured frustules of Diatomaceæ, keen siliceous needles, and the sharp armatures of minute Crustacea.

In the fore part of the intestinal canal, the food-mass, staining almost as readily as the wall of the gut itself, seems to merge into the ill-defined epithelium of the latter, and it is scarcely possible to say where the food-bearing mucous thread ceases and the intestinal epithelium begins, especially as this latter has a rugous arrangement. That we have here to do with a form of digestion entirely anomalous and unprecedented, he could not believe, and begged leave to differ from Dr. Korotneff on this point. Fol and others have recognized the endostyle as a sort of salivary gland, and have traced its food-laden mucous thread into the stomach of the living animal, while the speaker had been able to trace the same thing in well-preserved specimens. He had also several series of sections from animals which must have been without food for some time previous to death, in which the lumen of the intestine is not only free of food, but of any obliterating mass of cells or plasmodium. The only protoplasmic bodies not food are certain *Gregarina*-like organisms adhering to the walls of various parts of the intestine, and which he took to be parasites. These give on section the appearance of the large "scattered cells, entirely free from their surroundings," which Korotneff figures and regards as "analogous to the great stomach-cell of *Anchæna*." The first opportunity would be taken to examine these structures in living *Salpæ*; but he was now forced to conclude that Dr. Korotneff has endowed the food-bearing mucous thread with a power it does not possess, that *Salpæ* does not exhibit any unusual form of intracellular digestion, and that there is no immediate cause on its account for questioning the high genetic place occupied by the Tunicates.—*Proc. Acad. Nat. Sci. Philad.*, April 15, 1884, pp. 113-115.

On a Species of Tachina occurring on the Tracheal System of Carabus.

By M. N. CHOŁODKOWSKY.

In the summer of the year 1882, when I was examining various species of the genus *Carabus* for purposes of comparative anatomy, I found on the abdominal stigmata of some specimens of *Carabus cancellatus* some peculiar small whitish bodies which projected freely into the body-cavity of the beetle. These bodies were of an oval form and about 1 millim. long. On closer examination, after cutting out the stigma with a small piece of skin and with the tracheal stem starting from the stigma, the following proved to

be the case. The oval whitish body had one end turned towards a thick tracheal stem close to the stigma, and this end of it was pushed into a brownish chitinous cup which surrounded it, but the narrow base of the cup was attached to the trachea. After removing the whitish body from the cup it could be seen that at the bottom of the latter there was a small aperture leading into the trachea. From the margins of the cup extended irregular translucent chitinous deposits which surrounded the whitish oval body. On microscopic observation of the whitish oval body annulation was observable upon it; tubular organs (alimentary canals) shimmered through from the interior; at the end turned towards the body-cavity (of the *Carabus*) sharp hooklets were observed, and at the opposite extremity two respiratory apertures. From these characters a young *Tachina*-larva was easily recognized in these little bodies. Soon after I obtained some specimens of *Carabus cancellatus*, each of which was infested with several *Tachina*-larvæ already full-grown. The larvæ were so large that they filled nearly the whole ventral cavity of the beetle. The beetles infested by *Tachina* were distinguished by their sluggishness from those not so attacked, and soon died in captivity. The chitinous cups which embraced the hinder extremities of the large larvæ were large and had an irregular margin; the translucent chitinous deposits which surrounded the body of the larva were greatly developed and had the form of irregular and in part confluent lobes. In short, chitinous pathological structures surrounded the body of the larva just as inflamed connective formations enclose foreign bodies which have got into the body of a vertebrate animal. This fact is certainly in favour of the conception of chitine as the physiological equivalent of the connective tissue in the bodies of insects. There is no doubt that the deposition of chitine took place from the soft hypodermal layer of the wall of the trachea. Besides *Carabus cancellatus* I obtained a specimen of *Carabus glabratus*, which was also infested by numerous larvæ of *Tachina*.

I did not succeed in rearing a single fly from any of these larvæ, partly because I had other purposes in view in the investigation of the species of *Carabus*, but partly because the infested beetles did not live long in confinement. I hoped to have obtained some infested *Carabi* in the summer of 1883, but none of the beetles of this kind collected by me that summer contained *Tachina*-larvæ. On the other hand, I found a specimen of *Harpalus ruficornis* which was literally stuffed with these larvæ.

The occurrence of *Tachina*-larvæ in the bodies of adult insects is by no means a new fact. As long ago as the year 1828 Boheman found the larvæ of *Uromyia curvicauda* in *Harpalus ruficornis* and *H. aulicus**. Léon Dufour has described *Hyalomyia dispar*, which is parasitic in *Brachyderes lusitanicus*†; and he also found the larvæ of *Phasia* in *Pentatoma grisea* and *Cassida viridis*‡, and the

* Stockholm Akademiens Handlingar, 1828, p. 164.

† Ann. Soc. Ent. Fr. 1852, p. 443.

‡ Ibid. 1848, p. 427.

larva of *Ocyptera bicolor* in *Pentatoma grisea**. As regards the species of *Carabus*, Boye, in the year 1838, reared *Tachinae* from *Carabus violaceus*, *cancellatus*, and *clathratus*†. The description of this fly under the name of *Tachina pacta* is to be found in Zetterstedt‡.

Since that time, so far as I know, no *Tachina*-larvæ have been found in species of *Carabus*. The species *Tachina pacta* is very little known and very doubtful. Our Russian dipterologist, J. A. Portschinsky, to whom I am indebted for many references to literature, is of opinion that *Tachina pacta* is identical with *Tachina (Masicera) cinerea*. Zetterstedt himself says of *Tachina pacta* that it is "valde similis et affinis *Tachinae cinereæ*." Schiner is of the same opinion.

As regards the mode of penetration of the larva into the body of the *Carabus*, we must, in all probability, consider that the fly deposits its egg in the stigma, and the larva, escaping from the egg, bores through the wall of the trachea and gradually extends its body into the body-cavity of the beetle. During this time there are formed around the larva, on the part of the hypodermal layer of the trachea, chitinous deposits, which are strongest in the vicinity of the abdominal wall at the hinder extremity of the larva, and here form a brown cup, the margin of which, however, passes without any sharp boundary into the translucent chitinous lobes which surround the rest of the body of the larva.

A little while ago, Jules Küncel d'Herculais described a parasitic fly (*Gymnosoma rotundatum*), the larva of which lives in the body of *Pentatoma* §. In this case also the larva has its hinder extremity turned towards the stigma, and this end is embraced by a chitinous cup, called by Küncel "le siphon." Küncel, however, thinks that "le siphon" is a secretion of the larva itself, and by no means a product of the hypoderm of the infested insect. Küncel also describes the mode of penetration into the body in a different fashion, namely, that the fly sticks its eggs to the ventral segments of the *Pentatoma*, and the escaping larva penetrates between the ventral segments into the abdominal cavity and only by degrees becomes connected with the stigma. However this may be with regard to the *Pentatoma* and *Gymnosoma rotundatum*, in *Carabus* the case is most probably as I have suggested. The penetration of the larva through the stigma is in this instance evidenced by the fact that even the very smallest larvæ are attached to the stigma, and that they are only met with on the stigma.—*Zoologischer Anzeiger*, no. 169, June 9, 1884, p. 316.

* Ann. Sci. Nat. tome x. p. 248.

† 'Kröyer's Naturhistorisk Tidsskrift,' 1838. See also Erichson's 'Bericht über die wiss. Leistungen im Gebiete der Entomologie im Jahre 1838,' Berlin, 1840, p. 93.

‡ 'Diptera Scandinaviæ,' tome iii. pp. 1038-1039.

§ Ann. Soc. Ent. Fr. sér. 5, tome ix. (1879).