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XVIII.—*On some new or little-known Infusoria.*

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[Plate XII.]

In this article it is my intention to describe some new species of Infusoria that I have observed in the different seas that I have chanced to visit. There are two species from the White Sea, three others from the Black Sea, and two observed in the Bay of Naples. It is especially with the view of enriching our knowledge of the geographical distribution of the Infusoria that I publish these notes; it is also with this object that I undertake a revision of certain genera, such as *Trochilia* and *Acineta*, so far as the marine species are concerned.

Although want of time did not allow me to acquire more than a superficial knowledge of the Infusorial fauna of the Black Sea, I nevertheless see with satisfaction all the conclusions at which I arrived in my "Studien über Protozoa des nördlichen Russlands" more and more confirmed, as I have just shown in a recent note upon the Infusoria of the Black Sea*. There are already ten marine species, all more or less frequent in the Black Sea, that I have never met with in the White Sea; and there is not a single freshwater species ob-

* "Matériaux pour la faune des Infusoires de la Mer Noire," Travaux de la Société des Naturalistes à St. Pétersbourg, 1880.

served in the Crimea or in the Caucasus that has not also been observed by me in the Arctic regions of Northern Russia. Thus the law that the marine Infusoria of different seas differ much more than the freshwater Infusoria of different countries finds a new confirmation in the Infusorial fauna of the Black Sea.

All the other laws of the geographical distribution of the Infusoria established by me in the memoir above mentioned are likewise daily finding fresh confirmations; and I believe there is little change to be expected in this respect when the distribution of this class of organisms shall be studied with the same zeal and attention that is devoted to other classes.

I will now pass to the description of the new species.

Cothurnia pontica. (Pl. XII. figs. 4–6.)

Diagn. Concha superficie undulata insidet pediculo brevi; urceiformis, duobus rostris munita. Animal insidet pediculo triangulari, intus excavato.

Loc. Black Sea, Crimea, Livadia.

Descr. This is one of the prettiest species that I have ever seen of this genus, the forms of which are so numerous. The carapace has a very graceful pitcher-shape with the edges slightly turned out, and with two sides of the margin more elevated than the rest, which especially aids to give an elegant appearance to the whole animal. The surface of the carapace is not even, but covered with four or five not very strongly marked circular elevations. The carapace has scarcely any pedicle; it might therefore be placed among the sessile species; the little that can be taken for a peduncle is only the attenuated part of the base of the carapace, enclosing the peduncle of the animal itself, as is well shown in the figure (fig. 5). The peduncle of the animal is formed by an inferior small pad, which is perfectly solid, and a conical peduncle with its widest part turned upwards, where it is attached to the animal. This peduncle is not solid like the pad which serves as its base, but furnished with a cavity of the same conical form as the peduncle itself.

As to the animal, I have only seen its remains, already in a state of putrefaction. The carapace was attached to a Floridean Alga, apparently belonging to the genus *Ceramium*, which I found upon the shore of the Black Sea near Talta. The total length of the animal, or, more properly of the carapace, is 0·0171 millim., its breath is 0·007 millim.

Cothurnia socialis, A. Gruber. (Pl. XII. fig. 3.)

Loc. White Sea, Solowetzk Islands, at a depth of 2 metres.

Descr. I have waited so long with the description of this species, which I found in the White Sea in 1879, that it has at last been described by M. A. Gruber, not long since, under the name of *Cothurnia socialis*. And I do not regret it; for I should never have described the species with all the details given by M. Gruber; and, further, it would never have received from me the specific name "*socialis*," as I only came across it in St. Petersburg among Bryozoa preserved in alcohol, and I have only seen a single solitary individual, whilst the German zoologist has seen it in the living state and in great numbers. I have no doubt, however, on comparing my individual with the figures given by M. Gruber, that they belong to the same species. All the characteristic details of the species are present, except perhaps the coloration, which in the individual observed by me is not yellow, it is entirely colourless; but, as I have just remarked, the animal that I have observed is solitary, and therefore still very young, and it may very well be that the absence of colour is due simply to the youth of the animal. I would also call attention to the extreme regularity of its form.

The specimen that I have examined was attached to a Bryozoan by means of a rather long, slender, solid peduncle, slightly inflated at its base. The carapace, which is about the same length as the peduncle, is of an ovoid form, with a small conical process at the lower part, and with a funnel-shaped neck at the upper part. The carapace bears four very strongly marked circular striæ or grooves, dividing it into five parts or segments. The body of the animal is placed upon a small peduncle, which is only the continuation, in the interior of the carapace, of the exterior peduncle.

The following are some measurements of this marine species, which, apparently, is characteristic of the northern seas; for it is only in these that it has been found, by two observers:—

	millim.
Length of the carapace	0·084
Maximum breadth	0·035
Length of the peduncle	0·054

Tintinnus mediterraneus, sp. n.
(Pl. XII. figs. 1, 2.)

Diagn. Concha urceoli inflati forma, paulo longior quam latior, collo brevi lato, 4–5 striis annulatis.

Loc. Mediterranean Sea, Black Sea, Crimea, and Bay of Naples.

Descr. The carapace of the animal, which is all that I have

had the opportunity of examining, is in the form of a wide, somewhat inflated vase, rounded or terminating in a point at the bottom, thus forming, as we shall see, two distinct varieties. At the upper part it narrows suddenly, forming a wide but not very long neck, the margins of which are not turned out. In the variety that I have observed in the Black Sea, the neck is a little narrower relatively to the total width of the carapace (Pl. XII. fig. 2), which causes the neck to be more accentuated; while in the other variety, from the Bay of Naples, the neck is almost as wide as the carapace (Pl. XII. fig. 1), as may be seen by comparing the two figures here given.

The neck and the upper part of the carapace itself are adorned with slight rings, which are nothing but circular elevations or thickenings of the chitinous substance of the carapace. These circular striæ are four or five in number; and their arrangement is slightly different in the two varieties of the species that I have observed. In one of them, that from the Black Sea (fig. 2), the neck is ornamented with three rings, while the actual body of the carapace has only two; in the Neapolitan variety, on the contrary, there is only a single ring upon the neck, the others being placed upon the first third of the carapace itself (fig. 1). But the principal difference which distinguishes the two varieties is the form of the bottom of the carapace. Whilst in the specimen that I observed in the Black Sea the bottom is regularly rounded (fig. 2), that of the Neapolitan variety presents at the posterior extremity a rather long and regularly conical point. We should thus have two local varieties:—

1. Var. *pontica*, with the bottom of the carapace rounded. *Loc.* Black Sea, Crimea, Livadia.
2. Var. *neapolitana*, with the bottom terminating in a point. *Loc.* Bay of Naples.

This species, which is very easily distinguished by its form from all the other known species, is a marine species characterizing the fauna of the whole Mediterranean. It does not appear to be very rare; for I have found it in two different localities, namely the Black Sea and the Bay of Naples, although under somewhat different forms in the two places. Unfortunately I did not once happen to meet with the living animal; I have never seen more than the carapace.

The following are some measurements of this species (var. *pontica*):—

	millim.
Total length of the carapace	0·016
Maximum breadth	0·013
Length of the neck	0·002

Trochilia marina, sp. n. (Pl. XII. figs. 7–9.)

Diagn. Corpus ovale, in vertice paululum coangustatum, inferiore parte corrotundatum, dorsi superficie lævi.

Loc. Black Sea, Crimea, Livadia.

Descr. The slightly compressed body is regularly oval, except the anterior part, which is a little constricted and truncated; the rounded posterior part is furnished with a large and broad movable spine, excavated internally, and directed from right to left. The dorsal surface is more convex than the ventral, which is furnished with a space covered with cilia; this space is only half as wide as the body itself, and is of a slightly arcuated triangular form. On the dorsal surface there are two grooves, which run the whole length of the body, one on the right, the other on the left side, thus dividing the whole dorsal surface into three equal parts (Pl. XII. fig. 8). The single contractile vacuole is situated on the back, a little towards the left side. The oval nucleus is rather large, and situated on the right side. The mouth, with its bacilli, is very visible (Pl. XII. fig. 9).

This species, which is very well characterized by the form of the body, is not rare in the Black Sea, where I have often found it among the seaweeds covering the stones of the shore of the Crimea, near Livadia.

The genus *Trochilia*, first established by Dujardin, was exceptionally characterized by Stein by this peculiarity, that the cilia are not merely placed at the margins of the body, but occupy a larger or smaller portion of the ventral surface. The species hitherto known are a marine species (*Trochilia sigmoides**) found by Dujardin in the Mediterranean, and two freshwater species, *Trochilia palustris*, described by Stein†, and *T. polonica*, described by Wrzesniowski‡. Besides these three species and the fourth which I have just described, I think I may refer to the same genus another marine form from the Norwegian coast, described by Claparède and Lachmann§, in their 'Etudes sur les Infusoires et les Rhizopodes,' under the name of *Ægyria oliva*. As we may conclude from the excellent figure given of it by Claparède and Lachmann, this form must undoubtedly belong to the genus *Trochilia*, the greater part of the ventral surface

* Dujardin, Hist. Nat. des Infusoires.

† Stein, Organismus, Abth. i. p. 118, Taf. ii. figs. 28, 30.

‡ Wrzesniowski, "Beobachtungen über Infusorien aus der Umgebung von Warschau," Zeitschr. für wiss. Zool. Bd. xx. p. 485, Taf. xxiii. fig. 37.

§ Claparède and Lachmann, 'Etudes sur les Infusoires et les Rhizopodes,' p. 289, pl. xv. figs. 14, 15.

being covered with cilia. It seems very strange that such an eminent student of the Infusoria as M. Stein did not direct attention to this form, and that in general he has not mentioned the work of Claparède and Lachmann in treating of the family Ervilina. I propose, therefore, to call the Infusorian in question *Trochilia oliva*. As for the *Trochilia polonica*, Wrzesn., found by M. Wrzesniowski in the fresh waters of Poland, that species has very little to distinguish it from *T. palustris*, Stein.

With regard to the fifth species, which I have just described under the name of *Trochilia marina*, it is very distinct from all the other known species. It most nearly approaches *Trochilia oliva*, from which it is distinguished by the general form of the body, the two dorsal grooves, and the absence of the black pigment spot at the anterior part, which is so characteristic of *T. oliva*.

At present, therefore, we shall have five species of the genus *Trochilia*, three marine and two freshwater. Of the first three species, one (*T. oliva*) inhabits the northern seas, and the other two (*T. sigmoides* and *T. marina*) the seas of the south of Europe. Length of the animal 0·033 millim.

Acineta livadiana, sp. n.
(Pl. XII. fig. 10.)

Diagn. Concha ovalis, superiore parte, qua intus flectitur atque cum corpore conjungitur, truncata; pediculus tenuis, cylindricus, paulo quam corpus longior, scapo centrali.

Loc. Black Sea, Livadia, surface.

Descr. The carapace of the animal is regularly oval, except at the superior exteremity, where it is suddenly truncated, and furnished with a wide orifice, through which the suckers are seen to pass. The margins of the orifice bend in towards the interior of the carapace, and are produced there to some distance, forming a short interior tube. It is at the margin of this interior tube, and only at this margin, that the body of the animal is attached; in all other parts it remains freely suspended in the cavity of the carapace, occupying more than half its space. The body is almost regularly round, with its contours undulated and changing continually, these contours thus demonstrating the constant amœboid movement of the living animal. The protoplasm is strongly granular, which renders it rather opaque and at the same time makes it impossible to see the nucleus; but, on the other hand, a contractile vesicle situated in the ectosarcode is easily distinguished. The suckers, terminated by a knob, are not longer than the diameter of the body; they are about twenty-five in

number, and arranged at the summit of the body in a single broad bundle.

The pedicle, which supports the body with its carapace, is not much longer than the carapace itself. It is cylindrical, slender, of uniform breadth, and furnished with a central axis composed of a material different from that of the surface, and apparently less dense. There is no enlargement of the pedicle either at the spot where it joins the carapace or where it is attached to the plant on which I observed the animal. It terminates suddenly, without forming a disk to facilitate fixation, such as is observed in nearly all the other species.

As to the systematic position of *Acineta livadiana*, it cannot be confounded with any other known marine species. The oval general form with the posterior part rounded is a very rare phenomenon among the *Acinetæ*, which, in general, have a more or less conical form. There are only *Acineta cothurnia*, Clap. & Lachm., and *Acineta compressa*, Clap. & Lachm., which have also an oval form and the bottom of their carapace rounded; but it is not possible to confound the species that I have just described with *A. cothurnia*, the latter having the carapace at its upper part terminated obliquely; and still less with *A. compressa*, which, as indicated by its name, has a strongly compressed form and the two corners truncated, which is not the case in *Acineta livadiana*.

The following are some measurements of the present species:—

	millim.
Length of the carapace	0·0256
Maximum breadth of the carapace	0·0192
Length of the peduncle	0·0320
Breadth of the peduncle	0·0012

The individual observed by me was attached to a branch of *Ceramium* floating on the surface of the Black Sea near Livadia (Talta).

Acineta Saïfulæ, Mereschk. 1877*.
(Pl. XII. fig. 11.)

In a memoir published in Russian on the Protozoa of the north of Russia I described a new marine species of *Acineta* obtained from the White Sea. I will here give a translation of the description and a copy of the figure, taken from my Russian memoir.

The carapace is elongated, regularly conical, and not at all compressed; its form resembles that of a reversed sugar-loaf,

* "Studies on the Protozoa of Northern Russia," p. 69, pl. ii. fig. 11, in Travaux de la Soc. des Naturalistes à St. Pétersb., 1877.

the length of which is two or three times its greatest breadth. The carapace is borne upon a peduncle three times its length, of a cylindrical form, thin, and of equal thickness throughout. This peduncle is inserted into the carapace without causing any constriction at the point of union, as is the case, for example, in *Acineta patula*; it is straight in the normal state*, and hollow, the cavity of the peduncle being continued insensibly into that of the conical carapace without interruption. Close to the margin of the aperture of the carapace the walls of the latter are recurved suddenly inwards, and thus form a second carapace, situated in the interior of the first, and only united with the latter at the margin of the aperture. The second, or interior carapace occupies more than one third of the outer carapace, sometimes even one half of it, and is characterized by its rounded bottom and slightly turned-out margins. What further characterizes this species is a system of transverse circular striæ covering the whole surface of the exterior conical carapace; but as these striæ are extremely fine, they are only visible when a high magnifying-power is employed.

I have only seen the elongated oval body of *Acineta Saïfulæ* adhering to the margins of the carapace and freely suspended in the second carapace; but, as I have only observed this species when preserved in alcohol, it may be that the body of the living animal adheres to the whole surface of the inner carapace, which would thus perhaps not be easy to observe. A part of the body, in the form of a regular hemisphere, issues from the aperture of the carapace; and the whole of this part bears suckers (shortened by the action of alcohol), arranged regularly over the spherical surface. The small oval nucleus is situated in the middle, but nearer to the free half of the body. The protoplasm is, as usual, filled with fatty granules, and presents a slight yellowish coloration; the carapace and the peduncle are absolutely colourless.

The following measurements of this species have all been taken from individuals preserved in alcohol:—

	millim.
Length of the carapace	0·063
Maximum breadth	0·027
Length of the whole animal, including the peduncle	0·135
Breadth of the peduncle	0·0021

Loc. White Sea:—1. Bay of Onega, near the town of Rem, at a depth of 5 fathoms, on a muddy bottom, on the

* The figure represents a curved peduncle; but this form is due to artificial compression, rendered permanent by the action of alcohol.

5th July, 1876; at this spot I met with it in great abundance attached to the Hydroid *Leptoscyphus Grigoriewi*, Mereschk. 2. The shore of Terski, in 66° 58′ N. lat. and 41° 20′ E. long., at a depth of 16 fathoms, on a bottom of gravel and shells.

Acineta Saïfulæ is a good species, easily distinguishable from all other known marine species. To show better the affinities of this species and the characters which distinguish it from the others, however, I am under the necessity of giving a short revision of all the marine species belonging to the genus *Acineta*. With those that I have just described there are in all ten of them, as follows:—

1. *Acineta tuberosa*, Ehr.
2. *A. patula*, Clap. & Lachm.
3. *A. cucullus*, Clap. & Lachm.
4. *A. cothurnia*, Clap. & Lachm.*
5. *A. compressa*, Clap. & Lachm.
6. *A. divisa*, Fraipont †.
7. *A. crenata*, Fraip.‡
8. *A. vorticelloides*, Fraip.§
9. *A. livadiana*, Mereschk.
10. *A. Saïfulæ*, Mereschk.

Of these ten species we have four (*Acineta patula*, *cucullus*, *compressa*, and *Saïfulæ*) which characterize the northern seas, such as the White Sea and the seas of the Norwegian coast. One species (*A. livadiana*) is characteristic of the southern seas (Black Sea). The other species are in part peculiar to the seas of the middle of Europe, in part more or less cosmopolitan (*A. tuberosa*). In comparing *Acineta Saïfulæ* with the other marine species it is necessary in the first place to exclude all the species with the bottom rounded, such as *A. cothurnia*, Clap. & Lachm., *A. compressa*, C. & L., and *A. livadiana*, Mereschk.; then among the rest, all having the conical form of the carapace, there can be no question about the following species—*A. tuberosa*, Ehr., and *A. compressa*, as having the body strongly compressed, *A. cothurnia*, C. & L., and *A. cucullus*, C. & L., the former having the margin divided into angular lobes, after the fashion of *Acineta mysta-*

* Études sur les Infusoires et les Rhizopodes, p. 588; and Stein, Infus. p. 224, pl. iii. fig. 36.

† Recherches sur les Acinétiens de la côte d'Ostende, 1878, p. 25, pl. ii. fig. 1, &c.

‡ Fraipont, *l. c.* p. 89, pl. vi. figs. 1–11.

§ Fraipont, *l. c.* p. 92, pl. vi. figs. 12–17.

cina, and the latter having it strongly emarginate on one side (besides the suckers in two bundles). Nor can *Acineta Saïfulæ* be confounded with *A. patula*, on account of the difference in the form of the carapace, and the extreme fineness of the part of the peduncle where it unites with the carapace. The same difference of form distinguishes my species from *Acineta vorticelloides*, Fraip., with a very open and, "so to speak, rudimentary"*, carapace. Lastly, a crenulation upon the lateral surfaces and the irregularly-cut free margins of the carapace of *Acineta crenata*, Fraip., prevent its being confounded with our species. There only remains, therefore, *Acineta divisa*, Fraip., with which my species has the greatest analogy, as may be seen from the description given of it by Fraipont. The following, however, are the differences that may be found between the two species. In the first place, the general form of the body in *A. Saïfulæ* is usually much elongated, which is the case only exceptionally in *A. divisa*, the carapace of which is generally very wide open, approaching rather in form that of *A. patula*. Then the surface of *Acineta Saïfulæ* is always ornamented with transverse striæ, which is never the case in *A. divisa*. Lastly, the interior cup, the bottom of the second carapace, is much deeper in my species than in Fraipont's, which is in relation to the more elongated general form of the carapace in *Acineta Saïfulæ*.

To sum up, it may possibly be that we have to do here only with varieties of a single species, which would thus have to bear the name of *Acineta Saïfulæ*, as having been given earlier than the other name. But until we have more detailed observations I feel compelled to retain the two separate species.

Anisonema quadricostatum, sp. n.
(Pl. XII. fig. 12.)

Diagn. Body oval, strongly depressed, and furnished on the dorsal surface with four ribs.

Loc. Bay of Naples, Sorrento.

Descr. The oval body is characterized by its strong depression; the cuticle, which covers the whole body, is very firm, and in the dorsal part it forms at the surface four longitudinal elevations, four ribs, slightly spirally curved. The mouth, which is widely open in the form of a vertical fissure, is very visible on the ventral surface, from which originate two flagella, one of which, trained along behind, attains two and a half times the length of the body.

* Fraipont, *l. c.* p. 92.

This species, which I have met with only once, at Sorrento, among the seaweeds on the shore, is very well characterized by its flat form, and especially by its four dorsal costæ, characters which prevent its being confounded with the other known species.

Urceolus Alenizini, Mereschk. 1877.
(Pl. XII. fig. 13.)

In my Russian memoir, already mentioned, on the Protozoa of the north of Russia, which appeared in 1877*, I described a new genus of Infusoria belonging to the order Flagellata, which I called *Urceolus*, and met with in the White Sea. A year later, in 1878, appeared M. Stein's book on the Flagellata, under the title of 'Der Organismus der Infusionsthiere,' Abth. iii., in which he figures (pl. xxiii. figs. 42–48) an organism which he describes in the explanation of the plates as a new form, giving it the generic name of *Phialonema*. On comparing the *Phialonema cyclostoma*, Stein, with my *Urceolus Alenizini*, I saw in a moment that the former was only a new species belonging to my genus *Urceolus*, established in 1877.

The genus *Urceolus* is characterized by the presence of a neck of greater or less length, with a wide aperture at its extremity, leading into a rather deep conical canal, at the bottom of which is situated the buccal orifice; it is also at the bottom of this canal, *a little to one side*, that the single flagellum originates. The genus has two species:—

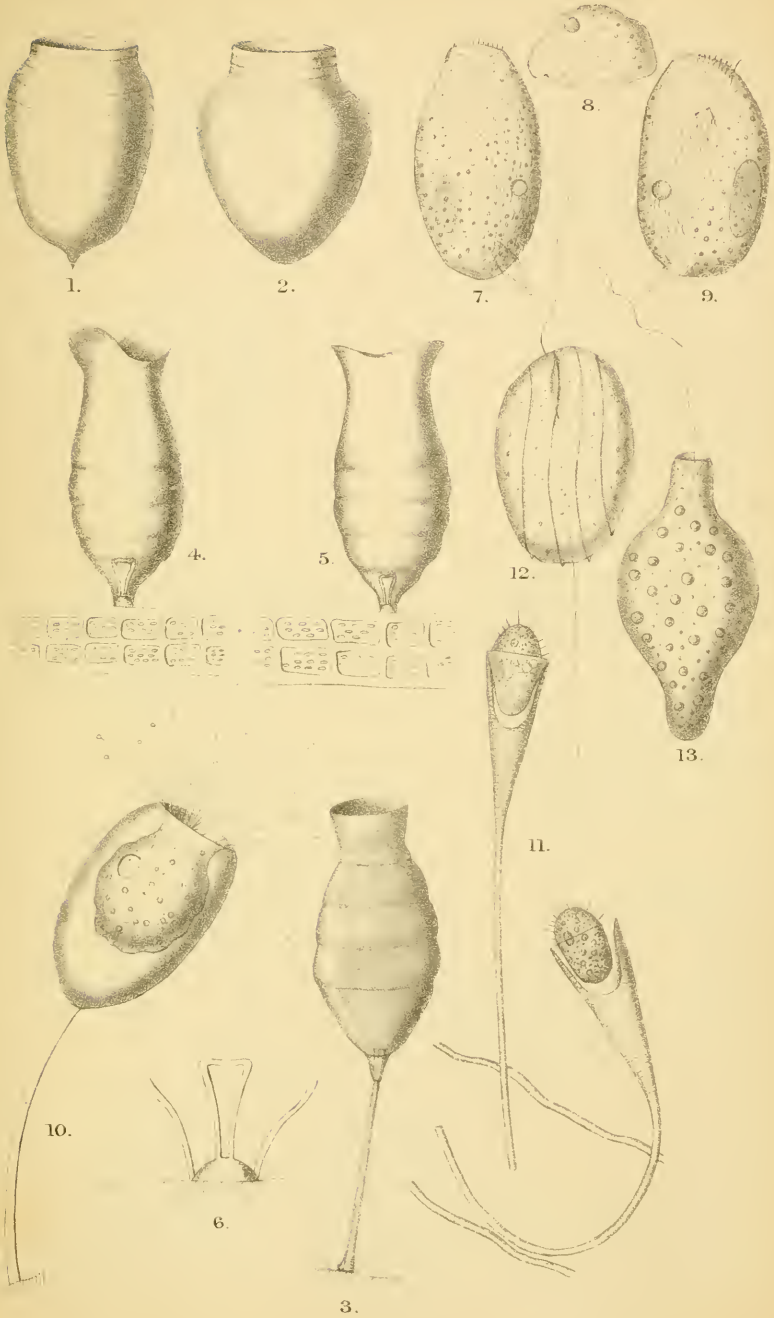
1. *Urceolus Alenizini*, Mereschk. 1877.—Surface of the body smooth, without striæ; neck cylindrical, with the margins abruptly truncated and not turned out. *Loc.* White Sea.

2. *Urceolus cyclostomus* (Stein), Mereschk. 1878.—Surface of the body furnished with spiral striæ; neck obliquely truncated, and with the margin turned out. *Loc.* ——?

It is not right to regard, as I formerly did†, the aperture at the extremity of the neck, and through which the flagellum issues, as the buccal aperture, this latter being placed much more in the interior of the animal, at the bottom of the conical fossa situated in the interior of the neck.

* In the Travaux de la Soc. des Naturalistes de St. Pétersb. vol. viii.

† C. Mereschkowski, "Studien über Protozoen des nördlichen Russlands," Archiv für mikr. Anat. Bd. xvi. 1879, p. 188.



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