Mastigophora i Rhizopoda, naigennyya v" Veisovom" i R(ê)pnom" ozerakh". C" 2 tabl. [Les Mastigophores et Rhizopodes trouves dans les lacs sales Weissovo et Repnoie (pres Slaviansk, gouvern. Kharkow).]. Trud. Obshch. Ispuit. Prir. Kharkov, 21, 119-140. 1887.

VYSOTSKII, A.V. 1888.

[Ochromonas & Pedinella]
p. 121. Ochromonas nov. *gen.*

In lake Veisov live two representatives of this genus, similar to, each other in the vegetative stage but, for all that, sharply differing in their zoospores which could not be attributed to already known genera of the group of Chrysomonads, and figuring in this list provisionally under a new generic name.

p. 122. 4. Ochromonas triangulata nov. gen. et sp. nova.

The zoospore is of elongate triangular shape, in which the apex ox the triangle is the front end of the body. - but the base is the rear end. At the apex, but somewhat to the side of it, the flagellum is attached, serving as the organ of movement, but beside it there is found yet another minute flagellum (Nebengeissel) passively concerned with the movement of the zoospore. By this little flagellum lies a 'red eyelet'. The. chromatophore disc, the doubleness of which I cannot certify, is always found in the anterior half of the body of the zoospore and covers the body on one longitudinal side but on the other side is found a broad gap between its margins. The rear half of the body, consisting of colourless protoplasm, has a shining appearance and often contains grains of varying size; here too sometimes there is a 'feeding vacuole' (Pl. 1, fig. 1, a-f).

Footnote: I have made a more or less literal translation in order to avoid distorting the author's meaning - J.W.G. Lund.

Division of the zoospore begins with the development of four flagella - two big and two small; then begins a stretching of the body in a transverse direction by which is stretched also the chromatophore, while keeping the bending up of its margin. Interestingly in this, is the position of the 'eyelet'. Before the stretching of the zoospore, the eyelet is not seen at its usual place, but instead in the central part of the body appear strongly shining granules, having a reddish gleam, sometimes moving energetically. Then, in the last stage of division, the 'eyelet' again appears near the flagella (Pl. 1, fig. 2). Sometimes the process of division goes very slowly and then is noticed a curious alteration of the form of the body, produced by the development of processes of the colourless part of the protoplasm (Pl. 1, figs. 3 and 4). Apart from division, multiplication sometimes is accomplished by budding; in the way Fischer described for Bodo jaculans : on the body is formed a process, gradually elongating and thickening at the end; at first it is colourless and only by enlargement takes on a brownish colour. On reaching a size approximately equal to 1/3 the size of the maternal organism, the two usual flagella are noticed, the colouration becomes more intense and finally a typical zoospore is obtained, joined to the maternal cell by a very delicate stalk which then is torn apart (Pl. 1, fig. 5).

Finally there exists a third method of multiplication in this stage, consisting in this, that the maternal body falls apart into several parts, keeping for some time a connection among themselves. The division begins with the eyelet and chromatophore, while the colourless part of the cells and equally the flagellum remain as before, undivided. In one of the cases seen by me, the coloured part fell apart into 4, having one flagellum which was feebly vibrating and a single communal colourless protoplasm which, in this time, altered itself in an amoeboid fashion and produced delicate pseudopodia (Pl. 1, fig. 10). Such a condition lasted from 12 o'clock in the afternoon to 9 o'clock in the morning of the following day, when, among many fine pseudopodia, I noticed a second new flagellum : about two hours afterwards that part of this complex zoospore, which had one of the flagella, began to

separate from the main body by means of a bud, rapidly separated completely and swam away; the remaining part of the zoospore had not divided further during this day and next morning it was not present in the usual place.

Nutrition of the zoospore sometimes occurs, as described above, by means of the capture of solid food particles - small bacteria, oil of the cedar nut etc. The catching of these substances is by delicate, sometimes very peculiar, pseudopodia and, falling into the zoospore, they are distributed into vacuoles in its rear portion (Pl. 1, fig. 1d.); in the presence of oil of the cedar nut the rear portion of the zoospore is filled
p. 124 with small shining granules.

The zoospore stage can last for very different lengths of time depending on the environmental conditions - from half a day to several months. In one of the cultures, Ochromonas, in the course of the whole winter, lived on the glass of the vessel (among palmelloid algae) above the level of the water, without loss of the flagellum and, on its transference into the water at once went over into the zoospore stage.

Footnote 1. The ability to catch solid food is excellently demonstrated in Chrysom. flavicans, thanks to the considerable size of the body of this organism. Very often specimens were found which had contained diatoms in the rear part of their body so that it was possible to see the succeeding process of 'digestion', to the degree in which it showed itself in the change of the diatom, which consisted in the reduction of its content and transformation, finally, of the chromatophore into a small, dark brown little clot. Once there was observed the case of the capture of a considerable piece of Leptothrix which greatly elongated the body of the Chrysomonad in the transverse plane. The fact of the capture of solid food here stands outside any doubt and it is not understandable why Bütschli doubts this, despite the convincing figures of Stein.

Apart from the zoospore stage, Ochromonas has also a vegetative - (protococcoid) stage which appears in two ways depending on whether it takes place on the surface of water or under water. In the first case there is obtained a one-layered film consisting of flattened cells, spread out parallel to the surface of the water, closely drawn together; there is no eyelet, the chromatophore is of a different type and in a different position; in the centre of the cell there is usually a colourless, light area (Pl. 1, fig. 11'). Under water, the growth of the colony occurs in all directions,'the separate cells are not flattened and are usually of elongate oval form with shining protoplasm and intensely coloured chromatophores. In this stage Ochromonas in no way differs from Chromophyton Rosanoffii Wor. in the corresponding state of this latter organism.

p. 125. Ochromonas has a cyst stage with a thick two-contoured wall and contents distributed in two sections : in one is placedthe chromatophore with turned up margins, in the other - a colourless, strongly shining protoplasm with granules. Development of the cyst consists in the swelling of its wall and division of the contents into 2, 4, etc., up to the formation of considerable colonies, enclosed in the very delicately mucilaginised wall; in this stage is seen the red 'eyelet'(Pl. 1, fig. 8, a, b; fig. 9, a, b.).

Ochromonas biciliata n.g. et sp.n.

The typical form of the zoospore is elongate elliptical, although variations are encountered - from an ovoid to elongate cylindrical form. In the anterior end of the body are located two identical flagella and the pulsating vacuole (sometimes two); the end of the body sometimes bulges asymmetrically in relation to the long axis of the body in the form of a lip. There is no 'eyelet'. Two chromatophores' are visible, situated in the body of the zoospore just as in the preceding species and, on death of the zoospore, always attaining the form of little clots. In the rear part of the body of the zoospore there are sometimes vacuoles containing undetermined little clots and giving the right, on the basis of analogy with the above described facts, to consider that these are 'digestion vacuoles'; this part

of the body is able to alter greatly in an amoeboid manner, without the formation of fine pseudocilia peculiar to the preceding species (Pl. 1, fig. 12, a,b,c). The zoospore stage usually lasts up to midday, after that the vegetative stage sets in, appearing in two ways depending on its location on the surface of the water or under water. In both cases this stage differs little from the corresponding state of the preceding species. Sometimes O. biciliata, in the vegetative stage, begins to alter in an amoeboid manner, at which time thick pseudopodia are developed (Pl. 1, fig. 13 a, b.).

Undoubtedly, the described forms stand close to the genus Chromulina Cnk. [syn. Nonas (ochracea) Ehr. (Infusionsth.), Fromentel (Etudes etc., 328, XXVII, f. 21). Chromulina Cnk. (Arch. f. m. Anat. 1870, 435; Bütschi (ib. 1878, 214); Fisch (Zeit. f. wiss. Zool. 1885, 67); Wille (Bot. Centralbl. 1885, 258). Chrysomonas (ochracea); Stein (Org. Inf. III, 2), S. Kent (Manual etc., p. 402) Chromophyton Woronin (Bot. Zeit. 1880, S-Abdr. l)]: the morphological features of the zoospores and the cycle of development, in general characteristics, have been described similarly by all these authors, there exist features of similarity sufficient for the relation of all the described forms in one genus together with our two species; but, with the similarity in general features, these forms differ so in details (for example - number of flagella, absence or presence of a red 'eyelet' and the general form of the zoospore), that it is necessary to recognise all the forms, described up till now, as independent.

p. 128. 16. Pedinella hexacostata, nov. gen. et sp. nova.

Despite its insignificant size, this organism has considerable morphological differentiation, permitting the distinction of three parts in its body : colourless anterior and posterior ends and a pigmented central part. This last has the form of a hexagonal prism, sometimes of a truncated pyramid

Footnote 1. Excluding Chrom. Woronina Fisch which is identical with Chromophyton Rosanoffii Wor.

so that, in transverse section (when observed en face) there is a hexagonal figure (Pl. 1, fig. 17). The chromatophore is thickened on the ribs, the spaces between being either weakly pigmented or completely colourless (in those individuals in which, in general, a faint pigmentation is observed). From the colourless anterior part of the body arises a long, thick flagellum, in the normal conditions of existence of this organism (in the attached state) usually vibrating only at the end. Apart from the flagellum, this part of the body carries very delicate, with difficulty seen, appendages of indefinite number, immobile, therefore it is possible to suppose that they are not protoplasmic and are analagous to those appendages which are met with in other brown flagellates (Pl. 2, fig. 15).

Within the body lies the nucleus, visible in transverse section of the body. Here too are found granulae and food vacuoles of varying degrees of size; there are no contractile vacuoles. From the posterior end of the body arises a stalk capable of contracting as a result of shortening (but not of bending). Usually with the least irritation, the body of this flagellate immediately moves the point of the attachment of the stalk while it moves away very slowly and, in this position, it is also possible to see thickening of the stalk: as it lengthens again, it takes up its previous thickness. Occasionally the body moves from the place of attachment on the whole length of the stalk : usually it is somewhat shortened by the formation of local thickening of the stalk.

Pedinella takes solid food. Small kinds of bacteria are propelled by the fiagellum to the front part of the body and fall between the previously described appendages but then, with the aid of a vacuole are drawn into the body. Vacuoles of considerable size are distributed in the anterior part of the body, often pressing on the chromatophore and bending its margins - a phenomenon noted in Chrysomonas flavicans. Multiplication takes place by division; first of all two flagella appear, then begins a splitting of the stalk at the place of its attachment to the body and, at the same time, the body lengthens in a transverse direction, when the chromatophore also is stretched out (Pl. 1, fig. 16, a). As, before the beginning of elongation, the number of ribs does not increase and, in the time of the whole process of

division, the regularity of the distribution of the chromatophore is disturbed - so it is possible to think that here are not six separate discs but one, all the more that, with the already considerable stretching of the body, the place where it looks squeezed in, is, all the same, pigmented. After division the daughter cells remain for some time in connection by means of a thin crosspiece, as a consequence of which is obtained the curious figure shown in the drawing b of Pl. 1, fig. 16. After the complicated division of the body and stalk (fig. 16, c) the young individuals live together having a common point of attachment; in spite of this the development of colonies was not observed.

The described organism usually lived attached to branches of Cladophora, especially between diatoms which had settled on the latter, among which it conceals itself, shortening the stalk when distrubed by infusoria, rotifers and others. Sometimes Pedinella is torn away* from a place and then gracefully is carried in the water, describing large circles, during which the stalk is dragged behind the body.

Habit. Lake Repno.

After p. 137.

Explanation of the Figures.

Ochromonas triangulata n. g. et sp.n. (fig. l-ll).

Fig. 1. a-f. Various forms of the zoospore, in the rear part of the body of which are seen granules of various size and food vacuoles.-

Fig. 2. Dividing specimens: a - 4 flagella have developed, and the eyelet already is not visible; b. the body is stretched transversely and in each of its halves, near the flagella, has appeared an eyelet.

* Sryvaetsya can mean either 'is torn away' or 'tears itself away' (i.e. spontaneously) - J.W.G. Lund.

Fig, 3-4. Various changes of the form of the body, observed during slowly occurring division.

Fig. 5. Development of a zoospore by means of a bud.

Fig. 8. Cysts; a - resting and b - growing out, in which the wall begins to swell and mucilaginise.

Fig. 9. Multiplication of the cyst by division: a - content has fallen apart into two; b - to four parts.

Fig. 10. Division, in which, first the chromatophore falls apart into several portions but the colourless protoplasm still remains single and carries out amoeboid movement.

Fig. 11. Vegetative (protococcoid-like) stage, developed on the surface of the water. Cells strongly crowded, spread parallel to the surface of the water and distributed in the form of a one-layered stratum.

Ochromonas biciliata n. g. et sp. n. (fig. 12-14).

Fig. 12. a, b, c. Rear part of the body can alter strongly in an amoeboid manner. c, v- contracting vacuoles, n. the cell nucleus.

Fig. 13. Vegetative stage, altering in an amoeboid manner and forming thick pseudopodia (a, b) and, c - pulsating vacuole, n - cell nucleus.

Pedinella hexacostata n.g. et sp. n. (fi.g. 15-17).

Fig. 15. Solitary specimen in which, apart from the flagellum, the thin appendages are also seen.

Fig. 16. Division: a - the body begins to divide and the stalk has branched, b - dividing halves of the body still connected by a thin crosspiece, branching of the stalk stronger. c - division wholly completed.

Fig. 17. Optical transverse section of the body; on examination of it en face, is obtained a hexagonal form.

Note: As a consequence of the sudden death of the author certain figures, in details, remained without explanation.

Notice

Please note that these translations were produced to assist the scientific staff of the FBA (Freshwater Biological Association) in their research. These translations were done by scientific staff with relevant language skills and not by professional translators.