Kleinere Mitteilungen.

Skadovskiella sphagnicola, a new colonial Chrysomonad.

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(With Plate 7.)

While working at the Hydro-physiological Station of the Moskow Institute of Experimental Biology, near the town Zvenigorod (Moskow district), I found an interesting organism from the group Chrysomonadineae, which proved to be a constant and characteristic inhabitant of peat bogs in the environs of the Station. My observations lasted from 25/VII to 5/IX of 1926, and I can therefore say nothing as to the periodicity of its apparition. Likewise, inasmuch as I had earlier paid no attention to the colonial Chrysomonads, I cannot judge what is its geographical distribution within the bounds of Russia, and whether peat bogs are the only kind of water basins inhabited by *Skadovskiella*.

The fact that in the list of the Flagellatae found in one of those peat bogs (the so-called "Lutzino-moor") [1]. *Synura uvella* Ehrbg.

[1]) Wermel, E.: Zur Biologie der Flagellaten eines Moortümpels. Arch. f. Protistenk. 1924 Bd. 48 p. 207.

Skadowsky, S. N.: Hydrophysiologische und hydrobiologische Beobachtungen über die Bedeutung der Reaktion des Mediums für die Süßwasserorganismen. Verh. d. Intern. Ver. f. theor. u. angew. Limnologie 1923.

and *S. verrucosa* PASCH. are the only colonial Chrysomonads referred to, permits to suppose that the distinction between these forms and *Skadovskiella* escaped the attention of the investigators of the basin, evident as it is. For my part, I thougt at the beginning that I was dealing with *Syncrypta volvox* EHRBG.; and this organism being very insufficiently known, I undertook a detailed investigation of it. It proved, however, that my form was not identical with *Syncrypta*, as this is described and figured by STEIN in his work on the Flagellates, differing from it in some important points. Therefore I consider it best to describe the organism found by me under a new generic and specific name.

The resemblance of *Skadovskiella*, when under a middle magnification, with *Synura*, which was also abounding there, is indeed rather great. The colonies have the same dimensions, as those of *Synura*, as well as the cells constituting them. It must be mentioned however that the cells of *Skadovskiella* are generelly more rounded, up to spherical, while in *Synura* they are elongated. The width of the cells depends chiefly on the abundance of leucosin, but the colonies were sometimes met with consisting of cells of so different sizes, that this could not be explained in this manner. In extreme cases, the larger cells were twice the length and width of the smaller ones; which difference may be looked upon as an age variation. In average the diameter of the cells was about 12 μ, that of the whole colony 35—40 μ.

The cells are joined together by their basal parts somewhat produced toward the centre of the colony. Due to a more spherical shape of the cells, the colonies consist of a less number of individuals, than those in *Synura*. Judging from the fact that very often the colonies contain as few as several cells only, the junction between the latter must be loose enough.

The structure of the protoplast resembles that of *Synura*. There are two equally long, strong flagella, which become thinner toward the end. They project from one point of the distal end of the cell, in which region several small red droplets — probably of haematochrom — are scattered about. Their presence was, in the given case at least, a good distinctive feature from the *Synura*, though in general no taxonomical importance is to be attached to this character. Indeed, according to CONRAD [1]), these droplets may be

[1]) CONRAD, W.: Contributions à l'étude des Chrysomonadines. Bruxelles 1921. Also in Bull. de l'Acad. royale de Belgique 1920 p. 167—189.

present in *Synura uvella* too, varying in number and size, and being sometimes, as Mr. Conrad wrote to me, quite absent. It may be noted, however, that in my case their absence (in *Synura*), resp. presence (in *Skadovskiella*), were quite constant.

Inside the protoplast two chromatophores are located. Their arrangement however is quite different from that in *Synura*. In the latter they are applied to the surface of the body, being separated by a large and irregularly shaped drop of leucosin. In *Skadovskiella* the arrangement is reverse: leucosin lies on the outer surfaces of the chromatophores, between the latter and the surface of the protoplast. The chromatophores are thus driven back to the middle of the cell, where they lie parallel with one another, or form an)(-like figure, if there is much leucosin in the cell. Often a third drop of leucosin is present, namely between the chromatophores, but on the one side of the cell only; in which case the chromatophores come into contact by a part of their surfaces, diverging further to give space to leucosin, as shown in Fig. 1.

Between the chromatophores is placed a nucleus, which is yet very indistinct. In the basal part of the cell there are contractile vacuoles, as in *Synura*.

Like *Synura*, there is no gelatinous envelope round the colony of *Skadovskiella*, though it may seem to be present, by superficial observation. Its absence may be indisputably demonstrated by placing the colonies into Indian ink solution. The presence of the mucilagineous investment, with minute rods of silica imbedded in it — as is described in Pascher's Süßwasserflora for *Syncrypta* [1]) — may be suggested, in *Skadovskiella*, by individual envelopes round each of the constituting cells, the structure of which is the most peculiar feature of the organism.

Unlike the *Synura*, there is no distinct and sculptured periplast on the perifery of the cell of *Skadovskiella*. The cells are here enclosed in an envelope, appearing as a chain-mail, when observed with a high power objective. This consists of a great many regular broadly elliptical rings, overlapping each other and loosely attached to the surface of the body at some angle to it, so that they spread from the body toward the outside of the colony. Each ring is provided, on its free end, with a short rod, lying either in the plane of the ring, or, nearer to the distal end of the cell, somewhat bent outwards. The whole is very like a lawn-tennis racket.

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[1]) Pascher, A.: Süßwasserflora Deutschlands usw. Bd. 2 p. 43.

These rings are of course very small and thin, therefore very difficult to observe in living cells. Most distinct and convincing pictures may be obtained by drying up the colonies on the cover glass. The protoplasts are then disorganised and the rings lie separated on the glass (Fig. 2). The shadows produced by an oblique illumination show that these are really rings, not elliptical plates, as it might be supposed on the analogy with what is known about the envelopes in *Mallomonas*.

The rings are very resistent against heat and strong acids, which shows them to consist of silica.

Formation of cysts was observed. They have a spherical shape, up to 15 μ in diameter, and are covered with a thin smooth wall with a pore closed by a stopper. The outer part of the latter is little developed, contrary to the inner one, protruding as a hemisphere inward the cyst. The pore is turned toward the centre of the colony. The chromatophores lie against the wall of the cyst, the whole distal half of the latter being occupied by leucosin. The ring envelope is preserved round the cyst.

As is seen from the preceding, the structure of *Skadovskiella* is different from that of both *Synura* and *Syncrypta*, provided the latter be correctly described by STEIN. Though the rings round the cells of *Skadovskiella* may be taken, by a superficial observer, for rods or bristles, as in *Synura*, the position of chromatophores is evidently different, a well as a general shape of the cells; so that any confusion is impossible. The absence of a gelatinous envelope with a hollow occupied by the cells, is an important distinguishing feature from *Syncrypta*. From both genera *Skadovskiella* differs above all by its ring envelope, unknown in any other Chrysomonad and not to be overlooked by a so prominent observer, as STEIN. Therefore, be STEIN's description correct, my organism must be considered as a particular genus of the colonial Isochrysidales, convergent in many points with *Synura* and *Syncrypta*.

According to J. B. PETERSEN [1]), the cells of *Synura uvella* are covered not with the sculptured periplast, but with an envelope consisting of numerous scales, as in *Mallomonas*. My own observations on *Synura uvella* showed it to be correctly described by the former authors. As to the PETERSEN's form, it has no relation to *Synura*,

[1]) PETERSEN, J. B.: Om *Synura uvella* STEIN og nogle andre Chrysomonadiner. Vidensk. Medd. fra Dansk naturhist. Foren. Bd. 69 1918 p. 346. I bring my greatest thanks to Prof. Dr. A. PASCHER, who has sent me the reprint of PETKRSEN's work, placed in the journal inaccessible for me.

differing from the latter not only by the structure of the cell envelopes, but by different length of the cilia too. Lately I have found this form in the environs of Kharkov and its description will be given in another place.

It is not impossible, that the organism found by Doflein [1]) and described, though with some doubts, as *Syncrypta volvox*, is in fact *Skadovskiella*, judging from the absence of the common mucous envelope round the colony, each cell being surrounded with an individual envelope enclosing some rods. It must be noted, however, that in fixed and stained preparations, which only the author was dealing with, the siliceous rings could not have appeared as rods, except in quite a definite and thus exclusively rare position. Therefore, the identity of Doflein's form with *Skadovskiella* can not be stated with certainty.

The structural differences of *Skadovskiella* from both *Synura* and *Syncrypta* are, I believe, too great and not to be considered as only specifical ones. It will be more sound, to create a new genus in the group Isochrysidales Pascher [2]). It is difficult to give any quite fitting characteristic of this genus knowing only a single species of it. Therefore, in the following diagnose mainly such characters are referred by which *Skadovskiella* may be distinguished from the two above mentioned genera.

Skadovskiella gen. nov.: Cells radially symmetrical, combined into loose spherical colonies not enclosed in a common mucilagineous envelope. Each cell is provided with two equal cilia, two chromatophores running parallel with the axis of the cell (not wall-sided), several contractile vacuoles in the basal part of the cell, without any uncontractile vacuole in the fore end. There is no distinct and sculptured periplast round the cell, but an envelope formed by a great many minute siliceous rings with rod-like appendages at the distal ends, losely attached to the cell surface all around.

As to the family, wherein *Skadovskiella* might be placed, I forbear from any definite conclusion. The Isochrysidales are too heterogeneous and at the same time too poor in generic types, that it might be possible to give any sound classification of them. That proposed by Pascher in his just mentioned book cannot be con-

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[1]) Doflein, F.: Untersuchungen über Chrysomonaden. IV. Arch. f. Protistenk. 1923 Bd. 46 p. 332.

[2]) Pascher, A.: Süßwasserflora Deutschlands usw. 1914 Heft 2 p. 42.

sidered quite adequate. According to CONRAD [1]), *Hymenomonas* ST. is in general not a relative of *Synura* or any other of the Isochrysidales, but a member of the Coccolythophoridae. There remain then only a doubtful and in any case quite little investigated genus *Syncrypta* EHRBG., the no less obscure *Stylochrysallis* ST., *Derepyxis* STOKES, *Synura* EHRBG., *Chlorodesmus* PHILIPPS, and possibly *Wissotzkia* LEMM. [2]). It is quite an ungrateful task, to divide them into families. Those established by PASCHER with purely practical purposes (Isochrysidaceae and Euphymenomonadaceae) are artificial, being based on such characters, as absence, resp. presence of the complex system of vacuoles and apical vesicle. The presence of the latter seems to me very doubtful in some cases.

Besides, *Skadovskiella* represents quite a new type among the Isochrysidales due to its envelope of siliceous rings. In this respect it approaches rather to the Coccolythophoridae, but an other disposition of those rings and absence of mucilagineosus coat round the cell is a difference not to be neglected.

In this consideration, it would be best to refuse from the establishing of various families in bounds of the Isochrysidales, to avoid the difficulties, which inevitably must arise whatever principles of classification may be chosen. We strike here on the same difficulties as generally offered by our attempts to bring in order what is disordered by nature.

Explanation of the figures.

The figures are made with use of ABBE's camera-lucida from living (exc. Fig. 2) objects

Plate 7.

Fig. 1. *Skadovskiella sphagnicola* n. gen. et sp. A general view of the colony. × 1000.

Fig. 2. Siliceous rings of the cell envelope separated by the drying up and destruction of the organism. × 2350.

Fig. 3. An isolated cyste with the siliceous envelope preserved. × 1000.

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[1]) CONRAD, W.: Recherches sur les Flagellates de nos eaux saumâtres. Arch. f. Protistenk. 1926 Bd. 56 p. 194.

[2]) PASCHER considers this last organism as a Cryptomonad (Braune Flagellaten mit seitlichen Geißeln. Zeitschr. f. wiss. Zool. 1912 Bd. 100 p. 184.).