

armed with a regular comb of long teeth projecting from the inner margin of the lower face. Sixth segment of the abdomen of the female with a smooth enclosure on the disk. The seventh segment in the male with a triangular pyramidal projection on the disk, the apex of the projection obtuse, the anterior and longest side polished.

XXXII.—*Tintinnus semiciliatus*, a new *Species of Infusoria*.

By Dr. V. STERKI*.

THERE are so many "new species" of Infusoria that it is hardly fair to publish separately the discovery of a single one. As regards the present species this course is taken because it appears specially adapted to interest us, with regard to the establishment of certain morphological characters.

The body of the animal is of the same form as that of *Tintinnus fluviatilis*, St.,—elongated, usually drawn out at the hinder end into a peduncle, by which it is fixed in a tube formed and inhabited by it. This peduncle is thin, but not abruptly marked, the body passing gradually into it. The mode of contraction is characteristic, and differs both from that of the Vorticellinæ and of the Stentorinæ; the peduncle simply shortens until it almost disappears, but without the body essentially changing its form. The animals were frequently to be met with outside the above-mentioned tubes. Whether they had fallen out, or, in other words, had been torn out, or whether they occur so normally, I am unable to say. The latter is the more probable supposition from the analogy of *T. fluviatilis*; only it may be remarked that even after the lapse of considerable time they had not commenced the formation of new tubes. In this "free" state they were entirely destitute of a peduncle, an indication of which was frequently to be seen only as a little stump; otherwise the body was perfectly rounded behind. In some cases a portion was half-constricted off behind; this state was probably produced traumatically by pressure. Even when observed for a long time this constriction went no further; so that in this case there could be no question of division. The length of the body (without cilia) is 0·04–0·06, with the peduncle 0·1–0·12, and the diameter about 0·03 millim.

At the anterior end the body is somewhat narrowed, truncated transversely, with a portion of firmer substance pro-

* Translated by W. S. Dallas, F.L.S., from the 'Zeitschrift für wissenschaft. Zoologie,' Bd. xxxii. (1879) p. 460.

jecting like a wall all round (external parenchyma), which bears, at its free margin, a closed circlet of 15–20 larger “cilia,” which will be more particularly described hereafter. Within, at the base of the wall, there is a series of smaller finer cilia, about half the length of the former. The middle part, which projects upwards like a hill, consists of softer material, and possesses spontaneous movement. On one side of this part, within the above-mentioned wall, there opens a somewhat irregular peristomial cavity penetrating into the soft sarcode as a simple sac-like depression. No separate œsophagus or mouth is observable in it; but this is easily intelligible, because this part of the body is not enclosed by any cortical layer, and the nutritive masses can consequently get easily into the interior. In like manner neither cilia nor an undulating membrane are to be observed on the peristome. Here, as in *Tintinnus fluviatilis*, all these structures are functionally replaced by the portion situated between the peristome and the middle line, which moves alternately forward, and at the same time sideways, and then back again, constantly oscillating to and fro, and thus acting like a cushion-like lip or tongue-like organ. In this case it is a very interesting and remarkable fact that we have here evidence of the possibility of a spontaneous and voluntary movement of the soft internal parenchyma, of which this part may well be said to consist.

The substance of the body is colourless or scarcely tinged with pale yellow, transparent, with a few granules and food-masses. Myophane bands, such as occur in the Stentorinæ, were not to be detected, any more than a serial arrangement of the oil-drops in the external parenchyma. In the peduncle also no differentiation into various parts was recognizable.

In the interior of the body there is, near the posterior end (leaving the peduncle out of consideration), a single distinctly recognizable elongate nucleus on the side opposite to the peristome. In its posterior extremity, in many cases, a well-marked, spherical, strongly refractive part was distinguishable, probably the nucleolus—which is rendered more probable because I could detect nothing of the kind in the vicinity of the nucleus. A contractile vesicle, apparently rather variable in position and dimensions, occurs in the neighbourhood of the peristome. In the anterior half of one specimen there were, moreover, several rather large roundish “serous” spaces, between which many smaller ones could be recognized—a phenomenon which, as is well known, occasionally occurs in many other species.

I was unable to ascertain the position of the anus.

The ciliation is of remarkably peculiar character. The anterior part of the body, from one third to nearly the half, bears scattered, short, fine cilia, like those of the Stentorinæ, but not so close together, while the hinder part and the peduncle remain perfectly naked. These cilia are usually directed rather forward; their movements, at least according to my observations, are slow and not very effective, and certainly incapable of taking any essential part in the locomotion of the animal. According to Claparède and Lachmann the species of *Tintinnus* living in the sea have the body entirely ciliated; while *T. fluviatilis*, which I only observed closely after *T. semiciliatus*, is entirely destitute of the fine body-cilia. The species now under consideration consequently holds a middle place in this respect.

It was particularly interesting to me to be able to ascertain exactly, in *T. semiciliatus*, the position and form of the so-called adoral cilia. Here these are not simple setæ or styles, any more than in the Oxytrichinæ*, Euplotinæ, Stentorinæ, &c., but flat membranes with a long insertion. There are about 15–20 of them, which, however, do not stand transversely, *i. e.* perpendicular to the series, as in the above-mentioned groups, but obliquely, thus forming, in this respect, a very interesting intermediate step between the "Heterotricha," such as *Stentor*, and the "Peritricha," although most nearly related to the former.

It has been elsewhere† stated that the adoral membranellæ of the Oxytrichinæ &c. originate as small lists, rising one after the other, which gradually, by continued growth, attain their normal size and form. In the Vorticellinæ, on the contrary, according to my observations, a single, closed, annular (*i. e.* spiral) border rises, and in its further growth becomes a single membrane. It is only when this has attained a considerable breadth (representing about half the length of the future cilia) that it begins to become fibrous at its free margin, so that, while growth still continues in the direction of length, a splitting at the same time extends more and more backward. In the species of *Tintinnus*, therefore, we have, to a certain extent, a middle form; the series is from the first broken up into pieces, which, however, are not placed at right angles, but obliquely to the series. Or might the course of development have followed the opposite direction?

From its insertion each membrane widens outwards, at first slowly, then more rapidly. From about the middle it is cleft,

* Zeitschr. für wiss. Zool. Bd. xxxi. pp. 44 *et seq.*

† Zeitschr. für wiss. Zool. Bd. xxxi. p. 46.

like a hand, into about six divisions. I have seen this structure clearly and repeatedly and in different positions of the animal; so that there can be no doubt about it. Moreover the observations were made on perfectly fresh and lively specimens, so that any division superinduced by pathological conditions is excluded. In the sequel I had the opportunity of observing nearly the same structure in *Tintinnus fluviatilis*, St., only it appeared to me that the points were rather more numerous and also finer and smaller. Each of these "cilia" gradually turns a little upon its axis, so that the surface approximates to the circular zone of insertion. In repose they all stand straight out, or still more bent in towards the axis of the body, forming a dense tuft; but they do not appear so much curved, or even almost angularly bent, as those of *T. fluviatilis*.

As already indicated there is within the cilia just described, at the base of the wall-like supporter of the latter, a second series of short fine cilia, which, so far as can be seen, are neither particularly flattened nor divided into filaments. They may perhaps be homologous with the paroral cilia of the *Oxytrichinæ* *. Whether *T. fluviatilis* possesses the second inner row of cilia I do not know; at any rate I have not yet seen them.

In general the movement of the animal is but small, and is limited in the case of the specimens inhabiting tubes to a rather slow protrusion and a by no means rapid retraction, by the elongation or abridgment of the peduncle, which may be entirely withdrawn into the body. The forward movement is of such an extent that the anterior large cilia protrude from the tube and can move; but they never separate widely from each other. Frequently we meet with specimens of our species without tubes, which attach themselves to the object-bearer (or to any object upon it) without a peduncle, and, indeed, very often with the anterior part turned upwards. Here, as in a lateral view, the animals may be observed very conveniently, as they usually remain quite quiet. Frequently no cilium moves for a long time; then a single one slowly bends outwards (peripherally), and strikes rapidly and, as it were, convulsively inwards; then one or another in different parts will act in the same manner. Simultaneous movement of all the cilia, or of a considerable portion of the series, is more rarely observed; and especially there are no simultaneous or undulatory movements passing through the series. In the open water the animals swim pretty rapidly by means of the

* *Loc. cit.* pp. 37, 38.

large anterior cilia, with the anterior part forwards. Nothing was to be observed of a newly formed posterior circlet of cilia, as in the Vorticellinæ and other Peritricha.

I have several times seen indubitable commencements of transverse division, in the form of a second, smaller, circlet of cilia placed laterally on the body, which could not be interpreted as any thing else. Unfortunately I had not the opportunity of observing its development further.

It remains to say a word or two with regard to the tube mentioned at the commencement of this paper. It is about 0·035 millim. in diameter, and becomes as much as 0·40 millim. long. Composed of the remains of macerated parts of plants, small fungoid and algoid filaments, &c., it is formed in the same way as the similar but shorter and less distinct tube of *Stichotricha*, by the accumulation of the masses brought together by the stream of water set up by the animal around its body, which are then pressed together, and as it were felted by pressure and the movement of the body in the interior. A rusty-red colour appears to be only accidentally caused by the material which happens to be present. The tubes were of equal width from one end to the other, and not closed behind, or only by masses which had accidentally fallen in. As they are generally much longer than the animal, and the latter is always seated near the extremity, it is evident that it must detach itself from time to time, and again attach itself more towards the end.

I observed *Tintinnus semiciliatus* here in Schleithem in January and February 1878. I obtained some dozens of specimens. They occurred in long-stagnant water containing Algæ, on the surface of which a covering of fungoid and algoid filaments had been formed; the animals occurred principally in these masses.

POSTSCRIPT.

I have the opportunity of adding on the proof that I observed some specimens of this species in February of the present year (1879). They occurred on plants in the aquarium, sometimes without a tube, sometimes with a short one, which now did not show the yellowish colour. All the essential characters just described were exhibited in the same manner; so that the species may be regarded as confirmed.



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