NEW SPECIES AND VARIETIES OF WISCONSIN ALGAE

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The history of glaciation in central North America, together with other geological and geographical factors, has been such that Wisconsin is richly endowed with a great variety of lakes, ponds, and drainage systems. A considerable number of lakes, especially in the northern uplands of the state, are land-locked, while many others are the flowage or drainage type. The countless bodies of water, so characteristic of the north central states, exhibit marked differences in their chemical and physical properties. These dissimilarities together with certain hydrographical features make possible a varied and abundant algal flora in Wisconsin which has become well known through the published reports of G. M. Smith (1916, 1918, 1920, 1924).

For more than three decades E. A. Birge and C. Juday, together with their co-workers have carried on limnological studies of the inland lakes of Wisconsin. It is in relation to their work that Smith (1920–1924) undertook his survey of the plankton algae, making rather exhaustive studies of the flora, especially from the lakes in which Birge and Juday had been conducting their investigations. Professor Juday, Director of the Trout Lake Limnological Laboratory, invited the author to extend the survey of Wisconsin algae from both taxonomic and ecological viewpoints. Consequently, special attention has been directed toward the attached or littoral algae. Collections and field work were carried on during three summers, mostly in the northeastern and northwestern lakes regions. A full report on this survey, which will also include the algae previously reported from the state, is forthcoming.

Many forms which appeared in the author’s collections and in others loaned to him, are new records for North America. The following thirty species and varieties apparently are novelties. The desmids were collected and identified but because they are so numerous, descriptions of them are deferred for a subsequent report. The diatoms are being studied by Mr. Paul Conger of the Carnegie Institution, Washington, D. C. All the other algal groups were considered, however, and they are represented in the state by approximately 1,025 species and varieties, exclusive of the desmids.

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PHYLUM CHLOROPHYTA
A. Chlorophyceae

Chlamydomonadaceae

Chlamydomonas polypyrnoideum, sp. nov.

PL. 1, FIG. 1-2.

Cellulae ovoideae vel ellipsoideae, carentes papilla apicali et vagina gelatinosa; chloroplaste calyce denso parietali cum incisione alta in medio; pyrenoidibus multis (12–16), sparsis; macula oculari non observata; cellulis 8–10 μ lat., 9–12 μ long.

Cells ovoid to ellipsoid, without an apical papilla; gelatinous sheath lacking; chloroplast a dense parietal cup with a deep median invagination; pyrenoids many (12–16), scattered; pigment spot not observed; cells 8–10 μ in diameter, 9–12 μ long.

Rare in the plankton of Weber Lake, Vilas County.

The differentiating character of this species is the large number of pyrenoids. Some other Chlamydomonas species have several such organs but the form of the chloroplast, the shape of the cell and other morphological differences prevent the Wisconsin form from being assigned to them.

Tetrasporaceae

Tetraspora lamellosa, sp. nov.

PL. 1, FIG. 3.

Thallus irregulariter lobatus et bullatus; libere natans; cellulis sphaericis, in paribus dispositis, cum membranis crassis et vaginis lamellatis gelatinosisque, distinctis et non confluentibus in gluten colonicum; pseudociliis delicatissimis, 20–30-plo diametro cellulae longioribus; chloroplaste lamina dense parietali paene totum membranum tegente, cum una pyrenoide; cellulis 9–10.5 μ lat.

Thallus irregularly lobed and saccate; free-floating; cells spherical, in twos, with thick walls and gelatinous lamellate sheaths, distinct and not confluent with the colonial mucilage; pseudocilia very fine, 20–30 times the diameter of the cell in length; chloroplast a dense parietal plate covering almost the entire cell wall, with 1 pyrenoid; cells 9–10.5 μ in diameter.

The species differs from others by the possession of distinct lamellated cell sheaths and the extraordinarily long pseudocilia. In the former character it resembles some species of Gloeocystis.

Schizochlamys compacta sp. nov.

PL. 1, FIG. 4–6.

Massa plantae microscopica, cum glutine solido, homogeneo et claro tegumento limitato; cellulis globosis cum apice conspicuo glutinis in uno latere locato, dividente fissura membrani quae unum fragmentum, rare 2, relinquit; apice glutinis persistente in antiquo membrano matris, cellulis filialibus habentibus singulos apices glutinis plerumque contingentes; una chloroplaste parietali cum pyrenoide; cellulis 7.4–11 μ lat.

Plant mass microscopic, mucilage firm, homogeneous and bounded by a definite tegument; cells globose with a conspicuous cap of gelatine at
one side, dividing by a splitting of the cell wall leaving one fragment (rarely two); the mucilage cap persisting on the old mother cell wall, daughter cells with respective caps of mucilage usually in contact; one parietal chloroplast with a pyrenoid; cells 7.4–11 μ in diameter.

Rare in a small pool within a Sphagnum bog near Manitowish River fish hatchery, Vilas County.

This plant should be compared with *S. delicatula* West which forms but a single fragment of the cell wall upon liberation of daughter cells. It differs in the definiteness of shape of the mucilage, in the larger cells, and in the mucilage cap on the cell wall which seems to be a constant character.

**Ulotrichaceae**

**Ulothrix cylindricum** sp. nov.

PL. 1, FIG. 7.

Fila longa, curva, et leviter implicata; cellulis elongato-cylindricis, 11–12.5 μ lat., 2 1/4–3-plo longioribus diametro, membranam parallelis et nullas constrictiones membranis transversis habentibus; chloroplaste fascia lata, paene pari longitudine cellulae et plicata ad mensuram 3/4 peripheriae parietalis; pyrenoidibus 2–5.

Filaments long, curved, and slightly entangled; cells elongate-cylindric, 11–12.5 μ in diameter, 2 1/4–3 times as long as wide, the walls parallel and without constrictions at the cross walls; chloroplast a broad band, nearly equal to the cell in length and folded about 3/4 of the wall circumference; pyrenoids 2–5.

In the plankton of Cecelia Lake, Vilas County.

This species should be compared with *U. aequalis* Kuetz. which has thick walls, shorter cells, fewer pyrenoids and a different form of chloroplast. Many species of this genus have been described and there is a great confusion in the synonymy. It is highly possible that the Wisconsin plants agree with some previously described varieties of known species. The proportions of the cell, the form of the chloroplast and the number of pyrenoids seem to separate our plants from described species as far as determined by available herbarium material.

**Geminella crenulatocollis** sp. nov.

PL. 1, FIG. 8.

Planta filum uniseriatum cellularum irregulariter ovoidarum, subquadratarum, vel oblongarum cum membranis lateribus emarginatis, crenulatis, aut undatis, truncatis aut late polis rotundatis, cum rugis et iugis interdum in membranis lateribus visis; cellulis inclusis in vagina lata gelatinosa, in paribus linearibus, sed saepe aequaliter locatis; chloroplaste lamina parietali irregulariter formata et plicata, quae paene totum cylindricum in membrano fingit, saepe monstrante iugum aut labrum alatum radialiter ad membranum extendens; pyrenoide una, in centro locata; cellulis 12–15 μ lat., 18–24 μ long.

Plant a uniseriate filament of irregularly ovoid, subquadrate or oblong cells with emarginate, crenulate, or wavy lateral walls, truncate or broadly rounded at the poles, with folds and ridges sometimes present in the lateral walls; cells inclosed in a broad gelatinous sheath, in linear pairs, but
often evenly spaced; chloroplast an irregularly shaped, folded parietal plate which almost makes a complete cylinder within the wall, often showing a ridge or wing-like flange extending radially toward the wall; pyrenoid single, centrally located; cells 12–15 μ in diameter, 18–24 μ long.

In an acid swamp near Woodruff, Oneida County.

This species should be compared with G. mutabilis (de Bréb.) Wille from which it differs in the irregularly creased cell wall and the shape of the chloroplast. The determination of this plant has been confirmed by observation made on specimens discovered in collections from Cheboygan County, Michigan.

Hormidiopsis ellipsoideum sp. nov.

PL. 1, FIG. 9–10.

Cellulae transversim ellipticae, collocatae in seriebus linearibus in globis 4 cellulas continentes, quoque globo incluso vagina gelatinosa lata, hyalina homogeneaque; chloroplaste fascia parietali latitudine pari longitudine cellulae sed totum membranum non cingente, cum una pyrenoide; cellulis 8 μ lat., 5.5 μ long.; filo 14.8 μ lat.

Cells transversely elliptic, arranged in linear series in groups of four, each group inclosed by a wide, hyaline and homogeneous gelatinous sheath; chloroplast a parietal band as wide as the length of the cell but not entirely encircling the wall, with 1 pyrenoid; cells 8 μ in diameter, 5.5 μ long; filament 14.8 μ wide.

In a Sphagnum bog lake near Long Lake, Vilas County.

This plant appeared in but one collection. It is so distinctive that it seems worthy of description, however. Hormidiopsis is a little understood genus containing, apparently, but one other species, H. crenulata Heering. To this genus Heering has also questionably assigned a plant previously described by Borge as Ulothrix moniliformis. Our plant has the cell shape and approximate size of the latter, but differs in the arrangement of the cells. In U. moniliformis the cells have a continuous filamentous arrangement, inclosed by a sheath. All of the Wisconsin specimens had the cells arranged in crooked filaments in linear groups of four, each group with an individual sheath. Also in our specimens the chloroplast contained a pyrenoid, a character which is typical for the genus as described by Heering. This does not preclude our plants from the genus Hormidiopsis since it is one in which members of the Ulotrichaceae show considerable variation.

CHAETOPHORACEAE

Stigeoclonium pachydermum sp. nov.

PL. 2, FIG. 1–3.

Planta filum rectum ramosissimumque ex multis ramis rhizoidalibus deorsum eminentibus; ramis irregulariter dispositis et plurimum forma distantis, plurumque alternis, sed cum uno ramo surgente protinus super alterum in latere adverso fili aut in plano rectis angulis posito, saepe evolvente ex cellulis brevibus et ligneo vaso similibus; multis ramis spinosis et deorsum irregulariter eminensibus evolventibus ex parte superiore axis principalis, qui ram in acuminata obtusa fastigantur et saepe...
Plant an erect, much branched filament from numerous, downward projecting rhizoidal branches; branches irregularly disposed and extremely varied in form, mostly alternate, but with one branch arising immediately above another on the opposite side of the filament or in a plane at right angles to it, often developing from short, barrel-shaped cells; many thorn-like and irregular downward projecting branches developing from the upper part of the main axis, branches tapering to blunt points; frequently ending in somewhat enlarged, quadrangular-globose sporangial cells which may be intercalary near the ends of short branches also; cells in the main axis 19.5–21 μ wide, in the branches 15–16 μ wide, cylindrical and up to 20 times longer than wide, or short and barrel-shaped in the same filament; the wall of the cells in the main axis 3–4 μ thick.

In the shallow water of High Lake, Vilas County.

The chief characteristics of this plant are the irregularly arranged and crooked branches and the thick cell walls. In its coarse habit it resembles *S. lubricum* which is, however, a species with opposite branching. Rhizoidal types of branches appear both near the base of the plant and toward the apices of the main axes.

**Draparnaldia Judayi** sp. nov.

Planta mollissimo aquosoque glutine investita; axe principali composito ex cellulis gracilibus, paulo inflatis aut cylindricis cum constrictionibus in membrana transverso locatis; ramis secundariis lateralibus absentibus; fasciculis parvorum ramorum adversis aut tortis, surgentibus angulis rectis ex regione media cellularum axis, fasciculis paulum ramosis et cum rachide viso tantum in maioribus et bene formatis; fasciculis saepe simplicibus aut si ramosis habentibus ramulos unae aut duarum cellularum, apicibus plurimorum ramulorum finientibus in setis validis rectisque quae saepe bulbosae in basi sunt, nonnumquam surgunt ex latere aut dichotomae divise sunt; chloroplaste fascia maiorem partem membrand in cellulis ramulorum angusta in cellulis axis principalis quae sunt tegente; 12–15.2 μ lat., 30–40 μ long.

Entangled about overhanging grass in a *Sphagnum* bog pool near Rhinelander, Oneida County.

One of the most distinctive characteristics of this species is the whorled arrangement of the very simple and much reduced fascicles of branches, arising, as they do, from the midregion rather than from the joint of the main axial cell. The position of the branchlet origin is remindful of *Draparnaldiopsis alpinis* Smith and Klyver. In that species, however, the stalked fascicles arise from short, differentiated cells in the main filament. Another peculiarity is the form and location of the setae. These may be terminal, one or two arising from a non-tapering apical cell, or lateral, in which case they take the place of a dichotomous branch. The setae are similar in morphology to those of *Chaetonema*. 
OEDOGONIACEAE

Oedogonium crenulatocostatum var. cylindricum fa. major fa. nov.

Forma maior quam ordinaria; cellulis vegetativis 25.9 μ lat., 88.8 μ long.; oogoniis 1–3, obovooideo-ellipsoides aut cylindrico-oblongis, aperientibus poro superiore, 42.5–44 μ lat., 63–74 μ long.; oospora ovoideo-ellipsoidea, membrano crasso, strato medio cum circa 16 costis in longitudinem positis quae satis leves, non crenulatae sunt, 37–39 μ lat., 55.5–57 μ long.

A form larger than the typical; vegetative cells 25.9 μ in diameter, 88.8 μ long; oogonia 1–3, obovoid-ellipsoid or cylindric-oblong, opening by a superior pore, 42.5–44 μ in diameter, 63–74 μ long; oospore ovoid-ellipsoid, wall thick, middle layer with about 16 longitudinal ribs which are quite smooth (not crenulate), 37–39 μ in diameter, 55.5–57 μ long.

Floating in the back water of Lost Canoe Lake, Vilas County.

Our specimens are stouter and somewhat larger throughout than the typical variety.

Oedogonium Kjellmanii var. granulosa var. nov.


Vegetative cells cylindrical, 19.5–23.4 μ in diameter, 109–117 μ long, oogonium solitary, ellipsoid, opening by a superior pore, 53–55 μ in diameter, 97–102 μ long; oospore ellipsoid, not filling the oogonium, wall of three layers, the outer smooth, the middle layer with about 22 longitudinal ribs which are crenulate and granular, frequently interrupted, but not anastomosing, 50.7–53 μ in diameter, 74–76 μ long.

Attached to old wood in a roadside tarn near Boulder Junction, Vilas County.

This plant should be compared with Oe. margaritiferum Hirn which has similarly marked oospore walls in both the outer and middle layers. The variety differs from the typical form of Oe. Kjellmanii in its larger size and in the different marking of the spore wall.

Oedogonium oviforme var. gracile fa. nov.

Forma cum cellulis vegetativis gracilioribus et oogoniis minoribus quam in planta ordinaria; cellulis vegetativis 7.6–9.2 μ lat., 103.6–125 μ long.; oogonio solitario, ellipsoideo-ovoideo, 44.4–46 μ lat., 51.8–53 μ long.; oospora ellipsoidea, paene oogonium replente, membrano levi, 40.7 μ lat., 49.9 μ long.; cellulis antheridialibus 9.2 μ lat., 11.1 μ long.; spermatibus duobus, cum divisione horizontali.

A form with more slender vegetative cells and smaller oogonia than the typical plant; vegetative cells 7.6–9.2 μ in diameter, 103.6–125 μ long; oogonium solitary, ellipsoid-ovoid, 44.4–46 μ in diameter, 51.8–53 μ long; oospore ellipsoid, nearly filling the oogonium, wall smooth,
40.7 µ in diameter, 49.9 µ long; antheridial cells 9.2 µ in diameter, 11.1 µ long; sperms 2, division horizontal.

Attached to submerged aquatics in a slough cut off from Lost Canoe Lake, Vilas County.

**Oedogonium Smithii sp. nov.**

Macrandrous; dioecious (?); vegetative cells cylindrical or irregularly inflated, 3.7-8 µ in diameter, 13-25 µ long; oogonium solitary, broadly pyriform-fusiform with a secondary lateral inflation in the upper portion, operculate, division median, wide, 22-25 µ in diameter, 27-32 µ long; oospore depressed-globose, nearly filling the oogonium laterally, wall smooth, 16-18 µ in diameter, 12.9-14 µ long; antheridium (?).

Rare in a roadside pond near Genoa City, Washburn County. This plant is named for Dr. Gilbert M. Smith.

This species should be compared with *Oe. inconspicuum* Hirn. It is distinguished by the pyriform oogonium with its lateral inflations.

**Oedogonium microgonium sp. nov.**

Macrandrous; dioecious (?); vegetative cells distinctly capitellate, 8-9.5 µ in diameter, 18-33 µ long; basal cell elongate, 16-18.5 µ long; oogonium solitary (rarely two together), but very little wider than the vegetative cells, globose or depressed-globose, operculate, division superior, 11-12.9 µ in diameter, 10-11.2 µ long; oospore globose, filling the oogonium, the wall smooth, 11-12 µ in diameter; antheridial cells not observed.

In several soft water lakes and acid swamps, Vilas County.

This species should be compared with *Oe. Howei* Tiffany which is larger and which has an inferior division of the oogonium. Although many individuals were examined antheridia were not found.

**Oedogonium spheroideum sp. nov.**

Macrandrous; monoecious; vegetative cells longis ac cylindricis, 16-19 µ lat., 115-155 µ long.; oogonio solitario, late ellipsoido-subglobose, operculato, cum divisione superiore, 55-64 µ lat., 80-87.5 µ long.; oospora spheroidi, membrano crasso, membrano exteriore cum 12-15 costis in longitudinem positis, 57-60 µ lat., 57-60 µ long.; cellula antheridialis 1-4, protinus infra oogonia locatis, aut sparais, spermatibus 2, cum divisione horizontali, 19-21 µ lat., 16 µ long.
Macrandrous; monoecious; vegetative cells long and cylindrical 16–19 μ in diameter, 115–155 μ long; oogonium solitary, broadly ellipsoid to subglobose, operculate, division superior, 55–64 μ in diameter, 80–87.5 μ long; oospore spheroidal, the wall thick, outer membrane with 12–15 longitudinal ribs, 57–60 μ in diameter, 57–60 μ long; antheridial cells 1–4, immediately below the oogonium, or scattered, sperms two, the division horizontal, 19–21 μ in diameter, 16 μ long.

Attached to grass in a roadside swamp near Fishtrap Lake, Vilas County.

This species should be compared with Oe. sol Hirn which is smaller and has an oospore with the middle rather than the outer layer of the wall ribbed.

**Oedogonium Sawyeri** sp. nov.

Nanandrosum; gynandrosporosum; cellulis vegetativis cylindricis, validis, 30–33.3 μ lat., 66.6–81 μ long.; oogonio solitario, paene globoso, 63–66.6 μ lat., 55–60 μ long., aperiente poro superiore; cellula suffultoria inflata; oospora globosa, membrano exteriore cum claro iugo spirali, continuo a polo ad polum, axe sporae converso in angulo c. 30 graduum an axe oogonii in longitudine viso, 50–55 μ lat. (iugo inclusu); plantis masculinis in cellula suffultoria locatus; cellulis antheridialibus 8–10 μ lat.; androsporangis 25.9 μ lat., 14–18 μ long.

Nanandrosum; gynandrosporous; vegetative cells cylindrical, stout, 30–33.3 μ in diameter, 66.6–81 μ long; oogonium solitary, nearly globose, 63–66.6 μ in diameter, 55–60 μ long, opening by a superior pore; suffultory cell swollen; oospora globosa, outer membrane with a prominent spiral ridge, continuous from pole to pole, the axis of the spore turned at an angle of about 30 degrees from the longitudinal axis of the oogonium, 50–55 μ in diameter (including ridge); male plants on the suffultory cell; antheridial cells 8–10 μ in diameter; androsporangia 25.9 μ in diameter, 14.8 μ long.

In a cut-off from Lost Canoe Lake, Vilas County. This plant is named for Mr. Webster Sawyer.

*Oe. Sawyeri* should be compared with the smaller idioandrosporous *Oe. latviense* (Tiff.) Tiffany and *Oe. spiripennatum* Jao. The latter has a median rather than a superior pore.

**Oedogonium sinuatum** fa. seriatum fa. nov.

Cellulae vegetativae undulatae et capitellatae, cum 4 undulationibus in medio, 22–25 μ lat., 48–59.2–(140) μ long.; oogonis 5 in seriebus, globosis, operculatis, cum divisione inferiore, 62–67 μ lat., 62–72 μ long.; oospora globosa, oogonium non replente, membrano levi, 55.5 μ lat.; plantis masculinis psilis paene semper condensis in cellula suffultoria; cellulis antheridialibus exterioribus (?), 10.9 μ lat.

Vegetative cells undulate and capitellate, with 4 median undulations, 22–25 μ in diameter, 48–59.2–(140) μ long; oogonia five in series, globose, operculate, division inferior, 62–67 μ in diameter, 62–72 μ long; oospore globose, not filling the oogonium, wall smooth, 55.5 μ in diameter; dwarf male plants usually crowded on the suffultory cell; antheridial cells exterior (?), 10.9 μ in diameter.
Attached to overhanging grass in a Sphagnum bog ditch near highway between Woodruff and Rhinelander, Oneida County.

This plant should be compared with *Oe. undulatum* (Bréb.) A. Braun with which it has some features in common. The chief characteristic of the Wisconsin plants is the decidedly seriate arrangement of the oogonia.

**Oedogonium Kozminskii** sp. nov.

PL. 5, FIG. 11.

Nanandrous; idioandrosporous; cellulis vegetativis cylindricis vel paulo capitellatis, 14–15.6 μ lat., 50–60 μ long.; oogonio solitario, globose, operculato, cum divisione supramediana, 46–50.7 μ lat., 46–53.7 μ long.; oospora globosa vel depresso-globosa membrano levi, 43.9–45 μ lat., 39–42 μ long.; cellula suffultoria haud dilatata vel paululo; plantis masculinis pusillis unicellularibus in oogonio locatis, 11.7 μ lat., 13–14 μ long.

Nanandrous; idioandrosporous; vegetative cells cylindrical to slightly capitellate, 14–15.6 μ in diameter, 50–60 μ long; oogonium solitary, globose, operculate, division supramedian, 46–50.7 μ in diameter, 46–53.7 μ long; oospore globose or depressed-globose, wall smooth, 43.9–45 μ in diameter, 39–42 μ long; suffultory cell not or scarcely enlarged; dwarf male plants unicellular, on the oogonium, 11.7 μ in diameter, 13–14 μ long.

Attached to grass in a bog near Arbor Vitae Lake, Vilas County. This plant is named for Dr. Zygmunt Kozminski.

This species is quite unlike any other in the genus. The shape and markings of the oospore together with the operculate oogonium and the numerous two-celled male plants, form a combination of characteristics which makes this species unique.

**Oedogonium oelandicum** var. **contortum** var. nov.

PL. 5, FIG. 13–14.


A variety differing from the typical form by its contorted filaments which sometimes form short spirals, several of which may occur in one filament; vegetative cells 11–12 μ in diameter, distinctly capitulate; oogonium much shorter than wide, depressed-globose, 29–30 μ in diameter, 20–21.5 μ long; oospore depressed-globose, the wall smooth, 25–27 μ in diameter, 18–20 μ long; dwarf male plants unicellular, on the oogonium.

Attached to grass in a small lake near Barber Lake, Sawyer County.

**Oedogonium polyandrium** sp. nov.

PL. 5, FIG. 12.

Nanandrosum; idioandrosporum (?); cellulis vegetativis paulo capitellatis, 4–5.4 μ lat., 14–30 μ long.; oogonio solitario, ovoidal vel late ellipsoideo, operculato, cum apertura superiore, 17–19 μ lat., 27–29 μ long.; oospora ovoidal, oogonium paene replente, membrano exteriore sporae cum acrobiculatiobus crassis sparsisque vel cum puteis brevibus, stratis medio et interiore membrani sporae levibus, 15–17 μ.
lat., 22-25 μ long.; plantis masculinis pusillus bicellularibus, numerosis, in oogonio locatis, stipe 4.5 μ lat., 14-16 μ long.; cellula antheridiali exteriore (?)

Nanandrous; idioandrosorous (?) ; vegetative cells slightly capitellate, 4–5.4 μ in diameter, 14–30 μ long; oogonium solitary, ovoid or broadly ellipsoid, operculate, opening superior, 17–19 μ in diameter, 27–29 μ long; oospore ovoid, nearly filling the oogonium; outer spore wall with coarse, sparsely arranged scrobiculations or shallow pits, middle and inner layers of the spore wall smooth, 15–17 μ in diameter, 22–25 μ long; dwarf male plants two-celled, numerous, on the oogonium, stipe 4.5 μ in diameter, 14–16 μ long; antheridial cell exterior.

Attached to grass in a bog near Arbor Vitae Lake, Vilas County.

This species is quite unlike any other in the genus. The shape and markings of the oospore, together with the operculate oogonium and the numerous two-celled male plants form a combination of characteristics which makes this species unique.

HYDRODICTYACEAE

Pediastrum biradiatum var. emarginatum fa. convexum fa. nov.

PL. 2, FIG. 6.

Colonia perforata (clathrata), cellulis bilobatis in peripheria, lobis bifurcatis, margine interiore lobularum convexo; cellulis peripherici adiuncti tantum in parte inferiore marginum lateralium, lobis cellularum interiorum solummodo emarginatis; cellulis 11.7 μ lat., 9.7–10 μ long.; colonia 16 cellularum 44–50 μ lat.

Colony perforate (clathrate), cells bilobed at the periphery, the lobes bifurcate, the inner margin of the lobules convex; peripheral cells adjoined along the lower part of their lateral margins only, lobes of inner cells merely emarginate; cells 11.7 μ in diameter, 9.7–10 μ long; 16-celled colony 44–50 μ wide.

Rare in a Sphagnum bog near Woodruff, Oneida County.

Pediastrum muticum var. crenulatum var. nov.

PL. 2, FIG. 7.


A variety differing from the typical form by having crenulate or irregularly wavy walls on both the adjoining and outer free surfaces; colony large, as many as 134 cells (34–31–27–21–15–6); cells 18–24.5 μ in diameter, colony 167 μ wide, 340 μ long.

Rare in the plankton of Lost Canoe Lake, Vilas County.

Pediastrum quadricornutum sp. nov.

PL. 1, FIG. 11.

Colonia paene integra, cum parvissimis intersticiibus formatis ex marginibus retusis nonnullarum cellularum; colonia oblonga, rare subcirculi (7–1) (16–11–5) (16–9–7), composita ex 8–32 cellulis alte bilobatis quae habent sinum altum angustumque formatem duas lobas maioribus ita incisas ut fingant lobulas obtuse rotundatas, duae centrales quarum omnino aut paene coniunctae sunt, sic sinum extrinsecus claudentes,
duae lobulae laterales quarum tangunt lobulas laterales cellularum contiguarum; cellulis interioribus paene eiusdem formae quam cellulae peripheriae sed cum lobulis minus prominentibus et nonnumquam absentibus, cum membrano tantummodo emarginato aut paene recto; cellulis 10.5–18 μ lat.; colonia 8 cellularum 154 μ lat.

Colony nearly entire, with minute interstices formed by the retuse margins of some cells; colony oblong, rarely subcircular (7–1) (16–11–5) (16–9–7), composed of 8–32 deeply bilobed cells which have a deep, narrow sinus forming two major lobes, the lobes incised to form bluntly-rounded lobules, the two central lobules in contact or nearly so, thus closing the sinus outwardly, the two lateral lobules in contact with the lateral lobules of the adjoining cells; interior cells about the same shape as the peripheral cells but with the lobules not so prominent, sometimes wanting, with the wall merely emarginate or nearly straight; cells 10.5–18 μ in diameter; eight-celled colony 154 μ wide.

Plankton in Beaver Lake and Trostel Lake, Vilas County.

According to Bigeard (1936) such a form as this would be included in *P. tetrads* (Ehr.) Ralfs, a species which has many variations. The distinctive shape of the peripheral cells, and the narrow, closed sinus are constant characters and justify separating the Wisconsin plants from that species.

**Oocystaceae**

**Oocystis pyriformis** sp. nov.  
PL. 1, FIG. 12–13.

Cellulae late pyriformi-ovoideae, cum apiculatione conspicua uno polo, altero late rotundato; consociatae in familiis duarum vel quattuor cellularum; chloroplaste solida et parietali cum una pyrenoide; cellulis 14–16 μ lat., 16–19 μ long.; colonia 4 cellularum 36 μ lat., 48.8 μ long.

Cells broadly pyriform-ovoid, with a prominent apiculation at one pole, the other end broadly rounded; united in families of 2–4; chloroplast massive and parietal with one pyrenoid; cells 14–16 μ in diameter, 16–19 μ long; colony of four cells 36 μ in diameter, 48.8 μ long.

Plankton in cedar swamp near Antigo, Langlade County.

This species should be compared with *O. apiculata* W. West, a much smaller plant with broadly elliptic cells. The pyriform shape of the Wisconsin plants is the chief differentiating characteristic.

**Tetraëdrum asymmetricum** sp. nov.  
PL. 1, FIG. 14.

Cellula forma quadrangulata, incisa sine symmetria ita ut formet duas lobas maiiores quae isthnum sinu late aperto praetectum habent; duae lobae maiores paulum bilo-batae, lobulis 2–3 spinis brevibus praefixis; cellulae 10–18 μ in mensura longissima.

Cell quadragangular in outline, unsymmetrically incised to form two major lobes with an isthmus bordered by a widely open sinus, the two major lobes slightly bilobed, the lobules tipped with 2–3 short spines; cells 10–18 μ in their longest dimension.

Plankton in Big Clam Lake, Burnett County.
This species should be compared with *T. irregulare* (Reinsch) de Toni which it more nearly resembles than any other.

**Tetraëdron bifurcatum** var. *minor* var. nov.

PL. 1, FIG. 15.

Forma ab ordinaria differens in mensura minore et quod lobas bifurcatas habet, cum lobulis firmioribus et brevi spina praefixis; cellulae 22.5 μ in diametro maximo.

A form differing from the typical by its smaller size and in having the lobes bifurcated, the lobules rather stout and tipped with a short spine; cells 22.5 μ in their maximum diameter.

Plankton in Okauchee Lake, Waukesha County.

**Tetraëdron cruciatum** var. *reductum* var. nov.

PL. 1, FIG. 16.

Cellula plana, irregulariter cruciformis vel nonnumquam trilobata, lobis bifurcatus, lobulis brevi spina praefixis; margines cellulae in duobus lateribus oppositibus concavi, in alteris lateribus recti aut tantum paululum concavi; cellulae 28–30 μ lat., etiam 54 μ in mensura longissima.

Cell flat, irregularly cruciform or sometimes three-lobed, the lobes bifurcate, the lobules tipped with a short spine; margins of the cell concave on two opposite sides, straight or only slightly concave on the other sides; cells 28–30 μ in diameter, up to 54 μ in the greatest dimension.

Plankton in Lost Canoe Lake and in Manitowish River, Vilas County.

This form differs from the typical in its broad, bilobed processes and in having the lateral walls much less concave or emarginate. It differs from var. *polyfurcatum* G. M. Smith in the form and number of processes.

**Tetraëdron enorme** var. *pentaëdricum* var. nov.

PL. 1, FIG. 17.

Cellulae forma quinquelaterali, lateribus rectis vel paulo convexis, paribus processuum angustorum bifurcatorumque in omnibus planis extendentibus et brevibus spinis praefixis; cellulae 50–55 μ lat., processibus non inclusis.

Cells five-sided in outline, the sides straight or slightly convex, with pairs of narrow, bifurcated processes extending in all planes, the processes tipped with short spines; cells 50–55 μ in diameter without processes.

Rare in the plankton of Sweeney Lake, Vilas County.

This form differs from the typical plant in its straight margins and narrow, bifurcated processes extending from the angles. It is similar to Borge's figure of *T. enorme* (Ralfs) Hansgirg, which we judge to be atypical of that species.

**Tetraëdron limneticum** var. *gracile* var. nov.

PL. 1, FIG. 18.

Cellulae pyramidatae vel tetragonales, angulis in processus bifurcatos extentis qui 2–3 spinis firmis praefixi sunt; margines cellulae concavi inter processus; bases processuum contiguae ita ut corpus cellulae vix visible sit; cellulae 40–46.8 μ lat., processus 6–8 μ lat.
Cells pyramidal, or tetragonal, the angles extended into bifurcate processes which are tipped with 2–3 stout spines, the margins of the cell concave between the processes; bases of the processes adjoining so that there is scarcely a cell body; cells 40–46.8 μ in diameter; processes 6–8 μ wide.

Plankton in Elcho Lake, Langlade County.

The processes of this form are so narrow and the cell body so greatly reduced that it approaches the genus Treubaria.

Tetraëdron lobulatum var. crassum var. nov.

PL. 2, FIG. 8.

Cellulae pyramidatae, tetragonales, angulis leviter productis ita ut forment processes comparate latos fortesque qui bilobati sunt, lobulis bifurcati et in acuminibus brevibus, curvis, spinosisque finitis; cellulae 25–30 μ lat.

Cells pyramidal, tetragonal, the angles slightly produced to form relatively wide, stout processes which are bilobed, the lobules bifurcate and ending in short, curved, spine-like tips; cells 25–30 μ in diameter.

Plankton in Lost Canoe Lake and in Manitowish River, Vilas County.

Tetraëdron regulare var. granulata var. nov.

PL. 3, FIG. 1.

Cellulae magnae, pyramidatae, lobis latis fortibusque cum marginibus convexis instructis, angulis late rotundatis et spina solitaria brevique praefixis quae multo reducta esse potest adeo ut tantummodo papilla sit; membranum punctatum et parvis granulis aut asperitatibus copertum; cellulae 35–51.8 μ lat.

Cells large, pyramidal, the lobes broad and stout, with convex margins, the angles broadly rounded and tipped with a single short spine which may be reduced to a mere papilla; wall punctate and covered with small granules or roughenings; cells 35–51.8 μ in diameter.

Plankton in Flambeau Lake, Vilas County; Little Round Lake, Sawyer County.

Tetraëdron regulare var. incus fa. major fa. nov.

PL. 3, FIG. 2.

Cellulae pyramidatae, tetragonales marginibus rectis vel leviter convexis instructis, angulis productis ut spinas longas fortisque forment; cellulae 35–50 μ lat. spinis inclusis; spinae 12–13.5 μ long.

Cells pyramidal, tetragonal, the margins straight or slightly convex, the angles produced to form long, stout spines; cells 35–50 μ in diameter including spines; spines 12–13.5 μ long.

Plankton from Sweeney Lake; in tow from Manitowish River, Vilas County.

SCENEDESMACEAE

Scenedesmus opoliensis var. contacta var. nov.

PL. 3, FIG. 3.

Planta constans ex 4 cellulis naviformibus in serie singula instructis, per ¼ longitudinem parietum lateralium coniunctis; spinis cellularum terminalium, 1 vel 2
Plant consisting of four naviculoid cells arranged in a single series, adjoined along \( \frac{3}{4} \) of the length of their lateral walls; spines on terminal
cells either one or two at each pole, long and curved; spines on the inner
cells short and straight; cells 6–8 µ in diameter, 20–24 µ long.

Plankton in Carpenter Lake, Vilas County.

*Tetradesmus Smithii* sp. nov.

Cellulæ leviter arcuatae aut lunatae aut subcylindratae, parum coartatae in
regione polorum qui sunt late rotundati, locatae in globis quattuor cellulas conti-

nentibus, axibus longis parallelis et membranis convexis adiunctis solum in regio-
me dia, membranis externis liberisque concavis aut paene rectis; cellulæ a polo
visae sphaericæ, in quadrangula dispositæ; chloroplastis lamina parietalis; cellulæ
3.7–4 µ lat., 27–29 µ long.

Cells slightly arcuate or crescent-shaped or subcylindrical, slightly nar-
rowed toward the poles which are broadly rounded, in groups of four
with their long axes parallel and with the convex walls adjoined in the
midregion only, outer free walls concave or nearly straight; cells in end
view spherical, arranged in a quadrangle; chloroplast a parietal plate;
cells 3.7–4 µ in diameter, 27–29 µ long.

Rare in the plankton of Devil’s Lake, Burnett County. This species
is named for Dr. Gilbert M. Smith.

*Tetradesmus Smithii* is very similar to some forms of *Quadrigula*, but
the arrangement of the cells is very definite and the colonies are without
a gelatinous sheath or envelope.

**CONJUGALES**

*Zyg nemataceae*

*Spirogyra pseudofloridana* Prescott, n. sp.

Fila cellularum fortium cylindrarumque membrana plane finita habentium, 51–60 µ lat., 3–5-plo longioribus diametro; chloroplastes 4–(5) angustae, laxe spirales
aut paene rectæ, \( \frac{1}{2} \text{–} \frac{3}{4} \) revolutiones in cellula facientes; coniugatio scalariformis
facta per inclinationem geniculatum fili ita ut cellulæ in iuxtappositione ponantur,
gibbis lateralibus (sed non tubulis) nascentibus in cellulis gametangialibus quae
breves et ut videtur cellulis vegetativis absissæ sunt et graviter corporibus oleaceis
inter coniugationem onustæ sunt, cellulis fertilibus leviter tumidis; zygospora ellip-
soidea cum polis angustae rotundatis, mesospora fulva atque granulationibus irregu-
laribus et rugis (non reticulatis) asperata, 63–70 µ lat., 100–120 µ long.

Filaments of stout cylindrical cells with plane end walls, 51–60 µ in
diameter, 3–5 times their diameter in length; chloroplasts 4–(5), narrow,
loosely spiralled or nearly straight, making \( \frac{1}{2} \text{–} \frac{3}{4} \) turns in the cell;
conjugation scalariform by geniculate bending of the filament to bring
the cells into juxtaposition, lateral bulges but not tubes forming on the
gametangial cells which become shortened and apparently cut off from
the vegetative cells, becoming heavily packed with oil bodies at the time
of conjugation, the fertile cells becoming slightly swollen; zygospore ellipsoidal with narrowly rounding poles, the mesospore brown and roughened with irregular granulations and wrinkles (not definitely reticulate), 63–70 μ in diameter, 100–120 μ long.

Floating clots in a lagoon-like cove, North Trout Lake, Vilas County.

This species should be compared with S. illinoisensis Transeau and S. floridana Transeau. It is smaller than the former and has fewer chloroplasts. From the latter it differs chiefly in the decoration of the mesospore layer of the zygospore wall.

PHYLUM CHRYSOPHYTA

A. XANTHOPHYCEAE

STIPITOCOCCACEAE

Stipitococcus apiculatus sp. nov.

PL. 3, FIG. 6–10.

Cellulae ovoideae vel fusiformes, apiculate, stipite tenui coniunctoque instructae; chloroplastes 1–3; corpus oleaceum et filus rhizoidalis in apice locati; cellulae gregales, adiunctae turbinibus circum desmidibus filamentosis, nonnumquam 2 vel 3 cellulae in serie in una stirpe locatis, protoplastibus filamentis rhizoidalibus connexis; cellulae 3.8–4 μ lat., 18–36 μ long., stipe inclusu.

Cells ovoid or fusiform, apiculate, with a slender attaching stipe; chloroplasts 1–3; an oil body and a rhizoidal thread at the apex; cells gregarious, attached in whorls about filamentous desmids, sometimes two or three cells in a series on one stalk, the protoplasts connected by rhizoidal threads; cells 3.8–4 μ in diameter, 18–36 μ long including the stipe.

On Hyalothece filaments; pond near Silver Lake, Langlade County.
The arrangement of the cells in dense, transverse zones about the host filament gives a very distinct appearance to this species. The occurrence of two or three cells in a series on a single attaching stipe is unlike any of the described species. It is thought that this condition must be the result of in situ germination of swarmers.

**Stipitococcus crassistipatus** sp. nov.

PL. 3, FIG. 11-14.

Cellula late (nonnumquam anguste) in forma ampulla figurata, coartata in parte anteriore in collum breve latumque et reductum in parte posteriore in stipitem crassum et 1.5-2 μ lat.; protoplastis ovalis vel subglobosa, 2 chloroplastibus laminatis instructa; 7.6-8 μ lat., 18-20 μ long.

Cell broadly (sometimes narrowly) flask-shaped, narrowed anteriorly into a short, broad neck and reduced posteriorly to a thick stipe, 1.5-2 μ wide; protoplast oval to subglobose, with two laminate chloroplasts; 7.6-8 μ in diameter, 18-20 μ long.

On filamentous algae in a pool on beach of Crystal Lake, Vilas County.

This species differs in having a stipe which is much stouter and less tapering than in the other described forms. It should be compared with *St. capense* Prescott which has a very similarly shaped lorica but a very slender, tapering stipe. Also compare with *Derepyxis amphora* Stokes which it superficially resembles.

**Ophiocytiaceae**

**Ophiocytium desertum** var. minor var. nov.

PL. 3, FIG. 15-16.

Cellulae coniunctae, cylindratae aut in forma farciminis figuratae, stipite basis habente partem connexa, planatam similemque disco, polo anteriore late rotundato, 4-9 μ lat., 58-65 μ long.

Cells attached, cylindrical or sausage-shaped, basal stipe with a flattened disc-like attaching organ, anterior end broadly rounded, 4-9 μ in diameter, 58-65 μ long.

In a roadside swamp near Boulder Junction, Vilas County.

This variety differs from the typical form only in its distinctly smaller size.

**Ophiocytium elongatum** var. major var. nov.

PL. 3, FIG. 17.

Varietas ordinaria differens in mensura multo maiore; cellulae libere natantes, cylindraceae, rectae, curvae, aut uno polo truncato hamatae, altero spinam fortem, non undulatam, habente; chloroplastes 16 disci parietales; cellula 10-12 μ lat., 400-420 μ long., stippe (10-12 μ long.) non inclusa.

A variety differing from the typical by its much greater size; cells free-floating, cylindrical, straight, curved or hooked at one end which is truncate, the other bearing a stout spine, not coiled; chloroplasts 16 parietal discs; cell 10-12 μ in diameter, 400-500 μ long without the stipe which is 10-12 μ long.

In a swamp near Rhinelander, Oneida County.
This variety should be compared with *O. cochleare* (Eich.) A. Braun which differs in its smaller size, arcuate or coiled cells. *O. elongatum* W. & G. S. West, originally described from Burma, is sometimes coiled, although not closely, and its dimensions are greater than for any of the other species in this genus. Our specimens are mostly curved or bent near one end and are not coiled.

### B. Chrysophyceae

**Mallomonadaceae**

*Mallomonas pseudocoronata* sp. nov.

*PL. 3, FIG. 18.*

Cells fusiform-elliptic, narrowly rounded at both poles; scales transversely elliptic to rhomboidal or diamond-shaped, not imbricate, in spiral transverse series; at the anterior end forming a corona of sharply pointed projections about the flagellum opening, needles of two kinds, stout long ones forming a posterior tuft, and short spine-like recurved ones over the surface; cell 20–25 μ in diameter, 48–50 μ long including the needles.

Plankton in Lake McKenzie, Burnett County.

The collar or ‘crown’ at the anterior end which is formed of spine-like scales, together with the shape and arrangement of the needles in the posterior region differentiate this species.

*Mallomonas urnaformis* sp. nov.

*PL. 3, FIG. 19.*

Cells elliptic with a corona or neck of erect scales at the anterior end about the flagellum pore, scales of the membrane rectangular in transverse and longitudinal series and with a few modified scales at the posterior end; needles few, long and slender, diverging in all directions, evenly scattered; cells 11–14 μ in diameter, 25–30 μ long, without needles.

Plankton from Boulder Lake, Vilas County.

The arrangement of the rectangular scales in regular transverse series is unique in this species.

**Rhizochrysidaceae**

*Lagynion reductum* sp. nov.

*PL. 3, FIG. 20–21.*
Lorica globo-conica, fusco-fulva, habens, aperturam densatam per quam extendit filus tenuis protoplasmatos; protoplastus globosus; chromatophorus unus, in uno latere cellulae positus; 10 μ alt., 11.5 μ lat.

Lorica globose to conical, dark brown, with an opening surrounded by an annular thickening through which a fine protoplasmic thread extends; protoplast globose; chromatophore one, laying along one side of the cell; 10 μ high, 11.5 μ in diameter.

Growing on filaments of Tribonema in a ditch near Rhinelander, Oneida County.

This organism is remindful of Heterologynion Oedogonii Pascher (Ber. Deutsche Bot. Ges., 30: 157, figs. 1-4, 7-9. 1912) which is, however, colorless and much larger than our species.

Lagynion triangularis var. pyramidatum var. nov.

Lorica anguste pyramidata, marginibus inaequalibus aut subtriangularibus, fastigata in collum breve longumve marginibus fere parallelis instructum; 10.8–12 μ lat., 15–20 μ alt.

Lorica narrowly pyramidate with uneven margins, or subtriangular, tapering to a short or long neck with nearly parallel margins; 10.8–12 μ wide, 15–20 μ high.

On filamentous algae in Cardinal Bog, Trout Lake, Vilas County.

This variety differs from the typical form in being narrower, proportionately taller and in having a longer neck.

PHYLUM EUGLENOPHYTA

EUGLENACEAE

Euglena breviflagellum Prescott and Goidics sp. nov.


Cellulae leviter metabolicae, elongato-fusiformes et spiraliter tortae curvatae, raro rectae ellipticae in transverso visae, nonnihil coarctatae in parte anteriore et truncatae, in parte posteriore coarctatae lenius ita ut caudum longum forment; membranum subtiliter spiraliterque striatum; flagellum breve, in mensura par sextae parti longitudinis cellulae; paramyla corpora duarum varietatum, 6–8 laminae magnae concavae alveatae a latere dispositae et axi longo parallelae, pellicula leviter undulata supra et aliis anulis discis similibus numerosis et parvis irregulariter per cellulum sparsis; chloroplastes disci numerosi ovoidicique regulariter per cellulum dispositi; pyrenoides nullae; macula ocularis elliptica, formata ex granulis coccineis irregulariter locatis.; cellulae 120–145 μ long., 10–12 μ lat.; corpora paramyla magna 18 μ long.; grana paramyla parva 5 μ lat., 7 μ long.

Cells slightly metabolic, elongate-fusiform and spirally twisted or curved, seldom straight, elliptic in cross section, rather abruptly narrowed anteriorly and truncate, posteriorly narrowing more gradually to form a long caudus; membrane finely and spirally striate; flagellum short, about one-sixth of the length of the cell; paramylon bodies of two sorts, 6–8 large concave or trough-shaped plates laterally arranged and parallel with the long axis with the pellicle slightly undulate over them, and other
numerous and small disc-like rings irregularly scattered throughout the cell; chloroplasts numerous ovoid discs evenly distributed throughout the cell; pyrenoids lacking (?); eye-spot elliptic, composed of irregularly arranged crimson granules; cells 120–145 μ long, 10–12 μ in diameter; large paramylon bodies 18 μ long; small paramylon grains 5 μ wide, 7 μ long.

Tychoplankton in Trilby Lake, Vilas County; also found in a pond near Woods Hole, Massachusetts, August, 1935 (Gojdics).

The plate-like and laterally arranged paramylon bodies are distinctive. The organism continually twists and turns in its movements and in so doing causes the paramylon plates to telescope or overlap.

**Euglena elastica** sp. nov.

Cellulae maxime metabolicae et in statu natandi formam constanter mutantes, maxima ex parte fusiformes, saepe, autem, media in parte inflatissimae atque postice abrupte coartatae, ad apices conice rotundatos paululum attenuatae; saepe, autem, parte basali inflatissima nodiforme, in caudum numquam extensa; flagello circa $\frac{2}{3}$ longitudinem cellulae habente; chloroplastis multis, irregulariter ovatis; sine pyrenoidis (?); paramyli granis bacillis multis brevibusque, per cellulam quasi aequaliter dispersis; stigmate irregulari atque parte in anteriore cellulae laterali; cellulis 9.5–11 μ diam. (cellula videlicet extensa), 76–100 μ long.

Cells highly metabolic and constantly changing shape when in motion, mostly spindle-shaped but frequently much swollen in the midregion and abruptly narrowed anteriorly and posteriorly, tapering slightly to conically rounded apices, but often with the basal end much swollen and knob-like, never extended into a caudus; flagellum about $\frac{2}{3}$ the length of the cell; chloroplasts many, irregularly ovoid bodies; pyrenoids lacking (?); paramylon bodies numerous short rods scattered rather evenly throughout the cell; pigment-spot an irregularly shaped body, lateral in the anterior end; cells 9.5–11 μ in diameter (when the cell is stretched out), 76–100 μ long.

In a small pool near Plum Creek at Sayner Fish Hatchery, Oneida County.

**Euglena minuta** sp. nov.

Cellulae maxime metabolicae, fusiformes ad subpyriformes; postice in cacumen breve, obtusum, saepe curvatum productae; membrana levi (?); flagello $\frac{2}{3}$ longitudinem cellulae habente; chloroplasto uno, laminiformi, pyrenoidum habente; paramyli granis bacillis multis parvisque aut granulis elongato-ovatis; cellula 5–6 μ diam., 12–13.5 μ long.

Cells highly metabolic, fusiform to somewhat pyriform; produced posteriorly into a short, blunt, often curved tip; membrane smooth (?); flagellum $\frac{3}{4}$ the length of the cell; one plate-like chloroplast with a pyrenoid; paramylon bodies many small rods or elongate-ovoid grains; cells 5–6 μ in diameter, 12–13.5 μ long.

Tychoplankton in Muskellunge Lake, Vilas County.

This is the smallest species of the genus recorded in North America. The highly metabolic cells with a single chloroplast and small rod-like
paramylon bodies make this organism different from other described species.

**Euglena oxyuris var. minor var. nov.**

*PL. 3, FIG. 31.*

Cellulæ paulum metabolicae in statu natando formam constantem saepissime retinentes, elongato-cylindricae tortaeque, postice ad caudem brevem efficiendam quasi abrupte attenuatae; periplasto longitudinaliter striato; chloroplastis multis, disciformibus; paramyli granis 2 anulis magnis complanatisque, uno anteriore uno posteriori quam nucleo centrali; cellulis 15–18 μ, diam., 77–85 μ long.

Cells slightly metabolic, mostly keeping a constant shape in movements, elongate-cylindrical and twisted, tapering posteriorly rather abruptly to form a short tail piece; periplast longitudinally striated; chloroplasts numerous, disc-like; paramylon grains as two large, flattened rings, one anterior and one posterior to the central nucleus; cells 15–18 μ in diameter, 77–85 μ long.

In shallow water of High Lake, Vilas County.

This variety differs from the typical form by its smaller size, the latter being twice as large (30–45 μ in diameter, 375–490 μ long).

**Phacus anacoelus var. undulata fa. major fa. nov.**

*PL. 4, FIG. 1.*

Cellulae late ovoideae, finientes in parte posteriore in caudo longo et oblique directo; margines cellulæ ruga alta in ambobus lateribus postitis instructi quae duos gibbos latos format; multo maior quam forma ordinaria; 64 μ lat., 111–115 μ long.

Cells broadly ovoid, ending posteriorly in a long, obliquely directed caudus; margins of cell with a deep crease on either side forming two broad bulges; much larger than in the typical form, 64 μ in diameter, 111–115 μ long.

Plankton in Spider Lake, Vilas County.

This variety is very similar in size and shape to the typical form but is differentiated by the prominent lateral creases or incisions which throw the margin into broad undulations.

**Phacus asymmetrica sp. nov.**

*PL. 3, FIG. 32.*

Cellula irregulariter ovoido-fusiformis et leviter spiralis in partibus anteriore et posteriore; extenta in parte posteriore in caudum curvatum obtuseque praeaeutum; coartata in parte anteriore et habens duos gibbos inaequalibus in ambobus lateribis apicis positis; periplastis subtiliter per longitudinem striata; corpora paramyła duo anuli crassi torsique, plerumque per transversum cellulæ locati; chloroplastes disci ovoidei numerosi parvique; cellula 22–25 μ lat., 50–53 μ long.

Cell irregularly ovoid-fusiform and slightly spiral in the posterior and anterior portions; extended posteriorly into a curved, bluntly pointed caudus; narrowed anteriorly and with two irregular bulges on either side of the apex; periplast finely striated longitudinally; paramylon bodies as two thick twisted rings, usually lying transversely in the cell; chloroplasts numerous small ovoid discs; cell 22–25 μ in diameter, 50–53 μ long.

In a roadside fosse near Shell Lake, Washburn County.
This species should be compared with *P. Raciborski* Drez. which is much more slender and more nearly symmetrical. *P. asymmetrica* is irregular in outline and in some instances seems more like an *Euglena*. The cells are flattened, however, and show periplast features and paramylon grains which are like *Phacus*, especially in regard to the arrangement of the latter. Besides the two large rings of paramylon there are numerous smaller bodies which sometimes are densely packed in the cell.

**Phacus Birgei** sp. nov.

PL. 3, FIG. 33.

Cellula late ovalis, producta in parte posteriore ut formet caudum longum fastigatumque qui obliquus axi longitudinali cellulae est, late rotundata in parte anteriore; flagellum in longitudine cellulae par; periplast tenuissime striata; margines cellulae acute incisae quattuor incisuris utrimque positis; corpora paramyla una magna et numerose parvae laminae circulares; chloroplastes multi disci ovoidei; macula ocularis (?) ; cellulae 50-60 μ. lat., 70-80 μ. long.

Cell broadly oval, produced posteriorly to form a long tapering caudus which is oblique to the longitudinal axis of the cell, broadly rounded anteriorly; flagellum as long as the cell; periplast very finely striated; margins of the cell sharply notched with four small indentations on either side; paramylon bodies one large and numerous small circular plates; chloroplasts many ovoid discs; eye-spot (?) ; cells 50–60 μ in diameter, 70–80 μ long.

In a small pond near Genoa City, Walworth County. This species is named for Dr. E. A. Birge.

The lateral creases, together with the shape and size of this species, present a combination of characteristics which separate it from other described *Phacus*.

**Phacus chloroplastes** sp. nov.

PL. 3, FIG. 34.

Cellulae late pyriformes; productae in parte posteriore ut caudum rectum vel levissime deflexum forment; late rotundatae in parte anteriore cum papilla in medio posita; periplastis per longitudinem striata; margo cellulae integer; chloroplastes aliquot ligamenta parietalia quae parallelæ axi longo cellulae sunt; corpora paramyla duo magni tenuesse anuli aut laminæ leviter torsæ quæ per longitudinem cellulae positæ sunt; macula ocularis in medio regionis apicalis locata; cellula 20–22 μ. lat., 29–31 μ. long.

Cells broadly pyriform; produced posteriorly to form a straight or very slightly deflected caudus; broadly rounded anteriorly with a median papilla; periplast longitudinally striated; margin of the cell entire; chloroplasts several parietal bands lying parallel with the long axis of the cell; paramylon bodies two large, thin rings or slightly twisted plates lying lengthwise in the cell; eye-spot median in the apical region; cell 20–22 μ in diameter, 29–31 μ long.

Plankton in an inlet to Trout Lake, Vilas County.

This species should be compared with *P. hispidula* (Eich.) Lemm. which it resembles in general shape. The distinctive features of the Wisconsin
species are the shape and the arrangement of the chloroplasts which are quite unlike any of the other described members of the genus.

**Phacus chloroplastes** fa. incisa fa. nov.

PL. 4, FIG. 2–4.

Cellulæ pyriformes vel napiformes in lineis extremis visae, fastigatae repente in longum caudum rectum acutumque; periplastis per longitudinem striata; margo cellulae instructus duabus incisuris utrimque utris locatis; cellulae 25–26 μ lat., 38–40 μ long.

Cells pyriform or napiform in outline, tapering suddenly to a long, straight, sharp caudus; periplast longitudinally striated; margin of the cell with two sharp notches on either side; cells 25–26 μ in diameter, 38–40 μ long.

In a cedar swamp, Lincoln County.

**Phacus crenulata** sp. nov.

PL. 4, FIG. 5.

Cellula ovoideo-pyriformis, extenta in parte posteriore ut formet caudum leviter fastigatum et acute praefixum; para anterior late rotundata sed bilobata cum papilla convexa inter lobas posita; flagellum par cellulae in longitudine aut paulo longius; margines cellulae distincte crenulati aut undulati; periplastis per longitudinem lineis undulatis striata; corpora paramyla duo disci circulares; cellulae 14–15 μ lat., 34–36 μ long.

Cell ovoid-pyriform, posteriorly extended to form a gradually tapering, sharp-pointed caudus, anterior end broadly rounded but bilobed with a convex papilla between the lobes; flagellum as long as the cell or a little longer; margins of the cell distinctly crenulate or undulate; periplast longitudinally striated with undulating lines; paramylon bodies as two circular discs; cells 14–15 μ in diameter, 34–36 μ long.

Plankton in a cedar swamp, Lincoln County.

This species should be compared with *P. costata* Conrad which has spiral, entire striations rather than longitudinal wavy ones. The anterior end is different in that species also. *P. setosa* var. *crenata* Skv. has spiral striations.

**Phacus pseudowireenko** sp. nov.

PL. 4, FIG. 8.

Cellulæ orbiculares in lineis extremis visae, repente coartatae in parte posteriorie et productae ut formetur caudum brevum acutumque qui ad sinistram curvatur; pars anterior late rotundata; flagellum in longitudinem corpori fere par; periplastis per longitudinem striatae, incisuræ laterali alta acutaque in medio lateris dextris posita (rare una etiam in latere sinistro); corpus paramyla lamina magna circularisque; cellulae 30–33 μ lat., 37–40 μ long.

Cells orbicular in outline, abruptly narrowed posteriorly and produced to form a short, sharp caudus which curves to the left; anterior end broadly rounded; flagellum about as long as the body; periplast longitudinally striated, with a deep, sharp, lateral notch medianly located on the right side (rarely one on the left side also); paramylon body a large circular plate; cells 30–33 μ in diameter, 37–40 μ long.
Plankton in a cedar swamp, Lincoln County, and in several ditches and small ponds.

This species should be compared with *P. Swirenko Skvortz.*, a form which is about the same size but which has entire margins and a caudus which turns to the right.

**Phacus Segreti** var. ovum var. nov.

**PL. 4, FIG. 9.**

Cellulae maiores quam in species ordinaria late ovoideae atque rotundatae in partibus et anteriore et posteriore, caudo carentes; periplastis per longitudinem striata; corpora paramyla duo disci annulares; cellulae 28–30 µ lat., 39–41 µ long.

Cells larger than in the typical form, broadly ovoid and rounded both posteriorly and anteriorly, without a caudus; periplast longitudinally striated; paramylon bodies two annular discs; cells 28–30 µ in diameter, 39–41 µ long.

In a swamp near Lauderdale Lakes, Walworth County.

**Phacus spirogyra** var. maxima var. nov.

**PL. 4, FIG. 6–7.**

Cellulae ovoideae vel quasi-oblongae, inaequaliter spirales aut tantummodo torsae, repente coartatae in parte posteriori in longum caudum rectum curvum; late rotundatae in parte anteriore (anguste rotundatae a latere visae), cum gibbo claro in medio posito; periplastis per longitudinem seriebus spiralibus granulorum gemmeorum striata; chloroplastes disci numerosi; corpora paramyla duo anuli magni elliptici; cellulae 35–40 µ lat., 70–80 µ long.

Cells ovoid to somewhat oblong, unsymmetrically spiral or merely twisted, abruptly narrowed posteriorly into a long straight or curved caudus; broadly rounded anteriorly (narrowly rounded when seen from the side), with a prominent median protrusion; periplast longitudinally striated with spiral rows of pearly granules; chloroplasts numerous discs; paramylon bodies two large doughnut-like rings; cells 35–40 µ in diameter, 70–80 µ long.

In a roadside fosse near Shell Lake, Washburn County.

This variety is peculiar in the shape of the body which is not very much flattened. In side view it is narrower, however, than when seen in front view. The form of the paramylon bodies and the periplast decorations are similar to those in *Euglena spirogyra* var. marchica. This type of periplast decoration is uncommon in the genus *Phacus*. While most specimens had but two large paramylon rings some individuals were found with three. The cell is irregularly twisted in the anterior end. This species should be compared with *P. striata* France.

Drezepolski’s description of *P. spirogyra* is not entirely complete and since it has been impossible to see type specimens of that species, the Wisconsin forms are assigned here with a question.
Lepocinclis glabra fa. minor fa. nov.

PL. 4, FIG. 10.
Cellulae late ovoideae, caudo brevi papillaeque simili instructae, late rotundatae in parte anteriore et finientes in gibbo bipapillato per quem emergit flagellum; flagellum in longitudine fere corporis par; periplastis levis; paramylon ex duoibus ligamentis semicircularibus compositum, curvatis in transverso in peripheria cellulae, uno utrique locato; chloroplastes numerosi disci ovales; cellulae 14—16 μ lat., 20—22 μ long., minores quam in forma ordinaria.

Cells broadly ovoid, with a short papilla-like caudus, broadly rounded anteriorly and ending in a bi-papillate protrusion through which the flagellum emerges; flagellum about as long as the body; periplast smooth; paramylon in the form of two semicircular bands, curving transversely at the periphery of the cell, one on either side; chloroplasts numerous, ovoid discs; cells 14—16 μ in diameter, 20—22 μ long, smaller than the typical form.

Tow sample from a cedar swamp in Lincoln County.

Trachelomonas hexangulata var. repanda var. nov.

PL. 4, FIG. 11.
Distans a specie ordinaria in marginibus lateralibus loricae convexioribus et marginibus lateralibus partis posterioris concavioribus adeo ut apiculatio obtusa in parte posteriori proferatur; lorica 14.4—15 μ lat., 36—38 μ long.

Differing from the typical form in having the lateral margins of the test more convex and the posterior lateral margins more concave so that a blunt apiculation is produced posteriorly; test 14.4—15 μ in diameter, 36—38 μ long.

In tow samples from a cedar swamp in Lincoln County.

Trachelomonas mammillosa sp. nov.

PL. 4, FIG. 12.
Testa spherica; ore flagelli in inflatione mammillata, per costam cincta crassa, anularemque, quae extremitatem, anteriorem circumplectitur; membrana levi, subflava; testa 24—26 μ diam.

Test spherical; flagellum aperture in a mammillate swelling which is surrounded by a thick annular ridge encircling the anterior end; wall smooth, yellowish; test 24—26 μ in diameter.

Tychoplankton in Stevens Swamp near Trout Lake, Vilas County.

This species is distinguished by the prominent ridge which encircles the test anteriorly, and the papillate swelling about the flagellum aperture. It should be compared with T. peridiniiformis Skv. reported from Manchuria.

Trachelomonas superba var. spinosa var. nov.

PL. 4, FIG. 13.
Lorica late ovalis; membranum spinosum, parte posteriore spinis multo longioribus et acutius praefixis cincta; apertura flagelli torque caresens sed coronula spinarum acutarum erectarumque circumdata; lorica 32.5—36 μ lat., 39—48 μ long.

Test broadly oval; wall spiny, with the posterior part beset with much longer and more sharply pointed spines; flagellum aperture without a
collar but encircled with a coronula of sharp, erect spines; test 32.5–36 μ in diameter, 39–48 μ long.

Plankton from Muskellunge Lake, Vilas County.

This variety differs from the typical form by the longer spines at the posterior pole and the coronula about the flagellum aperture. Also the size is greater in the variety.

**PHYLUM PYRROPHYTA**

**GYMNODINIACEAE**

**Gymnodinium caudatum** sp. nov.

PL. 4, FIG. 14–16.

Cellulae magnae, ovoideae aut inverse conicae aut similes turbinii in forma, late rotundatae in polo anteriore, coartatae et productae in caudum curvum in polo posteriori; plurimum complanatae in parte dorso-ventrali; sulcus transversus clarus in medio positus, spiraliter ad sinistrum versus; chromatophori numerosae et luteofulvae laminae, ovoideae elongatae, radialiter dispositae; macula ocularis prope sulcum in hypocoeno posita; sulcus per dimidiam longitudinem hypoconi extendens et paulum in epicono; cellula 65–70 μ lat., 104–118 μ long.

Cells large, ovoid to inversely conical or top-shaped, broadly rounded at the anterior end, narrowed and produced into a curved caudus at the posterior pole; very much flattened dorso-ventrally; transverse furrow prominent and median, spirally turned to the left; chromatophores numerous golden-brown, ovoid or elongate plates, radially disposed; eye-spot present near the sulcus in the hypocone; longitudinal furrow extending about half the length of the hypocone and for a short distance into the epicone; cell 65–70 μ in diameter, 104–118 μ long.

In a Sphagnum bog near Rhinelander, Oneida County.

The large size of this species and the narrowed hypocone which forms a distinct caudus posteriorly are its distinguishing features.

**PHYLUM CYANOPHYTA**

**CHROOCOCCACEAE**

**Glaucocystis duplex** sp. nov.

PL. 4, FIG. 17–19.

Coloniala 8–16 cellulara sphacoirum membrano sphacico cellulae matricalis molto dilatato circumdata; chromatophori duas massae stellatae habentes corpora vermiformia et caeruleo-viridia ex duobus locis separatis extendentia; cellulae 40–44 μ lat., colonia 150–170 μ lat.

Colony of 8–16 spherical cells inclosed by a much enlarged spherical mother-cell wall; chromatophores two stellate masses with vermiciform, blue-green bodies radiating from two separate points; cells 40–44 μ in diameter, colony 150–170 μ in diameter.

Among dense clots of algae in Manitowish River, Vilas County.
This species differs from *G. nostochinearum* Itz. in the spherical shape of the cell and in the dual arrangement of the chromatophores. From *G. cingulata* Bohlin it differs in the morphology of the cell wall. That species is spherical but the wall has a median annular thickening. The chromatophores are numerous and parietal. Some forms of *G. nostochinearum* Itz. are described as spherical but other features of the Wisconsin plants seem to warrant separating them from that species.

**Glaucocystis oocystiformis** sp. nov.

PL. 4, FIG. 20.

Cellulae solitariae (aut in coloniis posita ?) late ellipticae, densationibus glandulosis membrani in polis instructae; chromatophori numerosi, pulvinaribus in periphery cellulae circum vacuolam centralem, sphaericum, non coloratam positis (?); cellulae 20–27.3 μ lat., 40–45 μ long.

Cells solitary (or in colonies ?) broadly elliptic, with nodular thickenings of the cell wall at the poles; chromatophores numerous, irregular pads at the periphery of the cell about a central, spherical, colorless vacuole (?); cell 20–27.3 μ in diameter, 40–45 μ long.

Plankton from an inlet to Trout Lake, Vilas County.

This species differs from the others in the shape of the cell, the form of the chromatophores, and in its possession of polar nodules. Whether the absence of colonial association, or the retention of autospores within the mother-cell wall is a constant feature is undetermined, but in all cases observed the cells were solitary. In the developmental stages of *G. nostochinearum* Itz., as described by Hieronymus (1892), the chromatophores show much the same character as exhibited in *G. oocystiformis*. Since no other type of chromatophore expression or arrangement was found in the Wisconsin plants there is no indication that the forms in our collections are but a developmental stage of some other species.

**HORMOGONALES**

**OSCILLATORIACEAE**

*Lyngbya latissima* sp. nov.

PL. 4, FIG. 21.

Plantae solitariae, in alii algis impedita; trichomata recta, in apicibus non fastigata; cellulae discis similes materiam tenuiter aequaliterque granosam habentes, 37–40 μ lat., 3.7–7.4 μ long.; vagina dense (3.7–5 μ), lamellata, stratis externis rugosis et senectute asperatis; filamentum 44–58 μ lat.

Plants solitary, entangled among other algae; trichomes straight, not tapering at the apices; cells disc-like with contents finely and evenly granular, 37–40.7 μ in diameter, 3.7–7.4 μ long; sheath thick (3.7–5 μ), lamellate, with outer layers wrinkled and roughened in age; filament 44–58 μ in diameter.

In Sweeney Lake, Vilas County; Little Clam Lake, Burnett County.

This very large species should be compared with *Oscillatoria princeps* Vauch. when the latter is in the hormogonial condition and inclosed by
a sheath. In such a case the sheath is not thick and lamellated as in *L. latissima*, nor are the trichomes so long (usually). *L. gigantea* described by Lewis, Zirkle, and Patrick (1933) and referred by Drouet (1938) to *Oscillatoria princeps* Vauch., differs in having thin, smooth sheaths characteristic of the hormogonial phase of the latter species. Unlike *Oscillatoria princeps*, our plants are not at all tapering at the apices and the contents of the cell are not coarsely granular.

*L. latissima* should be compared with *L. Hummelii* Borge, a large species which is, however, smaller than the former, and one which has longer cells. Also the sheath in Borge’s species is thinner and apparently not lamellulate as in the Wisconsin plants.

**Nostocaceae**

**Anabaena wisconsinensis** sp. nov.

*Trichomata planctonica, recta aut subflexuosa, solitaria aut (saepius) ad fasciculos lamelliformes parvos laxosque efficiendos parallele aggregata, sine vagina, ad apices non attenuata; cellulis quadratis vel cylindricis, ad dissepimenta constrictis, 3.6—4 μ diam., 3.6—10.8 μ long., intus pseudovacuolas magnas praedentibus; heterocystibus sphaericis aut compresso-globosis, 3.6—4.2 μ in diameter, una sola singulo in trichomate partem median occupante; gonidiis elliptico-ovatis ad late ovatis, primum constantibus ex 3 cellulis vegetativis dilatatis seriatis dispositis, quarum una sola plerumque maturescit ut omnia trichomata unicum gonidium habeant, si plura autem, gonidia, bina sunt, 7.2—8 μ diam., 10—13 μ long.*

Trichomes planktonic, straight or slightly flexuous, solitary or (more often) aggregated in parallel fashion to form small, loose, flake-like bundles, without a sheath, not tapering at the apices; cells quadrate to cylindrical, constricted at the cross walls, 3.6—4 μ in diameter, 3.6—10.8 μ long; cell contents with large pseudovacuoles; heterocysts spherical or compressed-globose, 3.6—4.2 μ in diameter, only one in each trichome, centrally located; gonidia elliptic-ovoid to broadly ovoid, remote from the heterocysts, beginning their development as a series of three enlarged vegetative cells, usually only one of which matures so that each trichome has but a single gonidium, when more than one, occurring in pairs, 7.2—8 μ in diameter, 10—13 μ long.

Plankton in Post Lake, Langlade County.

This plant is remindful of *Aphanizomenon flos-aquae* (L.) Ralfs. It should be compared with *Anabaena aphanizomenoides* Forti from which it differs in the smaller size throughout, the ovoid shape of the gonidia and their location remote from the heterocysts rather than adjacent to them as in that species.

**Albion College**

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LITERATURE


EXPLANATION OF PLATE 1

Fig. 1-2. *Chlamydomonas polypyrenoideum* sp. nov. × 650.
3. *Tetraspora lamellosa* sp. nov. × 500.
4-6. *Schizochlamys compacta* sp. nov. × 600.
7. *Ulothrix cylindricum* sp. nov. × 500.
8. *Geminella crenulatocollis* sp. nov. × 650.
9-10. *Hormidiopsis ellipsoideum* sp. nov. × 650.
11. *Pediastrum quadricornutum* sp. nov. × 650.
12-13. *Oocystis pyriformis* sp. nov. × 500.
14. *Tetraëdron asymmetricum* sp. nov. × 1500.
15. *Tetraëdron bifurcatum* var. *minor* var. nov. × 650.
16. *Tetraëdron cruciatum* var. *reductum* var. nov. × 650.
17. *Tetraëdron enorme* var. *pentaëdricum* var. nov. × 650.
18. *Tetraëdron limneticum* var. * gracile* var. nov. × 650.
EXPLANATION OF PLATE 2

Fig. 1–3. Stigeoclonium pachydermum sp. nov.; 1, × 250; 2, × 500; 3, × 1000.

4–5. Draparnaldia Judayi sp. nov. × 600.

6. Pediastrum biradiatum var. emarginatum fa. convexum fa. nov. × 600.

7. Pediastrum muticum var. crenulatum var. nov. × 700.

8. Tetraëdron lobulatum var. crassum var. nov. × 1000.

9–10. Anabaena wisconsinensis sp. nov. × 500.
EXPLANATION OF PLATE 3

Fig. 1. *Tetraëdron regulare* var. granulata var. nov.  \( \times 500 \).
2. *Tetraëdron regulare* var. incus fa. major fa. nov.  \( \times 500 \).
3. *Scenedesmus opoliensis* var. contacta var. nov.  \( \times 850 \).
4–5. *Tetradesmus Smithii* sp. nov.; 4,  \( \times 400 \); 5,  \( \times 1000 \).
6–10. *Stipitococcus apiculatus* sp. nov.; 6,  \( \times 700 \); 7–10,  \( \times 2000 \).
11–14. *Stipitococcus crassistipatus* sp. nov.  \( \times 1000 \).
15–16. *Ophiocytium desertum* var. minor var. nov.  \( \times 500 \).
17. *Ophiocytium elongatum* var. major var. nov.  \( \times 500 \).
18. *Mallomonas pseudocoronata* sp. nov.  \( \times 500 \).
19. *Mallomonas urniformis* sp. nov.  \( \times 1000 \).
20–21. *Lagynion reductum* sp. nov.  \( \times 500 \).
22. *Lagynion triangularis* var. pyramidatum var. nov.  \( \times 650 \).
23–24. *Euglena breviflagellum* Prescott and Gojdics, sp. nov.  \( \times 650 \).
25–27. *Euglena elastica* sp. nov.  \( \times 500 \).
28–30. *Euglena minuta* sp. nov.  \( \times 500 \).
31. *Euglena oxyuris* var. minor var. nov.  \( \times 500 \).
32. *Phacus asymmetrica* sp. nov.  \( \times 600 \).
33. *Phacus Birgei* sp. nov.  \( \times 500 \).
34. *Phacus chloroplastes*.  \( \times 600 \).
EXPLANATION OF PLATE 4

Fig. 1. Phacus anacoelus var. undulata fa. major fa. nov. ×600.
2-4. P. chloroplastes fa. incisa fa. nov. ×600.
5. Phacus crenulata sp. nov. ×600.
6-7. Phacus spirogyra var. maxima var. nov. ×500.
8. Phacus pseudoswirenko sp. nov. ×600.
9. Phacus Segreti var. ovum var. nov. ×600.
10. Lepocinclis glabra fa. minor fa. nov. ×550.
11. Trachelomonas hexangulata var. repanda var. nov. ×550.
12. Trachelomonas mammillosa sp. nov. ×550.
13. Trachelomonas superba var. spinosa var. nov. ×750.
17-19. Glaucocystis duplex sp. nov.; 17, ×250; 18, 19, ×350.
20. Glaucocystis oocystiforme sp. nov. ×650.
21. Lyngbya latissima sp. nov. ×375.
EXPLANATION OF PLATE 5

Fig. 1–3. Oedogonium Kjellmanii var. granulosa var. nov.; 1, 2, ×275; 3, ×550.
4–5. Oedogonium oviforme fa. gracile. ×600.
6–7. Oedogonium Smithii sp. nov.; 6, ×500; 7, ×600.
8. Oedogonium microgonium sp. nov. ×600.
9. Oedogonium spheroides var. nov. ×300.
10. Oedogonium Sawyeri sp. nov. ×550.
11. Oedogonium Kozminskii sp. nov. ×360.
12. Oedogonium polyandrium sp. nov. ×550.
13–14. Oedogonium oelandicum var. contortum var. nov. ×600.
Plate 5

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