

**PHYTOPLANKTON COLLECTED FROM THE UNIVERSITY
POND IN THE EXPERIMENTAL FOREST OF
TAIWAN UNIVERSITY AT CH'I-T'OU (溪頭)**

by

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During the Easter holidays 1955, the writer has a chance to make a field trip to the experimental forest of the University at Ch'i-T'ou (溪頭) with the special purpose of collecting and studying the vegetation. At the back near the experimental station there is a small natural water body known as the University Pond (大學池). A slowly flowing water enters from its south eastern mouth and flows away from its south western end. It locates at a height of 1,200 meters above the sea level, and has a moderate climate all through the year. Even in the coldest month from January to February the frost appears twice or thrice only. On the other hand the humidity is quite high there. The total year's precipitation is 2,000-3,000 millimetre. The raining season starts from May to September and the October to April is the dry season. I made several collections there, with part of the material fixed in Trauseau's "six, three, one" (water six parts, ethyl alcohol three parts and formaline one part), and part of them carried in living condition for studying in the laboratory.

There are quite a number of interesting types which are newly discovered in this island. The present study identifies 40 Species and varieties, 6 of them belong to Cyanophyta, 29 Chlorophyta, 1 Chrysophyta, 3 Euglenophyta, and 1 Pyrrhophyta.

DIVISION CYANOPHYTA
CLASS CYANOPHYCEAE
Order Chroococcales
Family CHROOCOCCACEAE
CHROOCOCCUS Naegeli 1849

Chroococcus limneticus Lemmermann 1898. Bot. Centralbl., 76:153. (Figs. 1, 2.)

A free-floating, spherical or ovate colony of 4-32 spherical cells rather closely and evenly arranged, sometimes in groups of 2-4 cells as a result of rapid cell division; individual cell sheath usually indistinct and confluent with the hyaline, mucilaginous colonial envelope; cell contents dull to bright blue-green, not conspicuously granular; cells 6-12-22 mic. in diameter, without sheath.

Common.

Chroococcus minimus (Keissl.) Lemmermann 1904. Arkiv f. Bot., 2, No. 2 (1903-1904): 102.

A globose or elliptical colony of 4-8 spherical or ovoid cells in a wide, hyaline, non-lamellated colonial envelope; cells 2-3 mic. in diameter without sheaths; contents

blue-green, non-granular.

Scarce.

MERISMOPEDIA Meyen 1839.

Merismopedia elegans A. Braun 1849. In F. T. Kuetzing, Species algarum. p. 472.

Colony irregularly quadrangular, composed of as many as 4000 compactly arranged, ovate cells, with the rows of cells becoming distorted in older and larger colonies; cells 5-7.5 mic. in diameter, 7-9 mic. long; contents bright blue-green.

Fairly common.

Merismopedia glauca (Ehrenb.) Naegeli 1849. Gattungen einzelligen Algen, physiologische und systematische bearbeitet. p. 55.

Colony of 16-64 ovate or hemispherical cells, very regularly arranged to form quadrangular colonies; 3-5 mic. in diameter; 30 celled colony 30 mic. wide; cell contents bright blue-green, homogeneous.

Fairly common.

Order Homogonales

Family OSCILLATORIACEAE

LYNGBYA Agardh 1824

Lyngbya limnetica Lemmermann 1898, Beitrage zur Kenntniss der Planktonalgen II. Beschreibung neuer Formen. Bot. Centralbl., 76:154.

Plant straight solitary, planktonic; trichomes 1-2 mic. in diameter, not tapering at the apices; cells 6-12 mic. long, not constricted at the cross walls; cell contents coarsely granular; sheaths thin and colorless; filaments 2-2.2 mic. wide.

Scarce.

CLASS CHLOROBACTERIACEAE

PELOGLOEA Lauterborn 1913.

Pelagloea bacillifera Lauterborn 1917, Die Saproelische Lebewelt. Ver. Natur. mediz. Ver. Heidelberg, 13:430.

Cells bacilliform, straight or curved rods, sometimes elliptic, slightly tapering at the poles, solitary or 2-3 in linear series; densely crowded in a gelatinous, saccate or clathrate mucilage; cells 0.5-1.5 mic. in diameter, 2-4 mic. long.

Common.

DIVISION CHLOROPHYTA

CLASS CHLOROPHYCEAE

Order Volvocales

Family CHLAMYDOMONADACEAE

CHLAMYDOMONAS Ehrenberg 1835

Chlamydomonas globosa Snow 1903. Bull. U. S. Fish. Comm. p. 389.

Cells broadly ovoid to globose, inclosed in a hyaline, gelatinous sheath; anterior

papilla absent. Chloroplast a dense parietal cup with a basal pyrenoid; 1 contractile vacuole in the anterior end of cell; pigment-spot lens-shaped, suprmedian in position and lateral. Cells 5-7 mic. in diameter, 10-19 mic. long.

Scares.

Order Tetrasporales

Family PALMELLACEAE

SPHAEROCYSTIS Chodat 1897

Sphaerocystis Schroeteri Chodat 1897. Bull. Herb. Boiss., 5:119.

Colony often including both undivided and recently divided cells which form small spherical clusters within the colonial envelope. Cells 6-20 mic. in diameter; colonies up to 500 mic. in diameter.

Fairly common.

GLOEOCYSTIS Naegeli 1849.

Gloeocystis gigas (Kuetz.) Lagerheim 1883. Oefv. Kongl. Sv. Vet.-Akad. Forhandl. 40 (No. 2):63.

One-celled or a colony of 8 spherical or slightly oblong individuals inclosed by a copious, gelatinous, lamellate envelope. Contents of the cell frequently brownish-green because of oil. Cells 9-12 mic. in diameter. Forming gelatinous masses on submerged aquatics or entangled among other algae.

Fairly common.

ASTEROCOCCUS Scherffel 1908.

Asterococcus limneticus G. M. Smith 1918. Trans. Wis. Acad. Sci., Arts, & Letters, 19:627.

Cells spherical, arranged at some distance from one another in free-floating colonies of 4-16 within a colorless homogeneous investing mucilage. Chloroplast stellate with 4-16 lobes radiating from a central core, the lobes becoming flattened against the cell wall. Cells 10-25 mic. in diameter; colonies 50-125 mic. in diameter.

Scares.

Order Chlorococcales

Family HYDRODICTYACEAE

PEDIASTRUM Meyen 1829.

Pediastrum simplex (Meyen) Lemmermann 1897. Die Planktonalgen des Berlin. II. Zeit. f. Fisch. p. 180. (Fig. 9.)

Colony entire, composed of 16-32-64 smooth-walled cells; inner cells 5- or 6-sided; peripheral cells with the outer free wall extended to form a single tapering, horn-like process with concave margins; cells 12-18 mic. in diameter.

Fairly common.

Pediastrum Simplex var. *duodenarium* (Bailey) Rabenhorst. 1868. Florae Europaea

algarum aquae dulcis et submarinae. p. 72.

Colony perforate, composed of 36-48-64 cells with their inner margins concave, the outer margin of inner cells forming a long process, peripheral cells forming a stout process; cells 11-15 mic. in diameter, 27-28 mic. long; 36-celled colony 137 mic. in diameter.

Fairly common.

Pediastrum tetras (Ehrenb.) Ralfs 1844; Ann. & Mag. Nat. Hist. 14 (Ser. 1):469. (Fig. 8.)

Colony entire; inner cells (frequently none) with 4-6 straight sides but with one margin deeply incised; peripheral cells crenate, with a deep incision in the outer free margin, their lateral margins adjoined along 2/3 of their length; cells 8-12 mic. in diameter.

Fairly common.

Family COELASTRACEAE

COELASTRUM Naegeli in Kuetzing 1849

Coelastrum microporum Naegeli in A. Br. Alg. Unicell 1855, p. 70.

Coenobium spherical, composed of 8-64 sheathed globose cells; cells interconnected by very short, scarcely discernible gelatinous processes, leaving small intercellular spaces; cells 8-20 mic. in diameter including the sheath.

Fairly common.

Family OOCYSTACEAE

CHLORELLA Beyerinck 1890.

Chlorella ellipsoidea Gerneck 1907. Beih. Bot Centralbl., 21 (Abt. 2):250.

Cells ellipsoidal, sometimes unsymmetrical; chloroplast a folded plate over part of the cell wall; described as producing as many as 32 autospores during reproduction; vegetative cells 7-8 mic. in diameter. 9-9.5 mic. long.

Common.

Chlorella vulgaris Beyerinck 1890. Bot. Zeit., 48:758.

Cells spherical, scattered among other algae or sometime occurring in almost pure growths; chloroplast a parietal cup, sometimes without a pyrenoid; cells 5-8.5 mic. in diameter.

Common.

DICTYOSPHAERIUM Naegeli 1849.

Dictyosphaerium pulchellum Wood 1874. Smiths. Contrib. Knowledge, 19 (No. 241):84. (Fig. 12.)

Colony spherical or ovoid, composed of as many as 32 spherical cells arranged in series of 4 on dichotomously branched threads, inclosed in mucilage; cells 3-10 mic. in diameter.

Very common.

ANKISTRODESMUS Corda 1838.

Ankistrodesmus falcatus (Corda) Ralfs 1848. The British Desmidiaceae. p. 180.

Cells needle-like to somewhat spinlle-shaped, solitary or in clusters of 2-32 individuals, not inclosed in a colonial sheath; chloroplast 1, a parietal plate without pyrenoids; cells 2-6 mic. in diameter, 25-100 mic. long, sometimes longer.

Ankistrodesmus falcatus var. *acicularis* (A. Braun) G.S. west 1904. A treatise on the British freshwater algae. p. 223.

Cells solitary and almost straight, the outer wall slightly curved in the median portion, entended into long, finely drawn out apices; chloroplast extending over 2/3 of the cell wall; cells 2.5 mic. in diameter, 36-65 mic. long.

Fairly common.

Ankistrodesmus spiralis (Turner) Lemmermann 1908. Arch. f. Hydrobiol. u. Planktonk., 4:176.

Cells spindle-shaped, spirally twisted into bundles of 4-16 cells; cells 2-3 mic. in diameter, 25-35 mic. long; chloroplast a parietal plate without a pyrenoid.

Fairly common.

SELENASTRUM Reinsch 1867.

Selenastrum Westii G. M. Smith 1920. Wis. Geol. & Nat. Hist. Surv., Bull. 57:133. (Fig. 10.)

Colony small, composed of 2-8 slender, lunate or arcuate cells, arranged with their convex walls apposed; chloroplast a parietal plate lying along the convex wall; pyrenoid lacking; cells 1.5-2.5 mic. in diameter; 15-18 mic. between apices.

Rare.

KIRCHNERIELLA Schmidle 1893.

Kirchneriella contorta (Schmidle) Bohlin 1897. Bih. Kongl. Sv. Vet.-Akad. Handl., 23, Afd. 3, No. 7:20.

Free-floathing colonies, usually of 16 twisted arcuate, cylindrical cells with broad, convex apices, lying irregularly scattered throughout the homogeneous, gelatinous envelope; chloroplast covering the entire wall of the cells, which are 1-2 mic. in diameter, 5.8-10 mic. long.

Rare.

QUADRIGULA Printz 1915.

Quadrigula closterioides (Bohlin) Printz. 1915. Det. Kgl. Norske Vidensk. Selskabs Skrifter, No. 2:49.

Cells long, straight, but with one margin slightly curved, cylindrical in the mid-region, tapering to sharply rounded apices, arranged in longitudinal bundles of 4 within a fusiform colonial envelope; chloroplast parietal, covering almost the entire cell wall, with a median notch; 1 pyrenoid; cells 4-6 mic. in diameter, 22-35 mic. long.

Rare.

TETRAEDRON Kuetzing 1845.

Tetraedron limneticum Borge 1900. Schwedisches Susswasserplankton. Bot. Notiser, 1900:5. (Fig. 11.)

Cells pyramidal, 4-angled, the angles produced into relatively narrow, once or twice furcated processes which are tipped with short spines, the margins of the cell concave between the angles; cells 30-35 mic. in diameter including processes.

Rare.

Tetraedron minimum (A. Braun) Hansgirg 1888. Hedwigia, 27:131.

Cells small, flat, tetragonal, the angles rounded and without spines or processes, lobes sometimes cruciately arranged; margins of the cell concave, with one frequently incised; cells 14-20 mic. in diameter.

Scarce.

Family SCENEDESMACEAE

SCENEDESMUS Meyen 1829.

Scenedesmus bijuga (Turp.) Lagerheim 1893. Chlorophyteen aus Abessinien und Kordofan. Nuova Notarisia, 4:158.

Colony composed of 2-8 cells in a single flat series; cells ovate or oblong, without teeth or spines; cells 4-8 mic. in diameter, 8-16 mic. long.

Common.

Scenedesmus dimorphus (Turp.) Kuetzing 1833. Algologische Mittheilungen. Flora, 16:608.

Colony composed of 4 or 8 fusiform cells arranged in a single or alternating series; the inner cells with straight, sharp apices; the outer cells lunate, strongly curved, with acute apices; cells 3-6 mic. in diameter, 16-22 mic. long.

Fairly common.

Scenedesmus opoliensis P. Richter 1896. Zeit. f. Angw. Mikro., 1:7. (Fig. 3.)

Colony composed of 2-4-8-naviculoid cells arranged in a single series, with free walls of outer cells convex, the lateral adjoined walls in contact along 1/3 of their length; apices of cells with long spines (inner cells with one spine at one pole only, or sometimes without spines); cells 6-8 mic. in diameter, 14-26 mic. long.

Rare.

Scenedesmus obliquus (Turp.) Kuetzing 1833. Linnaea, 8:609.

Colony composed of 2-8 fusiform cells arranged in a single series; apices of cells apiculate; wall smooth; cells 4.2-9 mic. in diameter, 14-18 mic. Long.

Scarce.

Scenedesmus quadricauda (Turp.) de Brébisson 1835. in de Brébisson & Godey, P. Algues des environs de Falise decrites et dessinees. p. 66. (Figs. 4-6.)

Colony consisting of 2-4-8-oblong-cylindric cells usually in 1 series; outer cells with a long curved spine at each pole; inner cells without spines or with mere papillae at the apices; cells variable in size, 3-18 mic. in diameter, 9-35 mic. long.

Common.

Scenedesmus quadricauda var. *parvus* G.M. Smith 1916. Trans. Wis. Acad. Sci., Arts, & Letters 18:480.

Colony composed of 2-16 cylindrical-ovate cells arranged in a single series; outer cells with a long spine at each pole; inner cells with spineless walls; cells 4-6.5 mic. in diameter, 12-17 mic. long.

Scarce.

Scenedesmus quadricauda var. *Westii* G.M. Smith 1916. Trans. Wis Acad. Sci., Art, & Letters 18:480.

Colony composed of 4-8 ovate cells with broadly rounded apices; cells 5-8 mic. in diameter, 10-18 mic. long; spines relatively short; often strongly reflexed.

Rare.

TETRADESMUS G.M. SMITH 1913.

Tetradesmus formosana nov. sp. (Figs. 15-17.)

Cell lunate, arranged with their long axes parallel; strongly curved with acute apices; cells in groups of 4 with their long axes parallel and with the convex walls adjoined in the mid-region only; outer free walls concave, poles of the cell narrowed and directed away from the center of the colony; in the end view spherical the cells arranged in a quadrangle; cells 2.5-4 mic. in diameter, 15-18 mic. long.

Very common.

This species differs from *Tetradesmus wisconsinensis* G.M. Smith in being with narrower and longer cells, strongly curved than that of *T. wisconsinensis*, and with the convex walls adjoined in the mid-region only. It differs from *T. Smithii* Prescott with the acute apices. This species should be also compared with *Scenedesmus acuminatus* (Lag.) Chodat. Though its individual cells are quite seems alike but in *S. acuminatus* the cells arranged in a single curved plane, while the cells in this species arranged definitely in a quadrate (of two plane).

TETRALLANTOS Teiling 1916.

Tetrallantos Lagerheimii Teiling 1916. Svensk Bot. Tidskr., 10:62. (Fig. 13.)

A colony of 4 crescent-shaped or sausage-shaped cells which are bluntly rounded at their apices and inclosed by a colonial mucilage, with clusters of daughter cells often held in approximation by old mother cell wall fragments; cells in 2 planes of pairs, 1 pair facing each other and in contact at their poles, the other pair in a longitudinal plane vertical to these and so arranged that each member has 1 pole at the point of contact of the poles of the other pair; chloroplast a parietal plate with 1 pyrenoid. Cells 4-8 mic. in diameter, 10-13 mic. long.

Rare.

Order Zygnematales

Family DESMIDIACEAE

STAURASTRUM Meyen 1829.

Staurastrum tetracerum Ralfs. 1845. in Ann. Mag. Nat. Hist. 15. 150.

Cells minute, about as long as broad, constriction fairly deep, sinus open with a minutely excavated apex; semicells short and rectangular, apex straight or slightly concave, upper angles produced to form long, strongly diverging processes, gradually attenuated towards their apices, and with 4 or 5 undulations; apex of processes minutely emarginate. Vertical view fusiform with the poles drawn out to form nudulose processes.

Zygospore globose, with about 16 long processes swollen at the base, and once or twice dichotomous at the apex.

Cells 9-10 mic. long (without processes), 25-32 mic. (with processes); 29-35 mic. broad (including processes). Breadth of isthmus 4-5 mic.

Scarce.

DIVISION CHRYSOPHYTA

CLASS XANTHOPHYCEAE

Order Heterotrichales

Family TRIBONEMATACEAE

TRIBONEMA Derbés & Solier 1856.

Tribonema affine G.S. West 1904. A treatise on the British freshwater algae. p 208.

Filaments straight and slender; cells long-cylindric with thin walls, 5-5.6 mic. in diameter, 35-40 mic. long; chromatophores 4 pale, yellowgreen parietal plates with smooth margins.

Scars.

DIVISION EUGLENOPHYTA

CLASS EUGLENOPHYCEAE

Order Euglenales

Family EUGLENACEAE

EUGLENA Ehrenberg 1838.

Euglena acus Ehrenberg 1838. Die Infusionsthierchen als vollkommene Organismen. p. 112.

Cells very slightly matabolic, elongate spindle-shaped, produced posteriorly into a long, fine tapering point, narrowed and truncate at the anterior end; membrane indistinctly spirally striated; chloroplasts numerous, disc-like; paramylon bodies 2 to several long rods; 10-14 mic. in diameter, 140-180 mic. long.

Rare.

PHACUS Dujardin 1841.

Phacus p eudoswirenkoi Prescott 1944. Farlowia, 1:368. (Fig. 14.)

Cells orbicular in outline, abruptly narrowed posteriorly and produced to form a short, sharp caudus which curves to the left (when seen from the ventral side); 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 mic. in diameter, 37-40 mic. long.

TRACHELOMONAS Ehrenberg 1835.

Trachelomonas volvocina Ehrenberg 1833. Abh. d. Konigl. Akad. Wiss. z. Berlin, 1833-224.

Test globose; flagellum aperture without a collar; wall yellowish, sometimes colorless, smooth; test 16-20 mic. in diameter.

Scarce.

DIVISION PYRROPHYTA

CLASS DINOPHYCEAE

Order Peridinales

Family Glenodiniaceae

GLENODINIUM (Ehrenb.) Stein 1883.

Glenodinium pulvisculus (Ehrenb.) Stein 1883. III Abteilung. II Hälfte. Die Naturgeschichte der Arthrodelen Flagellaten. p. 90.

Cells ovate to subglobose, the epicone and hypocone both broadly rounded at the poles; transverse furrow winding to the left; longitudinal furrow extending into the epicone and posteriorly almost to the pole of the hypocone; chromatophores numerous, golden-brown bodies; cells 13-19 mic. in diameter, 23-35 mic. long.

Fairly common.

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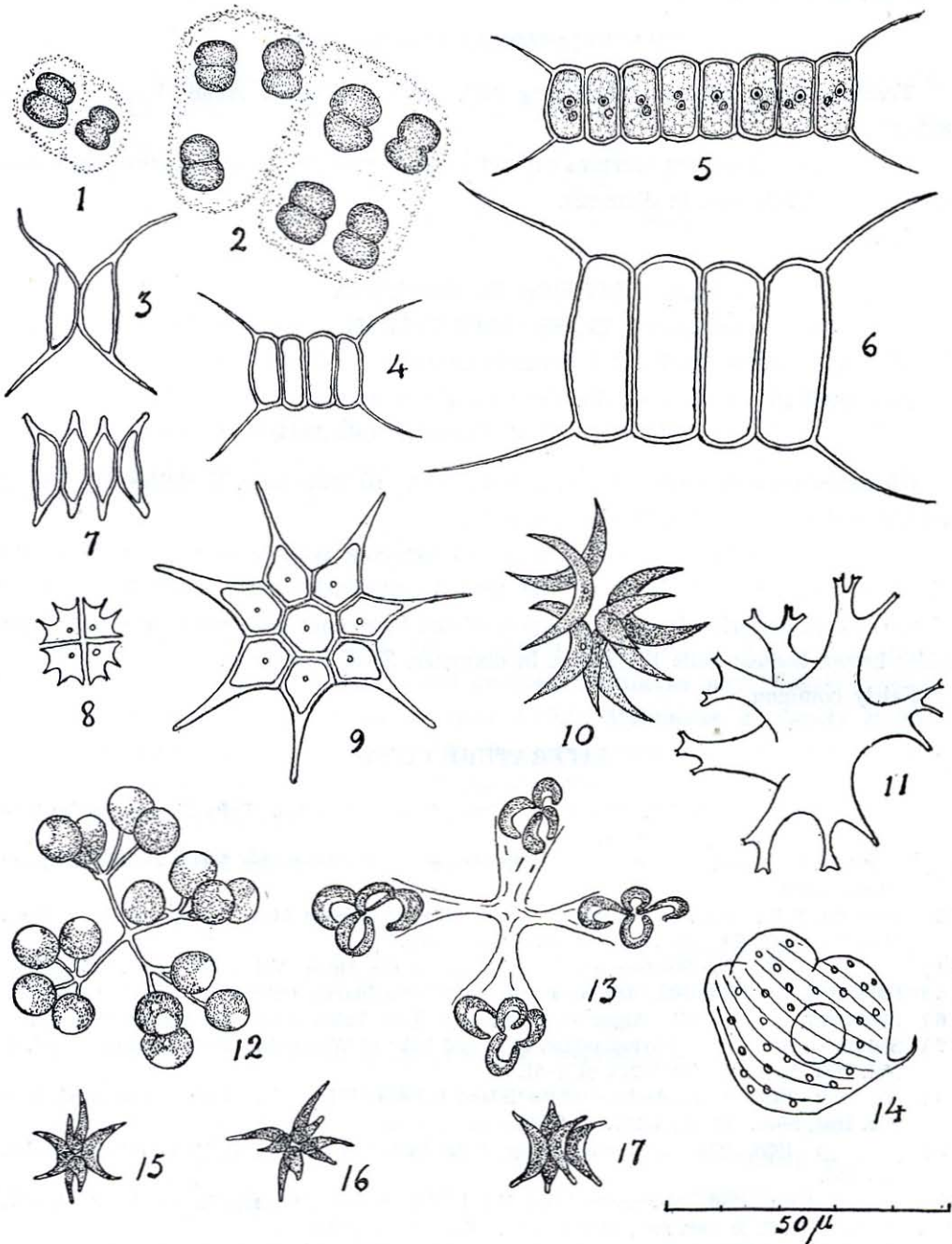


Fig. 1, 2. *Chroococcus limneticus* Lemmermann
 Fig. 3. *Scenedesmus opoliensis* P. Richter
 Figs. 4-6. *Scenedesmus quadricauda* (Turp.) de Brebisson
 Fig. 7. *Scenedesmus obliquus* (Turp.) Kuetzing
 Fig. 8. *Pediastrum tetras* (Ehrenb.) Ralfs.
 Fig. 9. *Pediastrum simplex* (Meyen) Lemmermann

Fig. 10. *Selenastrum Westii* G. M. Smith
 Fig. 11. *Tetraedron limneticum* Borge
 Fig. 12. *Dictyosphaerium pulchellum* Wood
 Fig. 13. *Tetrallantos Lagerheimii* Teiling
 Fig. 14. *Phacus Pseudoswirenkoi* Prescott.
 Figs. 15-17. *Tetradesmus formosana* nov. sp.