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During recent years in connection with the industrialisation of the Kola Peninsular, the study of this district in the botanical respect, in particular the study of the microflora of various bodies of water, began to advance markedly. The chief role here naturally belongs to the Leningrad botanists (Voronikhin, Shirshov, Poretskii, Kosinskaya, etc.). Their works are a considerable step forward compared with the data of the older authors - Nilander, El'fving, Levander, Kil'man, etc.

A historical survey of the investigations on the freshwater algae of the Kola Peninsular up to 1934 is given with sufficient completeness in the work of Kosinskaya (1934) and it is unnecessary to repeat it here. One should also supplement this work by mentioning the later works of Kosinskaya (1936) and Voronikhin (1934, 1936). The river Tuloma (Shirshov 1934) is the best studied of the rivers of the Kola Peninsular. For other rivers of the Peninsular, the information is poor and fragmentary and, as concerns the river Niva, the information is restricted to the data of Arnol'di and Aleksenko (1914) about material collected while journeying along the whole length of the slow water way [= Canal ?] Kola-Kandalaksha. These data are very poor and obviously cannot give a sufficient idea of the real composition of the algae of the Niva. In the list of species for the river Niva we have only twelve species of Desmidiales, one of Volvocales (Eudorina elegans), nothing of the Protococcales and Tetrasporales, and no particulars about the Bacillariales, Flagellates and Cyanophyceae, as, for them there is no indication in the list of their location and only the summary list is given of all the localities of the collections. Such manifest poverty of collections made twice in different years by different people is not entirely clear. In my case it seems to me quite useful to publish any list from the river Niva. It is made from the study of only one sample, collected in August/with a plankton net from the bank of the river, /1936 not far from its mouth in the town of Kandalaksha. As I had at my disposal only this material fixed in formalin I clearly could not study representatives of the flagellates which were either destroyed by the fixative or became unidentifiable. I think, however, that in general, there were few of them.

In the investigation of the material I met with species new to science, the description of which is given here. Among them I found Tetraspora simplex sp.n., Tetraspora imperfecta sp.n., and Chlorophysema adnata sp.n in other places and studies them in the living state under laboratory conditions.

The majority of new forms belong to the desmids, but I am not fully certain that they are all really new forms. Although it was possible for me to make use of the valuable library of Professor Ya.V. Roll (Kiev), to whom I here express sincere gratitude for this, all the considerable amount of work on desmids, scattered in diverse journals, remained inaccessible to me and perhaps something of what I found will prove to be already described. Irrespective of this I see in advance also the possibility of a fundamental difference of opinion concerning the systematic importance of some of the forms.

[Here follows list of algae added as photostat at end of paper]

A propos of the above mentioned list it is necessary to make the following comments.

First of all it is necessary to mention the general quantitative poverty of the plankton, about which one could judge by the very small quantity of sediment obtained as a result of approximately ten minutes filtration of water through a net floated from the bank in the current of the river. As regards the qualitative composition of the plankton, as it is not difficult to make sure from an examination of the list, only a very insignificant number of the species recorded were planktonic. Of these latter the general background of the plankton, by their own comparative abundance, was made up of the following organisms:- Asterionella formosa, Fragilaria crotonensis, Tabellaria fenestrata var. asterionelloides, Synedra acus var. radians, Anabaena flos-aquae, Coelosphaerium naegelianum, Dinobryon spp.

Often met with are Ceratoneis arcus, Cyclotella spp., Melosira islandica, Tetraspora imperfecta, Peridinium spp. The vast majority of the desmids are met with more or less rarely, sometimes very rarely, as single specimens. The more abundant of the others were representatives of Arthrodesmus and Staurastrum. Judging by the first impression there was little of these in general but after looking at a greater number of preparations, more and more new species were observed all the time and undoubtedly my list was not comprehensive. There is evidently a comparatively large quantity of Staurastra. In all probability the vast majority of desmids get into the river from various bogs communicating with it.

As concerns diatoms the majority of species are benthic, very often attached forms which get stirred up from the bottom or are torn off from their substratum by the rapid current of water. Very many diatoms are found on pieces of detritus and especially in the excrement of various aquatic animals (worms, crustacea, larvae of insects). This is also the case with small Peridinia.

An interesting find among the diatoms is Tabellaria fenestrata var. geniculata Cl. It is very rarely found in the river Niva but very often in the river Kobda and one may think that it is a form which is fairly widespread in our northern rivers.

Members of the groups of the Tetrasporeae were found to be interesting in the highest degree, represented by only four species, all of which were, however, new to science. Their description is given below.

TETRASPORA SIMPLEX, SP.N.

(Pl. I, fig. 6-7.)

Of all the new species of Tetraspora published here, this species is, in my opinion, the most widespread. I found it, apart from the river Niva; in numerous sphagnaceous bogs and lakes in the neighbourhood of the village of Kobda (Murmansk obl.), in the river Kobda itself and its back waters, in sphagnaceous bogs of the Kalininsk obl. (in the vicinity of the former Borodinsk Biological Station on lake Seliger), in the Gorky district (the "holy" lake, in the vicinity of the Biological Station of the Gorky University on lake Seresha), but it was not met with once within the Ukraine, in diverse bodies of water in the vicinity of Kharkov. In all probability, Tetraspora simplex is a fairly characteristic inhabitant of oligotrophic or dystrophic waters of the northern half of the USSR, chiefly bogs and shallow boggy lakes, from whence, maybe it comes into a river, being part of its plankton.

Tetraspora simplex is free floating, the microscopic colonies which are never attached have the appearance of delicate mucilaginous vesicles of spherical or ellipsoid shape in which are found cells or young daughter colonies. There are usually four cells in a colony, more rarely two and never more. The walls of the vesicle are strongly mucilaginous and are the inflated membrane of the mother cell of the colony, in which the spherical green cells are lying freely at a considerable distance from each other. The external layer of the vesicle is more compact and has the appearance of a very thin superficial pellicle which is clearly visible even without staining. Within this layer, the breadth of which does not exceed a few parts of a micron, is a thick (to 13/u) layer of watery mucilage which can only be seen with full clarity after staining the object by means of aniline blue or methylene blue. For staining one should take very weak solutions of dyes, because otherwise it shrivels on account of the coagulation of the mucilage. One can avoid this by using somewhat acidified solutions of the dye, which can then be stronger.

The inside of the vesicle is filled, as one may believe, by yet more watery mucilage, keeping the cells at the known distance from the wall of the vesicle/from one another. /and

The structure of the cells differs in no way from that of other species of Tetraspora. They have a prefectly spherical shape and are surrounded by a very thin and poorly visible membrane. The chromatophore is cup-shaped with one pyrenoid and with a strongly thickened base, without a stigma. In the opening of the chromatophore two vacuoles pulsate. Morphologically the place of their disposition is the front end of the cell, which is always turned to the wall of the visicle. From this outerside of the cell go two thin thread-like pseudocilia, lacking any kind of visible mucilaginous opening either inside or outside the vesicle. This length is greater than the diameter of the cells by 8-15 times and reached 80/u. They radiate at a bigger or smaller and sometimes very considerable angle and pierce the wall of the vesicle at a great distance one from another. Thus outer and inner parts are approximately the same lengths, but often the part outside is clearly longer. This latter is observed in very young colonies with small vesicles while they are still in the old vesicle (fig 7.). This circumstance, that the internal parts of the pseudocilia of the older colonies are considerably longer than in the young ones, but the outside parts are shorter, permits the supposition, that, by further extension of the vesicle, the pseudocilia are pulled inside up to half or more of their length. At the same time, of course, the points of exit of the pseudocilia through the walls of the vesicle are drawn apart. A stretching of the pseudocilia themselves seems to me hardly likely.

The size of such simple two or four celled colonies reached 80/u, the diameter of the cells, are depending on age, is 5-14/u..

As a result of the division of cells into 2 or 4 daughter colonies, remaining within the mucilaginising and dilating maternal envelope, the daughter colonies are for a long time included within the walls of the old vesicle. The pseudocilia of the new formed cells pierced the walls of the vesicle which is still enlarging further. Sometimes, however, it happens that new pseudocilia do not go out of the old vesicle and remain rolled up within it. Such examples I used to find in bogs near the Borodinsk biological station on Lake Seligar in 1914. As concerns the old pseudocilia, they behave as was already long ago shown by me (5) for Tetraspora lubrica, i.e. :- they do not go across to the daughter cells but remain on the surface of the maternal envelope which turns into the vesicle of the young colony; being greatly mucilaginised and in the end disappearing completely after the liberation of the young colony. Without stains they are extremely difficult to see.

Tetraspora simplex is more often met with in the form described above with vesicles with two or four colonies of the first order. On the number of these last depends the form of the vesicle which is spherical in the presence of four colonies inside and broadly elliptical in the presence of two colonies. The size of the vesicle fluctuates between 70 and 180 μ. /cells of I never saw more complex or big colonies consisting of/the third or fourth generations. From this it is possible to conclude that, after the formation of the daughter colonies, the old vesicle is destroyed and the daughter colonies are liberated. This fact, that simple two or four cell colonies are met with comparatively rarely, permits one to suppose that this stage of development is of short duration and that soon after liberation the formation of daughter colonies of the next generation begins.

Any other stages of reproduction, for example zoospores, gametes, resting cells were not seen.

TETRASPORA TENERA, SP.N.

(Pl. II Figs 1-3).

Up to the present time I only found this species in the plankton of the rivers Niva and Nevka. Like Tetraspora simplex it always has the appearance of a mucilaginous vesicle with two to four cells inside, which later on turn into daughter colonies, freeing themselves as a consequence of the destruction of the old vesicles. Dimensions are approximately the same: simple colonies - to 160 μ diameter, colonies of the second order (vesicle with daughter vesicles inside) somewhat bigger, to 175 - 180 μ. Structure of the cells normal: very delicate membrane, bowl-shaped chromatophore with a pyrenoid. There are, of course, contractile vacuoles but I did not see them for I only had fixed material. Size of young cells 9-10 μ, of older ones 18-20 μ, that is somewhat larger than in Tetraspora simplex.

The cells lie at a considerable distance from the wall of the vesicle and turn their morphologically anterior ends to the outside. Two pseudocilia, in length 18-20 times the diameter of the cells, go out from every cell towards the wall of the vesicle. In contrast to the very thin, filiform pseudocilia of the previous species, they are very mucilaginous, have a loose structure, from the base are comparatively thick and gradually become thinner towards their end so that they become scarcely visible. A characteristic peculiarity of these pseudocilia appears to be that in the majority of cases they branch dichotomously at some distance from the base. At the same time one of the branches is considerably shorter than the other. Such branching of pseudocilia is quite unknown in other species of Tetraspora and in those organisms near to it is met with only in Schizochlamys and Porochloris, it is repeated in the systematically further removed Dicranochaete.

Another extremely characteristic peculiarity of Tetraspora tenera is that the pseudocilia do not go out through the wall of the vesicle of the colony to the outside, but remain within it, twisting like a beautiful bow alongside its inner surface. The walls of the vesicle here are also differentiated, the outside more compact and skin-like [layer] which is perceptible, although with great difficulty in consequence of the extreme thinness, without definite colouration, and the inner watery [layer]. This watery layer, in contradistinction to such of the preceeding species is very delicate, cannot be stained and it is possible to judge about it only by this, that the pseudocilia do not fit closely to the visible immediate outer layer but are found to be arranged at an insignificant distance from it. The peripheral arrangement of the pseudocilia and also similar equidistance of the cells of the colony one from another indicates that the cavity of the vesicle is filled with a very watery mucilage secreted by each individual cell.

One can get an idea about the process of reproduction from fig. 3.. Here one will see three not yet divided cells with the base of the pseudocilia very mucilaginous, vacuolised and swollen (in reality they are visible with extraordinary difficulty) and a thick coat of mucilage on the wall. The fourth cell already had time to form a daughter colony of four cells, out of which each is provided with two still short pseudocilia of their own.

As to the old pseudocilia, belonging to the maternal cell of this colony, they for a time remain attached to the maternal envelope, converted here into the mucilaginous vesicle of the young colony, and later on on liberation of this, one may presume they fall off or disappear owing to final mucilaginisation. The old vesicle is destroyed apparently very soon after the formation of the daughter colonies and the organism is met with usually in the form of simple 4-celled colonies. This also distinguishes it from Tetraspora simplex.

TETRASPORA IMPERFECTA SP.N.
(Pl. III, figs 1-4).

This species I found in fixed material from the river Niva and subsequently in the Gorky district and mainly in the lake Velikoe by the river Seresh in the vicinity of the biological station of the Gorky University. A second find of this allowed me study it in the living state and to elucidate its systematic position which up to then remained unclear.

Tetraspora imperfecta has the appearance of microscopic mucilaginous masses of not truly elliptical but of somewhat quadrangular form, often somewhat constricted, length to 100-110 (140)/u, width about 70 (100)/u, with a small number of small, spherical green cells within. The cells lie in close pairs which in their turn are grouped by twos and fours (fig. 1, 2) in the interior of the mucilaginous mass at a distance of 25-30/u from the surface of the mucilage. In large colonies there occur four such groups (Fig. 2.) but such colonies are not solid and under the cover glass easily break up at the place of constriction, with two groups of cells in the ends (fig.1.), but further strong pressure gives rise to further breaking up into rounded colonies with only one group of cells in the centre.

As I did not meet with bigger colonies, it is possible to infer that in nature, by means of similar successive breaking up (apparently in 3 mutually perpendicular directions) going hand in hand with multiplication of the cells and growth of the colony, multiplication occurs in the course of the vegetative season. There may be multiplication by other methods which I did not see.

The mucilage of the colony is completely structureless, devoid of a thickened layer on the surface and it is so watery that its outline can only be seen in a solution of indian ink or after staining with methylene blue, gentian violet etc. One must say, however, that staining succeeds with difficulty, since any strong solution of a stain produces a concentration of the mucilage. A characteristic peculiarity is the red-violet shade, in which the mucilage stains in methylene blue.

Adult cells have a regularly spherical shape and reach up to 11.5/u, young ones are broadly ovoid and of somewhat lesser dimensions. The cells lying, in pairs, are somewhat flattened at the place of contact. This is seen during the period after division, but the daughter cells gradually round off, move away from one another and in their own turn divide. The chromatophore is bowl-shaped with a pyrenoid in the thickened base, without a stigma. On the morphological front side of the cell the chromatophore is broadly hollowed out and two contractile vacuoles are seen in the colourless granular protoplasm filling part of the cells. The cell wall is unusually thin and scarcely visible.

The cells are oriented in the mucilage in an unusual manner for Tetraspora, the front ends are inside not outside while the axes of the cells meet approximately at right angles. As regards the pseudocilia, in the vast majority of cases they are completely absent. Only by very careful investigation with the help of immersion objectives can one sometimes see on the anterior end of the cells faintly visible mucilagenous lumps or threads, which form, probably because of the destruction of the pseudocilia in the very beginning of their formation. In certain cases I was able to see on the front end of the cell pairs of tiny mucilagenous globules resembling those which are formed from the aggregation of threads (fig. 3). Thus, in fact, the pseudocilia are here as if reduced and this was the cause of my naming the organism Tetraspora imperfecta. However, careful examination of a large number of colonies showed that in some cases the cells have a supply of real pseudocilia and this permits me to include the given organism in the genus Tetraspora despite a series of pecularities unusual for this genus. In fig 4 two cells with pseudocilia are depicted. The latter were so thin that only with immersion objectives and strained attention did I succeed in tracing them from the beginning to the end and to depict them with the help of a drawing apparatus. The contour of the mucilage is invisible by normal investigation and was drawn after the application of a solution of indian ink. The length of the pseudocilia is about 60 μ. Immediately from their base they bend in the opposite direction backwards to the periphery coming forward out of the mucilage into the surrounding water for approximately half of their total length. They stain with extraordinery difficulty and this greatly impedes their being found. In material from the river Niva the cells apparently always have pseudocilia.

Cell division does not present any peculiarity. It is characteristic for this organism, however, that one always observes divisions into two, whereas for other species of Tetraspora division is usually into four, with the development of characteristic tetrads. At the time of division the maternal wall turns into structurless mucilage blending with the existing mucilage around. Only in certain cases was I able to see incompletely dispersed remnants of it on any side of the daughter cells. Probably the mucilage exudes from the cells themselves.

The above mentioned peculiarity of division explains why the cells of the organism are arranged in pairs. The cells of each pair remain for a long time tightly together but, before a new division, they separate a little, subsequently forming two new pairs lying close together. Later on these latter, apparently owing to a large production of mucilage between them, separate already to a considerable distance, and thus, after the following division, there arise two separate groups, each of two pairs of cells. At the moment of the following division these groups move away still further but later on are totally separated thanks to disintegration of the mucilaginous mass into two parts. Judging by this, that the maximum number of cells in the colony does not exceed, apparently 32, one may believe that each new division of the cells is accompanied by the division of the colony into two parts with the largest separate relationship [this is not clear to me but it is the correct translation. J.W.G.L.]

Tetraspora imperfecta is very similar to Tetraspora lacustris as the latter species was first described and figures by the author (Lemmerman 1899 Pl.I.f3) In Lemmermann's figure the pseudocilia are not depicted, as well as no indication of their presence in the very short diagnosis of this species, so that strictly there was not even a reason to attribute this organism to Tetraspora. However in his later work (1914) Lemmerman gives another figure for Tetraspora lacustris, in which already are depicted pseudocilia going out from the outer sides of the cells and immersed in the mucilage. Smith (Smith 1920) found Tetraspora lacustris in the Wisconsin lakes and for his picture of this organism he copies Tiffany (Tiffany 1934, pl.VII fig. 104), who found this organism in Lake Erie. In this picture the pseudocilia also go out from the outer side of the cell but only their bases are here immersed in the mucilage, so that about the full identity with Lemmerman's alga one may hardly speak. At any rate it is quite evident that *Tetraspora imperfecta* /not is an indipendant species and/identical with *Tetraspora lacustris*. As regards the organism originally described by Lemmerman under the name *Tetraspora lacustris*, it is possible that it was either *Tetraspora imperfecta* or the recently described *Pseudosphaerocystis planctonica* Woron. of Woronikhin (1931). At the moment, to be sure, it is impossible to sort this out.

CHLOROPHYSEMA ADNATA, SP.N.

(Pl. I. Fig. 1-5.)

This alga was found in the river Niva and also in the River Kobda, not far from its mouth by the village of Kobda (Murmansk oblast). The data given here are based on the study of living material during my work in Kobda in the summer of 1936. The alga was encountered here as an ephiphyte on *Gomphosphaeria naegeliana* (Ung.) Lemm. and *Dinobryon divergens* var *angulatum* Chod. In 1939 this organism was also found on *Dictyosphaerium pulchellum* in the plankton of the "great" lake (Gorky oblast) mentioned above. Usually the alga is encountered in the form of small palmelloid colonies sometimes with younger envelopes within. On *Dinobryon* the colonies attach themselves directly to the outside of the surface of the lorica and are also flattened (fig. 5). On *Gomphosphaeria naegeliana* they sit approximately three-quarters immersed in the mucilage which covers the host alga. On this substrate I have had occasion to find especially strong development of the colonies of the epiphyte. The colonies on *Gomphosphaeria* are usually shortly ovoid, which is probably conditioned by the pressure of the mucilage from the sides. Such egg-shaped colonies are immersed in the mucilage by their own narrower end. A direct contact of the ephiphyte with the cells of *Gomphosphaeria* was not observed. The usual size of a colony with 4-8 cells is 20-30 µ, but sometimes on *Gomphosphaeria* it has even much bigger cluster-like colonies protruding far out of the mucilage host alga (pl. VII, fig. 1.).

The cells of the colony have the appearance of typical Chlamydomonads, but merely without flagellae. They are ovoid in shape and are enclosed by a thin covering membrane without a papilla. The chromatophore is symmetrically basin-shaped with a clearly visible pyrenoid in a thickened base which occupies about half the total volume of the cell. Not far from the front end of the cell is a small oblong-elliptic stigma. At the front in the opening of the chromatophore pulsate two vacuoles. The size of the cells in the colony is, on the average, 6 µ long and 5 µ broad. The cells are not arranged irregularly in the colonies as is usually observed in palmellias but are oriented in the same manner, that is with the anterior ends inwards towards the substrate; and they are usually distributed in the lower half of the colony.

I did not observe a cell of the alga in the mobile state nor the process of their attachment to the substrate. It is possible to suppose that the zoospores are formed by division into two or four cells of a colony and that they go out as a consequence of the mucilaginisation of the old walls of the colony. Direct transformation of the cells of the colony into zoospores seems to me less likely.

In fig. 1, left hand side (Pl. I) a zoospore is depicted which has already lost its motility and is submerged almost completely in the mucilage of *Gomphosphaeria*, having reached the limited size for this one-/long celled stage of 10.5 µ/and 9 µ broad. Beside it is shown a young colony arising from the division of such a cell into two. The daughter cells lie freely in the markedly widened maternal envelope. In fig 2. is shown a similar colony of four cells of the first generation. The cells lie in a much enlarged but, in general, weakly mucilaginised and therefore fairly thin maternal envelope and all are turned with the anterior end downwards to the substrate. Such orientation, apparently, is not present at the very beginning but is reached by means of corresponding displacements of the daughter cells, which at first are distributed somehow differently, in all probability as they are distributed in Chlamydomonads of similar ovoid shape: two cells with the anterior ends on one side and two lying in the opposite direction. I did not have a chance to make sure by direct observation but I think that I am not mistaken. In fig 3 is depicted a colony of cells of the second generation, of which one is in the stage of further reproduction. Division, it seems, takes place in a transverse direction relative to the axis of the membrane and evidently, after rotation of the protoplast through 90° as is observed in ovoid chlamydomonads with a symmetrical cup-shaped chromatophore. Already from this alone, it is obvious, that the distribution of the daughter cells in the maternal envelope cannot correspond to their final distribution in the colony. By detailed examination of the enlarged maternal envelopes it is possible to see on their lower, morphologically anterior, end two short inwardly directed little tubules (fig. 1, 2, 4). These are the canals in the envelope through which the flagella of the motile mother cell go to the outside. It is obvious that there were two of the latter and this permits the given organism to be attributed to the genus Chlorophysema which is characterised by biflagellate Chlamydomonad like zoospores.

Further development of the colony takes place by quite similar divisions of the cells into 2 or 4. In fig. 4. is depicted an older colony of cells /from of the second generation, which has formed/a two-celled colony as a result of division of its cells into four. Apparently reproduction has occurred recently and the cells are still distributed somewhat irregularly in the still extending maternal membrane. It is interesting that in these latter below can also be seen a pair of canals, although these cells do not have developed flagella. This shows that non-motile cells never the less possess flagella but only in the form of rudiments and not going out of the membrane of the cell.

/me A similar case was already published by/(1932) for Chlorangium stentorium, in which the cells can at any time pass into a motile state growing flagella to the full length and subsequently coming off their mucilagenous stalks. There is the possibility that in Chlorophysema adnata zoospore formation takes place exactly in this way.

Fig. 3 depicts (at lower magnification) an older colony, analagous to that just described, with cells of the second generation which have reached 10/u long and are lying in the form of two tetrads. The cells are here already distributed equally, almost in one plane in the lower part of an old membrane. Such distribution of cells has evidently caused a stretching of the whole colony in a transverse direction simultaneously with a decrease in its height. The maternal membranes of the tetrad below were seen indistinctly, possibly owing to their partial mucilaginisation in this zone.

A very characteristic form of colony is met with on Dinobryon, depicted in fig. 5, which has formed itself into twos by means of a double division. The whole colony is attached to the case of Dinobryon by the strongly enlarged base, to the inside of which by a similar method are attached the inserted membranes of the first generation. In this figure the thickness of the membranes is precisely depicted which in the other pictures have been depicted semi-diagrammatically in the form of simple lines.

ARTHRODESMUS PHIMUS VAR. ROBUSTUS, VAR. N.

(Pl. IV. Fig. 1.)

Neither the typical form nor any variety of this species has up to now been found in the USSR. The examples found in the Niva are distinguished by their large size (length along the axis of the cells 30 /u, breadth without spines 37 /u, spines 9-10 /u, isthmus about 12 /u), greater size of the spines and somewhat different shape of the semicells, which are more clearly curved than in the type (cf. Roll 1936) and somewhat more concave sides.

ARTHRODESMUS INCUS VAR. BREVISPINUS, VAR. N.

(Pl. IV, Figs. 2-3.)

It is distinguished from the typical form (Pl. IV, Fig. 8.) which was also found in the river Niva, by the much shorter spines (5-10 /u long), broader semicells (30 /u), in some specimens with the sides slightly indented and a sharp angled sinus. From Arthrodesmus incus var perforata Schmidle, which is very similar in shape, it differs in the absence of scrobiculations on the wall. Intermediate forms between the variety and type were not found. But there is the theoretical possibility that they exist in nature and in this case the variety with short spines should be considered as an extreme modification of the form.

ARTHRODESMUS INCUS FO. TRIQUETRA. FO. N.

(Pl. IV, Figs. 4-7, 9).

Arthrodesmus triangularis Lagerh. is the only species in the genus in which a tri-radiate form has been recorded (A. triangularis fo. triquetra W. et W., 1912) but I am inclined to consider the tri-radiate cells found in abundance in the Niva is a form of Arthrodesmus incus, taking into consideration the resemblance in size (bigger than A. trangularis fo triquetra namely in length 30 /u, width without spines 27 /u, isthmus 27 /u, spines up to 26 /u) and also the resemblance in the form of the semicells - with convex sides, more or less with divergent spines and rounded sinus. The wall is not scrobiculate. The apex of the semicell is flat or clearly raised but, in view of the discovery of all transitions between these extreme cases, the form of the apex loses systematic importance, at least in the given case. A connection of the variety considered with A. incus is all the more probable in that the material collected there were neither A. trangularis nor any of its varieties but instead there was obtained the typical form of A. incus (fig. 8.)

Sometimes cells with converging spines were encountered (fig. 7) - a tri-radiate analogue of A. incus var Ralfsii W. et W. Both forms I consider as extreme modifications of the typical form with diverging spines. As far as var Ralfsii is concerned this is confirmed in that I encountered examples which had one semicell with diverging and the other with converging spines as in var Ralfsii (fig.9). This last should therefore be abolished.

XANTHIDIUM ANTILOPAEUM VAR. DIMAZUM BORGE.

(Pl. IV, Fig. 10.).

This variety was met with often in the plankton of the river Niva. The specimens found were provided with two pairs of spines on the apex of the semicell, not two solitary spines as is depicted in the figures of Gronblad and Roll (1936). The spines at the base of the semicells do not lie side by side but one is higher than the other. Besides this the protuberances on the sides were elliptic and not circular and without spines in the middle. They are distributed in the middle of the semicells and not near the apex and surrounded by more numerous (10-12) scrobiculae, sometimes showing a tendency to the formation of scrobiculate areolae around the protuberances. Dimensions: length about 60-65/u, isthmus 17/u.

XANTHIDIUM ANTILOPAEUM VAR. ORNATUM ANDERSS.

(Pl. IV, Fig. 11).

I consider this variety to be valid. In the occasionally found cells the protuberances on the sides of the semicells were surrounded not by a ring of scrobiculae but by a broad, finely scrobiculate areola. Dimensions: length and breadth 65/u, isthmus 17-18/u.

STAURASTRUM CINGULUM VAR. OBESUM G.M. SMITH.

(Pl. V, Fig. 1.)

This variety was described by Smith (Smith 1922), who found it in lakes of the Muskox region (Ontario, Canada). The examples frequently encountered in the plankton of the Niva fully agreed with Smith's figures if one does not count/that the spines on the body of the semicell were distributed more regularly, the arms were not somewhat upturned (this apparently was not the rule in the individuals found by Smith), and the body of the semicell was more massive as is particularly clearly visible in the cells viewed from the poles. Owing to the absence of spines on the apices of the semicells are large triangular smooth areas. Dimensions: length along the axis of the cells about 53/u, distance between ends of the arms 95/u, isthmus 15/u. These dimensions exceed appreciably those indicated by Smith (length without arms, 36-40/u distance between ends of arms 60-68/u, isthmus 10-12/u) but it is hardly worth attaching systematic importance to this difference.

STAURASTRUM CINGULUM VAR. LATUM, VAR. N.

(Pl. VI, Fig. 6.)

The complete similarity with Staurastrum cingulum var. obesum in the ornamentation of the cell and general nature of its shape, as this latter was represented in the plankton of the Niva, allows me to attribute the form depicted in fig. 6. to this species, but in the category of a special variety. It is distinguished from var. obesum by the greater breadth of the semicells gradually passing into fairly short and almost parallel only weakly diverging arms. The apices of the semicells are somewhat protuberant and covered with little spines. Dimensions: length along the axis 50/u, breadth with arms up to 76/u, isthums 14/u.

STAURASTRUM VESTITUM VAR. SPLENDIDUM GRÖNBL.

(Pl. VII. Fig. 2-4).

This rare form was first found by Gronblad (1920) in Finland. Examples were found by me in the Niva, different from the type in the cup-shaped form of the semicells and in the more developed and plentiful ornamentation of the wall. There are about seven rows of small spines on the arms - simple on the lower surface at the base of the arms and at the ends, and passing into more powerful ones which are either excavate or are split into two on the upper side of the semicell. On the flat upper surface of the semicell around the margins are rows of 5-6 big spines divided into two; passing towards the ends of the arms into smaller ones divided into two, then into excavate ones and finally simple spines. Dimensions: length about 40/u, breadth 30/u, distance between apices diagonally opposite arms about 100/u, isthmus 15/u.

STAURASTRUM VESTITUM VAR. ABUNDANS, VAR N.

(Pl. VI. Fig. 7.)

Cells are tri-radiate with 5-6 short, apically toothed arms, with a convex lower margin, slightly convex upper surface as in the type. Sides of the semicells with two (instead of one) pairs of excavate spines at the end or twice divided ones, disposed one above the other. One of the spines of the lower pairs sometimes absent. Central spines on the upper surface divided twice. Spines on the lower side of the arms often twice divided or excavate. Base of the semicells with a ring of little spines. Dimensions: length 50/u, distance between the apices of the arms about 60/u, isthmus 14.5 - 15/u.

STAURASTRUM PSEUDOPELAGICUM VAR. ORNATUM, VAR. N.

(Pl. V. Fig. 2-6.)

I diagnosed the form in fig. 6 as Staurastrum pseudopelagicum W. & W. The presence of three spines on the ends of the arms instead of the typical two, mentioned in the monograph of the Wests was seen also in the examples from the Niva, one semicell of which sometimes had two and the other three arms. Together with these, and even more frequently, were found examples with three pairs of spines on the upper surface, disposed fairly truly hexagonally, I consider them as a special variety - var. ornatum. The spines were strongly variable in their dimensions, in some cases rudimentary (fig. 4), in others powerfully developed and even split into two (fig.2.). The arms of such cells ended in two, three or even a greater number of long spines (fig.3). Transitions in the dimensions of the spines of the upper surface unite such forms with the typical Staurastrum pseudopelagicum and the expediency of their isolation in the form of special variety may be subject to doubt. If this is inexpedient then one should add to the species a large variability in the ornamentation of the cells.

STAURASTRUM MEGACANTUM VAR. SCOTICUM W ET W.

(Pl. VI, Figs. 1-4.)

I share the opinion of N. Carter (West and West , British Desmidiaceae Vol. V.) that "this species very much resembles St. curvatum West and could be a form of this last and not a variety of St. megacanthum." The form found in the Niva and defined as St. megacanthum var scoticum with no less foundation could be placed in S. curvatum, so far as it occupies an intermediate place between them in regard to dimensions and the shape of the cells It was present as tri-radiate, tetra-radiate and mixed individuals with opposing or alternating arms. Three angled
/long cells were about 35/u/ 35/u wide (without the spines), distance between the apices of the spines about 60/u, spines 13-18/u, isthmus 9-10/u. These dimensions are near those of S. curvatum, except the isthmus but the side view of the semicell is more reminiscent of var. scoticum, with

the sole distinction bur the latter has flat apices or slightly concave ones, whereas in my case they were flat or often convex, especially in tetraradiate individuals with an almost spherical body to the semicells (fig. 1.). In general my form has a mixture of the characters of S. curvatum and S. megacantum var. scoticum which can scarcely be retained in the character of separate systematic units.

STAURASTRUM DEJECTUM VAR. INFLATUM WEST (?)

(Pl. IV, Fig. 12).

I didn't succeed in defining the form depicted in fig 12 exactly. It shows the greatest resemblance to S. dejectum var inflatum West.

STAURASTRUM MUCRONATUM VAR. SUBTRIANGULARE W. ET W.

(Pl. VI, Fig. 8).

With some reserve I placed the form depicted in fig. 8 as S. mucronatum var. subtriangulare W and W to which it comes near in the form and dimensions (length 35 /u, breadth with spines 40/u, length of the spines 9-10 /u, isthmus 10 /u). The semicells, however, not distinctly triangular as in the figures of the Wests (Pl. 130, fig. 13, 14), show a transition to the elliptical semicellsof the type. It was impossible to carry out a more definite comparison as only one cell was obtained and the variability is unknown.

STAURASTRUM BOREALE W. ET W. VAR. QUADRIRADIATUM VAR. N.

(Pl. VII, Figs. 5-7).

I give here a picture of a form (fig 6.) which I define as S. boreale W. and W. which it resembles in the form and ornamentation of the wall. The dimensions are somewhat bigger than recorded by the Wests, length upto 32/u, breadth, including arms, to 40/u, isthmus about 11 /u. Individuals were encountered with an interrupted ring of spines at the base of the semicell (fig.5). Besides this there were obtained sometimes tetraradiate cells (fig.7) which I am inclined to attribute to the given species in the form of an independant variety. Besides the number of arms, which is not so important this variety differs from the type in the larger dimensions (length 40/u), breadth with arms, on the diagonal, 50/u, without arms 25/u, isthmus 12/u), more developed bases to the semicells, raised apex and more developed ornamentation of the wall. Examining the cells from the polar view there are double rows of excavate or twice divided teeth around each side; such teeth are situated near to the base of the semicells. The ends of the arms are provided with five short spines.

MALLOMONAS PUNCTIFERA, SP.N.

(Pl. VII, Figs. 8-9).

Cell from the rear rounded, from the front conically narrowed, with a crown of small divergent spines. The envelope consists of coarse trapezoid or oval scales disposed loosely in 6-8 transverse rows in which in the middle ones are seen 3-4 scales on one side of the cell. The narrowed end of each scale is covered by the broad end of the neighbouring one which is provided with a short outgrowth under which can be located the bent base of a needle. The free upper surface of the scale, excluding the terminal part, is covered with dots (scrobiculae ?) distributed in rows. The anterior conical end of the cell is covered with several (about 5) triangular scales distributed close to one another, each ending with a straight, lateral spine. The bristles are about equal in length to the cell, smooth, not numerous, present only on the rear half of the cell although, essentially, each scale would be provided with a bristle. Dimensions: length 20-30/u, breadth 12-14/u, bristles about 35/u. Structure of the protoplast and cysts unknown.

Found, apart from the river Niva, also in the Gorky region (river Serezha in the environs of the biological station of the Gorky University), in various places near Kharkov. It has some slight resemblance to M. coronata Bolochonzew.

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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.