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IOWA ALGAE

by

GERALD W. PRESCOTT

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UNIVERSITY OF IOWA STUDIES
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INTRODUCTION

Freshwater algae are, for the most part, relatively minute in size. Consequently, observations of these plants were unavoidably superficial prior to the introduction of the compound microscope. This instrument made possible an understanding of the structure, reproduction, and life histories of these forms, upon which taxonomic relationships and theories regarding their phylogeny are based.

The algae of a given region, in any event, are usually the least known plants of its flora. This is largely due to their small size and to the fact that no popular importance is attributed to them. However, a growing appreciation of the economic significance of these plants, and the biological problems now recognized as associated with them, engage more and more the attention of biologists. Interest in the study of such plants is further increased by the probability that higher plants are derived indirectly from a remote algal ancestry. Naturally, the taxonomy of algae has a fundamental relationship to their consideration from these various points of view.

Previous to 1920 Iowa algae had been studied but very little as compared to the amount of work done in this group in neighboring states. However, as a result of surveys made since that year the number of algae now known to occur in Iowa perhaps is as large as that for any other state. Taxonomic papers dealing with the algal flora of this state fall into three chronological periods. The first of these (1880-1894) is marked by the published notices of Arthur (2), Bessey (4), and Shimek (65). These reports are brief lists of species, accompanied in some cases by collection data. Wolle's "Freshwater Algae of the United States" which was published during this period, contains references to a few species collected in Iowa.

In the second period (1905-1909) papers by Fink (24), Pammel and Buchanan (52), Anderson (1), Edmondson (23), Buchanan (12), and Wilson (102), extended considerably the list of algae known for this region. The papers of Edmondson (23) and Wilson (102) deal primarily with the protozoa of Iowa but include, to-

gether with their colorless relatives, a few chlorophyll-bearing or algal-like organisms. Buchanan's paper (12), which contains specific keys and valuable distribution data, summarizes all the earlier papers but one (1), and adds appreciably to the list of previously reported species. Collins (13) in his outstanding treatise "The Green Algae of North America," published in 1909, mentions but few forms as occurring in Iowa. From 1907 until 1924 no single report on the algae of this state seems to have been published.

The third period of taxonomic work on the algae of Iowa was opened in 1924 by the papers of L. H. Tiffany of the Ohio State University, and Gilbert M. Smith of Stanford University. These very critical reports are based upon field surveys made during 1922 and 1923 from the Lakeside Laboratory on West Okoboji Lake in northwestern Iowa. The investigations of these two algologists were encouraged by Professor R. B. Wylie of the State University of Iowa. As Director of the Lakeside Laboratory he had become interested in the obviously rich algal flora of the Okoboji region and had himself made several hundred collections from the numerous aquatic habitats which characterize that section of the state. These collections were turned over to L. H. Tiffany for determination and were included in his reports (78), (79), on filamentous algae. These papers involve approximately 200 species and varieties, of which seven are described as new to science. G. M. Smith, who worked primarily on plankton algae, likewise reported approximately 200 species and varieties in a paper (76) which includes one genus and 18 forms new to science.

The highly critical studies of these two algologists have resulted in scientific papers which are of much more value than the brief notices of earlier workers. They are, by far, the most dependable reports on Iowa algae and should form, in a large degree, the basis for further studies of these plants in this region.

The writer's share in this third period of taxonomic work was begun in the autumn of 1924 under the direction of Professor R. B. Wylie. Two years later certain results of the study were summarized in the form of a thesis for the Master of Arts degree (58) which included nearly 200 forms, collected for the most part in eastern Iowa. The scope of this algal survey has since been enlarged and during the past two years collections have been made from many parts of the state. In addition to the writer's personal collections, numbering over a thousand, he has been permitted to

examine several hundred collections contributed by interested biologists over the state. These combined collections are fairly representative of the various habitats in Iowa.

With these surveys obviously far from complete, the number of algae known to occur in the state, exclusive of the Diatoms, is nearly one thousand species and varieties. Approximately eight hundred of these have been studied by the writer and over four hundred of his determinations are new to Iowa. Systematic field work carried on through all seasons would, without doubt, greatly enlarge the number of algae now listed for the region. Such an abundance of forms might have been predicted since taxonomic studies in the United States indicate that the central plains are characterized by a great variety of these plants.

The taxonomic summary which follows includes not only all the determinations of the writer, but also the forms previously reported from the state by other workers. The names of the collectors are given in connection with the distribution data for each species.

In addition to algae in the strict sense there are also listed below certain pigmented animal-like forms representing such groups as the Volvocales, Dinoflagellatae, and Euglenineae. A few colorless organisms, usually classified as protozoa but closely related to these "border-line" algae, have also been included in their proper taxonomic positions.

Few single authoritative works deal adequately with all the groups represented in this summary. It has been necessary therefore to refer to different authors in determining and arranging many of the species included in the following list. Algologists do not always agree in their treatment of a given species, family, or larger group. Consequently when the system of classification given below is compared as a whole with any other system, a few disagreements are apparent. However, the arrangement used here differs throughout but very little from the taxonomic plan followed by G. S. West in his treatise "Algae" Volume I, Cambridge 1916.

Pascher and Lemmermann (55), (56), have been followed in classifying the Flagellatae; Schilling (63) has been used for the Dinoflagellatae; Printz (60) for the Protococcales; and Geitler for the Myxophyceae. The Conjugatae have been arranged according to the suggestions of Transeau and Tiffany of the State University of Ohio. In addition to the literature mentioned above the following authoritative works have been referred to a great deal: Smith

(72), (74); Tiffany (79), (80); Transeau (86), (87); West and Fritsch (95); West and West (101); Collins (13), (14); Tilden (81); Heering (32), (33); Hirn (35); Pascher (54); Deflandre (18), (19); and Borge (11).

After the name of each species listed below is given an abbreviated reference to a complete and authoritative description of that form. These references appear in full in the accompanying bibliography.

The writer wishes to thank here Professor R. B. Wylie for his generous assistance in many ways throughout the four years in which this study has been in progress. Acknowledgments are also due Professors Shimek, Martin, and Loehwing, all of the State University of Iowa, for supplying a number of collections and for their helpful suggestions. I wish to thank Doctors E. N. Transeau, L. H. Tiffany and Gilbert M. Smith for reviewing many of my determinations, for the identification of a number of species and for their helpful suggestions and criticisms. Also I wish to thank Professors Jaques of Iowa Wesleyan College, Conard of Grinnell, Kelly of Cornell, and Clark of Iowa State Teachers College, as well as my student associates, who have contributed a number of collections.

Artificial Key to the Genera of Iowa Algae

The following key is based on the genera of algae recorded for Iowa (except Batrachospermum which probably occurs here). Its use is therefore somewhat limited to this region. The student should also bear in mind that because of the rich algal flora in Iowa, subsequent collections and further studies will undoubtedly make known many forms not included in the key. In so far as possible, morphological characters of the vegetative condition have been used to differentiate the forms. It should be remembered that while morphological characters may be quite apparent from microscopical examination, they are, alone, sometimes insufficient to satisfactorily identify species.

1. Plants without definite chloroplasts; color usually blue-green, frequently olive-green, gray-green or brownish; no definite nucleus.....Class I. Myxophyceae 2
1. Plants with definite chloroplasts; color other than blue-green; definite nucleus present..... 32
    2. Cells not forming filaments (or, if so, very short, attached to a substrate and showing basal-apical differentiation.....Subclass Chroococceae 3
    2. Cells forming definite, usually very long filaments.....Subclass Homogoneae, order Homogonealis 4
3. Cells solitary or in definite or irregular colonies; no differentiation of plant into base and apex; usually unattached.....Order Chroococcales, Chroococcaceae 5
3. Cells solitary or forming short, attached filaments with basal-apical differentiation.....Order Chamaesiphonales 11
    4. Cells usually single or in small aggregates, sometimes rectangular plates formed by cell-division in two planes 5
    4. Cells forming aggregates of many cells; cell-division in three planes 6
5. Cells solitary or irregularly arranged in small colonies..... Chroococcus p. 25
5. Cells regularly arranged in rectangular plates.....Merismopedia p. 28
    6. Cells embedded in individual, gelatinous sheaths which form concentric layers about the cell and groups of cells ..... Gloeocapsa p. 26
    6. Cells embedded in a common gelatinous envelope..... 7
7. Colony a hollow sphere; cells in one layer at the periphery..... 8
7. Cells not arranged to form a hollow sphere..... 9

8. Cells widely separated, solitary or in pairs at the ends of radiating, gelatinous strands from the center of the colony ..... Gomphosphaeria p. 27
8. Cells close together, not at the ends of radiating gelatinous strands ..... Coelosphaerium p. 26
9. Cells crowded in a solid aggregation to form either spherical or irregular colonies which are frequently saccate and perforate ..... Microcystis p. 29
9. Cells not densely crowded, distributed at some distance throughout the envelope 10
10. Cells spherical ..... Aphanocapsa p. 24
10. Cells oblong to cylindrical ..... Aphanothece p. 25
11. Cells forming several-layered colonies. Not reported from Iowa. ..... Pleurocapsa
11. Cells not in colonies; gonidial cells successively constricted from the apex of a gonidiangium ..... Chamaesiphon p. 29
12. Trichomes without heterocysts ..... Oscillatoriaceae 13
12. Trichomes with heterocysts 21
13. Trichomes inclosed by a sheath 14
13. Trichomes not inclosed by a sheath 18
14. One trichome in a sheath 15
14. Several or many trichomes in a sheath 16
15. Sheaths firm; filaments usually free-floating ..... Lyngbya p. 30
15. Sheaths not firm but mucous; filaments united in large masses by diffluent sheaths ..... Phormidium p. 34
16. Trichomes many within the sheath 17
16. A few trichomes within a mucous sheath ..... Hydrocoleus p. 30
17. Filaments branched; trichomes numerous; sheath firm ..... Schizothrix p. 35
17. Filaments not branched; sheaths mucous ..... Microcoleus p. 31
18. Filaments solitary, never forming permanent aggregations 19
18. Filaments united side by side to form rather permanent, flake-like bundles ..... Trichodesmium p. 36
19. Filaments long and usually large, straight or loosely curved or slightly spiralled ..... Oscillatoria p. 32
19. Filaments short, small, closely spiralled 20
20. Trichomes many-celled ..... Arthrospira p. 30
20. Trichomes one-celled ..... Spirulina p. 35
21. Filaments tapering toward the apex ..... Rivulariaceae 30
21. Filaments not tapering toward the apex 22
22. Filaments unbranched ..... Nostocaceae 23
22. Filaments branched 27
23. Trichomes much entangled, united in a copious gelatinous mass to form a colony of definite shape ..... Nostoc p. 40
23. Trichomes more straight (sometimes twisted) never joined to form gelatinous colonies of definite shape 24

36. Furnished with one or two terminal cilia in the dominant, vegetative condition; without an armor of calcareous plates ..... Chrysophyceae 37
36. Furnished with two flagella, one trailing and one wound around the organisms in a transverse furrow; many forms armored with calcareous plates ..... Class IX. Peridineae 172

37. Cells with cilia of unequal length, solitary or colonial; cell inclosed by a wide, hyaline, cone-shaped envelope ..... Dinobryon (Family Ochromonadaceae, Order Ochromonadales) p. 44
37. Cells with cilia of unequal length, united into globose colonies in which obovoid or ellipsoid cells are arranged with their narrow ends directed toward the center of the colony.
Synura (Family Euhymenomonadaceae, Order Hymenomonadales) p. 43

38. Plants large, bulbate, terrestrial; attached by branching rhizoids to mud ..... Botrydium (Family Botrydiaceae, Order Heterosiphonales) p. 48
38. Plants microscopic, aquatic, free-floating or attached 39

39. Plants filamentous ..... Tribonema (Family Tribonemaceae, Order Heterotrichales) p. 47
39. Plants unicellular, solitary or colonial, not filamentous 40

40. Plants epiphytic; cells small, each inclosed by a hyaline, pitcher-shaped envelope, attached to substrate by a fine, hair-like stalk ..... Stipitococcus (Family Rhizochloridaceae, Order Rhizochloridales) p. 45
40. Cells mostly free-floating, or when epiphytic not inclosed by pitcher-like envelopes 41

41. Cells globose, contained in mucilaginous tubes in branching colonies ..... Mischococcus (Family Mischococcaceae, Order Heterocapsales) p. 45
41. Plants not as above ..... Order Heterococcales 42

42. Plants, free-floating 43
42. Plants unicellular, attached 46

43. Cells solitary 44
43. Cells colonial 45

44. Cells quadrate in face view, the angles furnished with spines ..... Pseudotetraëdron (Family Chlorobotrydaceae) p. 45
44. Cells cylindric, the ends rounded, sometimes bearing a terminal spine (forming an attached colony of cylindric cells in one species) ..... Ophiocytium (Family Sciadaceae) p. 46

45. Forming large (usually compound) aggregates of globose cells inclosed by a mucilaginous envelope ..... Botryococcus (Family Botryococcaceae) p. 47
45. Cells cylindric, united in umbellate colonies and usually attached ..... Ophiocytium arbuscula p. 46

46. Cells minute, globose, gregarious, attached by fine, hair-like stalks to filamentous algae ..... Peroniella (Family Chlorotheciaceae) p. 45

46. Cells cylindric, ellipsoid or ovoid, attached by a short, comparitively thick stalk and adhesive disc to filamentous algae..Characiopsis (Family Chlorotheciaceae) p. 46
47. Plants large, coarse, many centimeters in length, growing upright, with root-like and stem-like branches, at the bottom of ponds and slow streams.....Class VI. Charaphyta 165
47. Plants smaller, one-celled, colonial, or filamentous..... 48
48. Cells with grass-green chromatophores and pyrenoids; sedentary or, if motile, with 2-4 fine cilia at the anterior end of symmetrical cells; without grooves or gullets.....Class V. Chlorophyceae 50
48. Cells always motile in the vegetative state by means of one or two strong flagella or band-shaped cilia; cells frequently flattened dorsi-ventrally; green color often modified by brownish or reddish tints..... 49
49. Cells distinctly dorsi-ventral, with a marked longitudinal or transverse furrow; cilia unequal in length; chromatophore often tinged with brown .....Class VII. Cryptophyceae 167
49. Cells radially organized; chromatophores grass-green (a few colorless, somewhat flattened relatives); one, (rarely two) prominent flagella; furrow absent .....Class VIII. Euglenineae 168
50. Plants motile, one-celled or colonial....Order Volvocales 51
50. Plants non-motile in the vegetative state..... 60
51. Plants solitary in the dominant, vegetative state 57
51. Plants colonial, four to thousands of cells inclosed by a hyaline, gelatinous envelope .....Family Volvocaceae 52
52. Cells 4-16, arranged in a flat, plate-like colony ..... Gonium p. 48
52. Cells otherwise 53
53. Cells in a flattened and twisted, horseshoe-shaped colony ..... Platydorina p. 49
53. Cells in globose or oval colonies 54
54. Cells in the colony numbering five hundred to several thousand .....Volvox p. 49
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55. Cells pear-shaped, crowded within the envelope .....Pandorina p. 49
55. Cells round or oval 56
56. Cells of the colony all similar in size .....Eudorina p. 48
56. Small vegetative and larger gonidial (reproductive) cells in the same colony .....Pleodorina p. 49
57. Cells inclosed by a hyaline, gelatinous envelope, conical or rounded at the anterior end 58
57. Cells naked, pyramidal or somewhat heart-shaped, three lobes at the anterior end.....Pyramimonas (Family Polyblepharidaceae) p. 51
58. Cells symmetrical, not flattened, with a cell-wall of one piece; anterior end frequently beaked between the two cilia .....Chlamydomonas (Family Chlamydomonadaceae) p. 50

58. Cells flattened; a wide, hyaline envelope often composed of two valves ..... Family Phacotaceae 59
59. Cells oval in face view, biconvex in side view; membrane dark and composed of two sections or valves which are thickened where the edges come together ..... Phacotus p. 50
59. Cells with an angular protoplast, concave between the angles with a very much flattened envelope that is silicified and extended into broad wings in the plane where the sections adjoin..... ..... Pteromonas p. 51
60. One-celled or filamentous; cells composed of two symmetrical halves or semicells as shown by a constriction of the cell-wall (sometimes constriction is very slight); cell-content usually organized into two symmetrical bodies ..... Order Desmidiales 145
60. Cells not divided into two symmetrical parts by wall constriction; cell-content not in two symmetrical bodies 61
61. Plants one-celled or colonial (often loosely organized) not filamentous ..... Order Protococcales 62
61. Plants composed of more or less permanently associated cells, forming simple or branched filaments 111
62. Cells loosely arranged, embedded in copious mucilage to form large, irregular colonies of an indefinite number of individuals; sedentary but furnished with pseudocilia in some forms..... Family Tetrasporaceae 63
62. Cells solitary, or arranged in small, permanent colonies of a rather definite shape and of an even number of cells, or, if in loose colonies, of an indefinite number of cells not embedded in copious mucilage and not large colonies 68
63. Colonies pyriform, epiphytic; cells bearing pseudocilia .... Apiocystis p. 51
63. Colonies not epiphytic, globose or irregular in shape..... 64
64. Cells grouped in 4's within copious mucilage; usually forming large, gelatinous masses, attached or floating, pseudocilia sometimes evident upon staining..... ..... Tetraspora p. 52
64. Without pseudocilia; cells not in 4's 65
65. Cells spherical to ellipsoid; irregularly placed in firm, lamellated tubes of mucilage ..... Hormotila p. 52
65. Cells not as above 66
66. Colony of eight cells (sometimes solitary or in 4's), embedded in a distinctly lamellated, gelatinous sheath ..... Gloeocystis p. 51
66. Colonies with a larger number of cells; gelatinous envelope, when present, not lamellated 67

67. Cells spherical, arranged in groups 4-8-16-32 at the periphery of a hyaline, gelatinous envelope; chloroplast green, cup-shaped ..... Sphaerocystis p. 52
67. Cells irregularly diposed in a copious, gelatinous matrix, obtaining macroscopic size; chloroplast bell-shaped, often red; semi-terrestrial ..... Palmella p. 52
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68. Plants aquatic 69
69. Cells coenocytic, definitely arranged to form a loose net, a flat plate or a spherical coenobium of stalked, spine-bearing cells ..... Hydrodictyaceae 70
69. Cells not as above 72
70. Cylindrical cells; arranged to form a sac-like net, the meshes formed by five or six cells ..... Hydrodictyon p. 54
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74. Plants not endophytic 75
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76. Cells spherical, oval, or globose, without angles or processes 80
77. Cells four-angled; angles extended into long, sharp spines; chloroplast filling the entire cell (rarely with parietal, cup-shaped chloroplasts); pyrenoids four, pyramidately arranged ..... Treubaria p. 69
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78. Cells not as above 79
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80. Cells spherical or oval 81

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81. Cells round or globose 82
81. Cells oval or reniform 87
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82. Cell-wall with spines, teeth or markings 85
83. Cells large, thin-walled, not inclosed by mucilage, chromatophores small, numerous ..... Eremosphaera p. 58
83. Cells not as above 84
84. Cells with thin walls; embedded in gelatine (often forming colonies); chloroplasts several, polygonal, parietal ..... Planktosphaeria p. 63
84. Cell-walls lamellated; solitary or several within mother-cell wall and separated by dark, gelatinous bands; one large chloroplast filling the cell ..... Gloeotaenium p. 59
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93. Cells small, ovate-cuneate, in groups with long axes radiating from a common center toward periphery of envelope ..... Gloeoactinium p. 58
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105. Cells oval or elliptic 106
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111. Cells of filament without ring-like scars at cross-walls; cells cylindrical or tapering anteriorly; chromatophore not a parietal net 113

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112. Filaments branched; cells bulbous, with bulbate, lateral and terminal setae ..... Bulbochaete p. 94

113. Rather fine, simple or branched filaments, often with basal-distal differentiation, or plants disc-like or tubular, cellular expansions; cells mostly cylindrical; chloroplasts parietal plates or discs; uninucleate (at least when young)..... Order Ulotrichales 114

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119. Cells without setae; filaments coalescing to form irregular expansions ..... Endoderma p. 85

120. Creeping filaments, seldom branched; cells with one or more setae on outer, free wall; seta with a bulbous base ..... Aphanochaete p. 87

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121. Cells in main axis of filament distinctly larger and of different character than those of the branches ..... Draparnaldia p. 85

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131. Filaments of cylindrical, regularly arranged cells in a wide, gelatinous envelope; chloroplast an equatorial band ..... Geminella p. 80
131. Filaments of quadrate or ellipsoid cells; cells sometimes in a double series; wall very heavy and lamellated; chloroplast massive ..... Cylindrocapsa p. 83
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Class MYXOPHYCEAE

Sub-class A. CHROOCOCCEAE

Order I. CHROOCOCCALES

Family **Chroococcaceae**

APHANOCAPSA Nägeli, 1849
(Smith, 1920, p. 41.)

1. *Aphanocapsa delicatissima* W. & G. S. West

Smith, 1920, p. 41, Pl. 2, Fig. 7.

Cells 0.5-0.75μ in diameter. Pl. I, Fig. 1. Rather rare. In lakes, streams and sloughs, Dickinson County. (Smith). Swamp, Johnson County. July. (Prescott).

2. *Aphanocapsa elachista* W. & G. S. West

Jour. Linn. Soc. Botany 30: 276, Pl. 15, Figs. 9, 10. 1895. Tilden, 1910, p. 28, Pl. II, Fig. 6.

Cells spherical, 1-2μ in diameter. Pl. I, Fig. 2. Among filamentous algae at margin of marsh-like pond, Johnson County. July. (Prescott).

var. a *conferta* W. & G. S. West.

Jour. Linn. Soc. Botany 40: 432, Pl. 19, Fig. 1. 1912. Smith, 1920, p. 42, Pl. 2, Fig. 8.

Cells distinctly more crowded than in the type, 1.6-2.0μ in diameter. Rare. Slough, Dickinson County. (Smith).

var. b *planctonica* G. M. Smith.

Smith, 1920, p. 42, Pl. 3, Fig. 3.

Cells 2-3μ in diameter. Plankton in slough, Dickinson County. (Smith).

3. *Aphanocapsa grevillei* (Hass.) Rabenhorst

Tilden, 1910, p. 28, Pl. II, Fig. 7.

Cells spherical, 4-6μ in diameter. Plankton, East Okoboji Lake, Dickinson County. August. (Prescott). Story County. (Buchanan).

4. *Aphanocapsa rivularis* (Carmichael) Rab.

Smith, 1920, p. 43, Pl. 3, Fig. 2.

Cells 5-6μ in diameter. Pl. I, Fig. 3. Plankton in shallow water of marsh, Johnson County. April. (Prescott).

5. *Aphanocapsa zanardinii* (Hauck) Hansgirg

Tilden, 1910, p. 28.

Cells 10-16μ in diameter. Pl. I, Fig. 4. Plankton from small open water tank, Johnson County. June. (Prescott).

Aphanothece Nägeli, 1849

(Smith, 1920, p. 43.)

1. *Aphanothece clathrata* W. & G. S. West

Smith, 1920, p. 44, Pl. 6, Fig. 3.

Cells 0.6-1.0μ in diameter, 3.5-4.5μ long. Pl. I, Fig. 6. Rare. Lakes, Dickinson County. (Smith).

2. *Aphanothece pallida* (Kuetz.) Rab.

Tilden, 1910, p. 31.

Cells 3-8μ in diameter, 5-24μ long. Pl. I, Fig. 5. On damp soil, among rhizoids and on wet tree bark, Johnson County. March. (Prescott).

Chroococcus Nägeli, 1849

(Smith, 1920, p. 27.)

1. *Chroococcus dispersus* (v. Keissler) Lemmermann

Smith, 1920, p. 28, Pl. 1, Fig. 2.

Cells 3-4μ in diameter. Rare. Lakes and streams, Dickinson County. (Smith).

2. *Chroococcus limneticus* Lemmermann

Smith, 1920, p. 29, Pl. 1, Fig. 4.

Cells 8-13μ in diameter. Pl. I, Fig. 7. Plankton in ponds, streams, lakes, Dickinson County. (Smith).

3. *Chroococcus minor* (Kuetz.) Nägeli

Tilden, 1910, p. 9, Pl. I, fig. 7.

Cells 3-4μ in diameter. Pl. I, Fig. 8. On moist surfaces, Johnson County. October. (Prescott).

4. *Chroococcus refractus* Wood

Tilden, 1910, p. 8.

Cells 5μ in diameter, triangular or quadrangular. Pl. I, Fig. 9. Story County. (Bessey).

5. *Chroococcus turgidus* (Kuetz.) Nägeli

Smith, 1920, p. 31, Pl. I, Fig. 9.

Cells 13-40μ in diameter. Pl. I, Fig. 10. Plankton in ponds, Johnson County, October. (Prescott); Dickinson County. (Smith).

6. *Chroococcus varius* A. Braun in Rab.

Tilden, 1910, p. 7.

Cells 2-4μ in diameter. Blue-green coatings on moist surfaces, Johnson County. October. (Prescott).

Coelosphaerium Nageli, 1849

(Smith, 1920, p. 33.)

1. *Coelosphaerium kuetzingianum* Nägeli

Smith, 1920, p. 34, Pl. 3, Figs. 4, 5.

Cells 2-5μ in diameter. Pl. I, Figs. 11, 12. Plankton in drainage canal, Dickinson County. July. (Prescott). Wright County. (Buchanan). Dickinson County. (Smith).

2. *Coelosphaerium naegelianum* Unger

Smith, 1920, p. 35, Pl. 3, Fig. 6; Pl. 4, Fig. 1.

Cells 2-3μ in diameter, 3.5-6μ long. Pl. I, Fig. 13. Plankton, East Okoboji Lake, Dickinson County. August. (Prescott). Lakes, Dickinson County. (Smith).

Gloeocapsa Kuetzing, 1843

(Tilden, 1910, p. 13.)

1. *Gloeocapsa aeruginosa* (Carmichael) Kuetzing

Tilden, 1910, p. 18, Pl. I, Fig. 19.

Cells 2-4μ in diameter. Pl. I, Fig. 14. On upper surface of polyporous fungus. Johnson County. October. (Prescott).

2. *Gloeocapsa arenaria* (Hass.) Rab.

Tilden, 1910, p. 16, Pl. I, Fig. 16.

Cells 3.7-6μ in diameter. Pl. I, Fig. 15. On outcroppings of limestone rock, Johnson County. October. (Prescott). Powesheik County. (Fink). Story County. (Buchanan).

3. *Gloeocapsa conglomerata* Kuetzing

Geitler, 1925, p. 89, Fig. 88; Tilden, 1910, p. 18, Pl. I, Fig. 21.

Cells 3-6μ in diameter. Pl. I, Figs. 16, 17. Plant masses adhering to large filamentous algae. Marsh, Johnson County. September. (Prescott).

4. *Gloeocapsa magna* (Breb.) Kuetzing

Tilden, 1910, p. 21, Pl. I, Fig. 29.

Cells 4.5-7μ in diameter. Pl. I, Fig. 18. On granite boulders, Fayette County. (Fink).

GLOEOCHAETE[1] Lagerheim, 1883

(West and Fritsch, 1927, p. 494.)

1. *Gloeochaete wittrockiana* Lagerheim

Collins, 1918, p. 27, Fig. 7.

Cells globose or subglobose, surrounded by a wide, hyaline, mucilaginous investment, through which 1-4 long, slender setae extend from each cell. Cell-content bluish-green, with several curved, rod-shaped chromatophores. Attached to Chara and large filamentous algae in shallow water of marsh, Johnson County. October. (Prescott).

GOMPHOSPHAERIA Kuetzing, 1836

(Smith, 1920, p. 36.)

1. *Gomphosphaeria aponina* Kuetzing

Smith, 1920, p. 37, Pl. 4, Figs. 2, 3.

Cells 4-5μ in diameter, 8-15μ long. Wright County, Dickinson County. (Buchanan).

var. a *cordiformis* Wolle.

Smith, 1920, p. 37, Pl. 4, Fig. 4.

Cells heart-shaped, 6-13μ wide, 9-20μ long. Aquarium, Linn County. (Prescott).

2. *Gomphosphaeria lacustris* Chodat

Smith, 1920, p. 36, Pl. 4, Fig. 5.

Cells 1.5-2.5μ wide, 1.5-4μ long. Plankton, Millers Bay, Dickinson County. July. (Prescott). Lakes and sloughs, Dickinson County. (Smith).

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[1] This interesting form has been assigned to various taxonomic positions. See West (l.c.), p. 40; West and Fritsch (95), p. 495, and L. Geitler, in Archiv für Protistenkunde 47: 1-24. 1924.

MERISMOPEDIA Meyen, 1839
(Smith, 1920, p. 31.)

1. *Merismopedia aeruginea* Brebisson in Kuetzing

Tilden, 1910, p. 42, Pl. II, Fig. 32.

Cells 5μ in diameter. Pl. II, Fig. 1. Plankton, marsh, Johnson County. (Prescott).

2. *Merismopedia convoluta* Breb.

Tilden, 1910, p. 44, Pl. II, Fig. 36.

Cells oval, 5-7μ wide, 6-9μ long. Pl. II, Figs. 2, 3. Plankton in slough, Johnson County. July. (Prescott).

3. *Merismopedia elegans* A. Braun

Smith, 1920, p. 32, Pl. 2, Fig. 5.

Cells 5-7μ wide, 5-9μ long. Pl. II, Fig. 4. Plankton from marsh, Johnson County. October. (Prescott). Okoboji Lakes, Dickinson County. (Smith). Wright County. (Buchanan).

4. *Merismopedia glauca* (Ehrenberg) Nägeli

Tilden, 1910, p. 43, Pl. II, Fig. 35.

Cells 3-6μ in diameter. Intermingled with filamentous algae attached to dam in swiftly flowing water, Johnson County. May. (Prescott). Decatur County. (Anderson). Story County. (Buchanan). Fayette County. (Fink). Powesheik County. (Fink). Okoboji Lakes, Dickinson County. (Prescott), (Smith).

5. *Merismopedia punctata* Meyen

Smith, 1920, p. 33, Pl. 2, Fig. 3.

Cells 2.5-3.5μ in diameter. Okoboji Lakes, Dickinson County. (Smith).

6. *Merismopedia tenuissima* Lemmermann

Smith, 1920, p. 33, Pl. 2, Fig. 2.

Cells 1.3-2μ in diameter. Plankton from shallow marsh, Johnson County. (Prescott). Okoboji Lakes, Dickinson County. (Smith).

7. *Merismopedia minima* Beck

Geitler, 1925, p. 106.

Cells 0.5-0.6μ in diameter. Pl. II, Fig. 5. Plankton from West Okoboji Lake, Dickinson County. August. (Prescott).

MICROCYSTIS Kuetzing, 1833
(Tilden, 1910, p. 33.)

1. *Microcystis aeruginosa* Kuetzing

Smith, 1920, p. 39, Pl. 5, Figs. 2, 3.

Cells 3-4μ in diameter. Okoboji Lakes, Dickinson County. (Prescott), (Smith), (Buchanan). Ames, Story County. (Bessey).

var. a *major* (Wittr.) G. M. Smith.

Smith, 1920, p. 40, Pl. 4, Fig. 6.

Colonial envelope more firm than in the type. Lakes and ponds, Dickinson County. (Smith).

2. *Microcystis flos-aquae* (Wittr.) Kirchner

Smith, 1920, p. 39, Pl. 5, Fig. 1.

Cells spherical, 4-6.5μ in diameter. Pl. II, Fig. 6. Lakes and sloughs, Dickinson County. (Smith). Ponds and swamp, Johnson County. (Prescott).

3. *Microcystis incerta* Lemmermann

Smith, 1920, p. 40, Pl. 5, Fig. 4. (*Microcystis pulverea* (Wood) Migula var. *incerta* (Lemm.)Crow.) Geitler, 1925, p. 62, Fig. 47.

Cells spherical 1-2μ in diameter. Rare. Lakes, Dickinson County. (Smith).

4. *Microcystis marginata* (Meneghini) Kuetzing

Tilden, 1910, p. 34, Pl. II, Fig. 17.

Cells 3-4μ in diameter. In stagnant, barnyard pool, Johnson County. June. (Prescott).

Order II. CHAMAESIPHONALES

Family **Chamaesiphonaceae**

CHAMAESIPHON Braun and Grunow, 1865
(Tilden, 1910, p. 55.)

1. *Chamaesiphon incrustans* Grunow

Tilden, 1910, p. 55, Pl. III, Figs. 29, 30.

Gonangia club-shaped or cylindrical, solitary or crowded, 4-8μ wide at the top, 7-30μ long. Pl. II, Fig. 7. Growing on *Oedogonium* filaments, Johnson County. April. (Prescott). On *Oedogonium* (?), Wright County. (Buchanan).

Sub-class B. HORMOGONEAE

Order I. HORMOGONEALES

Family **Oscillatoriaceae**

ARTHROSPIRA Stizenberger, 1852
(Tilden, 1910, p. 85.)

1. *Arthrospira jenneri* (Kuetzing) Stizenberger

Tilden, 1910, p. 85, Pl. IV, Fig. 44.

Cells quadrate, 4-5μ long. Pl. II, Fig. 8. Lakes, Dickinson County. (Tiffany).

HYDROCOLEUS Kuetzing, 1843
(Tilden, 1910, p. 134.)

1. *Hydrocoleus glutinosus* (Ag.) Gomont

Tilden, 1910, p. 136, Pl. V, Fig. 59. (*Lyngbya glutinosa* Agardh.) Buchanan, 1907, p. 57.

Iowa. (Buchanan).

LYNGBYA Agardh, 1824
(Tilden, 1910, p. 108.)

1. *Lyngbya aerugineo-caerulea* (Kuetzing) Gomont

Tilden, 1910, p. 116, Pl. V, Figs. 32, 33.

Cells 4-6μ wide, (2.1) 2-3μ long. Pl. II, Fig. 9. Forming blue-green coatings on submersed leaves in trickling water. Johnson County. May. (Prescott).

2. *Lyngbya aestuarii* (Mertens) Liebmann

Tilden, 1910, p. 120, Pl. V, Figs. 40, 41. (*Lyngbya obscura* Kuetzing.) Buchanan, 1907, p. 57.

Cells 8-24μ wide; trichomes tapering toward apex. Plankton in sloughs and ponds, Johnson County. (Prescott.) Plankton in ponds, Dickinson County. (Tiffany.) Ponds, Wright County. (Buchanan).

3. *Lyngbya birgei* G. M. Smith

Smith, 1920, p. 54, Pl. 7, Figs. 14, 15.

Cells 18-23μ wide, 2-2.5μ long. Pl. II, Fig. 10. Plankton in West Okoboji Lake, Dickinson County. May. (Prescott), (Smith), (Tiffany).

4. *Lyngbya contorta* Lemmermann

Smith, 1920, p. 52, Pl. 7, Figs. 12, 13.

Cells 1.5-2μ wide, 3-6μ long. Plankton in Pleasant Lake, Dickinson County. (Tiffany), (Smith).

5. *Lyngbya distincta* (Nordst.) Schmidle

Tilden, 1910, p. 113; Tiffany, 1926, p. 73, Pl. XI, Fig. 117.

Lake, Dickinson County. (Tiffany).

6. *Lyngbya lagerheimii* (Möbius) Gomont

Tilden, 1910, p. 111, Pl. V, Figs. 22, 23.

Cells rectangular, 1.2-3μ long, 2μ wide. Pl. II, Figs. 11, 12. Forming coatings on submersed wood in ponds, Johnson County. April. (Prescott).

7. *Lyngbya major* Meneghini

Tilden, 1910, p. 126, Pl. V, Fig. 46.

Cells 11-17μ wide, 2-4μ long. Pl. II, Fig. 13. Appearing in cultures of soil algae from greenhouse, University of Iowa, Johnson County. February. (Prescott).

8. *Lyngbya majuscula* (Dillw.) Harvey

Tilden, 1910, p. 123, Pl. V, Fig. 42; Tiffany, 1926, p. 73, Pl. II, Fig. 115.

Cells 16-60μ in diameter, 2-4μ long. Plankton from West Okoboji Lake, Dickinson County. (Tiffany).

9. *Lyngbya martensiana* Meneghini

Tilden, 1910, p. 124, Pl. V, Fig. 43.

Cells 1.7-3.3μ long, 6-10μ wide. Entangled about stems of water plants in aquarium, Linn County. (Prescott).

10. *Lyngbya ochracea* (Kuetzing) Thuret

Tilden, 1910, p. 113, Pl. V, Figs. 25, 26.

Cells 0.6-0.8μ long, 0.9μ wide. Johnson County. (Hobby). Where there is an abundance of iron, Wright County. (Buchanan). Decatur County. (Anderson).

Microcoleus Desmazieres, 1823

(Tilden, 1910, p. 154.)

1. *Microcoleus lacustris* (Rab.) Farlow

Tilden, 1910, p. 157.

Cells 4-5μ in diameter, 6-12μ long. Forming a stratum on damp soil of greenhouse, University of Iowa, Johnson County. April. (Prescott).

2. *Microcoleus paludosus* (Kuetzing) Gomont

Tilden, 1910, p. 158, Pl. VI, Fig. 30.

Cells 5-7μ wide, 4-13μ long. Pl. II, Figs. 14, 15. On damp soil, Johnson County. April. (Prescott).

3. *Microcoleus subtorulosus* (Kuetzing) Gomont

Tilden, 1910, p. 158, Pl. VI, Fig. 32. (*Lyngbya subtorulosa* (Breb.)Wolle.) Buchanan, 1907, p. 57.

Cells 6-10μ wide, 5-10μ long. Johnson County. (Hobby).

4. *Microcoleus vaginatus* (Vauch.) Gomont

Tilden, 1910, p. 156, Pl. VI, Fig. 29.

Cells 5.8μ wide, about as long or a little longer. Plant masses sparsely scattered among mats of *Vaucheria terrestris* on damp soil, Johnson County. April. (Prescott). Powesheik County. (Fink).

Oscillatoria Vaucher, 1803

(Tilden, 1910, p. 58.)

1. *Oscillatoria agardhii* Gomont

Tilden, 1910, p. 62, Pl. IV, Fig. 2.

Cells 4-6μ wide, 2.5-3.5μ long. Lakes, Dickinsin County. (Tiffany).

2. *Oscillatoria amoena* (Kuetz.) Tilden

Tilden, 1910, p. 77, Pl. IV, Fig. 26.

Cells 2.5-5.5μ wide, 2.5-4.2μ long. Pl. III. Figs. 11, 12. Appearing in cultures of soil algae, University of Iowa, Johnson County. February. (Prescott).

3. *Oscillatoria amphibia* Agardh

Tilden, 1910, p. 73, Pl. IV, Figs. 19, 20. (*Oscillatoria tenerrima* Kg.) Anderson, 1905, p. 56.

Cells 2-3μ wide, 4-8.5μ long. Pl. III, Figs. 1-3. On damp soil at edge of pond and floating in water, Johnson County. October. (Prescott). Generally distributed. (Fink), (Buchanan), (Anderson).

4. *Oscillatoria anguina* Bory

Tilden, 1910, p. 68, Pl. IV, Fig. 9.

Cells 6-8μ wide, 1.5-2.5μ long. Pl. III, Figs. 4, 5. Forming dark blue-green or nearly black mats on surface of aquaria and ponds, Johnson County. May to October. (Prescott).

5. *Oscillatoria angustissima* W. & G. S. West

Tilden, 1910, p. 76.

Cells 0.6μ wide, 0.9-1.2μ long. Pond, Story County. (Buchanan). Previously reported from West Indies and Africa.

6. *Oscillatoria chalybea* Mertens

Tilden, 1910, p. 82, Pl. IV, Fig. 36.

Cells 8-13μ wide, 3.6-8μ long. In bayou of Mississippi river, Clayton County. (Tiffany).

7. *Oscillatoria brevis* Kuetzing

Tilden, 1910, p. 79, Pl. IV, Fig. 32.

Cells 4-6.5μ wide, 1.5-2.8μ long. Pl. III, Fig. 6. Floating in standing water, Henry County. May. (Prescott).

8. *Oscillatoria chlorina* Kuetzing

Tilden, 1910, p. 75, Pl. IV, Fig. 22.

Cells 3.5-4μ wide, 3.7-8μ long. Thin expansions on decaying aquatic plants in marsh, Johnson County. October. (Prescott).

9. *Oscillatoria curviceps* Agardh

Tilden, 1910, p. 67, Pl. IV, Fig. 7.

Cells 10-17μ wide, 2-5μ long. Pl. III, Figs. 7, 8. Quarry pond, Linn County. April. (Prescott).

10. *Oscillatoria formosa* Bory

Tilden, 1910, p. 80, Pl. IV, Fig. 33.

Cells 4-6μ wide, 2.5-5μ long. Pl. III, Fig. 9. On dripping rocks and damp soil, Johnson County. May. (Prescott). Lakes, Dickinson County. (Smith).

11. *Oscillatoria limosa* Agardh

Tilden, 1910, p. 65, Pl. IV, Fig. 6; (*Oscillatoria froelichii* Kuetzing) Buchanan, 1907, p. 58; (*Oscillatoria nigra* Vaucher) Tilden, 1910, p. 70.

Cells 11-20μ wide, 2-5μ long. Clots in quarry pond, Johnson County. February. (Prescott). Sulphur spring, Hardin County. (Gardner). Generally distributed. (Hobby), (Fink), (Buchanan), (Bessey), (Tiffany), (Anderson).

var. a *fusca* (Kirchner) nob.

(*Oscillatoria froelichii* var. *fusca* Kirchner) Wolle, 1887, p. 316, Pl. 207, Figs. 9, 10.

Plants dark olive-brown in mass; cell content olive-green. On moist soil in greenhouse, Story County. (Buchanan).

12. *Oscillatoria princeps* Vaucher

Tilden, 1910, p. 62, Pl. IV, Fig. 3. (*Oscillatoria imperator* Wood) Buchanan, 1907, p. 59.

Cells 16-60μ wide, 3.5-7μ long. Pl. III, Fig. 10. Black clots floating in ponds and sloughs, Johnson County. March. (Prescott). Generally distributed. (Hobby), (Fink), (Bessey), (Buchanan), (Tiffany), (Anderson).

13. *Oscillatoria sancta* Kuetzing

Tilden, 1910, p. 64, Pl. IV, Fig. 5.

Cells 10-12μ wide, 2.5-6μ long. Forming dark masses on submersed leaves, beneath ice of spring water. Johnson County. February. (Prescott).

14. *Oscillatoria tenuis* Agardh

Tilden, 1910, p. 71, Pl. IV, Figs. 17, 18.

Cells 4-10μ wide, 2.6-5μ long. Generally distributed over the state. (Prescott), (Tiffany), (Hobby), (Fink), (Buchanan), (Anderson).

Species Inquirendae

15. *Oscillatoria cruenta* Grunow

Tilden, 1910, p. 80.

Cells 4-7μ wide, 2-4μ long. Floating clots in standing water. Henry County. May. (Prescott).

16. *Oscillatoria subtilissima* Kuetzing

Tilden, 1910, p. 74.

Cells 1.5-1.8μ wide. In shallow water at edge of marsh, Johnson County. March. (Prescott).

17. *Oscillatoria major* Vaucher

Tilden, 1910, p. 67.

Cells 4-6μ long, 15-23μ wide. Appearing in cultures of soil algae, University of Iowa, Johnson County. February. (Prescott).

PHORMIDIUM Kuetzing, 1843
(Tilden, 1910, p. 91.)

1. *Phormidium autumnale* (Agardh) Gomont

Tilden, 1910, p. 107, Pl. V, Figs. 18, 19. (*Lyngbya vulgaris* (Kuetzing) Kirchner) Buchanan, 1907, p. 57.

Cells 4-7μ wide, 2-5μ long. Plants growing on damp soil and

stones. Dickinson County. (Tiffany). Powesheik County. (Fink). Johnson County. (Hobby).

2. *Phormidium corium* (Agardh) Gomont

Tilden, 1910, p. 101, Pl. IV, Figs. 71, 72. (*Lyngbya cataracta* (Rab.) Wolle) De Toni, 1907, p. 231.

Cells 3-5μ wide, 3-4.8μ long. Pl. III, Figs. 13, 14. Appearing in cultures of soil algae, University of Iowa. Johnson County. March. (Prescott). Johnson County. (Hobby).

3. *Phormidium retzii* (Agardh) Gomont

Tilden, 1910, p. 102, Pl. V, Figs. 1, 4.

Cells 4.5-12μ wide, 4-9μ long. West Okoboji Lake, Dickinson County. (Tiffany).

4. *Phormidium tenue* (Meneghini) Gomont

Tilden, 1910, p. 98, Pl. IV, Figs. 63-65.

Cells 1-2μ wide, 2.5-5μ long. Fayette County. (Fink). Story County. (Buchanan). Ponds and sloughs, Wright County. (Buchanan).

5. *Phormidium uncinatum* (Agardh) Gomont

Tilden, 1910, p. 106, Pl. V, Figs. 16, 17.

Cells 6-9μ wide, 2-6μ long. Often forming blue-black layers, submersed or on damp ground. Drainage canal, Dickinson County. (Tiffany).

Schizothrix Kuetzing, 1843

(Tilden, 1910, p. 150.)

1. *Schizothrix purpurascens* (Kuetzing) Gomont

Tilden, 1910, p. 152, Pl. VI, Figs. 20, 21.

Pl. III, Figs. 15, 16. Attached to submersed iron drain-pipe, Muscatine County. October. (Prescott).

Spirulina Turpin, 1827

(Tilden, 1910, p. 86.)

1. *Spirulina major* Kuetzing

Tilden, 1910, p. 87, Pl. IV, Fig. 46.

Trichome 1.2-1.7μ in diameter; spiral 2.5-4μ in width, 2.7-5μ between spirals. Pl. IV, Fig. 1. Plankton from marsh water, Johnson County. October. (Prescott). Story County. (Buchanan). Dickinson County. (Tiffany), (Smith).

2. *Spirulina princeps* W. & G. S. West

Smith, 1920, p. 50, Pl. 7, Fig. 2.

Trichomes 4.5-5μ in diameter; width of spiral 11-12μ. Pleasant Lake, Dickinson County. (Tiffany).

3. *Spirulina subtilissima* Kuetzing

Tilden, 1910, p. 88, Pl. IV, Fig. 47.

Trichomes 0.6-0.9μ (1.0μ) in diameter; width of spiral 1.5-2.5μ; distance between spirals 1.2-2μ. Pl. IV, Fig. 2. Plankton in slough, Johnson County. July. (Prescott).

4. *Spirulina versicolor* Cohn

Tilden, 1910, p. 89; Tiffany, 1926, p. 73.

Trichomes 1.2-1.8μ in diameter; spiral 3-4.5μ wide. Little Spirit Lake, Dickinson County. (Tiffany).

TRICHODESMIUM Ehrenberg, 1830
(Smith, 1920, p. 54.)

1. *Trichodesmium lacustre* Klebahn

Smith, 1920, p. 54, Pl. 8, Fig. 1.

Cells 5-7μ wide, 5-7μ long. Pl. IV, Fig. 3. Plankton in lakes, Dickinson County. (Smith).

Family **Nostocaceae**

ANABAENA Bory, 1822
(Tilden, 1910, p. 185.)

1. *Anabaena affinis* Lemmermann

Smith, 1920, p. 57, Pl. 8, Fig. 7.

Cells 5-6μ wide; heterocysts 7.5-10μ wide. Okoboji Lakes, Dickinson County. (Tiffany).

2. *Anabaena augstumalis* Schmidle

Geitler, 1927, p. 320.

Type not reported from Iowa.

var. a *marchia* Lemmermann.

Smith, 1920, p. 58, Pl. 6, Figs. 9, 10.

Cells 5-7μ wide, 5-9.5μ long. Pl. IV, Figs. 4, 5. Plankton from West Okoboji Lake, Dickinson County. May. (Prescott).

3. *Anabaena bornetiana* Collins

Smith, 1920, p. 58, Pl. 8, Fig. 3.

Trichomes 12μ in diameter. Ponds, Muscatine County. July. (Prescott).

4. *Anabaena circinalis* Rabenhorst

Tilden, 1910, p. 190, Pl. IX, Fig. 15.

Cells 16-18μ wide, up to 30μ long. Ponds, Dickinson County. July. (Prescott), (Smith), (Tiffany), (Buchanan).

5. *Anabaena cycadeae* Reinke

Geitler, 1925, p. 329; (*Nostoc punctiforme* (Kuetzing) Hariot). Tilden, 1910, p. 164, Pl. VI, Figs. 35-37.

Vegetative cells 3-4μ in diameter; heterocysts 6μ in diameter. Pl. V, Fig. 7. Attached to rhizoids of moss in damp soil of greenhouse; on submersed aquatics, Johnson County. (Prescott).

6. *Anabaena flos-aquae* (Lyngbe) Breb.

Smith, 1920, p. 60, Pl. 10, Figs. 2-4.

Cells 4-8μ in diameter. Pl. IV, Figs. 7, 12. Generally distributed over the state. (Tiffany), (Anderson), (Smith), (Prescott).

var. a *treleasii* Born. & Flah.

Smith, 1920, p. 60, Pl. 10, Figs. 5-7.

Vegetative cells smaller than in the type. Dickinson County. (Smith).

7. *Anabaena hallensis* Janczewski

Tilden, 1910, p. 188, Pl. IX, Figs. 10-13.

Cells 4-5μ wide; heterocysts 5μ wide. Floating clots in swamp, Johnson County. October. (Prescott).

8. *Anabaena inaequalis* (Kuetzing) Born. & Flah.

Tilden, 1910, p. 191, Pl. IX, Fig. 16.

Cells 4-6μ in diameter. Plant masses on damp soil of hill-side seepage, Johnson County. February. (Prescott). Drainage canal, Dickinson County. (Tiffany).

9. *Anabaena lemmermanni* P. Richter

Smith, 1920, p. 61, Pl. 10, Fig. 8; Pl. 11, Fig. 1.

Cells 5.5-7μ wide, 5-8μ long. Dickinson County. (Smith).

10. *Anabaena levanderi* Lemmermann

Smith, 1920, p. 58, Pl. 8, Figs. 4, 5.

Cells 4-6μ broad, 11-33μ long. Plankton in Okoboji Lakes, Dickinson County. (Smith).

11. *Anabaena limnetica* G. M. Smith

Smith, 1920, p. 57, Pl. 8, Fig. 8.

Cells 12-15μ wide; heterocysts 10-14μ wide. Grovers Lake, Dickinson County. (Tiffany).

12. *Anabaena oscillarioides* Bory

Tilden, 1910, p. 193, Pl. IX, Fig. 20.

Cells 4.2-6μ wide; heterocysts 6-8μ wide. On moist rocks and dead leaves in springy places, Johnson County. May. (Prescott).

13. *Anabaena planctonica* Brunnthaler

Smith, 1920, p. 56, Pl. 8, Fig. 2.

Cells 9-15μ wide; heterocysts 12-14μ wide. Plankton in drainage canal and lakes, Dickinson County. (Smith).

14. *Anabaena spiroides* Klebahn

De Toni, 1907, p. 445; Smith, 1926, p. 166, Pl. 2, Fig. 10.

Cells 6.5-8μ wide; heterocysts smaller than the vegetative cells. Pl. IV, Fig. 8. Plankton in lakes, Dickinson County. (Prescott), (Smith).

var. a *crassa* Lemmermann.

Smith, 1920, p. 59, Pl. 9, Figs. 1-3.

Cells 11-15μ wide; heterocysts 10-17μ wide. Plankton in shallow marsh water, Johnson County. (Prescott). Dickinson County. (Smith).

15. *Anabaena torulosa* (Carmich.) Lagerheim

Geitler, 1925, p. 328, Fig. 389.

Cells 4.2-5μ wide; heterocysts 6μ wide. Decatur County. (Anderson).

16. *Anabaena* (?) *variabilis* Kuetzing

Tiffany, 1926, p. 75; Tilden, 1910, p. 187, Pl. IX, Fig. 9. (*Sphaerozyga polysperma* Rab.) Anderson, 1905, p. 56.

Drainage canal, Dickinson County. ((?) Tiffany). Decatur County. (Anderson).

APHANIZOMENON Morren, 1838

(Tilden, 1910, p. 196.)

1. *Aphanizomenon flos-aquae* (L) Ralfs

Smith, 1920, p. 61, Pl. 2, Figs. 2-4.

Cells 4-6μ wide, 5-15μ long. Pl. V, Fig. 1. Occurring in quiet bodies of water, often in such abundance as to give the water the

appearance of being filled with bits of finely chopped grass. Johnson County, Muscatine County. (Prescott). Dickinson County. (Smith), (Tiffany).

Cylindrospermum Kuetzing, 1843

(Tilden, 1910, p. 197.)

1. *Cylindrospermum catenatum* Ralfs

Tilden, 1910, p. 201, Pl. X, Fig. 7.

Cells 3.5-4μ in diameter, one and one-half times longer than broad. Pl. IV, Figs. 9, 10, 11. Shallow water of marsh, Johnson County. October. (Prescott).

2. *Cylindrospermum licheniforme* (Bory) Kuetzing

Tilden, 1910, p. 200.

Cells 4.2μ wide, 4-5μ long. Occurring among mats of *Spirogyra* in shallow water. Johnson County. May. (Prescott).

3. *Cylindrospermum stagnale* (Kuetzing) Born. & Flah.

Tilden, 1910, p. 198, Pl. X, Fig. 2. (*Cylindrospermum macrospermum* Kg.) Buchanan, 1907, p. 56.

Sells 3-4 times longer than broad, 3-4μ wide. Plankton in debris of shallow water, Johnson County. October. (Prescott). Dickinson County. (Tiffany). Johnson County. (Hobby).

Species Inquirendae

4. *Cylindrospermum comatum* Wood

Tilden, 1910, p. 198, Pl. X, Fig. 3.

Cells 3μ in diameter, heterocysts 4-5μ wide. On damp soil, marshy places, wet rocks, Johnson County. April. (Prescott). Powesheik County. (Fink).

5. *Cylindrospermum minutum* Wood

Tilden, 1910, p. 199, Pl. X, Fig. 5. (*Cylindrospermum limnicola* Kg.) Buchanan, 1907, p. 56.

Cells 2.8μ wide. Among other blue-green algae, forming a coating on wet rocks, Johnson County. October. (Prescott), (Hobby). Story County. (Buchanan).

Nodularia Mertens, 1822
(Tilden, 1910, p. 182.)

1. *Nodularia spumigena* Mertens

Tilden, 1910, p. 184.

Cells 8-12μ wide. Bayou of Little Sioux river, Dickinson County. (Tiffany).

Nostoc Vaucher, 1803
(Tilden, 1910, p. 161.)

1. *Nostoc coeruleum* Lyngbye

Tilden, 1910, p. 177, Pl. VIII, Fig. 8.

Cells 5-7μ in diameter. Pl. V, Fig. 3. Floating in shallow water of marsh, Johnson County. May. (Prescott). Story County. (Bessey). Canal, Center Lake, Dickinson County. (Tiffany).

2. *Nostoc commune* Vaucher

Tilden, 1910, p. 171, Pl. VIII, Fig. 1.

Cells 4.5-6μ in diameter. Pl. V, Figs. 4, 5. Attached to moss, mats of algae, or on wet stones, Johnson County. May. (Prescott). Generally distributed. (Hobby), (Bessey), (Buchanan), (Fink).

3. *Nostoc cuticulare* (Brebisson) Born. & Flah.

Tilden, 1910, p. 164.

Cells 3.8-4μ in diameter. Pl. V, Fig. 6. Attached to submersed post in pond water, Johnson County. April. (Prescott).

4. *Nostoc linckia* (Roth) Born. & Flah.

Tilden, 1910, p. 166, Pl. VII, Fig. 1, 2.

Cells 3.5-4μ in diameter. Floating among filamentous algae at margin of pond, Muscatine County. October. (Prescott). Dickinson County. (Tiffany).

5. *Nostoc muscorum* Agardh

Tilden, 1910, p. 169, Pl. VII, Figs. 12-14.

Cells 3-4μ in diameter. On soil in plant house, University of Iowa, Johnson County. June. (Prescott). On stems of mosses, Fayette County. (Fink).

6. *Nostoc piscinale* Kuetzing

Tilden, 1910, p. 166, Pl. VII, Fig. 2.

Cells 4μ in diameter. Floating in ponds, Muscatine County. June. (Prescott).

7. *Nostoc pruniforme* (L) Agardh

Tilden, 1910, p. 178, Pl. VIII, Figs. 9, 10.

Trichomes 4-6μ in diameter. In a creek, Linn County. October. (Prescott). Fayette County. (Fink). Pool near Story County. (Buchanan).

8. *Nostoc sphaericum* Vaucher

Tilden, 1910, p. 173, Pl. VIII, Fig. 2.

Cells 4-5μ in diameter. On damp soil of greenhouse, Johnson County. June. (Prescott). Johnson County. (Hobby). Story County. (Bessey).

Species Inquirendae

9. *Nostoc comminutum* Kuetzing

Tilden, 1910, p. 165.

Cells 3-4μ in diameter. Floating in pond water or attached to submersed sticks and leaves, Johnson County. May. (Prescott).

Family **Rivulariaceae**

Calothrix Agardh, 1824

1. *Calothrix braunii* Bor. & Flah.

Tilden, 1910, p. 269, Pl. XVIII, Fig. 11.

Trichomes 6-7μ in diameter. Pl. V, Fig. 8. Attached to floating wood in pond, Johnson County. April. (Prescott).

2. *Calothrix parietana* (Näg.) Thuret

Tilden, 1910, p. 269, Pl. XVIII, Fig. 12.

Trichomes 5-10μ in diameter. On submersed stems, Story County. (Buchanan).

Species Inquirendae

3. *Mastigonema elongatum* Wood

Tilden, 1910, p. 271; Wolle, 1887, p. 243, Pl. 174, Fig. 9.

Trichomes 6μ in diameter. Wolle (loc. ct.) refers this to a form of Rivularia. Story County. (Bessey).

Gloeotrichia Agardh, 1842

(Smith, 1920, p. 63.)

1. *Gloeotrichia echinulata* (J. E. Smith) P. Richter

Smith, 1920, p. 63, Pl. 11, Figs. 5, 6.

Cells 8-10μ in diameter. Pl. V, Fig. 9. Plankton in pond, Mus-

catine County; Okoboji Lakes, Dickinson County. (Prescott), (Smith), (Tiffany).

2. *Gloeotrichia pisum* (Agardh) Thuret

Tilden, 1910, p. 284, Pl. XIX, Fig. 6. (*Rivularia pisum* Ag.)

Trichomes 4-7μ in diameter. Drainage canal, Little Spirit Lake, Dickinson County. (Tiffany). Story County. (Bessey). Johnson County. (Hobby).

3. *Gloeotrichia natans* (Hedwig) Rab.

(*Rivularia natans* (Hedwig) Welwitsch) Tilden, 1910, p. 285, Pl. XIX, Fig. 7; Pl. XX, Figs. 1-3.

Trichomes 7-10μ in diameter. Drainage canal, Dickinson County. (Tiffany).

Rivularia (Roth) Agardh, 1824

(Tilden, 1910, p. 283.)

1. *Rivularia compacta* Collins

Tilden, 1910, p. 288.

Cells 6-10μ in diameter. Pl. VI, Fig. 1. Plankton from Millers Bay, West Okoboji Lake, Dickinson County. June. (Prescott).

2. *Rivularia minutula* (Kuetzing) Bor. & Flah.

Tilden, 1910, p. 288, Pl. XX, Fig. 9.

Trichomes 9-12.5μ in diameter. West Okoboji Lake, Dickinson County. (Tiffany).

Family **Scytonemaceae**

Scytonema Agardh, 1824

(Tilden, 1910, p. 211.)

1. *Scytonema cincinnatum* Thuret

(*Scytonema crispum* (Agardh) Bornet) Tilden, 1910, p. 214, Pl. XI, Fig. 15.

Trichomes 13-14μ in diameter. Pl. VI, Fig. 2. Drainage canal, lakes, pools. Dickinson County. (Tiffany).

2. *Scytonema figuratum* Agardh

(*Scytonema mirabile* (Dillw.) Bornet) Tilden, 1910, p. 222, Pl. XIII, Figs. 2-5.

Filaments 15-21μ in diameter; trichomes 6-12μ in diameter. Pl. VI, Fig. 3. On cliffs, Fayette County. (Fink).

3. *Scytonema myochrous* (Dillw.) Agardh

Tilden, 1910, p. 224, Pl. XIII, Fig. 6. (*Scytonema tomentosum* Kuetzing) De Toni, 1907, p. 522.

Filaments 18-36μ in diameter; trichomes 6-12μ in width. Fayette County. (Fink).

TOLYPOTHRIX Kuetzing, 1843

(Tilden, 1910, p. 229.)

1. *Tolypothrix lanata* (Desvaux) Wartmann

Tilden, 1910, p. 230, Pl. XIV, Fig. 1.

Cells 6-9μ in diameter. Pl. VI, Fig. 8. Plankton in West Okoboji Lake. June. (Prescott), (Tiffany).

2. *Tolypothrix limbata* Thuret

Tilden, 1910, p. 234.

Trichomes 10μ in diameter. Pl. VI, Fig. 4. Common in plankton from Lake West Okoboji. July. (Prescott).

3. *Tolypothrix tenuis* Kuetzing

Tilden, 1910, p. 229.

Trichomes 6-8μ in diameter. Drainage canal, Spirit Lake, Dickinson County. (Tiffany).

Family **Stigonemaceae**

STIGONEMA Agardh, 1824

(Tilden, 1910, p. 244.)

1. *Stigonema hormoides* (Kuetzing) Bor. & Flah.

Tilden, 1910, p. 244; Geitler, 1927, p. 183, Fig. 219.

Filaments 7-15μ in diameter. Pl. VI, Figs. 5, 6. Attached to large filamentous algae, quarry pond, Johnson County. September. (Prescott).

Class II. CHRYSOPHYCEAE

Order I. HYMENOMONADALES

Family **Euhymenomonadaceae**

SYNURA Ehrenberg, 1838

(Smith, 1920, p. 70.)

1. *Synura uvella* Ehrenberg

Smith, 1920, p. 70, Pl. 12, Figs. 9, 10; Prescott, 1927, p. 6, Pl. I, Fig. 1.

Plankton in sloughs and ponds, Johnson County. April. Generally distributed, abundant in summer months. (Prescott).

2. *Synura adamsii* G. M. Smith

Smith, 1924, Roosevelt Wild Life Bulletin 2, No. 2: 136, Pl. 5, Figs. 4, 5; Prescott, 1927, p. 7, Pl. I, Fig. 2.

Plankton in sloughs and ponds, Johnson County. April. (Prescott). Previously reported from New York.

Order II. OCHROMONADALES

Family **Ochromonadaceae**

DINOBRYON Ehrenberg, 1835

(Smith, 1920, p. 72.)

1. *Dinobryon calyciforme* Bachmann

Smith, 1920, p. 73, Pl. 13, Figs. 5, 6; Prescott, 1927, p. 7, Pl. I, Fig. 3.

Attached in the colonial gelatine of such colonial Myxophyceae as Microcystis and Aphanocapsa. Shallow water of marsh, Johnson County, spring and fall months. (Prescott).

2. *Dinobryon divergens* Imhof

Smith, 1920, p. 75, Pl. 14, Fig. 2; Prescott, 1927, p. 8, Pl. I, Fig. 4.

Plankton from Lake West Okoboji, July; plankton from small artificial pond, Johnson County, June. (Prescott).

3. *Dinobryon sertularia* Ehrenberg

Pascher in Pascher and Lemmermann, 1913, p. 72, Figs. 112, 114; Prescott, 1927, p. 8, Pl. I, Fig. 6.

Plankton from Clear Lake, Cerro Gordo County. July. (Prescott).

4. *Dinobryon sociale* Ehrenberg

Smith, 1920, p. 74, Pl. 13, Fig. 12; Pascher in Pascher and Lemmermann, 1913, p. 73, Figs. 116, 117; Prescott, 1927, p. 8, Pl. I, Fig. 5.

5. *Dinobryon stipitatum* Stein

Smith, 1920, p. 74, Pl. 13, Fig. 11; Prescott, 1927, p. 8, Pl. I, Fig. 7.

Plankton from West Okoboji Lake, Dickinson County; Clear Lake, Cerro Gordo County. July. (Prescott).

Class III. RHODOPHYCEAE

Family **Bangiaceae**

PORPHYRIDIUM Nägeli

(Pascher, Schiller and Migula, 1925, p. 164.)

1. *Porphyridium cruentum* (Agardh) Nägeli

Pascher and Schiller, 1925, p. 165, Fig. 143.

Cells 6.5-9μ in diameter. Pl. VI, Fig. 7. On stone wall, Story County. (Buchanan).

Class IV. HETEROKONTAE

Order I. RHIZOCHLORIDALES

Family **Rhizochloridaceae**

STIPITOCOCCUS W. & G. S. West, 1898
(West and Fritsch, 1927, p. 301.)

1. *Stipitococcus urceolatus* W. & G. S. West
West and Fritsch, 1927, p. 123.

Cells 3-4.2μ in diameter, 6.5-10.5μ long. Pl. VII, Figs. 7, 8. Epiphytic on Mougeotia, Oedogonium or filamentous desmids; often forming dense aggregates. Swamps and ponds, Johnson County. October. (Prescott). Apparently new to North America.

Order II. HETEROCAPSALES

Family **Mischococcaceae**

MISCHOCOCCUS Nägeli, 1849

1. *Mischococcus confervicola* Nägeli
Wolle, 1887, p. 200, Pl. 155, Figs. 36-41.

Cells 4.5-9μ in diameter. Pl. VII, Figs. 4, 5. Adhering to *Tribonema* and other filamentous algae beneath winter ice of a quarry pond, Johnson County. March. (Prescott).

Order III. HETEROCOCCALES

Family **Chlorobotrydaceae**

PSEUDOTETRAEDRON Pascher
(Pascher, 1925, p. 53.)

1. *Pseudotetraëdron neglectum* Pascher
Pascher in Pascher, Schiller and Migula, 1925, p. 54, Figs. 36a and 36b.

Cells 6-12μ in diameter. Pl. VII, Figs. 2, 3. Culture jar in botany laboratory, University of Iowa. February. (Prescott). Apparently new to North America.

Family **Chlorotheciaceae**

PERONIELLA Gobi, 1886
(Pascher, 1925, p. 56.)

1. *Peroniella hyalotheca* Gobi
Pascher in Pascher, Schiller and Migula, 1925, p. 56, Fig. 38a.

Cells 12-22μ wide. Pl. VII, Fig. 6. Attached to the filamentous

desmid, *Hyalotheca mucosa,* in shallow water of a swamp. Johnson County. June. (Prescott). Apparently new to North America.

G. M. Smith agrees with Pascher that this form is probably the rhizopodial stage of a Chrysomonad. Living specimens in Iowa collections have been examined several times. Only the sessile stage of the life cycle has been observed by the writer. The organism is therefore questionably assigned to this species.

Characiopsis Borzi
(Pascher, 1925, p. 57.)

1. *Characiopsis naegelii* (A. Braun) Lemmermann

West and Fritsch, 1927, p. 308; Wolle, 1887, p. 178, Pl. 159, Fig. 4, (*Characium naegelii* A. Braun).

Cells 7-18μ wide, 20-42μ long. Pl. IX, Fig. 6. Pond, Wright County. (Buchanan).

2. *Characiopsis tuba* Lemmermann

(*Characium tuba* Hermann) Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 82, Fig. 34.

Cells 6.5-7.5μ wide, 21-42μ long. Pl. IX, Fig. 9. Attached to filamentous algae collected in roadside ditch, Benton County. March. (Prescott).

Family **Sciadaceae**

Ophiocytium Nägeli, 1849

1. *Ophiocytium arbuscula* (A. Br.) Rabenhorst

Collins, 1909, p. 95; Wolle, 1887, p. 174, Pl. 157, Figs. 1-6.

Cells 3-5μ in diameter, in umbellate families. Pl. VIII, Fig. 1. Attached to filamentous algae in shallow marsh water, Johnson County. May. (Prescott).

2. *Ophiocytium capitatum* Wolle

Smith, 1920, p. 88, Pl. 15, Figs. 12, 13.

Cells 5-10μ in diameter. Pl. VIII, Figs. 2, 3. Plankton in swamp, Johnson County. October. (Prescott).

var. a *longispinum* (Möbius) Lemmermann.

Smith, 1920, p. 86, Pl. 15, Figs. 14-16.

Cells 4.5-6μ in diameter. Ponds, lakes and sloughs, Dickinson County. (Smith).

3. *Ophiocytium cochleare* (Eichwald) A. Braun

Collins, 1909, p. 94; Tiffany, 1926, p. 110, Pl. 15, Fig. 157.

Cells 5-10μ in diameter. Pl. VIII, Figs. 4, 5. Plankton from marsh, Johnson County. May. (Prescott). Center Lake, streams, Dickinson County. July, August. (Tiffany).

4. *Ophiocytium parvulum* (Perty) A. Braun

Smith, 1920, p. 86, Pl. 15, Fig. 11.

Cells 3-9μ in diameter. Pl. VIII, Figs. 6, 7. Plankton from marsh, Johnson County. October. (Prescott). Swamp, Dickinson County. July, August. (Tiffany).

Family **Botryococcaceae**

Botryococcus Kuetzing, 1849

1. *Botryococcus braunii* Kuetzing

Smith, 1920, p. 84, Pl. 15, Fig. 5.

Cells 3.5-5.5μ in diameter. Pl. VII, Fig. 1. Plankton from shallow water of swamp, Johnson County. July. (Prescott).

Order IV. HETEROTRICHALES

Family **Tribonemaceae**

Tribonema Derbes and Solier, 1856

(West and Fritsch, 1927, p. 310.)

1. *Tribonema bombycinum* (Agardh) D. and S.

Collins, 1909, p. 96, Fig. 4.

Cells 6-11μ in diameter, 2-4 diameters long. Pl. VII, Figs. 9, 10. Common in spring months in ponds, ditches and marshes, Johnson County. (Prescott). Wright County. (Buchanan). Story County. (Buchanan). Swamp, Dickinson County. (Tiffany).

var. a *tenue* Hazen.

Collins, 1909, p. 96.

Cells 3-6μ in diameter. Streams, well, Dickinson County. (Tiffany).

2. *Tribonema minus* (Wolle) Hazen

Collins, 1909, p. 97; Tiffany, 1926, p. 111, Pl. 15, Fig. 154.

Cells 5-6μ in diameter, 3-6 diameters in length. Pl. VII, Figs. 11, 12. Common, intermingled among other filamentous algae, Johnson County. October. (Prescott). Surface well, Dickinson County. (Tiffany).

3. *Tribonema utriculosum* (Kuetzing) Hazen

Collins, 1909, p. 97; Tiffany, 1926, p. 111, Pl. 15, Fig. 155.

Cells 11-16μ wide, 6 diameters long. Pl. VII, Fig. 13. Widely distributed. (Prescott), (Tiffany), (Buchanan).

Order V. HETEROSIPHONALES

Family **Botrydiaceae**

Botrydium Wallroth, 1815

(Collins, 1909, p. 97.)

1. *Botrydium granulatum* (L.) Greville

Collins, 1909, p. 98, Fig. 5.

Pl. VIII, Fig. 8. On mud and wet soil, commonly found along streams where water has subsided. Generally distributed. (Prescott), (Buchanan), (Bessey), (Fink), (Anderson).

Class V. CHLOROPHYCEAE

Sub-class A. Isokontae

Order I. VOLVOCALES

Family **Volvocaceae**

Eudorina Ehrenberg, 1832

(Collins, 1909, p. 134.)

1. *Eudorina elegans* Ehrenberg

Smith, 1920, p. 96, Pl. 19, Fig. 1; Prescott, 1927, p. 9, Pl. II, Fig. 2.

Plankton in open watering troughs, ponds and lakes, especially common during warm weather. Generally distributed. (Prescott), (Smith), (Fink).

Gonium Mueller, 1773

(Collins, 1909, p. 131.)

1. *Gonium pectorale* Mueller

Smith, 1920, p. 94, Pl. 16, Figs. 14, 15; Prescott, 1927, p. 9, Pl. I, Fig. 9.

Plankton in small pools and ponds, often appearing with other members of the Volvocaceae in such numbers as to color small bodies of water a vivid green. Generally distributed. (Prescott), (Bessey), (Buchanan).

2. *Gonium sociale* (Dujardin) Warming

Collins, 1909, p. 132; Pascher, 1927, p. 420, Figs. 381, 382; Prescott, 1927, p. 10, Pl. I, Fig. 8.

Plankton from a two months' old aquarium, University of Iowa, Johnson County. April. (Prescott).

Pandorina Bory, 1824

(Collins, 1909, p. 132.)

1. *Pandorina morum* Bory

Smith, 1920, p. 92, Pl. 16, Figs. 16, 17; Prescott, 1927, p. 10, Pl. II, Fig. 3.

Plankton in lakes, ponds, sloughs and wayside ditches, generally distributed. (Prescott), (Smith), (Bessey), (Buchanan).

Platydorina Kofoid, 1899

(Collins, 1909, p. 133.)

1. *Platydorina caudatum* Kofoid

Collins, 1909, p. 134, Figs. 19, 20; Prescott, 1927, p. 10, Pl. II, Figs. 9.

Plankton in lake, Dickinson County. (Smith), (Prescott).

Pleodorina Shaw, 1894

(Collins, 1909, p. 132.)

1. *Pleodorina californica* Shaw

Smith, 1920, p. 97, Pl. 17, Figs. 1-3; Prescott, 1927, p. 11, Pl. II, Fig. 4.

Ponds, Muscatine County. July. (Prescott). West Okoboji Lake, Dickinson County. (Smith).

2. *Pleodorina illinoisensis* Kofoid

Collins, 1909, p. 133, Fig. 18. (*Eudorina illinoisensis* Pascher), 1927, p. 443, Figs. 404, 405; Prescott, 1927, p. 11, Pl. II, Fig. 1.

Watering trough, Johnson County. June. (Prescott).

Volvox Linnaeus, 1758

(Collins, 1909, p. 135.)

1. *Volvox aureus* Ehrenberg

Collins, 1909, p. 135; Smith, 1920, p. 98, Pl. 18, Fig. 2; Prescott, 1927, p. 12, Pl. III, Fig. 1.

Ponds, Johnson County. July. (Prescott). Plankton in Lakes, Dickinson County. (Smith), (Prescott).

2. *Volvox mononae* G. M. Smith

Smith, 1920, p. 99, Pl. 18, Fig. 1; Prescott, 1927, p. 12, Pl. III, Fig. 2.

Ponds, Muscatine County. July. (Prescott).

3. *Volvox globator* Linnaeus

Smith, 1920, p. 98, Pl. 18, Figs. 3-5; Prescott, 1927, p. 12, Pl. III, Fig. 3.

Ponds, sloughs, lakes, generally distributed. (Prescott), (Bessey), (Buchanan), (Smith), (Fink).

Family **Chlamydomonadaceae**

Chlamydomonas Ehrenberg, 1833

(Collins, 1909, p. 128.)

1. *Chlamydomonas anglica* Pascher

Pascher, 1927, p. 295, Fig. 260; Prescott, 1927, p. 13, Pl. IV, Figs. 4, 5.

Plankton in slough, Johnson County. July. (Prescott). Previously reported from Europe.

2. *Chlamydomonas debaryana* Goroschankin

Pascher, 1927, p. 230, Fig. 177.

Story County. (Buchanan).

3. *Chlamydomonas dinobryoni* G. M. Smith

Smith, 1920, p. 91, Pl. 16, Figs. 5-7.

Plankton from West Okoboji Lake, Dickinson County. (Smith).

4. *Chlamydomonas ehrenbergii* Gorosch.

Pascher, 1927, p. 204, Figs. 142-144; Prescott, 1927, p. 13, Pl. IV, Figs. 1, 2.

Rare, in slough, Johnson County. July. (Prescott).

5. *Chlamydomonas globosa* Snow

Collins, 1909, p. 129; Smith, 1926, p. 166, Pl. 3, Figs. 5, 6; Prescott, 1927, P. 14, Pl. IV, Fig. 3.

Shallow marsh water, Johnson County. June. (Prescott).

6. *Chlamydomonas snowii* Printz

Smith, 1920, p. 91, Pl. 16, Figs. 9, 10; Prescott, 1927, p. 14, Pl. IV, Fig. 6.

Plankton in shallow water of marsh, Johnson County. May. (Prescott).

Family **Phacotaceae**

Phacotus Perty, 1852

(Pascher, 1927, p. 356.)

1. *Phacotus lenticularis* (Ehr.) Stein

Pascher, 1927, p. 358, Fig. 325; Smith, 1926, p. 166, Pl. 5, Figs. 1-3; Prescott, 1927, p. 14, Pl. II, Figs. 5, 6.

Plankton in slough, Dickinson County. (Smith).

PTEROMONAS Seligo, 1886
(Pascher, 1927, p. 363.)

1. *Pteromonas aculeata* Lemmermann

Pascher, 1927, p. 368, Fig. 339; Prescott, 1927, p. 15, Pl. V, Figs. 11, 12.

Plankton in Iowa river, Johnson County. July. (Prescott). Previously reported from Europe.

2. *Pteromonas angulosa* Lemmermann

Pascher, 1927, p. 365, Figs. 332-336; Prescott, 1927, p. 15, Pl. V, Figs. 2-5.

Plankton in shallow marsh water, Johnson County. June. (Prescott). Previously reported from Europe.

Family **Polyblepharidaceae**

PYRAMIDOMONAS Schmarda, 1850
(Pascher, 1927, p. 90.)

1. *Pyramidomonas inconstans* Hodgetts

New Phytologist 19. 1920.

Plankton from Iowa river, Johnson County. July. (Prescott). Previously reported from England.

Order II. PROTOCOCCALES

Family **Tetrasporaceae**
(Printz in Engler & Prantl Band 3:65, 1927.)

APIOCYSTIS Braunii, 1849
(West & Fritsch, 1927, p. 94.)

1. *Apiocystis brauniana* Nägeli

Collins, 1909, p. 140, Fig. 27; West and Fritsch, 1927, p. 95, Fig. 22.

Cells 6-8μ long. Pl. VIII, Fig. 9. Attached to filamentous algae and larger aquatics in a swamp, Johnson County. March. (Prescott).

GLOEOCYSTIS Nägeli, 1849
(West and Fritsch, 1927, p. 90.)

1. *Gloeocystis gigas* (Kuetz.) Lemmermann

Collins, 1909, p. 309; Smith, 1920, p. 101, Pl. 19, Fig. 2.

Cells 9-14μ in diameter. Pl. VIII, Fig. 10. Forming gelatinous masses among mats of *Spirogyra* in shallow water, Johnson County. May. (Prescott). Story County. (Buchanan).

2. *Gloeocystis vesiculosa* Nägeli

Collins, 1909, p. 308; Lemmermann, 1915, p. 35, Fig. 10.

Cells 11.6-12.4μ in diameter. Pl. VIII, Fig. 11. Forming irregular masses on damp soil, Johnson County. February. (Prescott).

HORMOTILA Borzi, 1883

(Printz, 1927, p. 73.)

1. *Hormotila mucigena* Borzi

Collins, 1909, p. 167, Fig. 52.

Cells 4-12μ in diameter. Pl. VIII, Fig. 12. Among filamentous algae in shallow water of swamp, Johnson County. October. (Prescott).

PALMELLA Lyngbye, 1819

(Collins, 1909, p. 136.)

1. *Palmella mucosa* Kuetzing

West and Fritsch, 1927, p. 86; Wolle, 1887, p. 192, Pl. 162, Figs. 12, 14.

Cells 7-15μ in diameter. On wet ground; on ledges of slow stream. Boone County. (Buchanan).

SPHAEROCYSTIS Chodat, 1897

(Smith, 1920, p. 101.)

((Gloeococcus A. Br.) Printz, 1927, p. 76.)

1. *Sphaerocystis schroeteri* Chodat

Smith, 1920, p. 101, Pl. 19, Figs. 3, 4.

Cells 5-7μ in diameter. Pl. VIII, Fig. 13. Plankton in shallow water of pond, Johnson County. May. (Prescott). Dickinson County. (Smith).

TETRASPORA Link, 1809

(Smith, 1920, p. 102.)

1. *Tetraspora gelatinosa* (Vauch.) Desvaux

Collins, 1909, p. 139.

Cells 2.5-13μ in diameter. Ponds, roadside ditches, Johnson County. April. (Prescott), (Hobby). Iowa. (Collins).

2. *Tetraspora lacustris* Lemmermann

Smith, 1920, p. 102, Pl. 19, Figs. 5, 6.

Cells 7-10μ in diameter. Pl. IX, Figs. 1, 2. Plankton from swamp, Johnson County. April. (Prescott).

3. *Tetraspora lubrica* (Roth) Agardh

Collins, 1909, p. 139, Fig. 26.

Cells 7-11μ in diameter. Pl. IX, Fig. 3. Attached to *Vaucheria* or larger aquatics; forming gelatinous expansions in slough water in spring months, Johnson County. (Prescott). Generally distributed. (Hobby), (Bessey), (Buchanan).

Family **Protococcaceae (Chlorococcaceae)**

(Printz, 1927, p. 81.)

Characium A. Braun, 1849

(West and Fritsch, 1927, p. 107.)

1. *Characium braunii* Bruegger

Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 80, Fig. 24.

Cells 6.5-13μ wide, 25-32μ long. Pl. IX, Fig. 4. Attached to filamentous algae in swamp, Johnson County. May. (Prescott). Questionably assigned to this species.

2. *Characium curvatum* G. M. Smith

Smith, 1920, p. 176, Pl. 49, Figs. 8-15.

Cells 3-6μ wide, 8-18μ long. Pl. IX, Fig. 10. Dickinson County. (Smith).

3. *Characium gracillipes* Lambert

Smith, 1920, p. 178, Pl. 49, Figs. 20-24.

Cells 5-14μ wide, 70-480μ long. Pl. IX, Fig. 5. Attached to *Diaphanosoma* sp. in swamp, Johnson County. June. (Prescott).

4. *Characium pringsheimii* A. Braun

Wolle, 1887, p. 177, Pl. 159, Fig. 3.

Cells 6-10μ wide, 20-25μ long. Pl. IX, Fig. 7. Attached to *Rhizoclonium* often forming dense aggregates, in slowly flowing stream, Johnson County. July. (Prescott).

5. *Characium stipitatum* (Bachmann) Wolle

Smith, 1920, p. 176, Pl. 49, Figs. 4-7.

Cells 5-8μ in diameter. Plankton in Marble Lake, Dickinson County. (Smith).

6. *Characium limneticum* Lemmermann (?)

Smith, 1920, p. 177, Pl. 49, Figs. 25-29.

Cells 5-14μ in diameter, 25-110μ long. Pl. IX, Fig. 8. Floating in shallow water of swamp, Johnson County. July. (Prescott). This form is epizoic on *Diaphanosoma*. Although our specimen was

found floating it is questionably assigned to this species since it agrees in all other respects. *Diaphanosoma* occurred in the same habitat in which this *Characium* was collected.

Chlorochytrium Cohn, 1874
(Collins, 1909, p. 146.)

1. *Chlorochytrium lemnae* Cohn

Collins, 1909, p. 146, Fig. 33.

Cells up to 100μ in diameter. Pl. IX, Figs. 11, 12. Endophytic in tissue of Lemna sp. Ponds and sloughs. Henry County. May. (Prescott).

Chlorococcum Fries, 1825
(Collins, 1909, p. 143.)

1. *Chlorococcum humicola* (Nägeli) Rabenhorst

Collins, 1909, p. 143, Fig. 31.

Cells 4-7μ in diameter. Pl. VIII, Fig. 14. Forming green coatings on dead grass, leaves, etc., in shallow water at edge of pond, Johnson County. April. (Prescott).

Family **Pleurococcaceae**

Pleurococcus Meneghini, 1842

(*Protococcus* Agardh, 1824)
(Printz, 1927, p. 101.)

1. *Pleurococcus vulgaris* Meneghini

Collins, 1909, p. 304, Fig. 106; (*Protococcus viridis* Agardh.) Pascher in Pascher and Brunnthaler, 1915, p. 224, Figs. 31, 32.

Generally distributed on moist substrates. (Bessey), (Fink), (Buchanan), (Prescott).

Family **Hydrodictyaceae**
(Printz, 1927, p. 106.)

Hydrodictyon Roth, 1800
(Collins, 1909, p. 175.)

1. *Hydrodictyon reticulatum* (L) Lagerheim

Collins, 1909, p. 176, Fig. 62.

Cells 15-30μ in diameter and up to 100μ in diameter. Pl. IX, Fig. 13. Generally distributed. (Prescott), (Tiffany).

Pediastrum Meyen, 1829

(Collins, 1909, p. 176.)

1. *Pediastrum biradiatum* Meyen

Smith, 1920, p. 173, Pl. 48, Figs. 5-8.

Plankton in pond, north of West Okoboji Lake, Dickinson County. July. (Prescott).

var. a *emarginatum* A. Braun.

Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 105, Fig. 66b.

Our specimens agree very closely with this form except the coenobia are always 8- rather than 16-32-celled as described by Brunnthaler. Pl. X, Fig. 1. Plankton from Center Lake, Dickinson County. July. (Prescott).

2. *Pediastrum boryanum* (Turp.) Meneghini

Collins, 1909, p. 177, Fig. 63.

Plankton in swamp, Johnson County. October. (Prescott). Lakes, Dickinson County. (Smith). Story County. (Bessey). Wright County. (Buchanan).

var. a *longicorne* Raciborski.

Smith, 1920, p. 170, Pl. 46, Fig. 9.

Pl. X, Fig. 4. Plankton in drainage canal, Dickinson County. July. (Prescott). Lakes, Dickinson County. (Smith).

3. *Pediastrum duplex* Meyen

Smith, 1920, p. 171, Pl. 46, Figs. 14-16.

Pl. X, Fig. 5. Plankton in swamp, Johnson County. July. (Prescott). Dickinson County. (Smith).

var. a *clathratum* (A. Braun) Lagerheim.

Smith, 1920, p. 171, Pl. 47, Figs. 1-3.

Plankton in quiet water of slowly flowing stream, Johnson County. July. (Prescott).

var. b *gracillimum* W. & G. S. West.

Smith, 1920, p. 172, Pl. 47, Figs. 8-11; Pl. 48, Figs. 1, 2.

Plankton in lakes, Dickinson County. (Smith).

var. c *reticulatum* Lagerheim.

Smith, 1920, p. 172, Pl. 47, Figs. 4-7.

Plankton in lakes and streams, Dickinson County. (Smith).

var. d *rotundatum* Lucks.

Smith, 1920, p. 172, Pl. 46, Fig. 17.

Plankton in Robinson Lake, Dickinson County. (Smith).

4. *Pediastrum integrum* Nägeli

Smith, 1920, p. 168, Pl. 45, Fig. 7.

Pl. X, Fig. 7. Plankton from Clear Lake, Cerro Gordo County. July. (Prescott).

var. a *priva* Printz.

Smith, 1920, p. 168, Pl. 45, Figs. 8-10.

Pl. X, Fig. 8. Plankton from Okoboji lakes, Dickinson County. October. (Prescott).

5. *Pediastrum kawraiskyi* Schmidle

Smith, 1920, p. 170, Pl. 46, Figs. 10-13.

Pl. X, Fig. 9. Plankton from Clear Lake, Cerro Gordo County. July. (Prescott). Okoboji lakes, Dickinson County. (Smith).

6. *Pediastrum ovatum* (Ehr.) A. Braun

Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 93, Fig. 54a; Smith, 1926, p. 193, Pl. 19, Figs. 3-7.

Plankton from Robinson Lake, Dickinson County. (Smith.)

7. *Pediastrum simplex* (Meyen) Lemmermann

Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 93, Fig. 55a.

Pl. X, Figs. 10, 11. Plankton in slowly flowing stream and in ponds, Johnson County. July. (Prescott).

var. a *duodenarium* (Bailey) Rabenhorst.

Smith, 1920, p. 167, Pl. 45, Figs. 2-6.

Pl. X, Fig. 6. Plankton in slowly flowing stream, occurring with the type, Johnson County. July. (Prescott). Clear Lake, Cerro Gordo County. July. (Prescott). Lakes, Dickinson County. (Smith).

8. *Pediastrum tetras* (Ehr.) Ralfs

Smith, 1920, p. 173, Pl. 48, Figs. 9-12. (*Pediastrum Ehrenbergii* A. Br.) Buchanan, 1907, p. 80.

Pl. XI, Fig. 2. Plankton in swamp, Johnson County. May. (Prescott). Lakes, Dickinson County. (Smith). Slough, Wright County. (Buchanan).

var. a *tetraodon* (Cda.) Hansgirg.

Smith, 1920, p. 174, Pl. 48, Figs. 13, 14; Pl. 49, Figs. 1, 2.

Plankton in lakes and streams, Dickinson County. (Smith).

9. *Pediastrum tricornutum* Borge

Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 104, Fig. 65a.

Swamp, Benton County. June. (Prescott).

Forma *evoluta* Schmidle.

Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 103, Fig. 64c.
Pl. XI, Figs. 3, 4. Lakes and swamps, Dickinson County. July. (Prescott). Previously reported from Europe.

Sorastrum Kuetzing, 1845
(Printz, 1927, p. 113.)

1. *Sorastrum americanum* (Bohlin) Schmidle

Smith, 1920, p. 163, Pl. 44, Fig. 1.
Type not reported from Iowa.
var. a *undulatum* G. M. Smith.
Smith, 1920, p. 163, Pl. 44, Figs. 2, 3.
Pl. XI, Fig. 5. Plankton from swamp, Johnson County; lakes and pond, Dickinson County. (Prescott).

2. *Sorastrum spinulosum* Nägeli

Smith, 1920, p. 163, Pl. 44, Figs. 4, 5.
Cells 8-20μ in diameter, 6-18μ long. Pl. XI, Fig. 6. Plankton in pond, Dickinson County. (Prescott). North arm of Center Lake, Dickinson County. (Smith).

Family **Oocystaceae**
(Printz, 1927, p. 130.)

Acanthosphaera Lemmermann, 1899
(Smith, 1920, p. 128.)

1. *Acanthosphaera zachariasi* Lemmermann

Smith, 1920, p. 128, Pl. 29, Figs. 6-8.
Cells 10-14μ in diameter. Pl. XI, Fig. 7. Plankton from drainage canal and pond, Dickinson County. (Smith). Clear Lake, Cerro Gordo County. July. (Prescott).

Cerasterias Reinsch, 1867
(Smith, 1926, p. 176.)

(*Chionaster* Wille, 1903)
(Printz, 1927, p. 132.)

1. *Cerasterias irregularis* G. M. Smith

Smith, 1926, p. 168, 176, Pl. 9, Figs. 2-8.
Maximum diameter of cells 42-56μ. Pl. XI, Fig. 8. Rare in lakes, Dickinson County. (Smith).

EREMOSPHAERA De Bary, 1858
(Collins, 1909, p. 154.)

1. *Eremosphaera viridis* De Bary

Collins, 1909, p. 154, Fig. 39.

Pl. XI, Fig. 9. Plankton in small pools, Jasper County. September. (Prescott).

ERRERELLA Conrad, 1913
(Brunnthaler, 1915, p. 120.)

1. *Errerella bornheimiensis* Conrad

Smith, 1926, p. 178, Pl. 11, Figs. 1-3.

Cells 3-6μ in diameter. Pl. XI, Fig. 13. Plankton in pond, Dickinson County. (Smith).

FRANCEIA Lemmermann, 1898
(Smith, 1920, p. 131.)

1. *Franceia ovalis* (France) Lemmermann

Smith, 1920, p. 131, Pl. 31, Fig. 4.

Cells 7-10μ in diameter. Pl. XI, Fig. 14. Plankton in pond, Dickinson County. (Smith).

2. *Franceia tuberculata* G. M. Smith

Smith, 1926, p. 182, Pl. 12, Figs. 27-30.

Cells 8.5-21.5μ in diameter without setae. Pl. XI, Fig. 12. Plankton in streams, pond, slough, Dickinson County. (Smith).

GLOEOACTINIUM G. M. Smith, 1926
(Smith, 1926, p. 184.)

1. *Gloeoactinium limneticum* G. M. Smith

Smith, 1926, p. 184, Pl. 14, Figs. 12, 13.

Cells 3.5-7.5μ long, 1.5-2.5μ in diameter. Pl. XI, Fig. 10. Plankton in lakes, Little Sioux River, Dickinson County. (Smith).

GLOEOCYSTOPSIS G. M. Smith, 1916
(Smith, 1920, p. 102.)

1. *Gloeocystopsis limneticus* Smith

Smith, 1920, p. 103, Pl. 20, Figs. 1, 2; Smith, 1926, p. 166, Pl. 5, Fig. 5.

Cells 4-6μ in diameter, 10-15μ long. Pl. XI, Fig. 11. Plankton in pond, Dickinson County. July. (Prescott). West Okoboji Lake, Dickinson County. (Smith).

GLOEOTAENIUM Hansgirg, 1890
(Smith, 1920, p. 115.)

1. *Gloeotaenium loitlesbergerianum* Hansgirg
Smith, 1920, p. 115, Pl. 23, Figs. 8, 9.

Cells 20-30μ in diameter. Pl. XI, Figs. 15-17. Plankton from pond, north of West Okoboji Lake, Dickinson County. July. (Prescott).

GOLENKINIA Chodat, 1894
(Smith, 1920, p. 127.)

1. *Golenkinia radiata* Chodat
Smith, 1920, p. 127, Pl. 29, Figs. 2, 3.

Cells 7-15μ in diameter without setae. Pl. XI, Figs. 18, 19. Plankton from aquarium jar, University of Iowa, Johnson County. February; plankton from drainage canal, Dickinson County. July. (Prescott). Lakes and stream, Dickinson County. (Smith).

var. a *longispinum* G. M. Smith.
Smith, 1926, p. 179, Pl. 10, Figs. 11, 12.

Cells 95-140μ in diameter including spines. Pl. XI, Fig. 20. Plankton from Spirit Lake, north slough of West Okoboji Lake, Dickinson County. (Smith).

KIRCHNERIELLA Schmidle, 1893
(Smith, 1920, p. 140.)

1. *Kirchneriella contorta* (Schmidle) Bohlin
Smith, 1920, p. 143, Pl. 35, Fig. 7.

Cells 0.7-2μ in diameter, 8-14μ long. Pl. XII, Fig. 1. Plankton from swamp, Johnson County. (Prescott). Lakes, Dickinson County. (Smith).

2. *Kirchneriella elongata* G. M. Smith
Smith, 1920, p. 143, Pl. 36, Figs. 1, 2.

Cells 2-3μ in diameter, 15-25μ long. Pl. XII, Fig. 2. Plankton from slough, Dickinson County. (Smith).

3. *Kirchneriella lunaris* (Kirchner) Möbius
Smith, 1920, p. 141, Pl. 34, Fig. 4.

Cells 4-6μ in diameter, 6-13μ long. Plankton from north slough, from marsh, Johnson County. May. (Prescott). Spirit Lake, Dickinson County. (Smith).

var. a *irregularis* G. M. Smith.

Smith, 1920, p. 142, Pl. 35, Fig. 1.

Cells 4-6μ in diameter, 6-13μ long. Plankton from north slough, West Okoboji Lake, Dickinson County. (Smith).

4. *Kirchneriella obesa* (West) Schmidle

Smith, 1920, p. 142, Pl. 35, Figs. 2, 3.

Cells 3-8μ in diameter, 6-16μ long. Pl. XII, Fig. 4. Plankton from small pasture pond, Johnson County. July. (Prescott).

var. a *aperta* (Teiling) Brunnthaler.

Smith, 1920, p. 143, Pl. 35, Figs. 5, 6.

Cells 6-12μ in diameter. Lakes, Dickinson County. (Smith).

5. *Kirchneriella subsolitaris* G. S. West

Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 182, Fig. 271.

Cells 2.5-3.5μ wide, 10-15μ long. Pl. XII, Figs. 5-7. Plankton from ponds, lakes, slough, Dickinson County. (Smith).

LAGERHEIMIA Chodat, 1895

(Smith, 1920, p. 129.)

1. *Lagerheimia chodati* Bernard

Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 136, Fig. 127; Smith, 1926, p. 179, Pl. 11, Figs. 5, 6.

Cells 5-9μ in diameter. Pl. XII, Figs. 11-13. Plankton in slough, Spirit Lake, Dickinson County. (Smith).

2. *Lagerheimia ciliata* (Lagerheim) Chodat

Smith, 1920, p. 129, Pl. 31, Figs. 1, 2.

Cells 6-18μ in diameter without setae. Pl. XII, Fig. 14. Plankton from Robinson Lake, Dickinson County. (Smith).

3. *Lagerheimia cingula* G. M. Smith

Smith, 1926, p. 181, Pl. 12, Fig. 25.

Cells 7.5μ wide, 11.5μ long, without setae. Pl. XII, Fig. 15. Plankton in slough, Dickinson County. (Smith).

4. *Lagerheimia citriformis* (Snow) G. M. Smith

Smith, 1920, p. 130, Pl. 30m, Figs. 1, 2.

Cells 8-20μ wide, 13-23μ long, without setae. Pl. XII, Fig. 16. Lakes, Dickinson County. (Smith).

5. *Lagerheimia droescheri* (Lemmermann) Printz

Smith, 1920, p. 131, Pl. 30, Figs. 5-7.

Cells 5-12μ wide, 9-16μ long, without setae. Pl. XII, Fig. 17. Plankton from lakes, pond, stream, Dickinson County. (Smith).

6. *Lagerheimia genevense* Chodat

Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 135, Fig. 126.

Type not reported from Iowa.

var. a *subglobosa* (Lemmermann) Chodat.

Smith, 1926, p. 180, Pl. 11, Fig. 8.

Cells 4μ wide, 5μ long, without setae. Pl. XII, Fig. 18. Plankton from pond, Dickinson County. (Smith).

7. *Lagerheimia longiseta* (Lemmermann) Printz

Smith, 1920, p. 130, Pl. 30, Figs. 8, 9.

Cells 5-8μ in diameter, without setae. Pl. XII, Fig. 19. Plankton from lakes, ponds, sloughs, Dickinson County. (Smith).

8. *Lagerheimia quadriseta* (Lemermann) Smith

Smith, 1926, p. 180, Pl. 12, Figs. 5-9; Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 139, Fig. 14.

Cells 4-6.5μ in diameter, 7.5-12μ long, without spines. Pl. XII, Figs. 20, 21. Plankton from Little Sioux River, Dickinson County. (Smith).

9. *Lagerheimia subsalsa* Lemmermann

Smith, 1920, p. 130, Pl. 30, Figs. 3, 4.

Cells 2.5-8μ wide, 5-12μ long, without setae. Pl. XII, Figs. 8, 9. Plankton from slough, Johnson County. July. (Prescott). Plankton from pond, lakes, Dickinson County. (Smith).

10. *Lagerheimia wratislawiensis* Schroder

Brunnthaler, in Lemmermann, Brunnthaler and Pascher, 1915, p. 136, Fig. 128; Smith, 1926, p. 180, Pl. 12, Figs. 10-14.

Cells 2.75-7μ wide, 10-13.5μ long, without setae. Pl. XII, Fig. 10. Dickinson County. (Smith).

var. a *trisetigera* G. M. Smith.

Smith, 1926, p. 181, Pl. 12, Figs. 15-21.

Cells 2.5-5.5μ wide, 5-9μ long, without setae. Plankton from streams, lakes, slough, Dickinson County. (Smith).

Micractinium Fresenius, 1858

(Smith, 1920, p. 125.)

1. *Micractinium pusillum* Fresenius

Smith, 1920, p. 125, Pl. 28, Figs. 1-3.

Cells 3-7μ in diameter, without setae. Pl. XIII, Fig. 10. Plankton from barnyard pool, Johnson County. June. (Prescott).

var. a *elegans* G. M. Smith.

Smith, 1920, p. 126, Pl. 29, Fig. 1.

Pl. XIII, Fig. 15. Plankton from swamp, Johnson County. July. (Prescott). Plankton from pond, slough, Dickinson County. (Smith).

3. *Micractinium quadrisetum* (Lemmermann) G. M. Smith

Smith, 1920, p. 126, Pl. 28, Fig. 4.

Cells 4-7μ wide, 8-10μ long, without setae. Pl. XIII, Fig. 20. Plankton from shallow water of marsh, Johnson County. July. (Prescott). Lakes and drainage canal, Dickinson County. (Smith).

NEPHROCYTIUM Nägeli, 1849
(Smith, 1920, p. 114.)

1. *Nephrocytium agardhianum* Nägeli

Smith, 1920, p. 114, Pl. 23, Figs. 6, 7.

Cells 2-12μ wide, 6-28μ long. Pl. XI, Fig. 21. Lakes, Dickinson County. (Smith). Among filamentous algae and organic debris of shallow marsh, Johnson County. May. (Prescott).

OOCYSTIS Nägeli, 1845
(Smith, 1920, p. 110.)

1. *Oocystis borgei* Snow

Smith, 1920, p. 111, Pl. 22, Fig. 4.

Cells 9-13μ wide, 9-17μ long. Pl. XII, Fig. 23. Plankton in swamp, Johnson County. October. (Prescott). Lakes, Dickinson County. (Smith).

2. *Oocystis crassa* Wittr.

Smith, 1920, p. 113, Pl. 22, Figs. 12, 13.

Cells 10-20μ wide, 14-26μ long. Pl. XII, Fig. 22. Lakes, Dickinson County. Rare. (Smith).

3. *Oocystis elliptica* W. West

Smith, 1920, p. 111, Pl. 22, Fig. 5.

Cells 11-12.5μ wide, 20-25μ long. Pl. XII, Fig. 24. Plankton from pond, Muscatine County. October. Shallow marsh, Johnson County. (Prescott).

4. *Oocystis eremosphaeria* G. M. Smith

Smith, 1920, p. 113, Pl. 23, Figs. 1, 2.

Cells 23-31μ wide, 35-45μ long. Pl. XII, Fig. 27. Plankton in Clear Lake, Cerro Gordo County. July. (Prescott).

5. *Oocystis lacustris* Chodat

Smith, 1920, p. 112, Pl. 22, Figs. 8, 9.

Cells 8-22μ in diameter, 14-30μ long. Pl. XII, Fig. 26. Plankton from swamp, Johnson County. October. (Prescott). Dickinson County. (Smith).

6. *Oocystis parva* W. & G. S. West

Smith, 1920, p. 112, Pl. 22, Fig. 6.

Cells 4-7μ wide, 6-12μ long. Pl. XII, Fig. 25. Ponds and lakes, Dickinson County. (Smith).

7. *Oocystis pusilla* Hansgirg

Smith, 1920, p. 111, Pl. 22, Fig. 3.

Cells 6-7μ broad, 9-12μ long. Pl. XII, Figs. 28, 29. Common in swamp, Johnson County. May. (Prescott).

8. *Oocystis solitaria* Wittr.

Smith, 1920, p. 113, Pl. 22, Fig. 11.

Cells 7-20μ wide, 14-35μ long. Pl. XII, Fig. 30. Lakes, Dickinson County. (Smith).

9. *Oocystis submarina* Lagerheim

Smith, 1920, p. 113, Pl. 22, Fig. 10.

Cells 3-9μ wide, 7-20μ long. Pl. XII, Figs. 31, 32. Lakes, Dickinson County. (Smith), (Prescott).

Palmellococcus Chodat, 1894

(Collins, 1909, p. 158.)

1. *Palmellococcus miniatus* (Leiblein) Chodat

Collins, 1909, p. 159, Fig. 43.

Cells 3-15μ in diameter. Pl. XI, Fig. 22. On wet stems and leaves of plants at edge of swamp, Johnson County. October. (Prescott). Story County. (Buchanan).

Planktosphaeria G. M. Smith, 1918

(Smith, 1920, p. 103.)

1. *Planktosphaeria gelatinosa* G. M. Smith

Smith, 1920, p. 103, Pl. 20, Figs. 3-6.

Cells 4.5-25μ in diameter; colonies 45-150μ in diameter. Pl. XIII, Fig. 1. Plankton in ponds, Johnson County. April. (Prescott). Gar Lakes, Dickinson County. (Smith).

POLYEDRIOPSIS Schmidle, 1899
(Smith, 1920, p. 124.)

1. *Polyedriopsis quadrispina* G. M. Smith

Smith, 1926, p. 176, Pl. 9, Figs. 9-13.

Cells 5-7.5μ in diameter without spines. Pl. XIII, Figs. 7, 8. Plankton from Little Sioux River, Dickinson County. (Smith).

2. *Polyedriopsis spinulosa* Schmidle

Smith, 1920, p. 124, Pl. 27, Figs. 7, 8.

Cells 12-25μ in diameter. Pl. XIII, Fig. 2. Plankton from lakes, ponds, sloughs, Dickinson County. (Smith).

var. a *excavatum* Playfair.

Smith, 1926, p. 177, Pl. 9, Figs. 16-18.

Cells 15-22μ in diameter, without spines. Pl. XIII, Figs. 3, 4. Plankton from Millers Bay, West Okoboji Lake. July. (Prescott). Plankton from Little Sioux River, Dickinson County. (Smith).

TETRAEDRON Kuetzing, 1845
(Smith, 1920, p. 115.)

1. *Tetraëdron arthrodesmiforme*

Smith, 1926, p. 167.

Lakes, Dickinson County. Rare. (Smith).

var. a *contorta* Wolosz.

Smith, 1926, p. 173, Pl. 7, Figs. 1-5.

Pl. XIV, Figs. 1-3. Plankton in lakes, Dickinson County. (Smith).

2. *Tetraëdron bifurcatum* (Wittr.) Lagerheim

Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 156, Fig. 194.

Cells 38-46μ in diameter, without spines. Pl. XIV, Figs. 4-6. Swamp, Johnson County. June. (Prescott). Apparently new to North America.

var. a *nudum* G. M. Smith.

Smith, 1926, p. 174, Pl. VII, Figs. 20-24.

Cells 10-21μ in diameter. Pl. XIV, Figs. 7-9. Slough and lakes, Dickinson County. (Smith). Aquarium, Lakeside Laboratory, Dickinson County. (Prescott).

3. *Tetraëdron caudatum* (Corda) Hansgirg

Smith, 1920, p. 120, Pl. 25, Figs. 4-7.

Cells 6-22μ in diameter. Pl. XIV, Figs. 10, 11. Plankton from

swamp, Johnson County. May; plankton from aquarium jar, Dickinson County. July. (Prescott). Lakes, Dickinson County. (Smith).

var. a *longispinum* Lemmermann.

Smith, 1920, p. 120, Pl. 25, Figs. 8-12.

Cells 8-18μ in diameter. Pl. XIV, Figs. 12, 13. Lakes and ponds, Dickinson County. (Smith).

4. *Tetraëdron constrictum* G. M. Smith

(*Tetraëdron arthrodesmiforme* var. *lobulatum Wolosynska*) Smith, 1920, p. 122, Pl. 25, Figs. 22-24.

Cells 5-8μ in diameter, 18-25μ long. Pl. XIV, Figs. 14, 15. Plankton from Spirit Lake, Dickinson County. (Smith). Gull Point, West Okoboji Lake, Dickinson County. July. (Prescott).

5. *Tetraëdron cruciatum* (Wallich) W. & G. S. West

Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 158, Fig. 202; Smith, 1926, p. 175, Pl. 8, Figs. 1, 2.

Cells 10-18μ in diameter, without processes. Pl. XIV, Fig. 16. Plankton from lakes, Dickinson County. (Smith).

6. *Tetraëdron enorme* (Ralfs) Hansgirg

Smith, 1920, p. 124, Pl. 27, Fig. 6.

Cells 20-45μ in diameter. Pl. XV, Figs. 1, 2. Plankton from marsh, Johnson County. October. (Prescott). Dickinson County. (Smith).

7. *Tetraëdron gracile* (Reinsch) Hansgirg

Smith, 1920, p. 122, Pl. 26, Figs. 1-5.

Cells 15-30μ in diameter, without processes. Pl. XIV, Fig. 17. Plankton from Robinson Lake, Dickinson County. (Smith).

var. a *excavatum* G. M. Smith.

Smith, 1926, p. 175, Pl. 8, Figs. 4-8.

Cells 30-44μ in diameter. Robinson Lake, Dickinson County. (Smith).

8. *Tetraëdron hastatum* (Reinsch) Hansgirg

Smith, 1920, p. 121, Pl. 25, Fig. 18.

Cells 28-36μ in diameter. Lakes, slough, drainage canal, Dickinson County. (Smith).

var. a *palatinum* (Schmidle) Lemmermann.

Smith, 1920, p. 121, Pl. 25, Figs. 19-21.

Cells 4-14μ in diameter. Pl. XIV, Fig. 18. Plankton from

slough, Johnson County. July. (Prescott). Lakes, Dickinson County. (Smith).

9. *Tetraëdron incus* (Teiling) G. M. Smith

(*Tetraëdron regulare* var. *incus* Teiling) Smith, 1926, p. 174, Pl. 7, Figs. 8-13.)

Cells 20-37μ in diameter. Plankton from lakes, Dickinson County. (Smith).

10. *Tetraëdron limneticum* Borge

Smith, 1920, p. 123, Pl. 27, Figs. 1-3.

Cells 45-85μ in diameter. Pl. XIV, Fig. 19. Dickinson County. (Smith).

11. *Tetraëdron lobulatum* (Nägeli) Hansgirg

Smith, 1920, p. 122, Pl. 26, Figs. 6, 7.

Cells 30-40μ in diameter. Pl. XIV, Figs. 20, 21. Plankton in lakes, Dickinson County. (Smith). Swamps, Johnson County. (Prescott).

var. a *polyfurcatum* G. M. Smith.

Smith, 1920, p. 123, Pl. 26, Fig. 8.

Cells 15-25μ in diameter, without processes. Sloughs and lakes, Dickinson County. (Smith).

12. *Tetraëdron longispinum* (Perty) Hansgirg

De Toni, 1889, p. 615; Buchanan, 1907, p. 82.

Cells 36-58μ in diameter, with processes. Creek, Story County. (Buchanan).

13. *Tetraëdron minimum* (A. Br.) Hansgirg

Collins, 1909, p. 163; Smith, 1926, p. 167, Pl. 6, Figs. 18, 19.

Cells 6-13μ in diameter. Pl. XIV, Fig. 22. Plankton from marsh, Johnson County. May. (Prescott). Dickinson County. (Smith).

14. *Tetraëdron muticum* (A. Br.) Hansgirg

Collins, 1909, p. 163; Smith, 1926, p. 167, Pl. 6, Figs. 4, 5.

Cells 13-38μ in diameter. Pl. XIV, Fig. 23. Plankton from marsh, Johnson County. May. (Prescott). Lakes, Dickinson County. (Smith).

15. *Tetraëdron pentaedricum* W. & G. S. West

Smith, 1920, p. 120, Pl. 25, Figs. 13-17.

Cells 5.5-14μ in diameter without spines. Pl. XV, Fig. 3. Plank-

ton in drainage canal, Dickinson County. (Smith). West Okoboji Lake, Dickinson County. August. (Prescott).

16. *Tetraëdron planctonicum* G. M. Smith

Smith, 1920, p. 123, Pl. 27, Figs. 4, 5.

Cells 18-30μ in diameter, without processes. Pl. XIV, Fig. 24. Plankton from lake, Linn County. August. (Prescott). Okoboji lakes, Dickinson County. (Smith).

17. *Tetraëdron pusillum* W. & G. S. West

Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 157; Fig. 200.

Cells 10μ wide, 25μ long. Pl. XIV, Figs. 25, 26. Swamp, near West Okoboji Lake, Dickinson County. July. (Prescott).

var. a *angolense* W. & G. S. West.

Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 157; Smith, 1926, p. 176, Pl. 8, Figs. 13-17.

Cells 19-23μ in diameter. Pl. XIV, Figs. 27, 28. Plankton from swamp, Dickinson County. June. (Prescott). Lakes, Dickinson County. (Smith).

18. *Tetraëdron quadrilobulatum* G. M. Smith

Smith, 1922, p. 333, Pl. 8, Figs. 14-18.

Cells 7.5-17μ in diameter. Pl. XIV, Fig. 29. Plankton from swamp, Johnson County. July. (Prescott). Lakes, Dickinson County. (Smith).

19. *Tetraëdron regulare* Kuetzing

Smith, 1920, p. 118, Pl. 24, Fig. 14.

Cells 14-45μ in diameter with spines. Pl. XIV, Figs. 30, 31. Plankton from Okoboji lakes, (Prescott), (Smith).

var. a *bifurcatum* Wille.

Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 151, Fig. 170.

Cells 30-36μ in diameter. Pl. XIV, Figs. 32-33. Plankton in aquarium, Dickinson County. October. (Prescott).

var. b *torsum* (Turner) Brunnthaler.

Smith, 1920, p. 119, Pl. 24, Figs. 17, 18.

Cells 25-40μ in diameter. Pl. XIV, Fig. 34. Plankton from marsh, Johnson County. October. (Prescott). Okoboji lakes, Dickinson County. (Smith).

20. *Tetraëdron siamensis* W. & G. S. West

Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 154, Fig. 185.

Cells 28μ in diameter, about 52μ long. Pl. XIV, Fig. 35. Plankton in pond, Dickinson County. July. (Prescott). Previously reported from Siam.

21. *Tetraëdron staurastroides* G. M. Smith

Smith, 1926, p. 173, Pl. 7, Figs. 6, 7.

Cells 10-12μ in diameter without processes. Pl. XIV, Figs. 36, 37. Plankton from Green Slough, Dickinson County. (Smith).

22. *Tetraëdron trigonum* (Nägeli) Hansgirg

Smith, 1920, p. 117, Pl. 23, Figs. 14-16.

Cells 28-40μ in diameter including spines. Pl. XIV, Fig. 38. Plankton from marsh, Johnson County. October. (Prescott). Okoboji lakes, Dickinson County. (Smith).

var. a *gracile* (Reinsch) de Toni.

Smith, 1920, p. 117, Pl. 24, Figs. 5-9.

Cells 23-50μ in diameter. Okoboji region. (Smith).

var. b *minor* Reinsch.

Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 149.

Cells 10-14μ in diameter. Pl. XIV, Figs. 39, 40. Aquarium, Dickinson County. August. (Prescott).

var. c *papilliferum* (Schröd) Lemmermann.

Smith, 1926, p. 172, Pl. 6, Figs. 13-17.

Cells 10-15μ in diameter. Pl. XIV, Figs. 41, 42. Dickinson County. (Smith).

var. d *setigerum* (Archer) Lemmermann.

Smith, 1920, p. 117, Pl. 24, Figs. 1-4.

Cells 7-12μ in diameter, without spines. Pl. XIV, Fig. 43. West Okoboji Lake, Dickinson County. July. (Prescott).

23. *Tetraëdron tumidulum* (Reinsch) Hansgirg

Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 148, Fig. 157; Smith, 1926, p. 167, 173, Pl. 6, Figs. 24-27.

Cells 20-60μ in diameter. Pl. XIV, Figs. 45-48. Dickinson County lakes. (Smith).

24. *Tetraëdron victoriae* Wolosz.

Smith, 1926, p. 173, Pl. 6, Figs. 33, 34.

Cells 20-24μ in diameter. Pl. XIV, Figs. 49, 50. Lakes and slough, Dickinson County. (Smith).

var. a *major* G. M. Smith.

Smith, 1920, p. 119, Pl. 24, Figs. 19-22; Pl. 25, Fig. 1.
Cells 15-20μ in diameter. Okoboji lakes. (Smith).

25. *Tetraëdron* sp.

An apparently new species, perhaps close to *Polyedrium armatum* Reinsch. The cell is triangular in outline, the sides straight or somewhat convex; angles bilobed, the apices of the lobes furnished with rather long but stout spines; diameter 57μ, including spines. Pl. XIV, Fig. 44. Pond, Dickinson County. July. (Prescott).

Treubaria Bernard
(Smith, 1920, p. 177.)

1. *Treubaria crassispina* G. M. Smith

Smith, 1926, p. 178, Pl. 10, Figs. 2-5.
Cells 100-115μ in diameter, without spines. Pl. XIII, Figs. 5, 6. Plankton from Dickinson County lakes. (Smith).

2. *Treubaria triappendicula* Bernard

Smith, 1926, p. 177, Pl. 9, Figs. 19-23; Pl. 10, Fig. 1.
Cells 6-12μ in diameter, without spines. Pl. XIII, Fig. 9. Lakes, ponds and streams, Dickinson County. (Smith).

Trochiscia Kuetzing, 1845
(Collins, 1909, p. 144.)

1. *Trochiscia aspera* (Reinsch) Hansgirg

Collins, 1909, p. 145.
Cells 18-22μ in diameter. Pl. XIII, Fig. 11. Plankton from open watering trough, Johnson County. June. (Prescott).

2. *Trochiscia obtusa* (Reinsch) Hansgirg

Collins, 1909, p. 146.
Cells 34-37μ in diameter. Pl. XIII, Fig. 12. Blue Lake, Monroe County. July. (Prescott).

3. *Trochiscia reticularis* (Reinsch) Hansgirg

Smith, 1920, p. 109, Pl. 22, Fig. 2.
Cells 24-32μ in diameter. Pl. XIII, Fig. 13. Plankton in slough, Dickinson County. (Smith).

4. *Trochiscia sporoides* (Reinsch) Hansgirg

Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 204.
Cells 25μ in diameter. Pl. XIII, Figs. 16, 17. Bog, Iowa County. May. (Prescott).

Family **Coelastraceae**

(Printz, 1927, p. 132.)

Actinastrum Lagerheim, 1882

(Smith, 1920, p. 164.)

1. *Actinastrum gracillimum* G. M. Smith

Smith, 1920, p. 164, Pl. 43, Figs. 3-5.

Cells 1.75-3μ wide, 14-21μ long. Pl. XIII, Figs. 18, 19. Plankton in lakes, Dickinson County. (Smith).

2. *Actinastrum hantzschi* Lagerheim

Smith, 1920, p. 164, Pl. 43, Figs. 6, 7.

Cells 3-6μ wide, 10-25μ long. Pl. XIII, Fig. 14. Plankton in roadside pool, Johnson County. September. (Prescott).

var. a *fluviatile* Lemmermann.

Smith, 1926, p. 171, 192, Pl. 20, Figs. 1, 2.

Cells 1.5-5.5μ wide, 16-32μ long. Plankton in lakes and sloughs, Dickinson County. (Smith).

Ankistrodesmus Corda, 1838

(Smith, 1920, p. 134.)

1. *Ankistrodesmus convolutum* Corda

Wolle, 1887, p. 198, Pl. 160, Figs. 1-3; Smith, 1926, p. 169, Pl. 13, Figs. 7-9.

Cells 2-2.5μ wide, 10-12μ long. Plankton from Center Lake, Dickinson County. (Smith). Fayette County. (Fink).

2. *Ankistrodesmus falcatus* (Corda) Ralfs

Smith, 1920, p. 134, Pl. 32, Fig. 1.

Cells 1.5-7μ in diameter. Generally distributed. (Smith), (Anderson), (Fink), (Prescott).

var. a *acicularis* (A. Braun) G. S. West.

Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 188, Fig. 284.

Pl. XV, Fig. 8. Generally distributed over the state in plankton of ponds and sloughs. (Fink), (Prescott), (Buchanan).

var. b *mirabilis* (W. & G. S. West) G. S. West.

Smith, 1920, p. 135, Pl. 32, Figs. 3-5.

Cells 2-3μ wide, 75-150μ long. Pl. XV, Fig. 4. Plankton in quarry pond, Johnson County. July. (Prescott).

var. c *spirilliformis* G. S. West.

Smith, 1926, p. 169, 182, Pl. 13, Fig. 6.

Cells 1.5-2μ in diameter, 30-40μ long. Plankton in slough, Dickinson County. (Smith).

3. *Ankistrodesmus spiralis* (Turner) Lemmermann

Smith, 1920, p. 135, Pl. 32, Figs. 6, 7.

Cells 1-2.5μ wide, 20-40μ long. Pl. XV, Figs. 6, 7. Plankton from Blue Lake, Monroe County. August. (Prescott). Dickinson County. (Smith).

Closteriopsis Lemmermann, 1898

(West and Fritsch, 1927, p. 132.)

1. *Closteriopsis longissimum* Lemmermann

Brunnthaler in Lemmerman, Brunnthaler and Pascher, 1915, p. 191, Fig. 300.

Type not reported for Iowa.

var. a *aciculare* (Chod.) G. M. Smith.

Smith, 1926, p. 169, 182, Pl. 13, Figs. 10, 11.

Cells 4.5-5μ wide, 158-175μ long. Pl. XV, Fig. 10. Rare in plankton of slough, Dickinson County. (Smith).

Coelastrum Nägeli, 1849

(Smith, 1920, p. 160.)

1. *Coelastrum cambricum* Archer

Smith, 1920, p. 161, Pl. 42, Figs. 2, 3.

Cells 6-21μ in diameter, without sheath. Pl. XV, Fig. 9. Plankton from Clear Lake, Cerro Gordo County. July. (Prescott). Lakes, Dickinson County. (Smith).

2. *Coelastrum cornutum* Lemaire

Jour. de Bot. 8:81, Fig. 2, 1894.

Pl. XV, Fig. 11. Plankton from culture jar, University of Iowa. February. (Prescott).

3. *Coelastrum microporum* Nägeli

Smith, 1920, p. 160, Pl. 41, Figs. 12, 13; Pl. 42, Fig. 1.

Cells 4-23μ in diameter, including sheath. Pl. XV, Fig. 12. Plankton among filamentous algae in slowly flowing stream, Johnson County. May. (Prescott). Dickinson County. (Smith).

4. *Coelastrum proboscideum* Bohlin

Smith, 1920, p. 162, Pl. 42, Figs. 7, 8; Pl. 43, Figs. 1, 2.

Cells 6.5-17μ in diameter, including sheath. Pl. XV, Fig. 13. Plankton in pools, watering trough, etc. Blackhawk County, Johnson County, August. (Prescott). Slough, Dickinson County. (Smith).

5. *Coelastrum reticulatum* (Dangeard) Senn.

Smith, 1920, p. 161, Pl. 42, Figs. 4-6.

Cells 6-24μ in diameter, including sheath. Plankton in lakes, Dickinson County. (Smith).

6. *Coelastrum sphaericum* Nägeli

Smith, 1926, p. 170, 192, Pl. 18, Figs. 12-14.

Cells 3.5-7μ in diameter, 6-11.5μ long. Plankton in lakes, slough, drainage canal. Dickinson County. (Smith).

Crucigenia Morren, 1830

(Smith, 1920, p. 144.)

1. *Crucigenia alternans* G. M. Smith

Smith, 1926, p. 185, Pl. 14, Figs. 14-18.

Cells 6.5-11.5μ long, 5-7μ wide. Pl. XV, Fig. 15. Plankton in lakes, river, slough, Dickinson County. (Smith).

2. *Crucigenia apiculata* Lemmermann

Smith, 1920, p. 146, Pl. 37, Fig. 1.

Cells 3-7μ wide, 5-10μ long. Pl. XV, Fig. 14. Plankton in lakes, pond, slough, Dickinson County. (Smith).

3. *Crucigenia divergens* G. M. Smith

Smith, 1926, p. 185, Pl. 14, Figs. 22-29.

Cells 3.5-7μ long, 2.5-4.5μ wide. Pl. XV, Fig. 16. Plankton in lakes, Dickinson County. (Smith).

4. *Crucigenia fenestrata* Schmidle

Smith, 1920, p. 148, Pl. 37, Fig. 3.

Type not reported from Iowa.

var. a *mucronata* G. M. Smith.

Smith, 1926, p. 185, Pl. 15, Figs. 4-6.

Cells 2.5-5.5μ wide, 5-9μ long. Pl. XV, Fig. 17. Plankton from Little Sioux River. Rare. Dickinson County. (Smith).

5. *Crucigenia irregularis* Wille

Smith, 1920, p. 145, Pl. 36, Figs. 4, 5.

Cells 4-6μ in diameter. Pl. XV, Fig. 18. Plankton in pond, Dickinson County. July. (Prescott), (Smith).

6. *Crucigenia lauterbornei* Schmidle

Smith, 1920, p. 148, Pl. 37, Fig. 4.

Cells 4.5-9μ wide. Pl. XV, Fig. 20. Plankton from lakes, Dickinson County. (Smith).

7. *Crucigenia quadrata* Morren

Smith, 1920, p. 147, Pl. 36, Figs. 10-14.

Cells 2.5-6μ wide, 3-7μ long. Pl. XV, Fig. 19. Plankton in shallow water of marsh, Johnson County. June. (Prescott).

8. *Crucigenia rectangualris* (Nägeli) Gay

Smith, 1920, p. 144, Pl. 36, Fig. 3.

Cells 4-7μ wide, 5-10μ long. Pl. XV, Fig. 21. Plankton from swamp, Johnson County. June. (Prescott).

9. *Crucigenia tetrapedia* (Kirchner) W. & G. S. West

Smith, 1920, p. 147, Pl. 37, Fig. 2.

Cells 4.8-9.5μ in diameter. Pl. XV, Fig. 22. Plankton in slough, Johnson County. July. (Prescott).

10. *Crucigenia truncata* G. M. Smith

Smith, 1920, p. 146, Pl. 36, Figs. 7-9.

Cells 4-6μ wide, 6-10μ long. Lakes, pond, sloughs, Dickinson County. (Smith).

Dictyosphaerium Nägeli, 1849

(Smith, 1920, p. 104.)

1. *Dictyosphaerium chrenbergianum* Nägeli

Smith, 1920, p. 105, Pl. 20, Figs. 11, 12.

Cells 4-7μ in diameter, 6-10μ long. Pl. XV, Fig. 23. Plankton from swamp and ponds, Johnson County, May. (Prescott). Lakes, Dickinson County. (Smith).

2. *Dictyosphaerium pulchellum* Wood

Smith, 1920, p. 105, Pl. 20, Fig. 13; Pl. 21, Fig. 1.

Cells 3-10μ in diameter. Pl. XV, Fig. 24. Plankton in swamp, Johnson County. October. (Prescott). Lakes, Dickinson County. (Smith).

Dimorphococcus A. Braun, 1855

(Smith, 1920, p. 106.)

1. *Dimorphococcus cordatus* Wolle

Collins, 1909, p. 174, Fig. 60.

Cells 4-8μ in diameter. Pl. XV, Fig. 25. Plankton from shallow water of marsh, Johnson County. April. (Prescott).

2. *Dimorphococcus lunatus* A. Braun

Smith, 1920, p. 106, Pl. 21, Fig. 5.

Cells 4-15μ in diameter. Plankton from ponds, Muscatine County. July. (Prescott).

QUADRIGULA Printz, 1915
(Smith, 1920, p. 138.)

1. *Quadrigula pfitzeri* (Schröder) G. M. Smith

Smith, 1920, p. 138, Pl. 33, Figs. 1, 2.

Cells 3-6μ wide, 45μ long. Pl. XVI, Fig. 1. Plankton from shallow marsh, John County. May. (Prescott). Gar Lakes, Dickinson County. (Smith).

SCENEDESMUS Meyen, 1829
(Smith, 1920, p. 150.)

1. *Scenedesmus abundans* (Kirchner) Chodat

(*Scenedesmus quadricauda* var. *abundans* (Kirch.) Lag.) Smith, 1920, p. 157, Pl. 39, Figs. 23-25.

Cells 4-7μ wide, 7-10μ long. Pl. XVI, Fig. 2. Plankton in ponds, pools, lakes, aquaria. (Prescott). Lakes, Dickinson County. (Smith).

var. a *longicauda* G. M. Smith.

Smith, 1920, p. 157, Pl. 39, Figs. 26, 27.

Cells 3-6μ in diameter, 7-9μ long. Plankton from Stream, slough, Dickinson County. (Smith).

var. b *brevicauda* G. M. Smith.

Smith, 1920, p. 157, Pl. 40, Figs. 3-5.

Cells 2.5-5μ wide, 5-9μ long. Pl. XVI, Fig. 3. Aquarium, University of Iowa. July. (Prescott). Lakes, Dickinson County. (Smith).

2. *Scenedesmus acuminatus* (Lag.) Chodat

Smith, 1920, p. 152, Pl. 38, Figs. 1-4.

Cells 3-7μ wide, 30-40μ between apices. Pl. XVI, Figs. 4, 5. Aquaria, ponds, pools, Johnson County. (Prescott). Okoboji lakes, Dickinson County. (Smith).

var. a *elongatus* G. M. Smith.

Smith, 1926, p. 189, Pl. 16, Figs. 13-15.

Cells 2.5-5μ in diameter, 24-72μ between apices. Pl. XVI, Fig. 6. Plankton from West Okoboji Lake, Dickinson County. (Smith).

3. *Scenedesmus arcuatus* Lemmermann

Smith, 1920, p. 153, Pl. 38, Figs. 12-14.

Cells 3-9μ in diameter, 9-17μ long. Pl. XVI, Figs. 7, 8. Plankton from aquarium, University of Iowa, (Prescott). Dickinson County. (Smith).

var. a *capitatus* G. M. Smith.

Smith, 1920, p. 153, Pl. 38, Figs. 15, 16.

Cells 5-11μ in diameter, 11-24μ long. Pl. XVI, Fig. 9. Plankton from marsh, Johnson County. July. (Prescott). Dickinson County. (Smith).

var. b *platydisca* G. M. Smith.

Smith, 1920, p. 154, Pl. 39, Figs. 1-3.

Cells 4.5-7.5μ wide, 8-17μ long. Pl. XVI, Fig. 10. Stagnant pond, Johnson County. (Prescott). Dickinson County. (Smith).

4. *Scenedesmus armatus* (Chodat) G. M. Smith

Smith, 1920, p. 154, Pl. 39, Figs. 9, 10.

Cells 4-7μ wide, 7-16μ long. Lakes and ponds, Dickinson County. (Smith).

var. a *major* G. M. Smith.

Smith, 1920, p. 155, Pl. 39, Fig. 11.

Cells 9μ wide, 25μ long. Pl. XVI, Fig. 11. Plankton from Clear Lake, Cerro Gordo County. (Prescott).

5. *Scenedesmus bernardii* G. M. Smith

Smith, 1920, p. 152, Pl. 38, Figs. 5-9.

Cells 3-6μ wide, 8-17μ long. Pl. XVI, Fig. 12. Lakes, stream, slough, Dickinson County. (Smith).

6. *Scenedesmus bijuga* (Turp.) Lag.

Smith, 1920, p. 152, Pl. 37, Figs. 18-20.

Cells 4-7μ wide, 7-18μ long. Pl. XVI, Figs. 13, 14. Generally distributed over the state. (Buchanan), (Anderson), (Smith), (Prescott).

var. a *alternans* (Reinsch) Borge.

Smith, 1920, p. 153, Pl. 38, Figs. 10, 11.

Cells 4-8μ wide, 6-15μ long. Dickinson County. (Smith).

var. *alternans* forma *irregularis* G. M. Smith.

Smith, 1926, p. 189, Pl. 16, Figs. 24-27.

Cells 7-15μ long, 2.5-5μ wide. Pl. XVI, Fig. 15. Dickinson County. (Smith).

var. b *flexuosus* Lemmermann.

Snow, Bull. U. S. Fish Comm. 22: 375, Pl. 1, Figs. IV-1 to IV-2. 1902; Smith, 1926, p. 189, Pl. 17, Figs. 1-4.

Cells 8-17μ long, 3.5-7.5μ broad. Pl. XVI, Fig. 16. Lakes, Dickinson County. (Smith).

var. c *radiatus* Hansgirg.

Smith, 1926, p. 487.

Pl. XVI, Fig. 17. Plankton from marsh, Johnson County. May. (Prescott).

7. *Scenedesmus brasiliensis* Bohlin

Smith, 1920, p. 155, Pl. 39, Figs. 12-14.

Cells 3-6μ broad, 11-24μ long. Pl. XVI, Fig. 18. Plankton from marsh, Johnson County. October. (Prescott).

8. *Scenedesmus carinatus* (Lemmermann) Chodat

Smith, 1916, p. 462, Pl. 26, Fig. 25; 1926, p. 192, Pl. 18, Fig. 9.

Cells 2.5-7μ wide, 14-30μ long. Pl. XVI, Fig. 19. Dickinson County. (Smith).

9. *Scenedesmus denticulatus* Lagerheim

Smith, 1920, p. 155, Pl. 39, Figs. 17-19.

Cells 5-11μ wide, 7-15μ long. Pl. XVI, Fig. 20. Plankton in Dickinson County Lakes. October. (Prescott), (Smith).

var. a *linearis* Hansgirg.

Collins, 1909, p. 169; Smith, 1926, p. 191, Pl. 17, Figs. 23-25.

Cells 11-14μ long, 2.5-5μ broad. Dickinson County. (Smith).

var. b *lunatus* G. M. Smith.

Smith, 1916, p. 455.

Pl. XVI, Fig. 21. Plankton from West Okoboji Lake, Dickinson County. October. (Prescott).

10. *Scenedesmus dimorphus* (Turp.) Kuetzing

Smith, 1920, p. 151, Pl. 37, Figs. 15-17. (*Scenedesmus obliquus* var. *dimorphus* Rab.)

Cells 2-5μ broad, 16-20μ long. Pl. XVI, Figs. 22, 23. Generally distributed over the state. (Fink), (Anderson), (Buchanan), (Smith), (Prescott).

Forma *tortus* G. M. Smith.

Smith, 1926, p. 188, Pl. 16, Figs. 5-8.

Cells 2.5-6.5μ broad, 20-32.5μ long. Dickinson County. (Smith).

11. *Scenedesmus incrassatulus* Bohlin

Smith, 1916, p. 440.

Type not found in Iowa.

var. a *mononae* G. M. Smith.

Smith, 1916, p. 440, Pl. 29, Figs. 81-83.

Cells 3.5-4.5μ wide, 11-12μ broad. Pl. XVI, Fig. 24. Dickinson County. (Smith).

12. *Scenedesmus longus* Meyen

Smith, 1920, p. 156, Pl. 39, Figs. 20-22.

Type not reported for Iowa.

var. a *naegelii* (Brebisson) G. M. Smith.

Smith, 1920, p. 156, Pl. 40, Figs. 1, 2.

Cells 6.6-11μ wide, 18-33μ long. Pl. XVI, Fig. 25. Plankton from Clear Lake, Cerro Gordo County. July. (Prescott).

13. *Scenedesmus obliquus* (Turp.) Kuetzing

Smith, 1920, p. 151, Pl. 37, Figs. 12-14.

Cells 3-9μ wide, 10-21μ long. Pl. XVI, Fig. 26. Generally distributed. (Fink), (Buchanan), (Smith), (Prescott).

14. *Scenedesmus opoliensis* P. Richter

Smith, 1920, p. 159, Pl. 41, Figs. 8-11.

Cells 4-8μ broad, 12-28μ long. Pl. XVII, Fig. 1. Ponds, Johnson County. July. (Prescott). Dickinson County. (Smith).

15. *Scenedesmus perforatus* Lemmermann

Smith, 1926, p. 191, Pl. 17, Figs. 26, 27.

Cells 22.5-28μ long, 8-10μ broad at apex. Lakes, Dickinson County. (Smith).

16. *Scenedesmus quadricauda* (Turp.) de Breb.

Smith, 1920, p. 158, Pl. 40, Figs. 9-11.

Cells 3.5-6μ broad, 11-16μ long. Pl. XVI, Fig. 27. Generally distributed. (Fink), (Bessey), (Smith), (Prescott).

var. a *alternans* G. M. Smith.

Smith, 1926, p. 191, Pl. 17, Figs. 29-33.

Cells 5-7.5μ long, 2.5μ wide. Pl. XVI, Fig. 28. Plankton in lakes and sloughs, Dickinson County. (Smith).

var. b *longispina* (Chodat) G. M. Smith.

Smith, 1920, p. 159, Pl. 40, Figs. 12-14.

Cells 3.5-5μ broad, 8-11μ long. Dickinson County. (Smith).

var. c *maximus* W. & G. S. West.

Smith, 1920, p. 159, Pl. 41, Figs. 1, 2.

Cells 9-11.5μ broad, 27-36μ long. Dickinson County. (Smith).

var. d *quadrispina* (Chodat) G. M. Smith.

Smith, 1920, p. 158, Pl. 40, Figs. 15, 16.

Cells 5-8μ broad, 16-18μ long. Pl. XVII, Fig. 2. Plankton from ponds and marshes, Johnson County. June. (Prescott).

var. e *westii* G. M. Smith.

Smith, 1920, p. 159, Pl. 41, Figs. 3-7.

Cells 5-8μ wide, 16-18μ long. PlXVII, Fig. 3. Plankton from ponds, marshes, Johnson County. June. (Prescott). Dickinson County. (Prescott), (Smith).

17. *Scenedesmus reniforme* G. M. Smith

Smith, 1926, p. 190, Pl. 17, Figs. 14-18.

Cells 2.5-3.5μ wide, 9-15μ long. Plankton from lakes, Dickinson County. (Smith).

Schroederia Lemmermann, 1898

(Smith, 1920, p. 136.)

1. *Schroederia judayi* G. M. Smith

Smith, 1920, p. 137, Pl. 32, Figs. 9-11.

Cells 2.5-6μ in diameter, 45-63μ long. Pl. XVII, Figs. 4, 5. Plankton from lakes, streams, sloughs, Johnson County. (Prescott). Dickinson County. (Smith).

2. *Schroederia setigera* (Schroeder) Lemmermann

Smith, 1920, p. 137, Pl. 32, Fig. 12; (*Ankistrodesmus setigerus* (Schroeder) W. & G. S. West) Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 191, Fig. 304.

Cells 3-6μ in diamter, 60-85μ long. Pl. XVII, Fig. 6; Pl. XV, Fig. 5. Plankton from lakes, stream, Dickinson County. (Smith). In shallow water of marsh, Johnson County. June. (Prescott).

var. a *ancora* G. M. Smith.

1926, p. 183, Pl. 13, Figs. 17-21.

Cells 37.5-59μ long, including spines. Plankton from Gar Lakes, Dickinson County. (Smith).

Selenastrum Reinsch, 1867

(Smith, 1920, p. 133.)

1. *Selenastrum bibrainum* Reinsch

Smith, 1920, p. 133, Pl. 31, Figs. 6, 7.

Cells 5-8μ wide, 20-38μ long. Plankton in lakes and sloughs, Dickinson County. (Smith).

2. *Selenastrum gracile* Reinsch

Smith, 1920, p. 133, Pl. 31, Fig. 5.

Cells 3-5μ in diameter, 15-30μ long. Pl. XVII, Fig. 7. Plankton from marsh, Johnson County. April. (Prescott). Okoboji lakes, Dickinson County. (Smith).

3. *Selenastrum westii* G. M. Smith

Smith, 1920, p. 133, Pl. 31, Figs. 8-10.

Cells 1.5-2.5μ wide, 15-18μ between apices. Pl. XVII, Fig. 8. Plankton from swamp water, Johnson County. May. (Prescott).

Tetrastrum Chodat, 1895

(Smith, 1920, p. 149.)

1. *Tetrastrum anomalum* G. M. Smith

Smith, 1926, p. 187, Pl. 15, Figs. 21-27.

Cells 1.25-5μ in diameter, 6.5-15μ long. Pl. XVII, Fig. 11. Plankton from Dickinson County lakes and sloughs. (Smith).

2. *Tetrastrum elegans* Playfair

Smith, 1926, p. 186, Pl. 15, Figs. 11-15.

Cells 2-8μ in diameter; spines 10-20μ long. Okoboji lakes, Dickinson County. (Smith).

3. *Tetrastrum heterocanthum* (Nordstedt) Chodat

Smith, 1926, p. 187, Pl. 15, Figs. 16-20; Brunnthaler in Lemmermann, Brunnthaler and Pascher, 1915, p. 177, Fig. 262.

Cells 3.5-11.5μ in diameter; spines 11-24μ long. Pl. XVII, Fig. 12. Ponds, streams and slough, Dickinson County. (Smith).

4. *Tetrastrum stauroginiaeforme* (Schröder) Lemm.

Smith, 1920, p. 149, Pl. 37, Figs. 5, 6.

Cells 3-6μ in diameter. Pl. XVII, Fig 13. Swamp, Dickinson County. July. (Prescott). Lakes, Dickinson County. (Smith).

var. a *longispinum* G. M. Smith.

Smith, 1926, p. 186, Pl. 15, Fig. 10.

Colony up to 50μ including spines. West Okoboji Lake, Dickinson County. (Smith).

Tetradesmus G. M. Smith, 1913

(Smith, 1920, p. 150.)

1. *Tetradesmus wisconsensis* G. M. Smith

Smith, 1920, p. 150, Pl. 37, Figs. 7-11.

Cells 4-6μ wide, 12-14.5μ long. Pl. XVII, Figs. 9, 10. Plankton from swamp, Johnson County. June. (Prescott).

WESTELLA de Wildemann, 1897
(Smith, 1920, p. 106.)

1. *Westella botryoides* (West) de Wildemann

Smith, 1920, p. 107, Pl. 21, Fig. 4.

Cells 3-9μ in diameter. Pl. XVII, Fig. 14. Swamp, Johnson County. May. (Prescott). Lakes and pond, Dickinson County. (Smith).

Order III. ULOTRICHALES

Family **Ulotrichaceae**

BINUCLEARIA Wittrock, 1886
(West and Fritsch, 1927, p. 155.)

1. *Binuclearia tatrana* Wittr.

Tiffany, 1926, p. 79; West and Fritsch, 1927, p. 155, Figs. 52-I, 54.

Cells 6-10μ in diameter. Pl. XVII, Figs. 15-17. Lakes and drainage canal, Dickinson County. (Tiffany). Swamp, Johnson County. (Prescott).

GEMINELLA Turpin, 1828
(West and Fritsch, 1927, p. 156.)

1. *Geminella minor* (Nägeli) Heering

Tiffany, 1926, p. 78, Pl. XV, Fig. 162.

Cells 2-10μ wide, 3-14μ long. Swamps and lakes, Dickinson County. (Tiffany). Johnson County. June. (Prescott).

2. *Geminella ordinata* G. S. West

Tiffany, 1926, p. 78; Heering, 1914, p. 41, Fig. 47.

Cells 5.8μ in diameter. Pl. XVII, Fig. 17a. Lake West Okoboji, Dickinson County. (Tiffany).

HORMIDIUM Kuetzing, 1849
(West and Fritsch, 1927, p. 154.)

1. *Hormidium nitens* Meneghini

Heering, 1914, p. 45, Fig. 50.

Cells 5.5-7μ in diameter, 1-3 diameters long. Pl. XVII, Figs. 18, 19. On damp bark of trees, Johnson County. March. (Prescott).

SCHIZOMERIS Kuetzing, 1843
(Collins, 1909, p. 189.)

1. *Schizomeris leibleinii* Kuetzing

Collins, 1909, p. 189, Fig. 67.

Cells 15-30μ in diameter; frond 5-20 cm. long. Pl. XVIII, Figs. 1, 2. Attached to submersed or floating wood, ponds, and slough, Johnson County. July. (Prescott). Dickinson County, Buena Vista County. (Tiffany). Johnson County. (Hobby).

STICHOCOCCUS Nägeli, 1848
(Collins, 1909, p. 189.)

1. *Stichococcus bacillaris* Nägeli

Collins, 1909, p. 190, Fig. 69.

Cells 2.5-3μ in diameter. Pl. XVII, Fig. 20. On damp rocks and trees, often associated with Pleurococcus on damp substrates. Generally distributed. (Buchanan), (Prescott).

ULOTHRIX Kuetzing, 1833
(Collins, 1909, p. 181.)

1. *Ulothrix tenerrima* Kuetzing

Collins, 1909, p. 183; Heering, 1914, p. 32, Figs. 28-30.

Cells 7-9μ in diameter, two-thirds to one and one-third diameters long. Pl. XVII, Fig. 21. Forming flocculent masses in slowly flowing streams, Johnson County. June. (Prescott), (Hobby). Wright County. (Buchanan).

2. *Ulothrix variabilis* Kuetzing

Collins, 1909, p. 183; Heering, 1914, p. 32, Fig. 27.

Cells 5-6μ in diameter, one-half to one and one-half diameters long. Fayette County. May. (Prescott).

3. *Ulothrix zonata* (Web. and Mohr.) Kuetzing

Collins, 1909, p. 184, Fig. 64.

Cells 27-35μ in diameter, one-third to one and one-half diameters long. Pl. XVII, Fig. 22. Generally distributed. (Prescott), (Tiffany).

Family **Microsporaceae**

MICROSPORA Thuret, 1850
(Collins, 1909, p. 192.)

1. *Microspora amoena* (Kuetzing) Rabenhorst

Collins, 1909, p. 193; Heering, 1914, p. 154, Fig. 222.

Cells 21-25μ in diameter, one to two diameters long. Forming

long masses in rapidly flowing water, Johnson County. May. (Prescott). Fayette County, Powesheik County. (Fink).

2. *Microspora floccosa* (Vaucher) Thuret

Collins, 1909, p. 194, Fig. 68.

Cells 14-17μ in diameter one to two and one-half diameters long. Floating in spring, Story County. (Buchanan and Holden).

3. *Microspora pachyderma* (Wille) Lagerheim

Collins, 1909, p. 193; Heering, 1914, p. 152, Fig. 218.

Cells 8-14μ in diameter, one and one-half to three diameters long. Pl. XVIII, Fig. 3. In shallow water of marsh, Johnson County. October. (Prescott).

4. *Microspora stagnorum* (Kuetzing) Lagerheim

Collins, 1909, p. 194; Heering, 1914, p. 151, Fig. 212.

Cells 7.5-9.5μ in diameter, one to three diameters long. Common with Ulothrix, Johnson County. April. (Prescott). Wright County. (Buchanan).

5. *Microspora tumidula* Hazen

Collins, 1909, p. 194; Heering, 1914, p. 151, Fig. 211.

Cells 6-9.5μ in diameter. Pl. XVIII, Fig. 4. Aquarium in Lakeside Laboratory, Dickinson County. October. (Prescott). Drainage canal, Dickinson County. (Tiffany).

6. *Microspora willeana* Lagerheim

Collins, 1909, p. 194; Tiffany, 1926, p. 79, Pl. XV, Fig. 161.

Cells 11-14μ in diameter, one-half to one and one-half diameters long. Seepage into Lake West Okoboji, Dickinson County. (Tiffany).

Family **Ulvaceae**

Protoderma Kuetzing, 1843

(Collins, 1909, p. 217.)

1. *Protoderma viride* Kuetzing

Collins, 1909, p. 217, Fig. 73.

Cells 6-12μ in diameter, one to two diameters long. Pl. XVIII, Fig. 5. On woody stems submersed in shallow water, Johnson County. October. (Prescott).

Family **Prasiolaceae**

Prasiola (Ag.) Meneghini, 1838

(Collins, 1909, p. 218.)

1. *Prasiola calophylla* (Spreng.) Meneghini

Collins, 1909, p. 219; Heering, 1914, p. 59, Fig. 87.

Cells 3-5μ wide, 10μ long at base of frond. Pl. XVIII, Fig. 6. Attached to large filamentous algae and other aquatics in shallow marsh water. Johnson County. June. (Prescott).

Family **Cylindrocapsaceae**

Cylindrocapsa Reinsch, 1887

(Collins, 1909, p. 222.)

1. *Cylindrocapsa conferta* West

Heering, 1914, p. 62, Fig. 91.

This species was collected several times from lakes and swamps in Dickinson County. One collection from Center Lake showed plants in the reproductive condition. So far as known this is the first time that reproductive organs have been reported for the species.

Vegetative cells quadrate-ellipsoid, shorter than their width; oogonia in a series of 4-8, irregularly globose to fusiform, the fecundation pore median; oospores globose; antheridia quadrate, the cells shorter than their diameter, in a series above or below the series of oogonia; vegetative cells 21-26μ in diameter; oogonia 36-40μ in diameter; oospores 22-25μ in diameter. Pl. XVIII, Fig. 7.

The observations of the fruiting material were made from a collection preserved but a short time in a water-alcohol-formalin solution.

Buchanan (12), p. 66, compares a form which he collected in Story County with West's figure of *C. conferta*. If Buchanan's specimen is correctly assigned his report of this species is apparently the first for North America.

Dickinson County. July. (Prescott). Story County. (Buchanan).

2. *Cylindrocapsa geminella* Wolle

Collins, 1909, p. 222, Fig. 80; Tiffany, 1926, p. 79, Pl. XV, Fig. 165.

Cells 10-16μ in diameter. Pl. XVIII, Figs. 8, 9. Generally distributed. (Prescott), (Tiffany).

var. a *minor* Hansgirg.

Tiffany, 1926, p. 79, Pl. XV, Fig. 164.

Cells 12-15μ in diameter. Common in Dickinson County. (Tiffany).

Family **Chaetophoraceae**

CHAETOPELTIS Berthold, 1878

(Collins, 1909, p. 288.)

1. *Chaetopeltis americana* Snow

Collins, 1909, p. 289, Fig. 96.

Outer cells of the colony 10-17μ long, 5-13μ wide. Thalli attached to the under surface of floating leaves of aquatics. Pl. XIX, Figs. 1, 2. Swamps, and ponds, Johnson County. October. (Prescott).

CHAETOPHORA Schrank, 1813

(Collins, 1909, p. 295.)

1. *Chaetophora elegans* (Roth) Agardh

Collins, 1909, p. 295, Fig. 85.

Cells 8μ in diameter in main filament. Pl. XIX, Figs. 3-5. Globose or tuberculate thalli attached to submersed stems and leaf petioles in swamps and ponds, Johnson County. July. (Prescott). Dickinson County. (Prescott), (Tiffany).

2. *Chaetophora incrassata* (Huds.) Hazen

Collins, 1909, p. 296; Tiffany, 1926, p. 79, Pl. 13, Fig. 144.

Cells in main filament 11-14μ in diameter. Pl. XIX, Fig. 6. Irregularly branched thalli floating on surface of ponds and lakes, Dickinson County. July. (Prescott). Generally distributed. (Tiffany), (Fink), (Pammel).

3. *Chaetophora monilifera* Kuetzing

Wolle, 1887, p. 118, Pl. CIII, Fig. 19.

Attached to Cladophora. Clear Lake, Cerro Gordo County. (Shimek).

4. *Chaetophora pisciformis* (Roth) Agardh

Collins, 1909, p. 296.

Cells of main filament 6-7μ in diameter. Generally distributed in ponds and other quiet bodies of water. (Hobby), (Shimek), (Buchanan).

Chaetosphaeridium Klebahn, 1891
(Collins, 1909, p. 281.)

1. *Chaetosphaeridium globosum* (Nordstedt) Klebahn

Collins, 1909, p. 281; Heering, 1914, p. 144, Fig. 198.

Cells 12-18μ in diameter; sheath 2-3μ in diameter. Pl. XIX, Fig. 7. Ponds, Johnson County. April. (Prescott). Wright County. (Buchanan).

Draparnaldia Bory, 1808
(Collins, 1909, p. 302.)

1. *Draparnaldia glomerata* (Vauch.) Agardh

Collins, 1909, p. 303, Fig. 89.

Cells of main filament 90-125μ in diameter. In shallow, temporary pond, Johnson County. April. (Prescott). Generally distributed. (Hobby), (Tiffany), (Anderson).

2. *Draparnaldia plumosa* (Vauch.) Agardh

Collins, 1909, p. 303.

Cells of main filament 45-70μ in diameter. Pl. XIX, Fig. 8, 11. Attached to submersed stems and roots in pond, Johnson County. May. (Prescott). Generally distributed. (Bessey), (Tiffany), (Fink).

Endoderma Lagerheim, 1883
(Collins, 1909, p. 278.)

1. *Endoderma pithophorae* West.

Collins, 1909, p. 280.

Cells 25-38μ in diameter. Pl. XIX, Fig. 9. On Rhizoclonium, Pithophora and Cladophora, Dickinson County lakes. May. (Prescott), (Tiffany).

Microthamnion Nägeli in Kuetzing, 1849
(Collins, 1909, p. 294.)

1. *Microthamnion kuetzingianum* Nägeli in Kuetzing

Collins, 1909, p. 294, Fig. 83.

Cells 3-4μ in diameter. Pl. XIX, Fig. 10. Attached to large filamentous algae and submersed aquatics in lakes, ponds and swamps, Johnson County, Jasper County. April and September. (Prescott).

Stigeoclonium Kuetzing, 1843
(Collins, 1909, p. 297.)

1. *Stigeoclonium flagelliferum* Kuetzing

Collins, 1909, p. 299.

Basal cells 14-18μ in diameter. In slowly flowing stream, attached to submersed stems. Johnson County. May. (Prescott), (Hobby).

2. *Stigeoclonium glomeratum* (Hazen) Collins

Collins, 1909, p. 301.

Lower cells 11-14μ in diameter. Pl. XX, Fig. 1. Attached to floating debris, West Okoboji Lake, Dickinson County. July. (Prescott).

3. *Stigeoclonium lubricum* (Dillw.) Kuetzing

Collins, 1909, p. 298, Fig. 84.

Lower cells 14-17μ in diameter. Drainage Canal, Dickinson County. August. (Tiffany).

4. *Stigeoclonium nanum* (Dillw.) Kuetzing

Collins, 1909, p. 300.

Attached to submerged sticks and stones in slowly running water, Jasper County. September. (Prescott). Fayette County, Powesheik County. (Fink). Story County. (Buchanan).

5. *Stigeoclonium polymorphum* (Franke) Heering

Heering, 1914, p. 87, Figs. 126a-126d.

Cells 3.5-7.5μ in diameter. Pl. XX, Fig. 2. Endophytic and epiphytic on roots of Lemna. Marsh and ponds, Johnson County. October. (Prescott). Previously reported from Europe.

6. *Stigeoclonium stagnatile* (Hazen) Collins

Collins, 1909, p. 301.

Lower cells 8-11μ in diameter. Pl. XX, Figs. 3, 4. Blackhawk County. March. (Prescott). Dickinson County. (Tiffany).

7. *Stigeoclonium subsecundum* Kuetzing

Collins, 1909, p. 301; Wolle, 1887, p. 112, Pl. 99, Fig. 2.

Cells 12-18μ in diameter. Pl. XX, Fig. 5. Attached to sides of water tank, Johnson County. June. (Prescott). Attached to stones, Dickinson County lakes. May to August. (Tiffany).

8. *Stigeoclonium tenue* (Ag.) Kuetzing

Collins, 1909, p. 300; Tiffany, 1926, p. 80, Pl. 13, Fig. 142.

Lower cells 5-6μ in diameter. Lakes, Dickinson County. August.

(Tiffany). Floating in West Okoboji Lake, Dickinson County. July. (Prescott). Johnson County. (Hobby). Story County. (Buchanan).

Family **Aphanochaetaceae**

APHANOCHAETE Berthold, 1878
(De Toni, 1889, p. 179.)

1. *Aphanochaete hyalothecae* (Hansgirg) Schmidle
Heering, 1914, p. 129, Fig. 184.

Cells 3-6μ in diameter, Pl. XXI, Fig. 2. Attached to filaments of *Hyalotheca dissiliens*, swamp, Johnson County. October. (Prescott).

2. *Aphanochaete repens* Berthold
(*Herposteiron confervicola* Nägeli) Collins, 1909, p. 311, Fig. 116.

Spines 200μ long. Pl. XXI, Fig. 1. Attached to Pithophora filaments in pond, Muscatine County. October. (Prescott). Lakes, Dickinson County. June-August. (Tiffany).

3. *Aphanochaete vermiculoides* Wolle
Collins, 1909, p. 311; Wolle, 1887, p. 119, Pl. 105, Figs. 9, 10.

Cells 4-6μ in diameter; spines short. Pl. XXI, Fig. 3. Attached to filaments of Oedogonium and other large filamentous algae. Ponds, Muscatine County. May and October. (Prescott).

G. M. Smith regards this as identical with *A. hyalotheca* and Collins, (13), p. 311 also questions the validity of Wolle's original description. I have found two expressions of this form, both of which may be *A. hyalothecae*. They seem to have differentiating characters, however. The form which I have regarded as *A. hyalothecae* has filaments in contact throughout their length with the substrate on which they are growing. Seta-bearing cells have not been observed. *A. vermiculoides* filaments have seta-bearing cells and the filaments are arched, coming in contact with the supporting plant at widely separated intervals.

Family **Coleochaetaceae**

COLEOCHAETE *Brebisson*, 1844
(Collins, 1909, p. 312.)

1. *Coleochaete divergens* Pringsheim
Collins, 1909, p. 314, Fig. 110.

Type not found in Iowa.

var. a *minor* Hansgirg.

Collins, 1909, p. 314.

Cells 8-18μ in diameter. Pl. XXI, Fig. 4. Our specimens are somewhat smaller throughout than usually given for this form but in other respects seem to agree. Epiphytic on Chara, marsh, Johnson County. October. (Prescott).

2. *Coleochaete irregularis* Pringsheim

Collins, 1909, p. 313; Heering, 1914, p. 135, Figs. 189, 190.

Cells 10-25μ in diameter. Pl. XXI, Fig. 5. Attached to Chara and other submersed aquatics, Johnson County. October. (Prescott). West Okoboji Lake, Dickinson County. (Tiffany).

3. *Coleochaete nitellarum* Jost

Collins, 1909, p. 313; Heering, 1914, p. 135, Fig. 192 (2)-(4).

Cells 16-20μ in diameter. Fruits abundantly from May to August. Pl. XXI, Figs. 6, 7; Pl. XXII, Figs. 1, 2. Endophytic in species of Chara. Swamps and ponds, Johnson County, Dickinson County. (Prescott).

4. *Coleochaete orbicularis* Pringsheim

Collins, 1909, p. 314; Heering, 1914, p. 136, Fig. 191.

Cells, 8-16μ wide, 16-32μ long. Pl. XXII, Fig. 3. Fruits May to July. Attached to Chara and leaves of Submersed aquatics, Johnson County. May and October. (Prescott). Generally distributed. (Tiffany), (Anderson), (Buchanan).

5. *Coleochaete pulvinata* A. Braun

Collins, 1909, p. 314; Heering, 1914, p. 134, Figs. 187, 188.

Cells 20-40μ in diameter, one and one-half to two diameters long. Pl. XXII, Fig. 4. On stems and leaves of submersed aquatics. Roadside pond, Dickinson County. July. (Prescott).

6. *Coleochaete scutata* Breb.

Collins, 1909, p. 314; Heering, 1914, p. 135, Figs, 192(5)-192(7), 194.

Cells 25-45μ in diameter, one to three diameters long. Pl. XXII, Fig. 5. Epiphytic on leaves and on large filamentous algae. Johnson County. October. (Prescott). Dickinson County. (Tiffany). Fayette County. (Fink).

7. *Coleochaete soluta* (Breb.) Pringsheim

Collins, 1909, p. 313; Heering, 1914, p. 134, Fig. 193.

Cells 12-25μ in diameter, two to three diameters long. Pl. XXII, Fig. 9. Fayette County. (Fink).

Family **Trentepohliaceae**

TRENTEPOHLIA Martius, 1817
(Collins, 1909, p. 315.)

1. *Trentepohlia odorata* (Wiggers) Wittr.

Collins, 1909, p. 319; Heering, 1914, p. 124, Fig. 174.

Cells rounded or cylindric, 10-30μ in diameter. Pl. XXII, Fig. 6. Fayette County, Powesheik County. (Fink).

Order IV. SIPHONOCLADIALES

Family **Cladophoraceae**

CHAETOMORPHA Kuetzing, 1845
(Collins, 1909, p. 322.)

1. *Chaetomorpha chelonum* Collins

Collins, 1909, p. 326; Tiffany, 1926, p. 78, Pl. 12, Figs. 138-141.

Cells 12-20μ in diameter, increasing to 35μ above. Pl. XXII, Figs. 7, 8. From back of turtle. Dickinson County lakes. (Tiffany), (Prescott).

CLADOPHORA Kuetzing, 1843
(Collins, 1909, p. 331.)

1. *Cladophora canalicularis* (Roth) Kuetzing

Cells 85-120μ in diameter in main axis, five to eight diameters long, becoming shorter in the branches. Pl. XXIII, Fig. 1. Attached in running water, Johnson County. (Prescott).

2. *Cladophora crispata* (Roth) Kuetzing

Collins, 1909, p. 354.

Cells 40-72μ in diameter in main axis, five to twenty diameters long. Generally distributed in running water. (Prescott), (Hobby), (Fink).

3. *Cladophora fracta* (Dillw.) Kuetzing

Collins, 1909, p. 353; Heering, 1921, p. 42, Figs. 41-44.

Cells 60-120μ in diameter, one to three diameters long. Pl. XXIII, Fig. 2. Ponds, Muscatine County. October. (Prescott). Generally distributed. (Shimek), (Bessey), (Hobby), (Fink), (Buchanan).

var. a *gossypina* (Kuetzing) Rab.

Collins, 1909, p. 353.

Filaments slender, sparingly branched. West Okoboji Lake, Dickinson County. (Shimek).

Forma *rigidula* (Kuetzing) Rab.

Collins, 1909, p. 353.

Filaments stout, stiff, loosely branched. Powesheik County. (Fink).

4. *Cladophora glomerata* (L) Kuetzing

Collins, 1909, p. 350, Fig. 124.

Cells 75-100μ in diameter, six to seven diameters long. Pl. XXIII, Figs. 3, 4. Attached to rocks and sticks in slowly flowing stream. Generally distributed over the state. (Prescott), (Bessey), (Shimek), (Buchanan), (Tiffany), (Hobby).

var. a *pumila* Bail.

Wolle, 1887, p. 128, Pl. 110, Fig. 3g.

Fayette County. (Fink).

Forma *rivularis* Rab.

Collins, 1909, p. 351.

Little Sioux River, Dickinson County. May. (Prescott). Fayette County. (Fink).

Sub-forma *kuetzingiana* Heering.

Heering, 1921, p. 39. (*C. kuetzingiana* Grunow.)

Cells 45-85μ in diameter. In watering troughs and ponds, Muscatine County. October. (Prescott).

5. *Cladophora oligoclona* Kuetzing

Collins, 1909, p. 353.

Cells 45-55μ in diameter. West Okoboji Lake, Dickinson County. (Shimek).

Pithophora Wittrock, 1877

(Collins, 1909, p. 362.)

1. *Pithophora aequalis* Wittr.

De Toni, 1889, p. 385.

Type not found in Iowa (?).

var. a *floridensis* Wolle.

Collins, 1909, p. 363.

Intercalary akinetes cask-shaped, 120μ in diameter, 215μ long. Pl. XXIV, Figs. 3, 4. Attached in running water. Henry County. May. (Prescott).

2. *Pithophora oedogonia* (Mont.) Wittr.

Collins, 1909, p. 363, Fig. 113.

Filaments 55-70μ in diameter; akinetes 95-115μ in diameter. Pl. XXIV, Figs. 5, 6. Entangled mats, floating or intermingled with submersed grass and stems, Johnson County. October. (Prescott).

3. *Pithophora varia* Wille

Collins, 1909, p. 364; Tiffany, 1926, p. 78, Pl. 14, Figs. 150, 151.

Filaments 60-100μ in diameter; akinetes 65-70μ in diameter. Pl. XXIV, Figs. 7, 8. Standing water, Henry County. July. (Prescott). Lakes and ponds, Dickinson County, Cerro Gordo County, Powesheik County. (Tiffany).

Rhizoclonium Kuetzing, 1843

(Collins, 1909, p. 326.)

1. *Rhizoclonium crassipelitum* W. & G. S. West

W. & G. S. West, Journal of Botany 35: 35. 1897.

Type not reported from Iowa.

var. a *robustum* G. S. West.

Collins, 1909, p. 330.

Filaments about 70μ in diameter. Pl. XXV, Fig. 1. Floating in ponds, Muscatine County. October. (Prescott).

2. *Rhizoclonium crispum* Kuetzing

Collins, 1909, p. 329.

Filaments 12-24μ in diameter. Pl. XXV, Fig. 2. Pond, Powesheik County. (Prescott).

3. *Rhizoclonium fontanum* Kuetzing

Collins, 1909, p. 330.

Filaments 12-20μ in diameter. Pl. XXV, Fig. 3. Attached in running water, Henry County. May. (Prescott).

4. *Rhizoclonium hieroglyphicum* (Ag.) Kuetzing

Collins, 1909, p. 329, Fig. 119.

Filaments 10-25μ in diameter. Pl. XXV, Fig. 4. In ponds, Henry County. October. (Prescott). Generally distributed. May to August. (Tiffany).

5. *Rhizoclonium hookeri* Kuetzing

Collins, 1909, p. 330.

Cells 60-90μ in diameter. Pl. XXV, Fig. 5. Forming yellowish

green mats on surface of slough, Muscatine County. June. (Prescott). Dickinson County, Gerro Gordo County. (Tiffany).

Order V. SIPHONALES

Family **Vaucheriaceae**

DICHOTOMOSIPHON Ernst, 1902

(Collins, 1909, p. 430.)

1. *Dichotomosiphon tuberosum* (A. Braun) Ernst

Collins, 1909, p. 431, Fig. 158.

Filaments 40-100μ in diameter. Pl. XXV, Figs. 6, 7. Forming dark green mats on swampy soil, or floating in shallow water, Johnson County. July. (Prescott). Dickinson County. May. (Tiffany).

VAUCHERIA De Candolle, 1805

(Collins, 1909, p. 422.)

1. *Vaucheria aversa* Hassall

Collins, 1909, p. 424; Wolle, 1887, p. 149, Pl. 127, Figs. 5-8.

Pl. XXVI, Fig. 1. Fayette County. (Fink).

2. *Vaucheria dillwynii* (Web. and Mohr.) Agardh

Collins, 1909, p. 423.

Johnson County. (Hobby).

3. *Vaucheria geminata* (Vauch.) De Candolle

Collins, 1909 p. 427; Tiffany, 1926, p. 76, Pl. 12, Fig. 136.

Pl. XXVI, Fig. 2. Tangled mats floating in bogs, Johnson County. May. (Prescott). Generally distributed. (Tiffany), (Hobby), (Fink), (Bessey), (Buchanan).

var. a *racemosa* (Vauch.) Walz.

Collins, 1909, p. 427.

Pl. XXVI, Fig. 3. In Sloughs and ponds, sometimes on damp soil. Johnson County. May to August. (Prescott). Generally distributed over the state. (Tiffany), (Buchanan), (Fawcett).

4. *Vaucheria hamata* (Vauch.) De Candolle

Collins, 1909, p. 426; Tiffany, 1926, p. 77, Pl. 12, Fig. 133.

Pl. XXVI, Fig. 4. On moist soil, Johnson County. February. (Prescott). In bayou of Mississippi River, Clayton County. August. (Tiffany).

5. *Vaucheria longipes* Collins

Collins, 1909, p. 428.

Pl. XXVI, Fig. 5. Seepages, Dickinson County. August. (Tiffany).

6. *Vaucheria ornithocephala* Agardh

Collins, 1909, p. 424; Heering, 1921, p. 84, Fig. 72.

Pl. XXVII, Figs. 1-3. Quarry pond, Johnson County. March-May. (Prescott).

7. *Vaucheria orthocarpa* Reinsch

Collins, 1909, p. 425. (*V. sessilis* forma *orthocarpa* (Reinsch)) Heering, 1921, p. 88, Fig. 77.

Pl. XXVII, Fig. 4. In mats at edge of slowly flowing stream, Johnson County. October. (Prescott). Swamp, Dickinson County, July. (Tiffany).

8. *Vaucheria polysperma* (Hass.) Migula

(*Vaucheria ornithocephala* (Ag.) forma *polysperma* Heering) Heering, 1921, p. 85, Fig. 72c.

Pl. XXVI, Fig. 6. Intermingled with other species of Vaucheria, floating in quarry pond, Johnson County. March. (Prescott).

9. *Vaucheria sessilis* (Vauch.) De Candolle

Collins, 1909, p. 425; Tiffany, 1926, p. 77, Pl. 12, Fig. 134.

Pl. XXVII, Fig. 5. Generally distributed. On moist ground. Sometimes found floating. May to August or later. (Prescott), (Hobby), (Bessey), (Fink), (Buchanan), (Pammel), (Tiffany).

Forma *repens* (Hass.) Hansgirg.

(*Vaucheria repens* Hass.) Collins, 1909, p. 425.

Swamps and moist soil, Johnson County. February to May. (Prescott). Swamp, Dickinson County. July. (Tiffany).

Forma nov. (?).

An interesting variation which perhaps should be assigned to the rank of a variety of *Vaucheria sessilis*. The sex organs, both antheridia and oogonia, are bilaterally arranged in pairs or sometimes the oogonia form short bilateral series of 3-5 with the antheridia various in number and location within the series. Otherwise like the type. Pl. XXVII, Figs. 8, 9. Lake, Fayette County. September. (Prescott).

10. *Vaucheria terrestris* (Vauch.) De Candolle

Collins, 1909, p. 426; Wolle, 1887, p. 153, Pl. 129, Figs. 1-8.

Pl. XXVII, Fig. 6. On moist soil in greenhouse, Johnson Coun-

ty. May. (Prescott). Story County. (Bessey). Fayette County. (Fink).

11. *Vaucheria* sp. (Sp. nov. ?)

An apparently new species with the oogonia arranged in bilateral series; a bilateral pair of antheridia terminating the series. To be described fully in a later paper. Pl. XXVII, Fig. 7. Quarry pond, collected in the fruiting condition from beneath winter ice. February. Johnson County. (Prescott).

Sub-class B. STEPHANOKONTAE

Order I. OEDOGONIALES

Family Oedogoniaceae

BULBOCHAETE Agardh, 1817
(Collins, 1909, p. 266.)

1. *Bulbochaete congener* Hirn

Tiffany, 1926, p. 108, Pl. 10, Figs. 111, 112.

Pl. XXIX, Fig. 21. Kettle hole, Dickinson County. August. (Tiffany).

2. *Bulbochaete gigantea* Pringsheim

Tiffany, 1926, p. 109, Pl. 10, Figs. 108-110.

Pl. XXIX, Fig. 20. Swamp, Dickinson County. July. (Prescott). Swamps and lakes, Dickinson County. July-August. (Tiffany).

3. *Bulbochaete intermedia* De Bary

Tiffany, 1926, p. 109, Pl. 10, Fig. 107.

Pl. 29, Fig. 18. Swamp, Dickinson County. July. (Prescott). Kettle Hole, Dickinson County. August. (Tiffany).

var. a *depressa* Wittr.

Tiffany, 1926, p. 109; Hirn, 1900, p. 329, Pl. 52, Fig. 336.

Kettle Hole, Dickinson County. August. (Tiffany).

4. *Bulbochaete minor* A. Braun

Tiffany, 1926, p. 110, Pl. 10, Fig. 114.

West Okoboji Lake, Dickinson County, August. (Tiffany). Swamp, Johnson County. July. (Prescott).

5. *Bulbochaete varians* Wittr.

Tiffany, 1926, p. 109, Pl. 10, Fig. 113.

Lakes, drainage canal, Dickinson County. August. (Tiffany).

var. a *subsimplex* (Wittr.) Hirn.

Tiffany, 1926, p. 110; Hirn, 1900, p. 357, Pl. LIX; Pl. LX, Fig. 374.

Pl. XXIX, Fig. 19. Swamp, Dickinson County. July. (Prescott). Clear Lake, Cerro Gordo County; West Okoboji Lake, Dickinson County. June-August. (Tiffany).

Oedogonium Link, 1820

(Collins, 1909, p. 223.)

1. *Oedogonium acrosporum* De Bary

Tiffany, 1926, p. 107, Pl. IX, Fig. 103.

Pl. XXVIII, Fig. 2. Swamps, and pool, attached to grass in quiet water, Johnson County. July. (Prescott). Kettle Hole, Dickinson County. August. (Tiffany).

2. *Oedogonium anomalum* Hirn

Tiffany, 1926, p. 91, Pl. I, Figs. 6, 7.

Streams, sloughs, lakes and ponds, Dickinson County. July. (Tiffany).

3. *Oedogonium areolatum* Lagerheim

Tiffany, 1926, p. 91; Hirn, 1900, p. 105, Pl. VII, Fig. 45.

Pl. XXVIII, Fig. 7. Swamp, Johnson County. July. (Prescott). Center Lake, swamps, Dickinson County. June, August. (Prescott), (Tiffany).

4. *Oedogonium autumnale* Wittr.

Collins, 1909, p. 246; Hirn, 1900, p. 167, Pl. XXVI, Fig. 151.

Johnson County. (Hobby).

5. *Oedogonium bohemicum* Hirn

Tiffany, 1926, p. 101, Pl. III, Fig. 30.

Pond, Dickinson County. July. (Tiffany).

6. *Oedogonium borisianum* (Le Cl.) Wittr.

Tiffany, 1926, p. 103, Pl. VIII, Fig. 87.

Pl. XXVIII, Fig. 3. Ponds, Muscatine County. June. (Prescott). Kettle Hole, Dickinson County. August. (Tiffany). Decatur County. (Anderson).

7. *Oedogonium boscii* (Le Cl.) Wittr.

Collins, 1909, p. 237; Hirn, 1900, p. 122, Pl. XIII, Fig. 73.

East Okoboji Lake, Dickinson County. August. (Prescott).

8. *Oedogonium braunii* Kuetzing

Tiffany, 1926, p. 102; Hirn, 1900, p. 194, Pl. XXXII, Fig. 197.

Swan Lake, Dickinson County. July. (Tiffany).

9. *Oedogonium capillare* (L) Kuetzing

Tiffany, 1926, p. 91, Pl. IV, Figs. 39, 40.

Lakes, Dickinson County. June-August. (Tiffany). Johnson County. (Hobby). Story County. (Buchanan).

10. *Oedogonium capilliforme* Kuetzing

Tiffany, 1926, p. 92, Pl. III. Figs. 22, 23.

Ponds, Muscatine County. June. (Prescott). Lakes and swamps, Dickinson County. (Tiffany).

var. a *australe* Wittr.

Tiffany, 1926, p. 92; Hirn, 1900, p. 109, Pl. IX, Fig. 52.

West Okoboji Lake, Dickinson County. August. (Tiffany).

var. b *australe* forma *uberosporum* Hirn.

Tiffany, 1926, p. 93; Hirn, 1900, p. 110, Pl. IX, Fig. 53.

Cut-off, Little Sioux River, Dickinson County. July. (Tiffany).

Forma c *debaryanum* (Chmiel.) Hirn.

Tiffany, 1926, p. 92, Pl. III, Figs. 20, 21.

Ponds, Dickinson County. July. (Prescott). Center Lake, Dickinson County. August. (Tiffany).

11. *Oedogonium cardiacum* (Hass.) Wittr.

Tiffany, 1926, p. 89; Hirn, 1900, p. 85, Pl. III, Fig. 19.

Pond, Dickinson County. July. (Tiffany). Story County. (Bessey).

var. a *carbonicum* Wittr.

Tiffany, 1926, p. 90, Pl. I, Fig. 5.

Ponds, Muscatine County. October. (Prescott). Johnson County. (Hobby). Lakes and swamps, Dickinson County. July, August. (Tiffany). Iowa. (Wolle).

var. b *minor* Lemmermann.

Tiffany, 1926, p. 90, Pl. I, Fig. 8.

Ponds, Johnson County. May. (Prescott). Ponds, lakes, Dickinson County. July. (Tiffany).

12. *Oedogonium cataractum* Wolle

Collins, 1909, p. 266; Hirn, 1900, p. 308, Pl. XLII, Fig. 264.

Story County. (Buchanan).

13. *Oedogonium ciliatum* (Hass.) Pringsheim

Tiffany, 1926, p. 106, Pl. IX, Figs. 98, 99.

Kettle Hole, Dickinson County. August. (Tiffany).

14. *Oedogonium concatenatum* (Hass.) Wittr.

Tiffany, 1926, p. 104, Pl. VIII, Fig. 92.

Roadside pond, Dickinson County. August. (Tiffany).

Forma *hutschinsiae* (Wittr.) Hirn.

Tiffany, 1926, p. 104; Hirn, 1900, p. 225, Pl. XXXVIII, Fig. 231.

Kettle Hole, Dickinson County. August. (Tiffany).

15. *Oedogonium crassiusculum* Wittr.

Hirn, 1900, p. 215.

Type not reported for Iowa.

var. a *idioandrosporum* Nordst. and Wittr.

Tiffany, 1926, p. 103, Pl. VIII, Fig. 89.

Pl. XXVIII, Fig. 4. Pond, Muscatine County. June. (Prescott). Swamps and lakes, Dickinson County. June-August. (Tiffany).

16. *Oedogonium crassum* (Hass.) Wittr.

Tiffany, 1926, p. 93, Pl. II, Figs. 17, 18.

Drainage canal, Spirit Lake, Dickinson County. June, August. (Tiffany).

17. *Oedogonium crenulatocostatum* Wittr.

Tiffany, 1926, p. 94, Pl. V, Figs. 48-50.

Swamp, Johnson County. July. (Prescott). Swamps, lakes, stream, Dickinson County. June, August. (Tiffany).

var. a *aureum* J. E. Tilden.

Hirn, 1900, p. 130, Pl. XV, Fig. 87.

Pl. XXIX, Fig. 22. Swamp, Johnson County. June. (Prescott).

18. *Oedogonium crispum* (Hass.) Wittr.

Tiffany, 1926, p. 101, Pl. III, Fig. 29.

Lakes, Dickinson County. July, August. (Tiffany).

var. a *gracilescens* Wittr.

Tiffany, 1926, p. 101; Hirn, 1900, p. 162, Pl. XXV, Fig. 143.

Swamp, Dickinson County. July. (Tiffany).

19. *Oedogonium cryptoporum* Wittr.

Hirn, 1900, p. 72, Pl. I, Fig. 1.

Johnson County. (Hobby).

20. *Oedogonium curvum* Pringsheim

Tiffany, 1926, p. 99, Pl. III, Figs. 25-27.

Attached to submersed grass in swamp, Johnson County. October. (Prescott).

21. *Oedogonium cyathigerum* Wittr.

Tiffany, 1926, p. 103, Pl. IX, Figs. 104, 105.

Pond, Johnson County. July. (Prescott). Center Lake, Dickinson County. July. (Tiffany).

22. *Oedogonium decipiens* Wittr.

Tiffany, 1926, p. 104, Pl. VIII, Fig. 88.

Kettle hole, Dickinson County. August. (Tiffany). Iowa. (Collins).

23. *Oedogonium dictyosporum* Wittr.

Tiffany, 1926, p. 99; Hirn, 1900, p. 103, Pl. VII, Fig. 43.

Center Lake, Dickinson County. August. (Tiffany).

24. *Oedogonium exocostatum* Tiffany

Tiffany, 1926, p. 94, Pl. V, Figs. 51-54.

Swamp, Johnson County. July. (Prescott). Lakes, streams, Dickinson County. August. (Tiffany).

25. *Oedogonium exospirale* Tiffany

Tiffany, 1926, p. 102, Pl. IX, Figs. 100-102.

Slough, lake, Dickinson County. July, August. (Tiffany). Swamp, Johnson County. July. (Prescott).

26. *Oedogonium flavescens* (Hass.) Wittr.

Tiffany, 1926, p. 103, Pl. IX, Fig. 95.

Swan Lake, Dickinson County. July. (Tiffany).

27. *Oedogonium fonticola* A. Braun

Tiffany, 1926, p. 106; Hirn, 1900, p. 313, Pl. LXIX, Fig. 315.

Drainage canal, Swan Lake, Dickinson County. July, August. (Tiffany). Johnson County. (Hobby).

28. *Oedogonium fragile* Wittr.

Tiffany, 1926, p. 100, Pl. IV, Fig. 36.

Swamp, Johnson County. June. (Prescott). Johnson County. (Hobby). Center Lake, Dickinson County. August. (Tiffany).

29. *Oedogonium franklinianum* Wittr.

Tiffany, 1926, p. 89, Pl. IV, Figs. 43, 44.

Lakes, Linn County. August. (Prescott). Lakes and slough, Dickinson County. June, July. (Tiffany). Gar Lake, Dickinson County. (Buchanan).

30. *Oedogonium giganteum* Kuetzing

Hirn, 1900, p. 295, Pl. XXIII, Fig. 115.

Johnson County. (Hobby).

31. *Oedogonium globosum* Nordstedt

Hirn, 1900, p. 94, Pl. V, Fig. 30.

Center Lake, Dickinson County. July, August. (Prescott).

32. *Oedogonium gracillimum* Wittr. and Lund.

Tiffany, 1926, p. 100, Pl. I, Fig. 9.

Pl. XXIX, Figs. 15-17. Swamp, Johnson County. June. (Prescott). Kettle hole, lakes, drainage canal, Dickinson County. June-August. (Tiffany).

33. *Oedogonium grande* Kuetzing

Tiffany, 1926, p. 93, Pl. II, Figs. 14-16.

Quarry pond, Scott County. July. (Prescott). Ponds, Muscatine County. June. (Prescott). Lakes, Dickinson County. June-August. (Tiffany).

var. a *robustum* (Hirn) Tiffany.

Tiffany, 1926, p. 94, Pl. II, Fig. 19.

Lakes, Dickinson County. June-August. (Tiffany).

34. *Oedogonium hians* Nordst. and Hirn

Hirn, 1900, p. 227, Pl. XXXVIII, Fig. 233.

Pl. XXVIII, Fig. 1. Shallow roadside pool, Johnson County. July. (Prescott). Previously reported from South America.

35. *Oedogonium hirnii* Gutw.

Hirn, 1900, p. 93, Pl. V, Fig. 29.

Type not reported for Iowa.

var. a *africanum* G. S. West.

Tiffany, 1926, p. 100, Pl. III, Fig. 24.

Drainage canal, Dickinson County. July. (Tiffany).

36. *Oedogonium hystricinum* Transeau and Tiffany

Tiffany, 1926, p. 102, Pl. VIII, Figs. 85, 86.

Pl. XXVIII, Fig. 5. Ponds, Muscatine County. June. (Prescott). Kettle hole, Dickinson County. August. (Tiffany).

37. *Oedogonium inaequale* Wood ?

Bessey, 1884, p. 139; Wood, 1874, p. 195, Pl. I, Fig. 1.

Story County. (Bessey).

38. *Oedogonium infimum* Tiffany

Tiffany, 1926, p. 95, Pl. VI, Figs. 50-62.

Pool, lakes, streams, Dickinson County. July-August. (Tiffany).

39. *Oedogonium intermedium* Wittr.

Hirn, 1900, p. 94, Pl. V, Fig. 31.

Pl. XXIX, Fig. 14. Roadside pool, Johnson County. July. (Prescott). Previously reported from Europe.

40. *Oedogonium inversum* Wittr.

Tiffany, 1926, p. 95, Pl. VI, Figs. 66, 67.

Lakes, pools, Dickinson County. July, August. (Tiffany).

Forma *subclusum* (Wittr.) Hirn.

Tiffany, 1926, p. 95, Pl. VI, Fig. 68.

Pool, Dickinson County. July. (Tiffany).

41. *Oedogonium iowense* Tiffany

Tiffany, 1926, p. 97, Pl. VI, Figs. 69-71.

Drainage canal, Dickinson County. August. (Prescott). Lakes, sloughs, drainage canal, Dickinson County. July, August. (Tiffany).

42. *Oedogonium landsborough* (Hass.) Wittr.

Tiffany, 1926, p. 93, Pl. II, Figs. 12, 13.

Lakes, swamp, kettle hole, Dickinson County. July, August. (Tiffany).

var. a *norvegicum* Wittr.

Tiffany, 1926, p. 93; Hirn, 1900, p. 137, Pl. XVIII, Fig. 98.

Dickinson County. (Tiffany).

43. *Oedogonium latiusculum* Tiffany

Tiffany, 1926, p. 96, Pl. VI, Figs. 72-74.

Lakes and stream, Dickinson County. August. (Tiffany).

44. *Oedogonium longatum* Kuetzing

Tiffany, 1926, p. 105, Pl. IX, Fig. 106.

Clear Lake, Cerro Gordo County. August. (Tiffany). Marsh, Johnson County. July. (Prescott). Story County. (Bessey).

45. *Oedogonium macrandrium* Wittr.

Tiffany, 1926, p. 106, Pl. IX, Fig. 97.

Roadside pond, Dickinson County. May. (Tiffany).

46. *Oedogonium macrospermum* West and West

Tiffany, 1926, p. 105, Pl. VIII, Figs. 93, 94.

Center Lake, drainage canal, Dickinson County. August. (Prescott), (Tiffany).

47. *Oedogonium martinicense* Hirn

Collins, 1909, p. 240; Hirn, 1900, p. 134, Pl. XVI, Fig. 92.

Pl. XXIX, Figs. 11-13. Iowa. (Collins).

48. *Oedogonium nanum* Wittr.

Tiffany, 1926, p. 97, Pl. VI, Figs. 63-65.

Dover Lake, Dickinson County (?). August. (Tiffany). Swamp, Dickinson County. July. (Prescott).

49. *Oedogonium oblongum* Wittr.

Tiffany, 1926, p. 101, Pl. III, Fig. 28.

Attached to grass in marsh, Dickinson County. July. (Prescott). Lakes, Dickinson County. June-August. (Tiffany).

50. *Oedogonium oryzae* Wittr.

Hirn, 1900, p. 294, Pl. XXII, Fig. 113.

Our specimens agree very closely with this form except that the former have oogonia averaging slightly smaller than are given by Hirn for *O. oryzae*. The oogonia ore usually in a series of two or three. The arrangement of the oogonia is very suggestive of var. *seriosporum* (Lag.) Hass. Hirn, 1900, p. 294. Our specimen is questionably assigned to this variety. Pl. XXVIII, Fig. 6. Pond, Henry County. May. (Prescott). Previously reported from Italy.

51. *Oedogonium oviforme* (Lewin) Hirn

Tiffany, 1926, p. 100, Pl. VII, Figs. 78, 79.

Pond, Dickinson County. August. (Tiffany).

52. *Oedogonium paucocostatum* Transeau

Tiffany, 1926, p. 98, Pl. V, Figs. 55, 56.

Pond, Johnson County. July. (Prescott). Spirit Lake, Dickinson County. August. (Tiffany).

var. a *gracilis* Tiffany.

Tiffany, 1926, p. 99.

Pl. XXVIII, Fig. 8. Spirit Lake, Dickinson County. August. (Tiffany). Pond, Dickinson County. July. (Prescott).

53. *Oedogonium pisanum* Wittr.

Tiffany, 1926, p. 97; Hirn, 1900, p. 181, Pl. XXIX, Fig. 175.

Lakes, Dickinson County. August. (Tiffany).

var. a *gracilis* Transeau and Tiffany.

Tiffany, 1926, p. 98, Pl. III, Figs. 31-34.

Oogonia of our specimens slightly smaller than the dimensions given in the original description; oogonia (11.5) 16-20μ in diameter, (16.7) 20-30μ long; oospores (9.5) 15-18μ in diameter, (15.5) 18-28μ long. Pl. XXIX, Figs. 9, 10. Swamp, Iowa County. May. (Prescott). Kettle hole, Dickinson County. August. (Tiffany).

54. *Oedogonium plagiostomum* Wittr.

Tiffany, 1926, p. 92; Hirn, 1900, p. 100, Pl. VI, Fig. 39.

Quarry pond, Scott County. July. (Prescott). Drainage canal, lakes, Dickinson County. June-August. (Tiffany).

var. a *gracilius* Wittr.

Tiffany, 1926, p. 92, Pl. IV, Figs. 37, 38.

West Okoboji Lake, Dickinson County. July. (Prescott). Dickinson County lakes. July, August. (Tiffany).

55. *Oedogonium pratense* Transeau

Tiffany, 1926, p. 96, Pl. I, Figs. 10, 11.

Pond, Dickinson County. July. (Prescott). Drainage canal, lakes, pool, Dickinson County. June-August. (Tiffany).

56. *Oedogonium praticolum* Transeau

Tiffany, 1926, p. 107, Pl. VII, Figs. 82-84.

Drainage canal, Dickinson County. August. (Tiffany).

57. *Oedogonium pringsheimii* Cram.; Wittr.

Tiffany, 1926, p. 98, Pl. V, Figs. 45, 46.

Floating in West Ookoboji Lake, Dickinson County. July. (Prescott). Swamps, creeks, lakes, Dickinson County. June-August. (Tiffany). Johnson County. (Hobby).

var. a *nordstedtii* Wittr.

Tiffany, 1926, p. 98, Pl. V, Fig. 47.

Ponds, Muscatine County. October. (Prescott). Drainage canal, lakes, Dickinson County. July, August. (Tiffany).

58. *Oedogonium pusillum* Kirchner

Tiffany, 1926, p. 95, Pl. VII, Fig. 80.

Little Spirit Lake, Dickinson County. July. (Tiffany).

59. *Oedogonium reinschii* Roy

Hirn, 1900, p. 319, Pl. L, Fig. 326.

Pl. XXIX, Fig. 8. In shallow water of marsh, Johnson County. October. (Prescott). Previously reported from Europe and South America.

60. *Oedogonium rivulare* (Le Cl.) A. Braun

Collins, 1909, p. 236; Hirn, 1900, p. 119, Pl. XII, Fig. 66.

Iowa. (Wolle).

61. *Oedogonium rufescens* Wittr.

Collins, 1909, p. 229; Hirn, 1900, p. 76, Pl. I, Fig. 4.

Pl. XXIX, Figs. 6, 7. Pond, Dickinson County. July. (Prescott).

62. *Oedogonium rugulosum* Nordstedt

Tiffany, 1926, p. 105, Pl. IX, Fig. 96.

Drainage canal, Dickinson County. May, August. (Tiffany).

63. *Oedogonium suecicum* Wittr.

Tiffany, 1926, p. 89, Pl. V, Figs. 57, 58.

West Okoboji Lake, Dickinson County. June. (Tiffany).

64. *Oedogonium supremum* Tiffany

Tiffany, 1926, p. 107, Pl. VIII, Figs. 90, 91.

Lakes, Dickinson County. August. (Tiffany).

65. *Oedogonium tapeinosporum* Wittr.

Tiffany, 1926, p. 96, Pl. VII, Fig. 81.

Stream north of Plymouth County. July. (Tiffany).

66. *Oedogonium tyrolicum* Wittr.

Tiffany, 1926, p. 99, Pl. VII, Fig. 77.

Swamp, Johnson County. July. (Prescott). Drainage canal, Dickinson County. June. (Tiffany).

67. *Oedogonium undulatum* Breb.

Hirn, 1900, p. 257, Pl. XLV, Figs. 273-277; Pl. XLIV, Fig. 272.

Pl. XXIX, Figs. 4, 5. Swamp, Johnson County. May, October. (Prescott).

68. *Oedogonium varians* Wittr. and Lund.

Tiffany, 1926, p. 99, Pl. VII, Figs. 75, 76. (*Oedogonium polymorphum* Wittrock).

Pl. XXIX, Figs. 2, 3. Swamp, Johnson County. July. (Pres-

cott). Center Lake, Dickinson County. August. (Tiffany). Decatur County. (Anderson).

69. *Oedogonium vaucherii* (Le Cl.) A. Braun.; Wittr.

Tiffany, 1926, p. 100, Pl. IV, Fig. 35.

Pl. XXVIII, Figs. 11, 12. Pond, Dickinson County. July. (Prescott). Drainage canal, West Okoboji Lake, Dickinson County. June, August. (Tiffany).

70. *Oedogonium victoriense* G. S. West

Journ. Linn. Soc. 39: 47, Text figure 6c. 1909.

Pl. XXIX, Fig. 1. Intermingled with other species of *Oedogonium* in pond, Muscatine County. June. (Prescott).

71. *Oedogonium welwitschii* West

Tiffany, 1926, p. 97, Pl. IV, Figs. 41, 42.

Attached to submersed roots in pond, Johnson County. July. (Prescott). Lakes and pond, Dickinson County. July. (Tiffany).

72. *Oedogonium wolleanum* Wittr.

Hirn, 1900, p. 220, Pl. XXXVII, Fig. 226.

Pl. XXVIII, Fig. 9. In small roadside pond, Johnson County. July. (Prescott).

73. *Oedogonium wyliei* Tiffany

Tiffany, 1926, p. 90, Pl. I, Figs. 1-4.

Pl. XXVIII, Fig. 10. Kettle hole, Storm Lake, Dickinson County. August. (Tiffany). Swamp, Benton County. June. (Prescott).

Sub-class C. Akontae

Order I. ZYGNEMALES

Family **Zygnemaceae**

Debarya Wittrock, 1872
(Collins, 1909, p. 119.)

1. *Debarya decussata* Transeau

Transeau, 1925, p. 197; Tiffany, 1926, p. 81, Pl. XVI, Fig. 168.

A specimen with spores not quite mature, collected from a swamp in Johnson County is questionably assigned to this species. (Prescott). Lakes and sloughs, Dickinson County. June, August. (Tiffany).

MOUGEOTIA Agardh, 1824
(Collins, 1909, p. 122.)

1. *Mougeotia elegantula* Wittr.

Transeau, 1926, p. 323, Pl. VI, Figs. 84-87.

Outlet to Center Lake, Dickinson County. August. (Prescott).

2. *Mougeotia genuflexa* (Dillw.) Agardh

Transeau, 1926, p. 320, Pl. IV, Figs. 43, 44.

Fayette County. (Fink). Swamp, Dickinson County. July. (Prescott). Ponds, lakes and swamp, Dickinson County. July, August. (Tiffany). Decatur County. (Anderson).

3. *Mougeotia nummuloides* (Hass.) De Toni

Transeau, 1926, p. 317, Pl. I, Figs. 15, 16.

Kettle hole, Dickinson County. August. (Tiffany).

4. *Mougeotia parvula* Hassall

Transeau, 1926, p. 316, Pl. I, Figs. 1-3.

Aquarium, Johnson County. July. (Prescott).

5. *Mougeotia robusta* (De Bary) Wittr.

Transeau, 1926, p. 318, Pl. III, Figs. 39-41.

Drainage canal, Dickinson County. August. (Tiffany).

var. a *biornata* Wittr.

Transeau, 1926, p. 318.

Stream north of Akron, Iowa; creek in Dickinson County. July, August. (Tiffany).

6. *Mougeotia scalaris* Hassall

Transeau, 1926, p. 317, Pl. II, Figs. 25-27.

Swamp, Dickinson County. October. (Prescott). Johnson County. (Hobby). Story County. (Bessey). Dickinson County. (Tiffany).

7. *Mougeotia sphaerocarpa* Wolle

Transeau, 1926, p. 319, Pl. III, Figs. 28-33.

Quarry pond, Johnson County. June. (Prescott). Lakes and swamps, Dickinson County. July, August. (Tiffany).

8. *Mougeotia tenuis* (Cleve.) Wittr.

Tiffany, 1926, p. 81; Collins, 1909, p. 126.

Spirit Lake, Dickinson County. August. (Tiffany).

9. *Mougeotia tumidula* Transeau

Transeau, 1926, p. 326, Pl. VII, Fig. 105.

Tributary of Des Moines River, Osceola County. July. (Tiffany).

Spirogyra Link, 1820

(Collins, 1909, p. 105.)

1. *Spirogyra adnata* Kg.

Wolle, 1887, p. 220, Pl. CXXXV, Figs. 3, 4. Probably *Spirogyra decimina* (Müller) Kuetzing, Collins, 1909, p. 119.

Johnson County. (Hobby). Decatur County. (Anderson).

2. *Spirogyra angolensis* Welwitsch

Tiffany, 1926, p. 81.

Silver Lake, Dickinson County. July. (Tiffany).

3. *Spirogyra borgeana* Transeau

Tiffany, 1926, p. 82; Transeau, 1914, p. 23.

Stream, Dickinson County. July. (Tiffany).

4. *Spirogyra borysthenica* Kasau & Smirn.

Type not reported from Iowa.

var. a *echinospora* Kasau & Smirn.

Tiffany, 1926, p. 82.

Swamp and lake, Dickinson County. July. (Tiffany).

5. *Spirogyra braziliensis* (Nordstedt) Transeau

Transeau, Ohio Journal of Science XVI, No. 1: 26.

Drainage canal, Dickinson County. July. (Prescott).

6. *Spirogyra catenaeformis* (Hass.) Kuetzing

Tiffany, 1926, p. 82.

West Okoboji Lake, Dickinson County. August; stream, Plymouth County. July. (Tiffany).

var. a *parvula* Transeau.

Tiffany, 1926, p. 82.

Lakes, Dickinson County. June-August. (Tiffany). Stream, Plymouth County. July. (Tiffany).

7. *Spirogyra circumlineata* Transeau

American Journal of Botany 1: 293, Pl. XXVI, Figs. 5, 6. 1914; Tiffany, 1926, p. 82.

Drainage canal, Dickinson County. August. (Tiffany).

8. *Spirogyra communis* (Hass.) Kuetzing

Collins, 1909, p. 109; Wolle, 1887, p. 213, Pl. CXLII, Figs. 1, 2.

Pl. XXX, Figs. 5, 6. Pond, Johnson County. June. (Prescott). Johnson County. (Hobby).

9. *Spirogyra crassa* Kuetzing

Tiffany, 1926, p. 82, Pl. XVI, Fig. 175; Collins, 1909, p. 112.

Slowly flowing stream, Johnson County. July. (Prescott), (Hobby). Lakes and swamps, Dickinson County. July, August. (Tiffany).

10. *Spirogyra daedalea* Lagerheim

Tiffany, 1926, p. 82; De Toni, 1889, p. 749.

Center Lake, Dickinson County. July, August. (Tiffany), (Prescott).

11. *Spirogyra decimina* (Müller) Kuetzing

Collins, 1909, p. 110; Wolle, 1887, p. 216, Pl. CXXXV, Figs. 5, 6.

Pl. XXX, Fig. 7. East Okoboji Lake, Dickinson County. July. (Prescott). Pools and lakes, Dickinson County. May, July, August. (Tiffany). Decatur County. (Anderson). Johnson County. (Hobby). Wright County. (Buchanan). Iowa. (Collins).

var. a *inflata* Fritsch.

Tiffany, 1926, p. 82.

Attached to submersed stems in pond, Johnson County. July. (Prescott). Lakes and drainage canal, Dickinson County. July. (Tiffany).

var. b *plena* W. & G. S. West.

Tiffany, 1926, p. 82.

Little Sioux River, Dickinson County. June. (Prescott).

12. *Spirogyra dubia* Kuetzing

Collins, 1909, p. 115; Borge, 1913, p. 27.

Johnson County. June, July. (Prescott), (Hobby). Dickinson County. (Tiffany).

13. *Spirogyra echinata* Tiffany

Tiffany, 1924, p. 180, Pl. I, Fig. 1.

Little Sioux River, Dickinson County. July. (Tiffany).

14. *Spirogyra ellipsospora* Transeau

American Journal of Botany 1: 294, Pl. XXVII, Fig. 1.

Ponds, Muscatine County. June. (Prescott). Lakes, Dickinson County. July, August. (Tiffany).

var. a *crassoidea* Transeau.

Tiffany, 1926, p. 82.

Ponds and lakes, Dickinson County. July. (Tiffany).

15. *Spirogyra farlowii* Transeau

Ohio Journal Science XVI, No. 1: 29. 1915.

Lakes and drainage canal, Dickinson County. July, August. (Tiffany).

16. *Spirogyra fluviatilis* Hilse in Rabenhorst

Collins, 1909, p. 114; Borge, 1913, p. 27, Fig. 33.

Generally distributed over the state. (Tiffany), (Hobby), (Prescott), (Anderson).

17. *Spirogyra grevilleana* (Hass.) Kuetzing

Borge, 1913, p. 17, Fig. 4; Collins, 1909, p. 117.

Johnson County. (Hobby). Wright County. (Buchanan). Iowa. (Collins).

18. *Spirogyra hassallii* (Jenner) Petit

Collins, 1909, p. 117; Wolle, 1887, p. 210, Pl. CXXXIII, Figs. 5-7.

Iowa. (Collins), (Wolle).

19. *Spirogyra hyalina* Cleve.

Tiffany, 1926, p. 83; De Toni, 1889, p. 763.

Center Lake, Dickinson County. August. (Tiffany).

20. *Spirogyra inflata* (Vauch.) Kuetzing

Collins, 1909, p. 116; Borge, 1913, p. 17, Fig. 3.

Johnson County. (Hobby).

21. *Spirogyra insignis* (Hass.) Kuetzing

Collins, 1909, p. 117; Borge, 1913, p. 19, Fig. 10.

Johnson County. July. (Prescott), (Hobby).

22. *Spirogyra intermedia* Rabenhorst

De Toni, 1889, p. 761.

Johnson County. (Hobby).

23. *Spirogyra jüergensii* Kuetzing

Collins, 1909, p. 108; Borge, 1913, p. 23, Fig. 23.

Ponds and marshes, Johnson County. May-July. (Prescott). Spirit Lake, Dickinson County. July. (Tiffany).

24. *Spirogyra jugalis* (Fl. Dan.) Kuetzing

Collins, 1909, p. 111; Borge, 1913, p. 29, Fig. 39.

Pl. XXX, Figs. 8, 9. Pond, Linn County. May. (Prescott). Wright County. (Buchanan).

25. *Spirogyra laxa* Kuetzing

Borge, 1913, p. 17, Fig. 7.

Johnson County. (Hobby). Dickinson County. (Tiffany).

26. *Spirogyra longata* (Vauch.) Kuetzing

Collins, 1909, p. 107; Borge, 1913, p. 25, Fig. 26.

Generally distributed over the state. (Tiffany), (Hobby), (Prescott), (Buchanan), (Bessey).

27. *Spirogyra majuscula* Kuetzing

Borge, 1913, p. 31, Fig. 43; Tiffany, 1926, p. 83, Pl. XVI, Fig. 172.

Generally distributed over the state. (Prescott), (Tiffany), (Anderson), (Hobby), (Anderson), (Bessey).

28. *Spirogyra maxima* (Hass.) Wittr.

Collins, 1909, p. 112; Borge, 1913, p. 31, Fig. 46.

Wright County. (Buchanan). Linn County. (Prescott). Dickinson County. (Tiffany).

29. *Spirogyra mirabilis* (Hass.) Kuetzing

Collins, 1909, p. 113; Borge, 1913, p. 21, Fig. 17.

Decatur County. (Anderson).

30. *Spirogyra nitida* (Dillw.) Link

Collins, 1909, p. 110; Tiffany, 1926, p. 83, Pl. XVI, Fig. 171.

Generally distributed. (Tiffany), (Prescott), (Hobby), (Buchanan).

31. *Spirogyra novae-angliae* Transeau

Ohio Journal of Science XVI: 26.

Center Lake, Dickinson County. (Tiffany). Roadside ditch, Johnson County. July. (Prescott).

32. *Spirogyra pellucida* (Hass.) Kuetzing

Borge, 1913, p. 31, Fig. 45.

Mats in pooled stream, Johnson County. July. (Prescott). Previously reported from Europe.

33. *Spirogyra porticalis* (Müller) Cleve.

Collins, 1909, p. 108; Borge, 1913, p. 25, Fig. 27. (*Spirogyra quinina* Kuetz.)

Generally distributed over the state. (Prescott), (Bessey), (Hobby), (Collins), (Buchanan).

var. a *alpina* Breugg.

De Toni, 1889, p. 744.

Johnson County. (Hobby).

34. *Spirogyra pratensis* Transeau

American Journal of Botany I: 292, Pl. XXV, Figs. 12-14; Pl. XXVI, Figs. 1-2. 1914.

West Okoboji Lake, Dickinson County. August. (Tiffany).

35. *Spirogyra protecta* Wood

Collins, 1909, p. 118; Borge, 1913, p. 19, Fig. 9. (*Spirogyra callospora* Cleve.)

Generally distributed. (Prescott), (Tiffany), (Bessey), (Buchanan).

36. *Spirogyra punctata* Cleve.

Collins, 1909, p. 115; Borge, 1913, p. 21, Fig. 16.

Swamp, Johnson County. April. (Prescott).

37. *Spirogyra punctiformis* Transeau

American Journal of Botany I: 294, Pl. XXVI, Fig. 7. 1914.

Mats in quarry pond, Johnson County. July. (Prescott).

38. *Spirogyra quadrata* (Hass.) Petit

Collins, 1909, p. 116; Borge, 1913, p. 17, Fig. 2.

West Okoboji Lake, Dickinson County. July, August. (Tiffany). Story County, Wright County. (Buchanan).

39. *Spirogyra reticulata* Nordstedt

Borge, 1913, p. 19, Fig. 14.

Roadside pool, Dickinson County. July. (Prescott).

40. *Spirogyra rivularis* (Hass.) Rab.

Borge, 1913, p. 27.

Johnson County. (Hobby).

41. *Spirogyra setiformis* (Roth) Kuetzing

Collins, 1909, p. 111; Borge, 1913, p. 29, Fig. 40.

Ponds, Wright County. (Buchanan).

42. *Spirogyra spreeiana* Rab.

Collins, 1909, p. 116; Borge, 1913, p. 17, Fig. 5.

West Okoboji Lake, Dickinson County. August. (Tiffany).

43. *Spirogyra stictica* (Engl. Bot.) Wille

Collins, 1909, p. 119; Borge, 1913, p. 32, Fig. 47.

Pl. XXX, Fig. 10. Pond, Dickinson County. July. (Prescott). Ponds and lakes, Dickinson County. June-August. (Tiffany).

44. *Spirogyra subreticulata* Fritsch

Fritsch and Stevens, Trans. Roy. Soc. South Africa 9. 1921.

Pl. XXX, Figs. 1-4. Pond, Dickinson County. July. (Pres-

cott). Roadside pool, Johnson County. July. (Prescott). Previously reported from South Africa.

45. *Spirogyra tenuissima* (Hass.) Kuetzing

Collins, 1909, p. 115; Borge, 1913, p. 16, Fig. 1.

Kettle hole, lake, Dickinson County. June, August. (Tiffany). Pond, Wright County. (Buchanan).

46. *Spirogyra varians* (Hass.) Kuetzing

Collins, 1909, p. 108; Borge, 1913, p. 23, Fig. 21.

Rivulets, Dickinson County. May, August. (Tiffany). Pond, Decatur County. (Anderson). Johnson County. (Hobby).

var. a *gracilis* Borge.

Tiffany, 1926, p. 84.

Seepage, Dickinson County. (Tiffany).

var. b *minor* Teodoresco.

Tiffany, 1926, p. 84.

Milford Creek, Dickinson County. August. (Tiffany).

47. *Spirogyra velata* Nordstedt

var. a *occidentalis* Transeau.

Ohio Journal of Science XVI, No. 1: 24. 1915.

Swamp near Benton County. June. (Prescott).

48. *Spirogyra weberi* Kuetzing

Collins, 1909, p. 116; Borge, 1913, p. 17, Fig. 6.

Ponds and swamps, Johnson County. July, September. (Prescott). Fayette County. (Prescott). Johnson County. (Hobby).

Zygnema Agardh, 1814

(Collins, 1909, p. 102.)

1. *Zygnema cruciatum* (Vauch.) Agardh

Collins, 1909, p. 104; Borge, 1913, p. 35, Fig. 54.

Generally distributed. (Prescott), (Hobby), (Tiffany), (Anderson), (Buchanan).

2. *Zygnema insigne* (Hass.) Kuetzing

Collins, 1909, p. 104; Borge, 1913, p. 35, Fig. 53.

Pl. XXX, Figs. 11, 12. Marsh, Johnson County. April. (Prescott). Johnson County. (Hobby). Story County. (Bessey).

3. *Zygnema pectinatum* (Vauch.) Agardh

Collins, 1909, p. 103; Borge, 1913, p. 33, Fig. 49.

Ponds, Muscatine County. October. (Prescott). Johnson County. (Hobby). Dickinson County. (Tiffany).

var. a *anomalum* (Ralfs) Kirchner.

Collins, 1909, p. 103.

Quarry pond, Johnson County. June. (Prescott).

4. *Zygnema stellinum* (Müller) Agardh

Collins, 1909, p. 104, Fig. 7.

Roadside ditch, Johnson County. October. (Prescott). Dickinson County. (Tiffany). Wright County. (Buchanan).

Order II. DESMIDIALES

Family **Mesotaeniaceae**

CYLINDROCYSTIS Meneghini
(West and West, Brit. Desm. I: 58. 1904.)

1. *Cylindrocystis crassa* De Bary

West and West, Brit. Desm. I: 59, Pl. IV, Figs. 33-38. 1904.

Pool in field, Johnson County. April. (Prescott).

NETRIUM Nägeli, 1849
(West and West, Brit. Desm. I: 63. 1904.)

1. *Netrium nägelii* (Breb.) West and West

Brit. Desm. I: 66, Pl. VII, Figs. 4, 5.

Pools and swamps, Johnson County. July. (Prescott).

2. *Netrium digitus* (Ehrenberg) Itzigs.

West and West, Brit. Desm. I: 64, Pl. VI, Figs. 14-16. 1904.

Pl. XXXI, Fig. 1. Swamp, Johnson County. May. (Prescott).

ROYA W. & G. S. West, 1896
(Brit. Desm. I: 106.)

1. *Roya obtusa* (Breb.) W. & G. S. West

Brit. Desm. I: 107, Pl. X, Fig. 27.

Type not reported from Iowa.

var. a *montana* W. & G. S. West.

Brit. Desm. I: 108, Pl. X, Figs. 28, 29.

Pl. XXXI, Fig. 2. Plankton from swamp, Johnson County. April. (Prescott).

Spirotaenia Brebisson, 1848

(West and West, Brit. Desm. I: 37.)

1. *Spirotaenia condensata* Breb.

West and West, Brit. Desm. I: 38, Pl. II, Figs. 7-10. 1904.

Pl. XXXI, Fig. 3. Swamp, Johnson County. April. (Prescott). Wright County. (Buchanan).

var. a var. nov. (?).

A specimen occurs very commonly in collections from swamps in Johnson County which is consistently much smaller than the type. The length is seldom over 100μ while the type ranges from 150-270μ in length. The chromatophore is similar to that of *S. condensata.*

Swamps and pond, Johnson County. May-July. (Prescott).

2. *Spirotaenia obscura* Ralfs

West and West, Brit. Desm. I: 44, Pl. III, Figs. 7-12. 1904.

Swamp and small pools in old stream bed, Johnson County. May, October. (Prescott).

Family **Desmidiaceae**

Arthrodesmus Ehrenberg, 1838

(West and West, Brit. Desm. IV: 88.)

1. *Arthrodesmus convergens* Ehrenberg

West and West, Brit. Desm. IV: 106, Pl. CXVI, Figs. 4-13. 1911.

Pl. XXXI, Fig. 4. Swamps, Dickinson County, Johnson County. May, July. (Prescott).

2. *Arthrodesmus incus* (Breb.) Hass.

West and West, Brit. Desm. IV: 90, Pl. CXIII, Figs. 13-15. 1911.

Swamp, Johnson County. May. (Prescott). Wright County. (Buchanan).

var. a *extensus* Andersson.

G. M. Smith, 1924, p. 132, Pl. 85, Figs. 23-26.

Pl. XXXI, Fig. 5, 5a. Swamp, Johnson County. May, October. (Prescott).

3. *Arthrodesmus octocornis* Ehrenberg

West and West, Brit. Desm. IV: 111, Pl. CXVII, Figs. 6-10. 1911.

Pl. XXXI, Fig. 6. Plankton from swamp, Johnson County. May. (Prescott).

4. *Arthrodesmus triangularis* Lagerheim

West and West, Brit. Desm. IV: 97, Pl. CXIV, Figs. 11-13, 17. 1911.

Type not reported for Iowa.

var. a *inflatus* W. & G. S. West.

Brit. Desm. IV: 99, Pl. CXIV, Figs. 14, 15. 1911.

Pl. XXXI, Fig. 7. Swamp, Johnson County. October. (Prescott).

Closterium Nitzsch, 1817

(West and West, Brit. Desm. I: 109. 1904.)

1. *Closterium abruptum* West

West and West, Brit. Desm. I: 158, Pl. XX, Figs. 6-10. 1904.

Marsh, Johnson County. July. (Prescott).

2. *Closterium acerosum* (Schrank) Ehrenberg

West and West, Brit. Desm. I: 146, Pl. XVIII, Figs. 2-5. 1904.

Slowly flowing streams, Jasper County. September. (Prescott). Wright County. (Buchanan).

var. a *elongatum* Breb.

West and West, Brit. Desm. I: 148, Pl. XVIII, Fig. 1. 1904.

Pl. XXXVI, Figs. 1, 2. Intermingled with mats of *Spirogyra* and *Zygnema* in slowly flowing stream, Johnson County. July. (Prescott).

var. b *minus* Hantzsch.

West and West, Brit. Desm. I: 148. 1904.

Pl. XXXVI, Fig. 4. Pond, Johnson County. May, July. (Prescott).

3. *Closterium calosporum* Wittr.

West and West, Brit. Desm. I: 138, Pl. XVI, Figs. 1-4. 1904.

Type not found in Iowa.

var. a *brasiliense* Börge.

Arkiv för Botanik I: 78, Tab. I, Fig. 18, 1903.

Swamp, Dickinson County. July. (Prescott).

4. *Closterium cornu* Ehrenberg

West and West, Brit. Desm. I: 157, Pl. XX, Figs. 1-5. 1904.

Stagnant pool, Johnson County. July. (Prescott).

5. *Closterium costatum* Corda

West and West, Brit. Desm. I: 120, Pl. XIII, Figs. 1-3. 1904.

Pl. XXXVI, Figs. 6, 6b. Swamp, Johnson County. May. (Prescott).

6. *Closterium decorum* Breb.

West and West, Brit. Desm. I: 184, Pl. XVII, Figs. 7, 8; Pl. XXVIII, Figs. 1-3. 1904.

Swamp, Johnson County. May. (Prescott). Swamp and pond, Dickinson County. July. (Prescott).

7. *Closterium dianae* Ehrenberg

West and West, Brit. Desm. I: 130, Pl. XV, Figs. 1-6. 1904.

Pl. XXXVI, Fig. 3. Pools and swamp, Johnson County. May, June. (Prescott). Wright County. (Buchanan).

8. *Closterium eboracense* Turner

West and West, Brit. Desm. I: 140, Pl. XVI, Figs. 7, 8. 1904.

Pl. XXXVI, Fig. 5. Plankton from West Okoboji Lake, Dickinson County. May. (Prescott).

9. *Closterium ehrenbergii* Meneghini

West and West, Brit. Desm. I: 143, Pl. XVII, Figs. 1-4. 1904.

Swamp, Johnson County. July. (Prescott).

10. *Closterium gracile* Breb.

West and West, Brit. Desm. I: 166, Pl. XXI, Figs. 8-12. 1904.

Pl. XXXVI, Fig. 13. Among filamentous Conjugatae in slowly flowing stream, Johnson County, July. (Prescott).

11. *Closterium intervolicola* Cushman

Bull. Torrey Bot. Club 35: 131, Pl. V, Fig. 5. 1908.

Swamp, Dickinson County. July. (Prescott).

12. *Closterium jenneri* Ralfs

West and West, Brit. Desm. I: 134, Pl. XV, Figs. 23-25. 1904.

Pl. XXXVI, Fig. 7. Decatur County. (Anderson). Ponds and sloughs, Dickinson County. June. (Prescott). Wright County. (Buchanan).

13. *Closterium juncidum* Ralfs

West and West, Brit. Desm. I: 128, Pl. XIV, Figs. 10-14. 1904.

Type not reported from Iowa.

var. a *brevior* Ralfs.

West and West, Brit. Desm. I: 129, Pl. XIV, Figs. 15, 16. 1904.
Pl. XXXVI, Figs. 12, 12a. Swamp, Dickinson County. July. (Prescott).

14. *Closterium kützingii* Breb.

West and West, Brit. Desm. I: 186, Pl. XXV, Figs. 6-11. 1904.
Swamp and shallow water of slough, Johnson County. May. (Prescott).

15. *Closterium lanceolatum* Kuetzing

West and West, Brit. Desm. I: 149, Pl. XVII, Figs. 9, 10; Pl. XVIII, Fig. 7. 1904.
Johnson County. (Hobby).
var. a *parvum* W. & G. S. West.
Brit. Desm. I: 150, Pl. XVII, Fig.. 11.
Pl. XXXVI, Figs. 16, 16a. Powesheik County. (Prescott).

16. *Closterium laterale* Nordstedt

West and West, Brit. Desm. I: 186, Pl. XXV, Figs. 4, 5. 1904.
Pl. XXXVI, Fig. 17. Swamp, Dickinson County. July. (Prescott).

17. *Closterium leibleinii* Kuetzing

West and West, Brit. Desm. I: 141, Pl. XVI, Figs. 9-14. 1904.
Plankton from quarry pond, Johnson County. July. (Prescott).

18. *Closterium lineatum* Ehrenberg

West and West, Brit. Desm. I: 181, Pl. XXIV, Figs. 1-5. 1904.
Pl. XXXVI, Figs. 18, 18a. Swamp, Dickinson County. July. (Prescott).

19. *Closterium lunula* (Müll) Nitzsch

West and West, Brit. Desm. I: 150, Pl. XVIII, Figs. 8, 9. 1904.
Johnson County. (Hobby).
var. a *minor* W. & G. S. West.
Brit. Desm. I: 151. 1904.
Plankton from slowly flowing stream, Johnson County. July. (Prescott).

20. *Closterium macilentum* Breb.

West and West, Brit. Desm. I: 118, Pl. XII, Figs. 8-10. 1904.
Plankton from lake, Powesheik County. October. (Prescott).

21. *Closterium malinvernianum* De Not.

West and West, Brit. Desm. I: 145, Pl. XVII, Figs. 5, 6. 1904.
Marsh, Iowa County. May. (Prescott).

22. *Closterium moniliferum* (Bory) Ehrenberg

West and West, Brit. Desm. I: 142, Pl. XVI, Figs. 15, 16. 1904.

Swamp, Johnson County. May. (Prescott). Generally distributed. (Bessey), (Buchanan), (Anderson).

23. *Closterium parvulum* Nägeli

West and West, Brit. Desm. I: 133, Pl. XV, Figs. 9-12. 1904.

Type not reported for Iowa.

var. a *angustum* W. & G. S. West.

Brit. Desm. I: 134, Pl. XV, Figs. 13, 14. 1904.

Stagnant water, Henry County. July. (Prescott).

24. *Closterium pritchardianum* Archer

West and West, Brit. Desm. I: 172, Pl. XXII, Figs. 6-14. 1904.

Pl. XXXVI, Figs. 19, 19a. Swamp, Henry County. May. (Prescott).

25. *Closterium ralfsii* Breb.

West and West, Brit. Desm. I: 182, Pl. XXIV, Figs. 6, 7. 1904.

Type not reported from Iowa.

var. a *hybridum* Rab.

West and West, Brit. Desm. I: 183, Pl. XXIV, Figs. 8-13. 1904.

Swamp, Johnson County. July. (Prescott).

26. *Closterium regulare* Breb.

West and West, Brit. Desm. I: 122, Pl. XIII, Figs. 4-6. 1904.

Swamp, Johnson County. May. (Prescott).

27. *Closterium rostratum* Ehrenberg

West and West, Brit. Desm. I: 188, Pl. XXVI, Figs. 1-5. 1904.

Type not reported from Iowa.

var. a *brevirostratum* West.

West and West, Brit. Desm. I: 189, Pl. XXVI, Figs. 6-8. 1904.

Swamp, Johnson County. May. (Prescott).

28. *Closterium siliqua* West and West

Brit. Desm. I: 154, Pl. XIX, Figs. 6-8. 1904.

Roadside pool, Johnson County. July. (Prescott).

29. *Closterium strigosum* Breb.

West and West, Brit. Desm. I: 165, Pl. XXI, Figs. 6, 7. 1904.

Intermingled in mats of *Vaucheria* collected from beneath the winter ice of a quary pond, Johnson County. February. (Prescott).

30. *Closterium striolatum* Ehrenberg

West and West, Brit. Desm. I: 122, Pl. XIII, Figs. 7-16. 1904.

Decatur County. (Anderson). Swamp, Johnson County. May, July. (Prescott).

31. *Closterium toxon* West

West and West, Brit. Desm. I: 160, Pl. XX, Figs. 13, 14. 1904.

Roadside ditch, Johnson County. July. (Prescott).

32. *Closterium venus* Kuetzing

West and West, Brit. Desm. I: 137, Pl. XV, Figs. 15-20. 1904.

Pl. XXXVI, Fig. 10. Swamp, Johnson County. May. (Prescott).

Cosmarium Corda, 1834

(West and West, Brit. Desm. II: 125. 1905.)

1. *Cosmarium abreviatum* Racib.

West and West, Brit. Desm. III: 84, Pl. LXXII, Figs. 9-11. 1908.

Pl. XXXI, Fig. 8. Pond, Muscatine County. October. (Prescott).

2. *Cosmarium amoenum* Breb.

West and West, Brit. Desm. IV: 29, Pl. CII, Figs. 1-4; Pl. CIII, Fig. 9. 1911.

Pl. XXXI, Fig. 9. Roadside ditch of slowly running water, Johnson County. April. (Prescott).

3. *Cosmarium biretum* Breb.

West and West, Brit. Desm. IV: 25, Pl. CI, Figs. 1-8. 1911.

Pl. XXXI, Fig. 10. Swamp, Johnson County. May. (Prescott).

var. a *floridense* Wolle.

Wolle, Desm. U. S. p. 93, Pl. XLVI, Fig. 6. 1892.

Pond, Muscatine County. June. (Prescott).

var. b *minus* Hansgirg.

West and West, Brit. Desm. IV: 26. 1911.

In shallow marsh water, Johnson County. April. (Prescott).

4. *Cosmarium blyttii* Wille

West and West, Brit. Desm. III: 225, Pl. LXXXVI, Figs. 1-4. 1908.

Pl. XXXI, Fig. 11. Pond, Dickinson County. July. (Prescott).

5. *Cosmarium boeckii* Wille

West and West, Brit. Desm. III: 234, Pl. LXXXVI, Figs. 26-32. 1908.

Pl. XXXI, Fig. 12. Pond, north of West Okoboji Lake, Dickinson County. July. (Prescott).

6. *Cosmarium botrytis* Meneghini

West and West, Brit. Desm. IV: 1, Pl. XCVI, Figs. 1, 2, 5-15. 1911.

Plankton in pond, Muscatine County. June. Swamp, Dickinson County. July. (Prescott). Johnson County. (Hobby).

var. a *subtumidum* Wittr.

West and West, Brit. Desm. IV: 4, Pl. XCVII, Fig. 1. 1911.

Pl. XXXI, Fig. 13. Johnson County. (Prescott).

7. *Cosmarium broomei* Thwaites

West and West, Brit. Desm. IV: 24, Pl. C, Fig. 12. 1911.

Pl. XXXI, Fig. 14. Swamp, Johnson County. May. (Prescott). Decatur County. (Anderson).

8. *Cosmarium circulare* Reinsch

Smith, 1924, p. 29, Pl. 57, Fig. 3.

Pl. XXXI, Fig. 20. Swamp, Johnson County. June. (Prescott).

9. *Cosmarium contractum* Kirchner

West and West, Brit. Desm. II: 170, Pl. LXI, Figs. 23-25, 34. 1905.

Type not reported from Iowa.

var. a *ellipsoideum* (Elfv.) W. & G. S. West.

Brit. Desm. II: 172, Pl. LXI, Figs. 28, 35. 1905.

Pl. XXXI, Fig. 16. Swamp, Johnson County. October. (Prescott).

var. b *jacobensii* (Roy) W. & G. S. West.

Brit. Desm. II: 171, Pl. LXI, Fig. 26. 1905.

Pl. XXXI, Fig. 17. Swamp, Johnson County. October. (Prescott).

10. *Cosmarium cucumis* (Corda) Ralfs

West and West, Brit. Desm. II: 152, Pl. LIX, Figs. 18-20. 1905.

Pl. XXXI, Fig. 18. Swamp, Johnson County. May. (Prescott).

11. *Cosmarium cucurbita* Breb.

West and West, Brit. Desm. III: 106, Pl. LXXIII, Figs. 31-33; Pl. LXXIV, Fig. 3. 1908.

Pl. XXXI, Fig. 19. Plankton from marsh, Johnson County. May. (Prescott).

12. *Cosmarium cyathiforme* W. & G. S. West

Trans. Linn. Soc. Bot. V, Pt. 2: 248, Pl. XV, Fig. 9. 1896.

Pl. XXXI, Fig. 21. Swamp, Johnson County. May. (Prescott).

13. *Cosmarium decachondrum* Roy and Biss.

Jour. Bot. XXIV: 196, Pl. 268, Fig. 15. 1886.

Type not reported from Iowa.

var. a *ornatum* G. S. West.

Jour. Linn. Soc. Bot. 38: 120, Pl. 7, Fig. 8. 1907.

Pl. XXXI, Figs. 22, 22a. Swamp, Johnson County. May. (Prescott).

14. *Cosmarium didymoprotupsum* W. & G. S. West

Brit. Desm. III: 192, Pl. LXXXVIII, Fig. 8. 1908.

Pl. XXXII, Fig. 2. Swamp, Dickinson County. August. (Prescott).

15. *Cosmarium didymochondrum* Nordstedt

West and West, Brit. Desm. III: 262, Pl. XC, Fig. 16. 1908.

Pl. XXXII, Fig. 1. Pond, north of West Okoboji Lake, Dickinson County. July. (Prescott).

16. *Cosmarium formulosum* Hoff.

West and West, Brit. Desm. III: 240, Pl. LXXXVIII, Figs. 1-3. 1908.

Type not reported from Iowa.

var. a *nathorstii* (Boldt) W. & G. S. West.

Brit. Desm. III: 242, Pl. LXXXVIII, Figs. 4, 5. 1908.

Pl. XXXII, Fig. 3. Kettle hole, Dickinson County. July. (Prescott).

17. *Cosmarium garrolense* Roy and Biss.

West and West, Brit. Desm. III: 12, Pl. LXVI, Figs. 7, 8. 1908.

Pl. XXXII, Fig. 4. East Okoboji Lake, drainage canal, Dickinson County. June. (Prescott).

18. *Cosmarium globosum* Bulnh.

West and West, Brit. Desm. III: 29, Pl. LXVIII, Figs. 1, 2. 1908.

Pl. XXXI, Fig. 15. Drainage streamlet from swamp, Johnson County. June. (Prescott).

19. *Cosmarium granatum* Breb.

West and West, Brit. Desm. II: 186, Pl. LXIII, Figs. 1-4. 1905.

Pl. XXXII, Fig. 5. Marsh and ponds, Johnson County. April. (Prescott).

var. a *elongatum* Nordstedt.

West and West, Brit. Desm. II: 189, Pl. LXIII, Fig. 10. 1905.

Swamp, Johnson County. May. (Prescott).

var. b *subgranatum* Nordstedt.

West and West, Brit. Desm. II: 188, Pl. LXIII, Figs. 5-8. 1905.

Pl. XXXI, Fig. 23. Swamps, ponds and roadside ditches, Muscatine County, Johnson County. May, June. (Prescott).

20. *Cosmarium hammeri* Reinsch

West and West, Brit. Desm. II: 181, Pl. LXII, Figs. 20, 21. 1905.

Swamp, Johnson County. May. (Prescott).

var. a *protuberans* W. & G. S. West.

Brit. Desm. II: 183, Pl. LXII, Figs. 24, 25. 1905.

Pl. XXXI, Figs. 24, 24a. Swamp, Johnson County. May. (Prescott).

21. *Cosmarium jenisejense* Boldt

West and West, Brit. Desm. III: 175, Pl. LXXXI, Fig. 9. 1908.

Swamp, Dickinson County. July. (Prescott).

22. *Cosmarium laeve* Rab.

West and West, Brit. Desm. III: 99, Pl. LXXIII, Figs. 8-19. 1908.

Fayette County. (Fink).

23. *Cosmarium lundellii* Delp.

West and West, Brit. Desm. II: 138, Pl. LVII, Figs. 1, 2. 1905.

Pl. XXXI, Fig. 26. Pond, Dickinson County. July. (Prescott).

24. *Cosmarium margaritiferum* Meneghini

West and West, Brit. Desm. III: 199, Pl. LXXXIII, Figs. 4-11. 1908.

Plankton from East Okoboji Lake, Dickinson County. August. (Prescott). Story County. (Bessey).

25. *Cosmarium meneghinii* Breb.

West and West, Brit. Desm. III: 90, Pl. LXXII, Figs. 29-32. 1908.

Swamp, Johnson County. October. (Prescott).

var. a *concinum* Rab.

West and West, Brit. Desm. III: 94, Pl. LXXII, Figs. 37, 38. 1908.

Wright County. (Buchanan).

26. *Cosmarium moniliforme* (Turp.) Ralfs

West and West, Brit. Desm. III: 20, Pl. LXVII, Figs. 1-3, 1908.

Pl. XXXII, Fig. 8. Swamp, Johnson County. May. (Prescott).

27. *Cosmarium nitidulum* De Not.

West and West, Brit. Desm. II: 197, Pl. LXIV, Figs. 1-3, 1905.

Pl. XXXI, Fig. 25. Ponds and sloughs, Muscatine County. July. (Prescott).

28. *Cosmarium notabile* Breb.

West and West, Brit. Desm. III: 15, Pl. LXVI, Figs. 15, 16. 1908.

Pl. XXXII, Fig. 7. Swamp, Johnson County. October. (Prescott). Wright County. (Buchanan).

29. *Cosmarium norimbergense* Reinsch.

West and West, rit. Desm. III: 52, Pl. LXIX, Figs. 25-27. 1908.

Type not reported from Iowa.

Forma *depressa* W. & G. S. West.

Brit. Desm. III: 53, Pl. LXIX, Figs. 28, 29. 1908.

Pl. XXXII, Figs. 6, 6a. Swamp, Johnson County. October. (Prescott).

30. *Cosmarium novae-semilae* Wille

West and West, Brit. Desm. III: 35, Pl. LXVIII, Fig. 16. 1908.

Type not reported from Iowa.

var. a *sibericum* Boldt.

West and West, Brit. Desm. III: 36, Pl. LXVIII, Figs. 17, 18. 1908.

Pl. XXXII, Fig. 13. Swamp, Johnson County. May. (Prescott).

31. *Cosmarium obtusatum* Schmidle

West and West, Brit. Desm. III: 7, Pl. LXV, Figs. 13, 14. 1908.

Pl. XXXII, Fig. 9. Pond, Muscatine County. June. (Prescott).

32. *Cosmarium ornatum* Ralfs

West and West, Brit. Desm. III: 151, Pl. LXXVIII, Figs. 1-10. 1908.

Pl. XXXII, Fig. 10. Swamp, Johnson County. May. (Prescott).

33. *Cosmarium ovale* Ralfs

West and West, Brit. Desm. III: 267, Pl. XCII. Fig. 1; Pl. XCIII, Fig. 1; Pl. XCIV, Fig. 1. 1908.

Pl. XXXII, Fig. 17. Swamps, Dickinson County, Johnson County. May, October. (Prescott).

34. *Cosmarium pachydermum* Lund.

West and West, Brit. Desm. II: 139, Pl. LVII, Fig. 7. 1905.

Type not reported from Iowa.

var. a *aethiopicum* W. & G. S. West.

Brit. Desm. II: 140, Pl. LVII, Figs. 8, 9. 1905.

Marshy seep, Johnson County. April. (Prescott).

35. *Cosmarium polygonum* (Näg.) Archer

West and West, Brit. Desm. III: 76, Pl. LXXI, Figs. 32-34. 1908.

Pl. XXXII, Figs. 29, 30. Stagnant, meadow pool, Johnson County. July. (Prescott).

36. *Cosmarium portianum* Archer

West and West, Brit. Desm. III: 165, Pl. LXXX, Figs. 4-7. 1908.

Pl. XXXII, Fig. 12. Swamp, Johnson County. May. (Prescott).

var. a *nephroideum* Wittr.

West and West, Brit. Desm. III: 167, Pl. LXXX, Figs. 10, 11. 1908.

Swamp, Johnson County. October. (Prescott).

37. *Cosmarium protractum* (Näg.) De Bary

West and West, Brit. Desm. III: 181, Pl. LXXXII, Fig. 8; Pl. XCIV, Figs. 4, 5. 1908.

Pl. XXXII, Fig. 14. Swamp, Johnson County. May. (Prescott).

38. *Cosmarium protuberans* Lund.

West and West, Brit. Desm. III: 69, Pl. LXXI, Fig. 9. 1908.

Type not reported from Iowa.

var. a *granulatum* Wolle.

Desm. U. S., p. 91, Pl. LXII, Figs. 13-15, 1892.

Pond, Dickinson County. July. (Prescott).

39. *Cosmarium pseudobroomei* Wolle

West and West, Brit. Desm. IV: 22, Pl. C, Figs. 7, 8; Pl. CIII, Fig. 7. 1911.

Swamp, Johnson County. May. (Prescott).

40. *Cosmarium punctulatum* Breb.

West and West, Brit. Desm. III: 206, Pl. LXXXIV, Figs. 13, 14; Pl. CII, Fig. 22. 1908.

Type not reported from Iowa.

var. a *subpunctulatum* (Nordst.) Börg.

West and West, Brit. Desm. III: 209. 1908.

Pond, Dickinson County. August. (Prescott).

41. *Cosmarium quinarium* Lund.

West and West, Brit. Desm. III: 216, Pl. LXXXV, Figs. 9, 10. 1908.

Swamp, Johnson County. July. (Prescott).

42. *Cosmarium rectangulare* Grun.

West and West, Brit. Desm. III: 54, Pl. LXX, Figs. 1, 2. 1908.

Decatur County. (Anderson).

var. a *hexagonum* (Elfv.) West and West.

Brit. Desm. III: 56, Pl. LXX, Fig. 4. 1908.

Pond, Dickinson County. July. (Prescott).

43. *Cosmarium regnesii* Reinsch

West and West, Brit. Desm. III: 36, Pl. LXVIII, Figs. 19-28. 1908.

Pl. XXXII, Fig. 25. Swamp, Johnson County. May. (Prescott).

44. *Cosmarium reniforme* (Ralfs) Archer

West and West, Brit. Desm. III: 157, Pl. LXXIX, Figs. 1, 2; Pl. LXXXII, Fig. 15, 1908.

Pl. XXXII, Fig. 16. Pond, Muscatine County. October. (Prescott).

var. a *apertum* W. & G. S. West.

Brit. Desm. III: 159, Pl. LXXIX, Fig. 5. 1908.

East Okoboji Lake, Dickinson County. August. (Prescott).

var. b *compressum* Nordstedt.

West and West, Brit. Desm. III: 158, Pl. LXXIX, Figs. 3, 4. 1908.

Ponds, Dickinson County. July. (Prescott).

var. c *elevatum* W. & G. S. West.

Brit. Desm. III: 159, Pl. LXXIX, Fig. 6. 1908.

Kettle hole, Dickinson County. July. (Prescott).

45. *Cosmarium sexangulare* Lund.

West and West, Brit. Desm. III: 81, Pl. LXXII, Fig. 3. 1908.

Pl. XXXII, Fig. 15. Swamp, Johnson County. May. (Prescott).

46. *Cosmarium smolandicum* Lund.

West and West, Brit. Desm. II: 134, Pl. LVI, Fig. 5. 1905.

Pl. XXXII, Fig. 18. Swamp, Johnson County. June. (Prescott).

47. *Cosmarium speciosum* Lund.

West and West, Brit. Desm. III: 247, Pl. LXXXIX, Figs. 1-3. 1908.

Type not reported from Iowa.

var. a *rostafinskii* (Gutw.) West and West.

Brit. Desm. III: 152, Pl. LXXXIX, Figs. 8-10. 1908.

Roadside ditch, Johnson County. June. (Prescott).

48. *Cosmarium sphagnicolum* W. & G. S. West

Brit. Desm. III: 71, Pl. LXXI, Figs. 11-14. 1908.

Pl. XXXII, Fig. 26. Attached to submersed aquatics, especially in acid water, Johnson County. May. (Prescott).

49. *Cosmarium subcucumis* Schmidle

West and West, Brit. Desm. II: 155, Pl. LX, Figs. 1-3. 1905.

Pl. XXXII, Fig. 24. Swamp, Johnson County. May. (Prescott).

50. *Cosmarium subcostatum* Nordstedt

West and West, Brit. Desm. III: 236, Pl. LXXXVII, Figs. 3-5. 1908.

Swamp, Johnson County. June. (Prescott).

51. *Cosmarium subnudiceps* W. & G. S. West

Jour. Linn. Soc. Bot. 33: 306, Pl. 17, Fig. 6. 1897.

Aquarium, Lakeside Laboratory, Dickinson County. August. (Prescott).

52. *Cosmarium subprotumidum* Nordstedt

West and West, Brit. Desm. III: 231, Pl. LXXXVI, Figs. 19, 21. 1908.

Slowly flowing stream, Johnson County. May, October. (Prescott).

53. *Cosmarium subretusiforme* W. & G. S. West

Brit. Desm. II: 180, Pl. LXII, Fig. 19. 1905.

Pl. XXXII, Fig. 28. Pond, Dickinson County. July. (Prescott).

54. *Cosmarium subtumidum* Nordstedt

West and West, Brit. Desm. II: 192, Pl. LXIII, Figs. 18-20. 1905.

Pl. XXXII, Fig. 19. Swamp, Johnson County. May. (Prescott).

55. *Cosmarium taxichondrum* Lund.

West and West, Brit. Desm. IV: 45, Pl. CIII, Figs. 11-13. 1911.

Pl. XXXII, Fig. 23. Swamp, Johnson County. May. (Prescott).

56. *Cosmarium thwaitesii* Ralfs

West and West, Brit. Desm. III: 104, Pl. LXXIII, Figs. 27, 28. 1908.

Type not reported from Iowa.

var. a *penoides* Klebs.

West and West, Brit. Desm. III: 105, Pl. LXXIII, Figs. 29, 30. 1908.

Swamp, Johnson County. June. (Prescott).

57. *Cosmarium trachypleurum* Lund.

West and West, Brit. Desm. III: 172, Pl. LXXXI, Figs. 2, 3. 1908.

Type not reported from Iowa.

var. a *minus* Racib.

West and West, Brit. Desm. III: 173, Pl. LXXXI, Figs. 4, 5. 1908.

Pl. XXXII, Fig. 22. Pond, Dickinson County. July. (Prescott).

58. *Cosmarium trilobulatum* Reinsch

West and West, Brit. Desm. II: 185, Pl. LXII, Figs. 28-30. 1905.

Swamp, Johnson County. May. (Prescott). Ponds, Muscatine County. October. (Prescott).

59. *Cosmarium turpinii* Breb.

West and West, Brit. Desm. III: 189, Pl. LXXXII, Figs. 16, 17; Pl. LXXXIII, Fig. 1. 1908.

Pl. XXXII, Fig. 21. Pond, Johnson County. August. (Prescott).

var. a *exinum* W. & G. S. West.

Brit. Desm. III: 192, Pl. LXXXIII, Fig. 3, 1908.

Pool in old stream bed, Johnson County. November. (Prescott).

var. b *podolicum* Gutw.

West and West, Brit. Desm. III: 191, Pl. LXXXIII, Fig. 2. 1908.

Swamp, Dickinson County. July. (Prescott).

60. *Cosmarium undulatum* Corda

West and West, Brit. Desm. II: 148, Pl. LIX, Figs. 1-3. 1905.

Pl. XXXII, Fig. 20. Swamp, Johnson County. October. (Prescott).

var. a *crenulatum* (Näg.) Wittr.

West and West, Brit. Desm. II: 150, Pl. LIX, Figs. 11, 12. 1905.

Slough, Wright County. (Buchanan).

var. b *minutum* Wittr.

West and West, Brit. Desm. II: 149, Pl. LIX, Figs. 6, 7. 1905.

Swamp, Johnson County. June. (Prescott).

61. *Cosmarium venustum* (Breb.) Archer

West and West, Brit. Desm. III: 8, Pl. LXVI, Figs. 1-3. 1908.

Type not reported from Iowa.

Forma *minor* Wille.

West and West, Brit. Desm. III: 10, Pl. LXVI, Fig. 4. 1908.

Pl. XXXII, Fig. 27. Clear Lake, Cerro Gordo County. July. (Prescott).

62. *Cosmarium vexatum* West

West and West, Brit. Desm. III: 187, Pl. XCII, Fig. 4. 1908.

Pond, Henry County. October. (Prescott).

Cosmocladium Brebisson, 1856

(West and West, Brit. Desm. V: 197. 1923.)

1. *Cosmocladium pusillum* Hilse

West and Carter, Brit. Desm. V: 201, Pl. CLVIII, Figs. 8-10. 1923.

Roadside ditch of slowly running water, Johnson County. April. (Prescott).

2. *Cosmocladium saxonicum* De Bary

West and Carter, Brit. Desm. V: 202, Pl. CLVIII, Figs. 13-16. 1923.

Pl. XXXIII, Fig. 1. Swamp, Johnson County. July. (Prescott).

Desmidium Agardh, 1824

(West and Carter, Brit. Desm. V: 240. 1923.)

1. *Desmidium aptogonum* Breb.

West and Carter, Brit. Desm. V: 242, Pl. CLXIV, Figs. 1-3. 1923.

Pl. XXXIII, Figs. 2, 2a. Swamp, with other filamentous Desmids, Johnson County. October. (Prescott).

2. *Desmidium baileyi* (Ralfs) Nordstedt

Smith, 1924, p. 145, Pl. 88, Figs. 5-7.

Swamp, Johnson County. May. (Prescott).

3. *Desmidium cylindricum* Grev.

West and Carter, Brit. Desm. V: 249, Pl. CLXIV, Figs. 7-10. 1923.

Swamp, Johnson County. May. (Prescott).

4. *Desmidium occidentale* W. & G. S. West

West and Carter, Brit. Desm. V: 245, Pl. CLXIV, Fig. 11. 1923.

Pl. XXXIII, Figs. 3, 3a. Swamp, Johnson County. May. (Prescott).

5. *Desmidium swartzii* Agardh

West and Carter, Brit. Desm. V: 246, Pl. CLXIII, Figs. 5-8. 1923.

Swamp, Johnson County. May. (Prescott). Decatur County. (Anderson).

Docidium Brebisson, 1844, em. Lundell, 1871

(West and West, Brit. Desm. I: 193, 1904.)

1. *Docidium baculum* Breb.

West and West, Brit. Desm. I: 193, Pl. XXVII, Figs. 1-6. 1904.

Pl. XXXIII, Fig. 4. Pond, Muscatine County. October. (Prescott). Story County. (Buchanan).

Euastrum Ehrenberg, 1832

(West and West, Brit. Desm. II: 1. 1905.)

1. *Euastrum bidentatum* Nägeli

West and West, Brit. Desm. II: 39, Pl. XXXVII, Figs. 16-19. 1905.

Pl. XXXIII, Fig. 13. Swamp, Dickinson County. July. (Prescott).

2. *Euastrum binale* (Turp.) Ehrenberg

West and West, Brit. Desm. II: 51, Pl. XXXVIII, Figs. 28, 29. 1905.

Swamp, Johnson County. May. (Prescott). Slough, Wright County. (Buchanan).

Forma *hians* West.

West and West, Brit. Desm. II: 53, Pl. XXXVIII, Fig. 33. 1905.

Pl. XXXIII, Fig. 5. Swamp, Johnson County. October. (Prescott).

3. *Euastrum crassicolle* Lund.

West and West, Brit. Desm. II: 71, Pl. XL, Figs. 9, 10. 1905.

Pl. XXXIII, Fig. 6. Swamp, Johnson County. October. (Prescott).

4. *Euastrum denticulatum* (Kirch.) Gay

West and West, Brit. Desm. II: 56, Pl. XXXIX, Figs. 1-4. 1905.

Pl. XXXIII, Fig. 11. Swamp, Johnson County. May. (Prescott).

5. *Euastrum dubium* Nägeli

West and West, Brit. Desm. II: 43, Pl. XXXVIII, Figs. 5-8. 1905.

Swamp, Dickinson County. July. (Prescott).

6. *Euastrum insulare* (Wittr.) Roy

West and West, Brit. Desm. II: 68, Pl. XL, Figs. 11-13. 1905.

Swamp, Johnson County. May. (Prescott).

7. *Euastrum verrucosum* Ehrenberg

West and West, Brit. Desm. II: 64, Pl. XL, Fig. 1. 1905.

Pl. XXXIII, Fig. 12. Swamp, Johnson County. February, October. (Prescott). Decatur County. (Anderson).

var. a *alatum* Wolle.

West and West, Brit. Desm. II: 67, Pl. XL, Fig. 6. 1905.

Swamp, Johnson County. May. (Prescott).

var. b *coarctatum* Delp.

West and West, Brit. Desm. II: 66, Pl. XL, Fig. 4. 1905.

Swamp, Johnson County. October. (Prescott).

var. c *reductum* Nordstedt.

West and West, Brit. Desm. II: 65, Pl. XL, Figs. 2, 3. 1905.

Pond, Dickinson County. July. (Prescott).

Gymnozyga Ehrenberg, 1841

(West and Carter, Brit. Desm. V: 254. 1923.)

1. *Gymnozyga moniliformis* Ehrenberg

West and Carter, Brit. Desm. V: 255, Pl. CLXV, Figs. 8, 9. 1923.

Marsh, Johnson County. May. (Prescott).

Hyalotheca Ehrenberg, 1840

(West and Carter, Brit. Desm. V: 228. 1923.)

1. *Hyalotheca dissiliens* (Sm.) Breb.

Smith, 1924, p. 142, Pl. 87, Figs. 8, 9.

Swamp, Johnson County. October. (Prescott).

2. *Hyalotheca mucosa* (Mert.) Ehrenberg

Smith, 1924, p. 142, Pl. 87, Fig. 10.

Swamps, Dickinson County, Johnson County. July, October. (Prescott).

Micrasterias Agardh, 1827

(West and West, Brit. Desm. II: 76. 1905.)

1. *Micrasterias americana* (Ehr.) Ralfs

West and West, Brit. Desm. II: 117, Pl. LIII, Figs. 4, 5; Pl. LIV, Figs. 1-3. 1905.

Pl. XXXVI, Fig. 9. Swamp, Johnson County. October. (Prescott). Decatur County. (Anderson).

2. *Micrasterias apiculata* (Ehr.) Meneghini

West and West, Brit. Desm. II: 97, Pl. XLVII, Figs. 1, 2. 1905.

Type not reported from Iowa.

var. a *fimbriata* (Ralfs) Nordstedt.

West and West, Brit. Desm. II: 99, Pl. XLVI, Fig. 6; Pl. XLVII, Figs. 3. 4. 1905.

Pl. XXXVI, Fig. 11. Swamp, Dickinson County. July. (Prescott).

3. *Micrasterias crux-melitensis* (Ehr.) Hassall

West and West, Brit. Desm. II: 116, Pl. LIII, Figs. 1-3. 1905.

Swamp, Johnson County. May. (Prescott).

4. *Micrasterias papillifera* Breb.

West and West, Brit. Desm. II: 91, Pl. XLIV, Figs. 1, 2, 7. 1905.

Type not reported from Iowa.

var. a *glabra* Nordstedt.

West and West, Brit. Desm. II: 93, Pl. XLIV, Figs. 4, 5. 1905.

Swamp, Johnson County. May. (Prescott).

5. *Micrasterias pinnatifida* (Kuetz.) Ralfs

Smith, 1924, p. 41, Pl. 59, Figs. 1, 2.

Pl. XXXVI, Fig. 15. Swamp, Johnson County. May. (Prescott).

6. *Micrasterias rabenhorstii* Kirchner

Wolle, Desm. U. S., p. 131, Pl. LXIII, Fig. 6; Pl. XLV, Fig. 6. 1892.

Pl. XXXVI, Fig. 14. Swamp, Johnson County. October. (Prescott).

7. *Micrasterias radiosa* Ralfs

Smith, 1924, p. 45, text figure 5.

Swamp, pond, Dickinson County. July. (Prescott).

var. a *ornata* Nordstedt.

Smith, 1924, p. 47, Pl. 60, Figs. 3, 4.

Swamp, Johnson County. May. (Prescott).

8. *Micrasterias radiata* Hassall

Smith, 1924, p. 50, Pl. 63, Figs. 1-3.

Pl. XXXVI, Fig. 20. Swamp, Johnson County. May. (Prescott).

9. *Micrasterias truncata* (Corda) Breb.

Smith, 1924, p. 43, Pl. 60, Figs. 1, 2.

Wright County. (Buchanan).

ONYCHONEMA Wallich, 1860
(West and Carter, Brit. Desm. V: 215. 1923.)

1. *Onychonema filiforme* (Ehr.) Roy and Biss.

Smith, 1924, p. 135, Pl. 86, Figs. 13, 14.

Pl. XXXIII, Fig. 8. Swamp, Johnson County. October. (Prescott).

2. *Onychonema laeve* Nordstedt

West and Carter, Brit. Desm. V: 218, Pl. CLX, Figs. 15, 16. 1923.

Pl. XXXIII, Fig. 10. Swamp, Johnson County. October. (Prescott).

PENIUM Brebisson, 1844
(West and West, Brit. Desm. I: 71. 1904.)

1. *Penium libellula* (Focke) Nordstedt.

West and West, Brit. Desm. I: 73, Pl. VII, Figs. 6, 7. 1904. (*Penium closteroides* Ralfs).

Swamp, Johnson County. October. (Prescott). Dickinson County. (Buchanan). Story County. (Buchanan).

2. *Penium margaritaceum* (Ehr.) Breb.

Smith, 1924, p. 7, Pl. 52, Fig. 6.

Roadside ditch, Johnson County. April. (Prescott).

PLEUROTAENIUM Nägeli, 1849
(West and West, Brit. Desm. I: 197. 1904.)

1. *Pleurotaenium coronatum* (Breb.) Rab.

West and West, Brit. Desm. I: 199, Pl. XXVII, Figs. 16-18; Pl. XXVIII, Fig. 4. 1904.

Not reported from Iowa.

var. a *nodulosum* (Breb.) West.

West and West, Brit. Desm. I: 200, Pl. XXVIII, Figs. 5-8. 1904. (*Pleurotaenium nodulosum* Breb.)

Plankton in swamp, Johnson County. May. (Prescott). Decatur County. (Anderson).

var. b *robustum* West.

West and West, Brit. Desm. II: 200, Pl. XXVIII, Fig. 3. 1904.

Swamp, Johnson County. July. (Prescott).

2. *Pleurotaenium ehrenbergii* (Breb.) De Bary

Smith, 1924, p. 15, Pl. 54, Figs. 5-8.

Pond, Dickinson County. July. (Prescott).

3. *Pleurotaenium trabecula* (Ehr.) Nägeli

Smith, 1924, p. 14; West and West, Brit. Desm. I: 209, Pl. XXX, Figs. 11-13. 1904.

Swamp, Johnson County, May. (Prescott). Slough and pond, Wright County. (Buchanan).

var. a *rectum* (Delp.) W. & G. S. West.

Smith, 1924, p. 14, Pl. 54, Fig. 1.

Swamp, Johnson County. May. (Prescott).

4. *Pleurotaenium truncatum* (Breb.) Nägeli

Smith, 1924, p. 16, Pl. 55, Figs. 1, 2.

Swamp, Johnson County. July. (Prescott).

var. a *granulatum* West.

West and West, Brit. Desm. I: 205, Pl. XXIX, Figs. 7, 8.

Roadside ditch, Johnson County. April. (Prescott).

Sphaerozosma Corda, 1835

(West and Carter, Brit. Desm. V: 206. 1923.)

1. *Sphaerozosma aubertianum* West

West and Carter, Brit. Desm. V: 207, Pl. CLIX, Fig. 13. 1923.

Type not reported from Iowa.

var. a *archeri* (Gutw.) W. & G. S. West.

Smith, 1924, p. 137, Pl. 86, Fig. 16.

Pl. XXXV, Fig. 20. Swamp, Johnson County. July. (Prescott).

2. *Sphaerozosma granulatum* Roy and Biss.

West and Carter, Brit. Desm. V: 213, Pl. CLX, Figs. 6, 7. 1923.

Pl. XXXIII, Fig. 9. Swamp, Johnson County. May. (Prescott).

3. *Sphaerozosma vertebratum* (Breb.) Ralfs

West and Carter, Brit. Desm. V: 209, Pl. CLIX, Figs. 9, 10. 1923.

Pl. XXXV, Fig. 15. Swamp, Johnson County. May. (Prescott).

Forma *minor* West.

West and Carter, Brit. Desm. V: 210, Pl. CLIX, Fig. 12. 1923.

Pl. XXXV, Fig. 14. Swamp, Johnson County. October (Prescott).

SPONDYLOSIUM, Brebisson, 1844
(West and Carter, Brit. Desm. V: 219. 1923.)

1. *Spondylosium pulchellum* Archer

West and Carter, Brit. Desm. V: 227, Pl. CLXI, Figs. 1-3. 1923.

Pl. XXXIII, Fig. 7. Swamp, Johnson County. May. (Prescott).

STAURASTRUM Meyen, 1829
(West and West, Brit. Desm. IV: 118. 1911.)

1. *Staurastrum alternans* Breb.

West and West, Brit. Desm. IV: 170, Pl. CXXVI, Figs. 8, 9. 1911; Smith, 1924, p. 70, Pl. 68, Fig. 4.

Pl. XXXV, Figs. 4, 4a. Swamp, Johnson County, October. (Prescott).

2. *Staurastrum apiculatum* De Breb.

West and Carter, Brit. Desm. V: 6, Pl. CXXIX, Figs. 6-8. 1923.

Pl. XXXV, Figs. 6, 6a. Swamp, Johnson County. October. (Prescott).

3. *Staurastrum arcuatum* Nordstedt

West and Carter, Brit. Desm. V: 180, Pl. CLV, Fig. 8. 1923.

Pl. XXXV, Fig. 18. Swamp, Johnson County. May. (Prescott).

4. *Staurastrum avicula* De Breb.

Smith, 1924, p. 71, Pl. 68, Figs. 8-10.

Pl. XXXV, Figs. 12, 12a. Swamp, and ponds, Johnson County. May, October. (Prescott).

5. *Staurastrum botrophilum* Wolle

West and West, Brit. Desm. IV: 166, Pl. CXXVI, Fig. 4. 1911.

In slowly flowing stream draining from a meadow swamp, Johnson County. April. (Prescott).

6. *Staurastrum breviculeatum* G. M. Smith

1924, p. 78, Pl. 70, Figs. 10-18.

Pl. XXXIV, Figs. 12, 12a. Plankton in shallow marsh-like swamp, Johnson County. October. (Prescott).

7. *Staurastrum brevispinum* Breb.

West and Carter, Brit. Desm. IV: 145, Pl. CXXVIII, Figs. 1-3. 1911.

Pl. XXXV, Figs. 9, 9a. Swamp, Johnson County. October. (Prescott).

8. *Staurastrum chaetoceros* (Schröder) G. M. Smith

1924, p. 99, Pl. 76, Figs. 21-24; Pl. 77, Fig. 1.

Pl. XXXV, Fig. 13. Plankton from West Okoboji Lake, Dickinson County. July. (Prescott).

9. *Staurastrum connatum* (Lund.) Roy and Biss.

West and Carter, Brit. Desm. V: 15, Pl. CXXX, Figs. 6-8. 1923.

Pl. XXXV, Fig. 8. Swamp, Johnson County. May. (Prescott).

10. *Staurastrum controversum* Breb.

West and Carter, Brit. Desm. V: 162, Pl. CLIV, Figs. 1-4. 1923.

Pl. XXXV, Fig. 7. Swamp, Johnson County. May. (Prescott).

11. *Staurastrum crenulatum* (Näg.) Delp.

West and Carter, Brit. Desm. V: 110, Pl. CXLIII, Figs. 9-13. 1923.

Pl. XXXV, Figs. 3, 3a. Plankton from West Okoboji Lake, Dickinson County. October. (Prescott). Wright County. (Buchanan).

12. *Staurastrum dejectum* Breb.

Smith, 1924, p. 73, Pl. 68, Figs. 18-24.

Pl. XXXV, Fig. 2. Swamp, Johnson County. October. (Prescott).

13. *Staurastrum denticulatum* (Näg.) Archer

Smith, 1924, p. 70, Pl. 68, Figs. 5-7.

Pl. XXXV, Figs. 1, 1a. Plankton in shallow swamp, Benton County. June. (Prescott).

14. *Staurastrum dickiei* Ralfs

West and Carter, Brit. Desm. V: 3, Pl. CXXIX, Figs. 14, 15. 1923.

Pl. XXXIV, Figs. 16, 16a. Plankton in marsh, Johnson County. May. (Prescott).

var. a *circulare* Turner.

West and Carter, Brit. Desm. V: 5, Pl. CXXIX, Fig. 16. 1923.

Swamp, Johnson County. May. (Prescott).

var. b *maximum* W. & G. S. West.

Smith, 1924, p. 76, Pl. 70, Figs. 3-5.

Plankton from Millers Bay, Dickinson County. July. (Prescott).

var. c *rhomboideum* W. & G. S. West.

West and Carter, Brit. Desm. V: 5, Pl. CXXIX, Fig. 17.

Swamp, Johnson County. October. (Prescott).

15. *Staurastrum erostellum* W. & G. S. West

West and Carter, Brit. Desm. V: 72, Pl. CXXXVI, Fig. 12. 1923.

Pl. XXXIV, Fig. 17. Swamp, Johnson County. June. (Prescott).

16. *Staurastrum floriferum* W. & G. S. West

Smith, 1924, p. 91, Pl. 74, Figs. 12-18.

Pl. XXXIV, Figs. 15, 15a. Swamp, Dickinson County. October. (Prescott).

17. *Staurastrum furcatum* (Ehr.) Breb.

Smith, 1924, p. 118, Pl. 83, Figs. 1-3.

Swamp, Johnson County. (Prescott).

18. *Staurastrum furcigerum* De Breb.

Smith, 1924, p. 122, Pl. 83, Figs. 4-7.

Swamp, Johnson County. May. (Prescott).

var. a *armigera* (Breb.) Nordstedt.

West and Carter, Brit. Desm. V: 191, Pl. CLVI, Fig. 10. 1923.

Swamp, Johnson County. May. (Prescott).

var. b *eustephana* (Ehr.) Nordstedt.

West and Carter, Brit. Desm. V: 190, Pl. CLVII, Fig. 1. 1923.

Pl. XXXIV, Figs. 14, 14a. Marsh and ponds, Johnson County. April. (Prescott).

19. *Staurastrum glabrum* (Ehr.) Ralfs

West and Carter, Brit. Desm. V: 2, Pl. CXXIX, Figs. 2-5. 1923.

Pl. XXXIV, Fig. 13. Swamp, Johnson County. October. (Prescott).

20. *Staurastrum gracile* Ralfs

Smith, 1924, p. 88, Pl. 73, Figs. 16-18; text figure 9.

Swamp, Johnson County. May. (Prescott).

var. a *nanum* Wille.

West and Carter, Brit. Desm. V: 100, Pl. CXLIV, Figs. 8, 9. 1923.

Pl. XXXIV, Figs. 11, 11a. Swamp, Johnson County. October. (Prescott).

21. *Staurastrum gladiosum* Turner

West and Carter, Brit. Desm. V: 57, Pl. CXXXVII, Figs. 1, 2. 1923.

In slowly flowing stream, Johnson County. June. (Prescott).

22. *Staurastrum grallatorium* Nordstedt

Smith, 1924, p. 100, Pl. 77, Figs. 3-5.

Type not reported from Iowa.

var. a *americanum* W. & G. S. West.

Trans. Linn. Soc. Bot. Ser. 2, V: 265, Pl. XVII, Fig. 15. 1896. (*Staurastrum americanum* (W. & G. S. West) G. M. Smith), 1924, p. 100, Pl. 77, Fig. 2.

Pl. XXXIV, Figs. 10, 10a. Swamp, Johnson County. October. (Prescott).

23. *Staurastrum haabolliense* Wille

West and Carter, Brit. Desm. V: 140, Pl. CXLII, Figs. 19, 20. 1923.

Pl. XXXIV, Figs. 8, 8a. Plankton in marsh and swamps, Johnson County. May, October. (Prescott).

24. *Staurastrum hexacerum* (Ehr.) Wittr.

West and Carter, Brit. Desm. V: 138, Pl. CXLII, Figs. 11-14. 1923.

Pl. XXXIV, Figs. 7, 7a. Swamp, Dickinson County. October. (Prescott).

var. a (?) *aversum* W. & G. S. West.

Jour. Linn. Soc. 33: 313, Pl. 18, Fig. 13. 1898.

Pool in old stream bed, Johnson County. November. (Prescott).

25. *Staurastrum irregulare* West

West and Carter, Brit. Desm. V: 150, Pl. CXLIX, Fig. 7. 1923.

Pl. XXXIV, Fig. 5. Swamp, Johnson County. October. (Prescott).

26. *Staurastrum laeve* Ralfs

West and Carter, Brit. Desm. V: 92, Pl. CXLI, Figs. 1-3. 1923.

Pl. XXXIV, Fig. 6. Swamp, Johnson County. October. (Prescott).

27. *Staurastrum leptocladum* Nordstedt

Smith, 1924, p. 102, Pl. 78, Figs. 1-7.

Type not reported from Iowa.

var. a *insigne* W. & G. S. West.

Smith, 1924, p. 103, Pl. 77, Fig. 13; Pl. 78, Figs. 8-11.

Pl. XXXIV, Fig. 9. Slough, Johnson County. August. (Prescott).

28. *Staurastrum longiradiatum* W. & G. S. West

Smith, 1924, p. 90, Pl. 74, Figs. 5-11.

Pl. XXXIV, Figs. 4, 4a. Plankton in West Ookoboji Lake, Dickinson County. July. (Prescott).

29. *Staurastrum lunatum* Ralfs

West and Carter, Brit. Desm. V: 29, Pl. CXXXIII, Figs. 17-19. 1923.

Swamp, Johnson County. May. (Prescott).

30. *Staurastrum margaritaceum* (Ehr.) Meneghini

West and Carter, Brit. Desm. V: 131, Pl. CL, Figs. 5-9. 1923.

Swamp, Johnson County. May. (Prescott). Slough, Wright County. (Buchanan).

31. *Staurastrum muticum* De Breb.

Smith, 1924, p. 67, Pl. 67, Figs. 13-15.

Pl. XXXIV, Figs. 1, 1a. Swamp, Johnson County. May. (Prescott).

32. *Staurastrum orbiculare* Ralfs

West and West, Brit. Desm. IV: 155, Pl. CXXIV, Figs. 10, 11. 1911.

Swamp, Johnson County. October. (Prescott).

var. a *hibernicum* W. & G. S. West.

Brit. Desm. IV: 156, Pl. CXXIV, Figs. 5-9. 1911.

Pond, Dickinson County. July. (Prescott).

var. b *ralfsii* W. & G. S. West.

Brit. Desm. IV: 156, Pl. CXXIV, Figs. 12, 13, 15, 16. 1911.

Pl. XXXIV, Fig. 3. Roadside ditch, Johnson County. April. (Prescott).

33. *Staurastrum paradoxum* Meyen

Smith, 1924, p. 85, Pl. 72, Figs. 15-22; Pl. 73, Figs. 1, 2.

Type not reported from Iowa.

var. a *longipes* Nordstedt.

Smith, 1924, p. 86, Pl. 73, Figs. 3-6.

Pl. XXXIV, Fig. 2. Plankton from Clear Lake, Cerro Gordo County. July. (Prescott).

var. b *parvum* W. West.

Smith, 1924, p. 87, Pl. 73, Figs. 7-15.

Plankton, West Okoboji Lake, Dickinson County. July. (Prescott).

34. *Staurastrum pilosum* (Näg.) Archer

West and Carter, Brit. Desm. V: 63, Pl. CXXXVIII, Figs. 1-3. 1923.

Swamp, Johnson County. May. (Prescott).

35. *Staurastrum polytrichum* (Pert) Rab.

West and Carter, Brit. Desm. V: 53, Pl. CXXXVI, Figs. 9, 10. 1923.

Swamp, Johnson County. October. (Prescott).

36. *Staurastrum polymorphum* Breb.

West and Carter, Brit. Desm. V: 125, Pl. CXLII, Fig. 24; Pl. CXLIII, Figs. 1-3. 1923.

Pl. XXXIII, Figs. 20, 20a. Swamp, Johnson County. May. (Prescott). Wright County. (Buchanan).

37. *Staurastrum pseudosebaldi* Wille

West and Carter, Brit. Desm. V: 113, Pl. CLXVI, Fig. 4. 1923.

Type not reported from Iowa.

var. a *simplicius* West.

West and Carter, Brit. Desm. V: 114, Pl. CXLIX, Fig. 13. 1923.

Pl. XXXIII, Fig. 21. Swamp, Johnson County. May. (Prescott).

38. *Staurastrum punctulatum* Breb.

West and West, Brit. Desm. IV: 179, Pl. CXXVII, Figs. 8-11, 13, 14. 1911.

Pl. XXXV, Fig. 16. Seep from marsh, Johnson County. April. (Prescott).

var. a *pygmaeum* (Breb.) W. & G. S. West.

Brit. Desm. IV: 184, Pl. CXXVIII, Figs. 1, 2. 1911.

Pool in old slough bed, Johnson County. November. (Prescott). Slough, Wright County. (Buchanan).

39. *Staurastrum setigerum* Cleve

Smith, 1924, p. 79, Pl. 70, Figs. 19-25.

Type not reported from Iowa.

var. a *pectinatum* W. & G. S. West.

Smith, 1924, p. 80, Pl. 71, Figs. 5-8.

Pl. XXXIII, Figs. 16, 16a. Swamp, Johnson County. May. (Prescott).

40. *Staurastrum spongiosum* Breb.

West and Carter, Brit. Desm. V: 76, Pl. CXL, Fig. 14. 1923.

Pl. XXXIII, Fig. 17. Pool in old creek bed, Johnson County. November. (Prescott).

41. *Staurastrum striolatum* (Näg.) Archer

West and West, Brit. Desm. IV: 177, Pl. CXXVII, Figs. 1-5. 1911.

Pl. XXXIII, Fig. 15. Drainage canal, Dickinson County. June. (Prescott).

42. *Staurastrum teliferum* Ralfs

West and Carter, Brit. Desm. V: 58, Pl. CXXXVI, Figs. 2-6. 1923.

Pl. XXXIII, Fig. 19. Swamp, Johnson County. May. (Prescott).

43. *Staurastrum tetracerum* Ralfs

Smith, 1924, p. 96, text figure 11.

Artificial pond, Johnson County. July. (Prescott).

var. a *validum* W. & G. S. West.

West and Carter, Brit. Desm. V: 121, Pl. CXLIX, Fig. 5. 1923.

Pl. XXXIII, Fig. 22. West Okoboji Lake, Dickinson County. July. (Prescott).

44. *Staurastrum tohopekaligense* Wolle

West and Carter, Brit. Desm. V: 178, Pl. CLV, Fig. 12. 1923.

Type not reported from Iowa.

var. a *trifurcatum* W. & G. S. West.

West and Carter, Brit. Desm. V: 179, Pl. CLV, Figs. 13, 14. 1923.

Pl. XXXIII, Fig. 18. Swamp, Johnson County. (Prescott).

45. *Staurastrum vestitum* Ralfs

West and Carter, Brit. Desm. V: 158, Pl. CLI, Figs. 9-11; Pl. CLII, Figs. 5, 6. 1923.

Type not reported from Iowa.

var. a *semivestitum* West.

West and Carter, Brit. Desm. V: 160, Pl. CLII, Figs. 7, 8. 1923.

Pl. XXXIII, Figs. 14, 14a. Swamp, Johnson County. May. (Prescott).

Xanthidium Ehrenberg, 1837

(West and West, Brit. Desm. IV: 48. 1911.)

1. *Xanthidium antilopaeum* (De Breb.) Kuetzing

Smith, 1924, p. 57, Pl. 65, Figs. 5, 6.

Pl. XXXV, Fig. 5. Swamp, Johnson County. July. (Prescott). Wright County. (Buchanan).

var. a *minneapoliense* Wolle.

Smith, 1924, p. 58, Pl. 65, Figs. 10, 11.

Pl. XXXV, Fig. 21. Swamp, occurring commonly with the type, Johnson County. May-July. (Prescott).

var. b *polymazum* Nordstedt.

Smith, 1924, p. 58, Pl. 65, Figs. 7-9.

Pl. XXXV, Figs. 11, 11a. Swamp, Johnson County. October. (Prescott).

var. c (?) An apparently new variety or new form of var. *minneapoliense* Wolle. There are two spines below the arc of verrucae

at the apex rather than a single spine as in *minneapoliense*. Pl. XXXV, Fig. 10. Swamp, Johnson County. July. (Prescott).

2. *Xanthidium concinnum* Archer

West and West, Brit. Desm. IV: 86, Pl. CXII, Fig. 10. 1911.

Pl. XXXV, Fig. 17. Swamp, Johnson County. April. (Prescott).

3. *Xanthidium cristatum* De Breb.

Smith, 1924, p. 59, Pl. 66, Figs. 2, 3.

Type not reported from Iowa.

var. a *uncinatum* Breb.

Smith, 1924, p. 60, Pl. 66, Fig. 4.

Pl. XXXV, Fig. 19. Swamp, Johnson County. May. (Prescott).

4. *Xanthidium hastiferum* Turner

var. a *javanicum* (Nordst.) Turner.

W. & G. S. West, Trans. Linn. Soc. Ser. 2, VI: 161. 1902.

Swamp, Johnson County. May. (Prescott).

5. *Xanthidium subhastiferum* W. West

Smith, 1924, p. 60, Pl. 66, Figs. 5-12.

Swamp, Johnson County. October. (Prescott).

Class VI. CHAROPHYTA

A. Nitelleae

Nitella Agardh, 1826 (emend Leonhardi, 1863)

(Groves and Bullock-Webster, 1915, p. 95.)

1. *Nitella opaca* Agardh

Groves and Bullock-Webster, 1917, p. 99, Pl. VII.

Pl. XXXVIII. Lakes, Dickinson County. (Sawyer).

Tolypella Leonhardi

(Groves and Bullock-Webster, 1917, p. 129.)

1. *Tolypella glomerata* Leonhardi

Groves and Bullock-Webster, 1917, p. 135, Pl. XL.

Pl. XXXIX. Lakes, Dickinson County. (Sawyer).

B. Chareae

Chara Vaillant, 1719

(Migula in Pascher, Schiller and Migula, 1925, p. 223.)

1. *Chara braunii* Gmel.

Robinson, 1906, p. 258.

Lakes, ponds, sloughs, Dickinson County. (Sawyer). Swamps, and sloughs, Johnson County. July-September. (Prescott).

2. *Chara contraria* A. Braun

Migula in Pascher, Schiller and Migula, 1925, p. 230, Fig. VIII, 7, 8.

West Okoboji Lake, Dickinson County. (Sawyer). Pond on railroad right-of-way, Muscatine County. July. (Prescott).

3. *Chara formosa* Robinson

Bull. New York Botanical Garden, 4, No. 13: 244-308.

New Jersey to Iowa. (Robinson).

4. *Chara fragilis* Desvaux

Migula in Pascher, Schiller and Migula, 1925, p. 241, Fig. II, 6; XIV, 4-6.

Ponds, Dickinson County. (Sawyer).

5. *Chara inconnexa* Allen

Bull. Torr. Bot. Club 9: 40, Pl. 17, 1882.

Pl. XXXVII. Storm Lake, Iowa. (Allen).

6. *Chara longifolia* Robinson

Bull. New York Botanical Garden, 4, No. 13: 272. 1906.

Indiana to Iowa and Kansas. (Robinson).

7. *Chara vulgaris* L.

Robinson, 1906, p. 269.

Bog, Dickinson County. (Sawyer).

Class VII. CRYPTOPHYCEAE

Order I. CRYPTOMONADALES

Family **Cryptomonadaceae**

Cryptomonas Ehrenberg, 1838

(West and Fritsch, 1927, p. 390.)

1. *Cryptomonas erosa* Ehrenberg

Pascher in Pascher and Lemmermann, 1913, p. 105, Figs. 163, 164.

Slough, Johnson County. March. (Prescott). Apparently new to North America.

2. *Cryptomonas ovata* Ehrenberg

Pascher in Pascher and Lemmermann, 1913, p. 107, Figs. 168-169; Prescott, 1927, p. 31, Pl. VII, Fig. 6.

Aquarium in Botanical Laboratory, University of Iowa. March. (Prescott). Generally distributed. (Edmondson).

Chilomonas Ehrenberg

(Pascher, 1913, p. 108.)

1. *Chilomonas paramaecium* Ehrenberg

Pascher in Pascher and Lemmermann, 1913, p. 109, Fig. 17. Prescott, 1927, p. 32, Pl. VII, Fig. 11.

Widely distributed in Iowa. (Edmondson).

Family **Nephroselmidiaceae**

Nephroselmis Stein

(Pascher, 1913, p. 111.)

1. *Nephroselmis olivacea* Stein

Pascher in Pascher and Lemmermann, 1913, p. 111, Fig. 174. Prescott, 1927, p. 32, Pl. VI, Fig. 29.

Rare in ponds. (Edmondson).

Class VIII. EUGLENINEAE

Family **Euglenaceae**

Euglena Ehrenberg, 1838

(Lemmermann in Pascher and Lemmermann, 1913, p. 123.)

1. *Euglena acus* Ehrenberg

Lemmermann in Pascher and Lemmermann, 1913, p. 129, Fig. 209; Prescott, 1927, p. 16, Pl. IV, Fig. 7.

Often with other species of *Euglena* in small ponds and pools, Johnson County. May-July. (Prescott). Fayette County. (Wilson).

2. *Euglena acutissima* Lemmermann

Lemmermann in Pascher and Lemmermann, 1913, p. 129, Fig. 210; Prescott, 1927, p. 17, Pl. IV, Fig. 12.

Plankton in Iowa River, Johnson County. July. (Prescott).

3. *Euglena deses* Ehrenberg

Lemmermann in Pascher and Lemmermann, 1913, p. 131, Fig. 212; Prescott, 1927, p. 17, Pl. IV, Fig. 10.

In mud and shallow water, bank of Iowa River and sloughs, John-

son County. June. (Prescott). Frequent among algae. (Edmondson).

4. *Euglena elongata* Schewiakoff

Lemmermann in Pascher and Lemmermann, 1913, p. 125, Fig. 181; Prescott, 1927, p. 17, Pl. IV, Fig. 16.

In mud and shallow water at edge of marsh, Johnson County. June. (Prescott).

5. *Euglena pisciformis* Klebs

Lemmermann in Pascher and Lemmermann, 1913, p. 125, Fig. 182; Prescott, 1927, p. 17, Pl. IV, Fig. 11.

Iowa River, Johnson County. July. (Prescott). Apparently new to North America.

6. *Euglena proxima* Dangeard

Lemmermann in Pascher and Lemermann, 1913, p. 129, Fig. 193; Prescott, 1927, p. 18, Pl. IV, Fig. 9.

Iowa River, Johnson County. July. (Prescott).

7. *Euglena sanguinea* Ehrenberg

Lemmermann in Pascher and Lemmermann, 1913, p. 128, Fig. 185; Prescott, 1927, p. 18, Pl. IV, Fig. 15.

In pools of slowly flowing stream, Johnson County. July. (Prescott).

8. *Euglena spirogyra* Ehrenberg

Lemmermann in Pascher and Lemmermann, 1913, p. 131, Fig. 208; Prescott, 1927, p. 18, Pl. IV, Fig. 8.

Pools and ponds, Johnson County. September. (Prescott). Fayette County. (Wilson).

9. *Euglena spiroides* Lemmermann

Lemermann in Pascher and Lemmermann, 1913, p. 130, Fig. 194; Prescott, 1927, p. 19, Pl. V, Fig. 17.

Swamp, Johnson County. October. (Prescott).

10. *Euglena viridis* Ehrenberg

Lemmermann in Pascher and Lemmermann, 1913, p. 127, Fig. 189; Prescott, 1927, p. 19, Pl. IV, Fig. 14.

Iowa River, Johnson County. July. (Prescott). Fresh and stagnant water. (Edmondson). Fayette County. (Wilson).

LEPOCINCLIS Perty, 1852
(Lemmermann, 1913, p. 133.)

1. *Lepocinclis fusiformis* (Carter) Lemmermann

Lemmermann in Pascher and Lemmermann, 1913, p. 135, Fig. 219; Prescott, 1927, p. 19, Pl. V, Fig. 7.

Marsh, Johnson County. June. (Prescott).

2. *Lepocinclis ovum* (Ehr.) Lemmermann

Lemmermann in Pascher and Lemmermann, 1913, p. 134, Fig. 216; Prescott, 1927, p. 20, Pl. V, Fig. 8.

Pools of stagnant water, Johnson County. July. (Prescott).

var. a *globula* (Perty) Lemmermann.

Lemmermann in Pascher and Lemmermann, 1913, p. 134; Prescott, 1927, p. 20.

Stagnant water, Johnson County. (Prescott).

PHACUS Dujardin, 1841
(Lemmermann, 1913, p. 135.)

1. *Phacus acuminata* Stokes

Lemmermann in Pascher and Lemmermann, 1913, p. 138, Fig. 233; Prescott, 1927, p. 20, Pl. V, Fig. 9.

Small pools of stagnant water, Johnson County. July. (Prescott).

2. *Phacus brevicaudata* (Klebs) Lemmermann

Lemmermann in Pascher and Lemmermann, 1913, p. 139, Fig. 232; Prescott, 1927, p. 20, Pl. V, Fig. 1.

Shallow water of marsh, Johnson County. May. (Prescott). Apparently new for North America.

3. *Phacus longicauda* (Ehr.) Dujardin

Lemmermann in Pascher and Lemmermann, 1913, p. 138, Fig. 235; Prescott, 1927, p. 21, Pl. V, Fig. 13.

Swamps, Johnson County. (Prescott).

var. a *torta* Lemmermann.

Drezepolski, 1925, p. 232, Fig. 124; Prescott, 1927, p. 21, Pl. V, Figs. 15, 16.

In shallow, often stagnant water, Johnson County. July. (Prescott).

4. *Phacus pleuronectes* (O. F. M.) Dujardin

Lemmermann in Pascher and Lemmermann, 1913, P. 138, Fig. 236; Prescott, 1927, p. 21, Pl. V, Fig. 14.

Swamp, Johnson County. July. (Prescott).

5. *Phacus pyrum* (Ehr.) Stein

Lemmermann in Pascher and Lemmermann, 1913, p. 139, Fig. 245; Prescott, 1927, p. 21, Pl. V, Fig. 6.

In scum on the surface of small pool, Johnson County. (Prescott).

6. *Phacus suecica* Lemmermann

Lemmermann in Pascher and Lemmermann, 1913, p. 139, Fig. 241.

var. nov. (?). Our specimens agree exactly with the type except for size which in the latter is as much as 10μ longer than the former. Pl. XXX, Fig. 13.

Trachelomonas Ehrenberg, 1833

(Lemmermann, 1913, p. 142.)

1. *Trachelomonas abrupta* Swir.

Deflandre, 1926, p. 695, Figs. 344-352, 354-361, 364, 365; Prescott, 1927, p. 22, Pl. VI, Fig. 23.

Swamp, Johnson County. June. (Prescott).

var. a *bonnieri* Drezepolski.

1925, p. 210, Fig. 68; Prescott, 1927, p. 22, Pl. VI, Fig. 1.

In pools of small stream, Johnson County. March. (Prescott).

2. *Trachelomonas affinis* Lemmermann

Lemmermann in Pascher and Lemmermann, 1913, p. 153, Fig. 294.

Type not reported from Iowa.

var. a *levis* Lemmermann.

Lemmermann in Pascher and Lemmermann, 1913, p. 153, Fig. 296; Prescott, 1927, p. 22, Pl. VI, Fig. 2.

Iowa River, Johnson County. July. (Prescott).

3. *Trachelomonas allia* Drezepolski

Deflandre, 1926, p. 652, Figs. 233, 238; Prescott, 1927, p. 22, Pl. VI, Fig. 24.

Pools and swamps, Johnson County. June-August. (Prescott).

4. *Trachelomonas armata* (Ehr.) Stein

Lemmermann in Pascher and Lemmermann, 1913, p. 150, Fig. 275; Prescott, 1927, p. 23, Pl. VI, Fig. 3.

Swamp, Johnson County. June. (Prescott).

var. a *steinii* Lemmermann.

Deflandre, 1926, p. 690, Figs. 314, 316, 322, 324, 326, 327; Prescott, 1927, p. 23, Pl. VI, Fig. 4.

Plankton in marsh, Johnson County. July. (Prescott).

5. *Trachelomonas elegans* Conrad

Deflandre, 1926, p. 526, Fig. 67; Prescott, 1927, p. 23, Pl. VI, Fig. 22.

Swamp, Johnson County. June. (Prescott). Apparently new for North America.

6. *Trachelomonas ensifera* Daday

Lemmermann in Pascher and Lemmermann, 1913, p. 154, Fig. 304; Prescott, 1927, p. 23, Pl. VI, Figs. 6, 7.

Iowa River, Johnson County. (Prescott).

7. *Trachelomonas hispida* (Perty) Stein

Lemmermann in Pascher and Lemmermann, 1913, p. 149, Fig. 272; Prescott, 1927, p. 23, Pl. VI, Fig. 8.

Swamp, Johnson County. June. (Prescott).

var. a *coronata* Lemmermann.

Skvortzow, 1925, p. 302, Fig. 6; Prescott, 1927, p. 24, Pl. VI, Fig. 9.

Stagnant water, Johnson County, July. (Prescott).

var. b *punctulatum* Skvortzow.

New Phytologist 25: 303, Fig. 10. 1925; Prescott, 1927, p. 24, Pl. VI, Fig. 11.

In film on surface of standing water, Johnson County. July. (Prescott).

var. c *verrucosa* Drezepolski.

1925, p. 216, Fig. 39a; Prescott, 1927, p. 24, Pl. VI, Fig. 12.

Iowa River, Johnson County. July. (Prescott).

var. d *crenulatocollis* (Maskell) Skvortzow.

New Phytologist 25: 302, Fig. 4. 1925; Prescott, 1927, p. 24, Pl. VI, Fig. 10.

Swamp, Johnson County. July. (Prescott).

8. *Trachelomonas horrida* Palmer

Lemmermann in Pascher and Lemmermann, 1913, p. 150, Fig. 276; Prescott, 1927, p. 24, Pl. VI, Fig. 5.

Freshwater, Johnson County. October. (Edmondson).

var. a *paucispina* Prescott.

1927, p. 24, Pl. VI, Fig. 26.

Swamp, Johnson County. July. (Prescott).

9. *Trachelomonas oblonga* Lemmermann

Deflandre, 1926, p. 588, Figs. 117, 118, 120-124.

Center Lake, Dickinson County. August. (Prescott).

10. *Trachelomonas obovata* Stokes

Deflandre, 1926, p. 698, Figs. 423, 429; Prescott, 1927, p. 25, Pl. VI, Fig. 21.

Swamp, Johnson County. July. (Prescott).

11. *Trachelomonas piscatoris* (Fischer) Stokes

Lemmermann in Pascher and Lemmermann, 1913, p. 149, Fig. 271; Prescott, 1927, p. 25, Pl. VI, Fig. 19.

Generally distributed. (Edmondson).

12. *Trachelomonas planctonica* Swirenk.

Drezepolski, 1925, p. 220, Fig. 75; Prescott, 1927, p. 25, Pl. VI, Fig. 15.

Swamp, Johnson County. May. (Prescott).

13. *Trachelomonas raciborskii* Woloszynska

Lemmermann in Pascher and Lemmermann, 1913, p. 150, Fig. 279; Prescott, 1927, p. 25, Pl. VI, Fig. 13.

Swamp, Dickinson County. July. (Prescott).

var. a *punctata* Prescott.

1927, p. 25, Pl. VI, Fig. 14.

Swamp, Johnson County. June, October. (Prescott).

14. *Trachelomonas reticulata* Klebs

Lemmermann in Pascher and Lemmermann, 1913, p. 151, Fig. 293; Prescott, 1927, p. 26, Pl. VI, Fig. 16.

Small bog, Iowa County. May. (Prescott).

15. *Trachelomonas rugulosa* Stein

Deflandre, 1926, p. 581, Fig. 89; Prescott, 1927, p. 26, Pl. VI, Fig. 20.

Ditch of standing water, Johnson County. June. (Prescott).

16. *Trachelomonas spinosa* Stokes

Lemmermann in Pascher and Lemmermann, 1913, p. 149, Fig. 268; Prescott, 1927, p. 26, Pl. VI, Fig. 17.

Swamp, Johnson County. October. (Prescott).

17. *Trachelomonas superba* Swirenko.

Deflandre, 1926, p. 657, Fig. 261, 269, 273; Prescott, 1927, p. 26, Pl. VI, Fig. 25.

Pool, Johnson County. July. (Prescott).

18. *Trachelomonas volvocina* Ehrenberg

Lemmermann in Pascher and Lemmermann, 1913, p. 145, Fig. 246; Prescott, 1927, p. 27, Pl. VI, Fig. 18.

Swamp, Johnson County. June. (Prescott).

CRYPTOGLENA Ehrenberg
(Lemmermann, 1913, p. 156.)

1. *Cryptoglena pigra* Ehrenberg

Lemmermann in Pascher and Lemmermann, 1913, p. 156, Fig. 309; Prescott, 1927, p. 27, Pl. VI, Fig. 28.

Not abundant in Iowa. (Edmondson).

Family **Peranemaceae**

ANISONEMA Dujardin
(Lemmermann, 1913, p. 172.)

1. *Anisonema acinus* Dujardin

Lemmermann in Pascher and Lemmermann, 1913, p. 172, Fig. 369; Prescott, 1927, p. 29, Pl. VII, Fig. 8.

Widely distributed in pond water. (Edmondson).

2. *Anisonema truncatum* Stein

Lemmermann in Pascher and Lemmermann, 1913, p. 173, Fig. 373; Prescott, 1927, p. 29, Pl. VII, Fig. 7.

Rare, Johnson County. (Edmondson).

3. *Anisonema ludibundum* S. K.

Edmondson, 1906, p. 47, Pl. XI, Fig. 79; Prescott, 1927, p. 29.

Freshwater. (Edmondson). Fayette County. (Wilson).

ENTOSIPHON Stein
(Lemmermann, 1913, p. 173.)

1. *Entosiphon sulcatum* (Duj.) Stein

Lemmermann in Pascher and Lemmermann, 1913, p. 173, Fig. 367; Prescott, 1927, p. 28, Pl. VII, Figs. 1, 2.

Frequent. (Edmondson).

HETERONEMA Stein
(Lemmermann, 1913, p. 168.)

1. *Heteronema spirale* Klebs

Lemmermann in Pascher and Lemmermann, 1913, p. 169, Fig. 360; Prescott, 1927, p. 30, Pl. IV, Fig. 13.

Swamp, Johnson County. July. (Prescott).

2. *Heteronema acus* (Ehr.) Stein

Lemmermann in Pascher and Lemmermann, 1913, p. 169, Fig. 354; Prescott, 1927, p. 30, Pl. V, Fig. 10.

Johnson County. Keokuk County. (Edmondson).

NOTOSOLENUS Stokes
(Lemmermann, 1913, p. 171.)

1. *Notosolenus apocamptum* Stokes

Lemmermann in Pascher and Lemmermann, 1913, p. 172, Fig. 361; Prescott, 1927, p. 28, Pl. VII, Fig. 9.

Rare, in ponds, Johnson County. (Edmondson).

PETALOMONAS Stein
(Lemmermann, 1913, p. 164.)

1. *Petalomonas mediocanellata* Stein

Lemmermann in Pascher and Lemmermann, 1913, p. 164, Fig. 349; Prescott, 1927, p. 29, Pl. VII, Fig. 10.

Frequent. (Edmondson).

Family **Astaciaceae**

ASTASIA Dujardin
(Lemmermann, 1913, p. 157.)

1. *Astasia trichophora* Ehrenberg

Edmondson, 1907, p. 45, Pl. X, Figs. 72, 73; Prescott, 1927, p. 30, Pl. VII, Figs. 3, 4.

Common among algae. (Edmondson). Fayette County. (Wilson).

DISTIGMA Ehrenberg
(Lemmermann, 1913, p. 160.)

1. *Distigma proteus* Ehrenberg

Lemmermann in Pascher and Lemmermann, 1913, p. 161, Fig. 336; Prescott, 1927, p. 31, Pl. VII, Fig. 5.

Freshwater. (Edmondson).

Class IX. PERIDINEAE

Family **Peridiniaceae**

CERATIUM Schrank, 1793
(Schilling, 1913, p. 52.)

1. *Ceratium hirundinella* O. F. M.

Schilling, 1913, p. 55, Fig. 62; Prescott, 1927, p. 33, Pl. VIII, Fig. 1.

Pools and ponds, Johnson County, Dickinson County. May-August. (Prescott).

Forma *carinthiacum* (Zederbauer) Schilling.
1913, p. 57, Fig. 64a; Prescott, 1927, p. 34, Pl. VIII, Fig. 3.
Quarry pond, Johnson County. May. (Prescott).
Forma *robustum* (Amberg) Schilling.
1913, p. 58, Figs. 65d, 65e; Prescott, 1927, p. 34, Pl. VIII, Fig. 2.
Quarry pond, Johnson County. May. (Prescott).

Peridinium Ehrenberg, 1830
(Schilling, 1913, p. 32.)

1. *Peridinium cinctum* Ehrenberg

Schilling, 1913, p. 46, Fig. 52; Prescott, 1927, p. 34, Pl. IX, Figs. 1-4.
Pond, Dickinson County. July. (Prescott).

2. *Peridinium marssonii* Lemmermann

Schilling, 1913, p. 48, Fig. 55; Prescott, 1927, p. 35, Pl. IX, Figs. 5-8.
Quarry pond, Johnson County. July. (Prescott).

3. *Peridinium pusillum* (Penard) Lemmermann

Schilling, 1913, p. 40, Fig. 45; Prescott, 1927, p. 35, Pl. IX, Figs. 13-16.
Drainage canal, Dickinson County. July. (Prescott).

4. *Peridinium quadridens* Stein

Schilling, 1913, p. 37, Fig. 41; Prescott, 1927, p. 36, Pl. IX, Figs. 9-12.
Slough, Monona County. July. (Prescott).

5. *Peridinium tabulatum* (Ehr.) Clap u. Lachm.

Schilling, 1913, p. 34, Fig. 38; Prescott, 1927, p. 36, Pl. X, Figs. 1, 2.
Lakes, Dickinson County. July. (Prescott).

6. *Peridinium westii* Lemmermann

Schilling, 1913, p. 47, Fig. 53; Prescott, 1927, p. 37, Pl. X, Figs. 3-5.
Drainage canal, Dickinson County. July. (Prescott).

7. *Peridinium willei* Huitfeld-Kass.

Schilling, 1913, p. 45, Fig. 51; Prescott, 1927, p. 37, Pl. IX, Figs. 17-20.
Drainage canal, Dickinson County. July. (Prescott).

Gonyaulax Diesing, 1866
(Schilling, 1913, p. 30.)

1. *Gonyaulax palustris* Lemmermann

Schilling, 1913, p. 31, Fig. 35; Prescott, 1927, p. 38, Pl. X, Figs. 6-9.
Drainage canal, Dickinson County. July. (Prescott).

Family **Gymnodiniaceae**

HEMIDINIUM Stein, 1883
(Schilling, 1913, p. 13.)

1. *Hemidinium nasutum* Stein

Schilling, 1913, p. 13, Fig. 8; Prescott, 1927, p. 32, Pl. X, Figs. 10-12.
Quarry pond, Johnson County. March. (Prescott).

GYMNODINIUM Stein
(Schilling, 1913, p. 14.)

1. *Gymnodinium palustre* Schilling

1913, p. 16, Fig. 11; Prescott, 1927, p. 33, Pl. X, Fig. 13.
Marsh, Johnson County. May, June. (Prescott).

2. *Gymnodinium vorticella* Stein

Schilling, 1913, p. 20, Fig. 19; Prescott, 1927, p. 33, Pl. X, Fig. 14.
Swamp, Johnson County. May. (Prescott).

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PLATE I.

Fig. 1. Aphanocapsa delicatissima after Smith (x 775).
2. A. elachista (x 775).
3. A. rivularis (x 484).
4. A. zanardinii (x 775).
5. Aphanothece pallida (x 265).
6. A. clathrata after Smith (x 775).
7. Chroococcus limneticus after Smith (x 465).
8. C. minor (x 310).
9. C. refractus after Wood (x 465).
10. C. turgidus after Smith (x 465).
11. Coelosphaerium kuetzingianum (x 310).
12. C. kuetzingianum (x 775).
13. C. naegelianum (x 775).
14. Gloeocapsa aeruginosa (x 465).
15. G. arenaria after Saunders.
16-17. G. conglomerata (x 310).
18. G. magma after Bornet and Thuret ex Tilden.

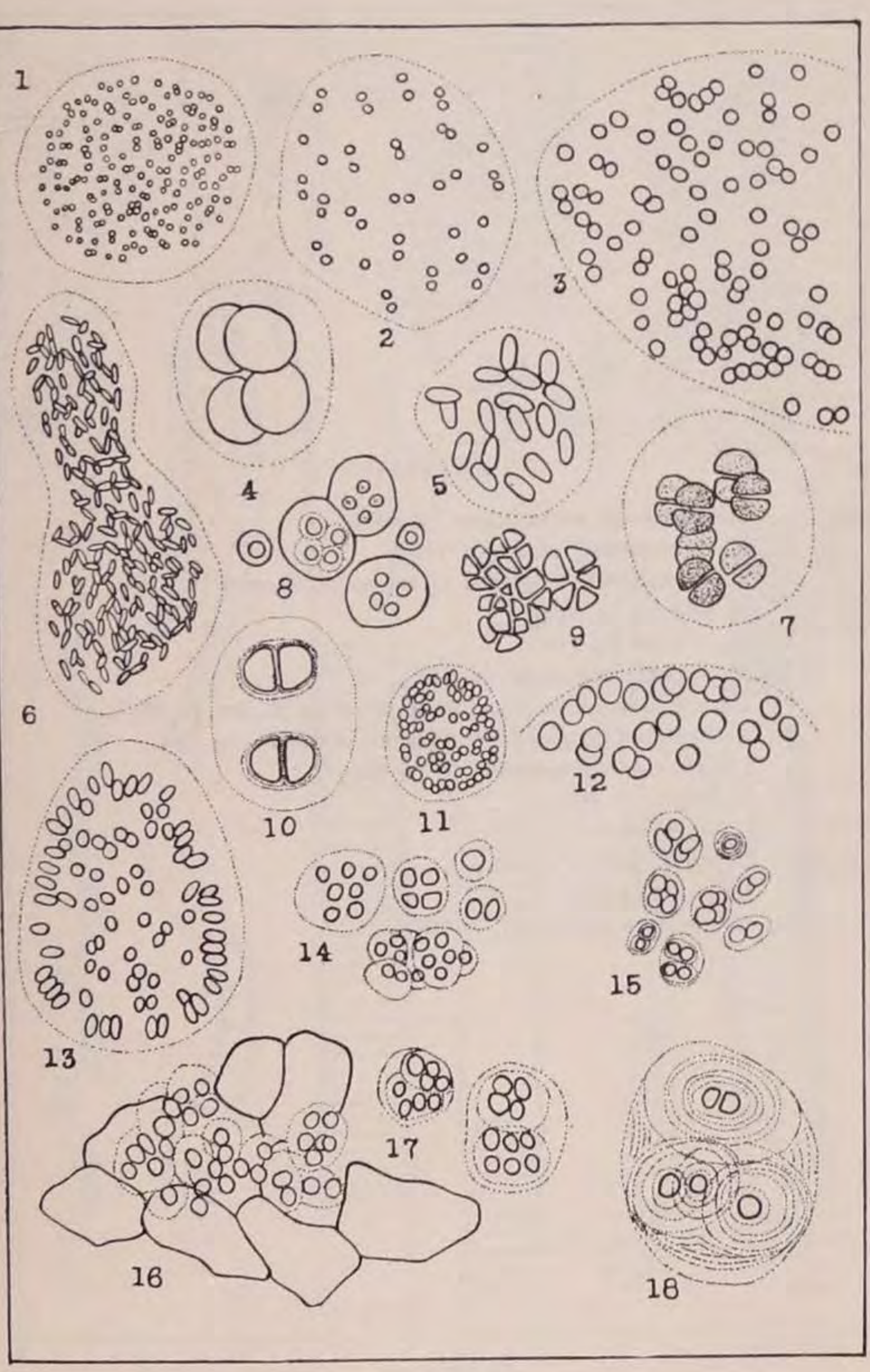

PLATE I

PLATE II.

Fig. 1. Merismopedia aerugineum (x 465).
2. M. convolutum, colony (x 115).
3. M. convolutum, fragment of colony at margin (x 310).
4. M. elegans (x 510).
5. M. minima (x 610).
6. Microcystis flos-aquae (x 610).
7. Chamaesiphon incrustans after West ex Tilden (x 620).
8. Arthrospira jenneri after Gomont ex Tilden (x 580).
9. Lyngbya aerugineo-caerulea (x 610).
10. L. birgei (x 460).
11. L. lagerheimia (x 775).
12. L. lagerheimia (x 1160).
13. L. major (x 500).
14-15. Microcoleus paludosus (x 248).

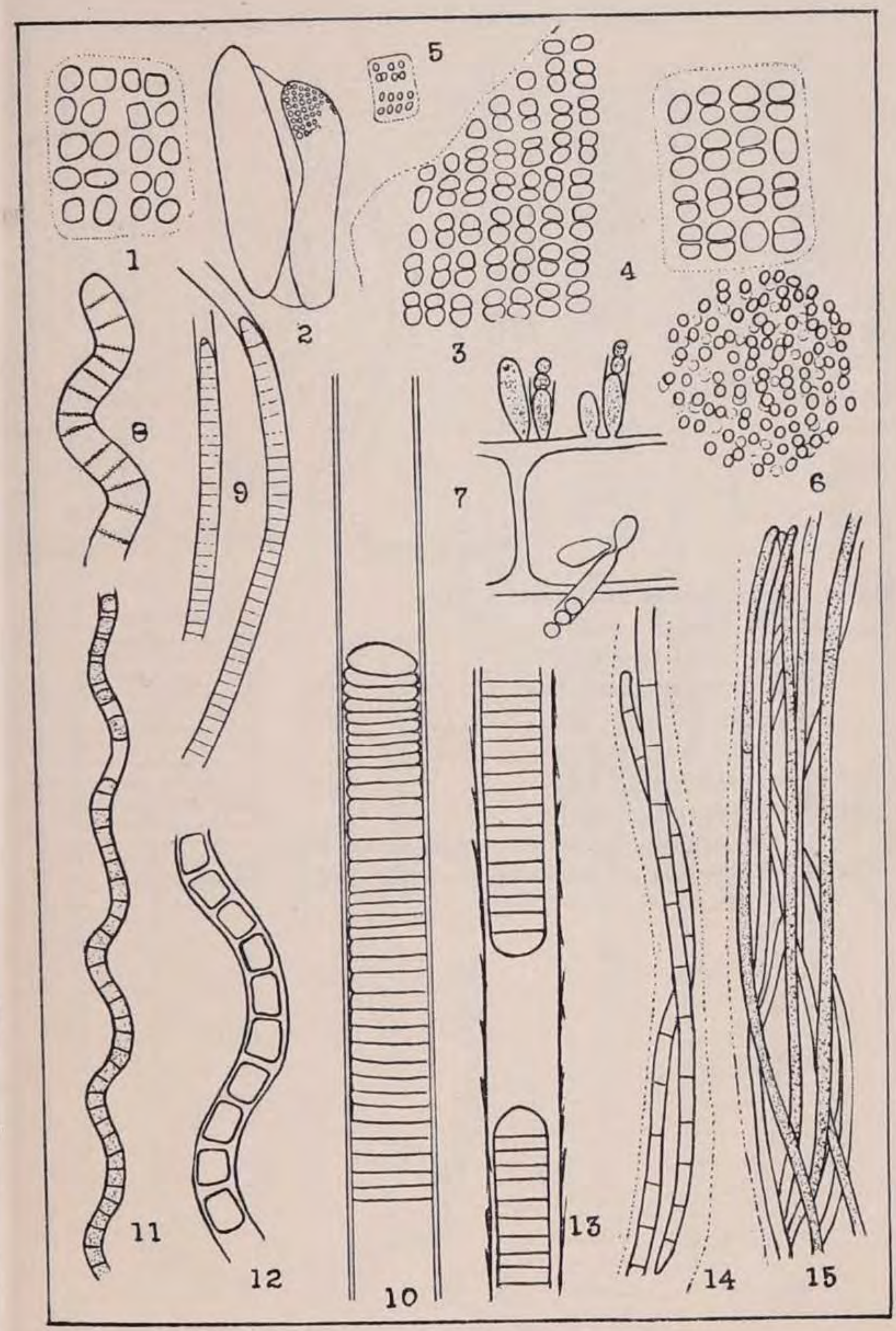

PLATE II

PLATE III.

Fig. 1-3. Oscillatoria amphibia (x 775).
4-5. O. anguina (x 520).
6. O. brevis (x 390).
7. O. curviceps after Geitler.
8. O. curviceps (x 520).
9. O. formosa (x 775).
10. O. princeps (x 610).
11-12. O. amoena (x 520).
13-14. Phormidium corium after Gomont ex Tilden.
15-16. Schizothrix purpurascens, 15 (x 132), 16 (x 310).

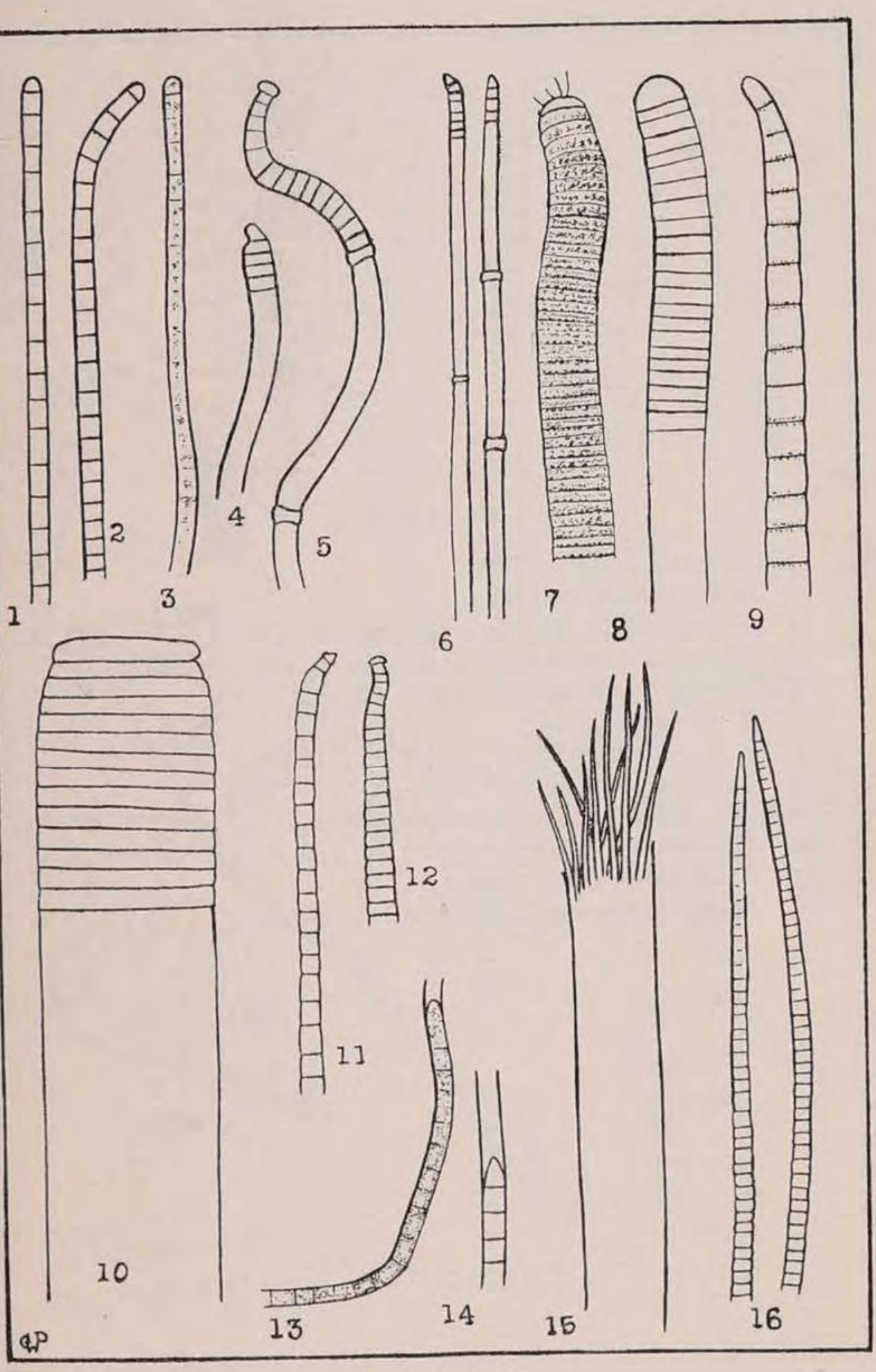

PLATE III

PLATE IV.

Fig. 1. Spirulina major (x 775).
2. S. subtilissima (x 775).
3. Trichodesmium lacustre after Smith (x 775).
4. Anabaena augstumalis var. marchia (x 310).
5. A. augstumalis var. marchia (x 775).
6. A. circinalis (x 355).
7. A. flos-aquae (x 660).
8. A. spiroides (x 310).
9. Cylindrospermum catenatum (x 395).
10. C. catenatum (x 775).
11. C. catenatum after Tilden.
12. Anabaena flos-aquae after Smith ex Geitler.

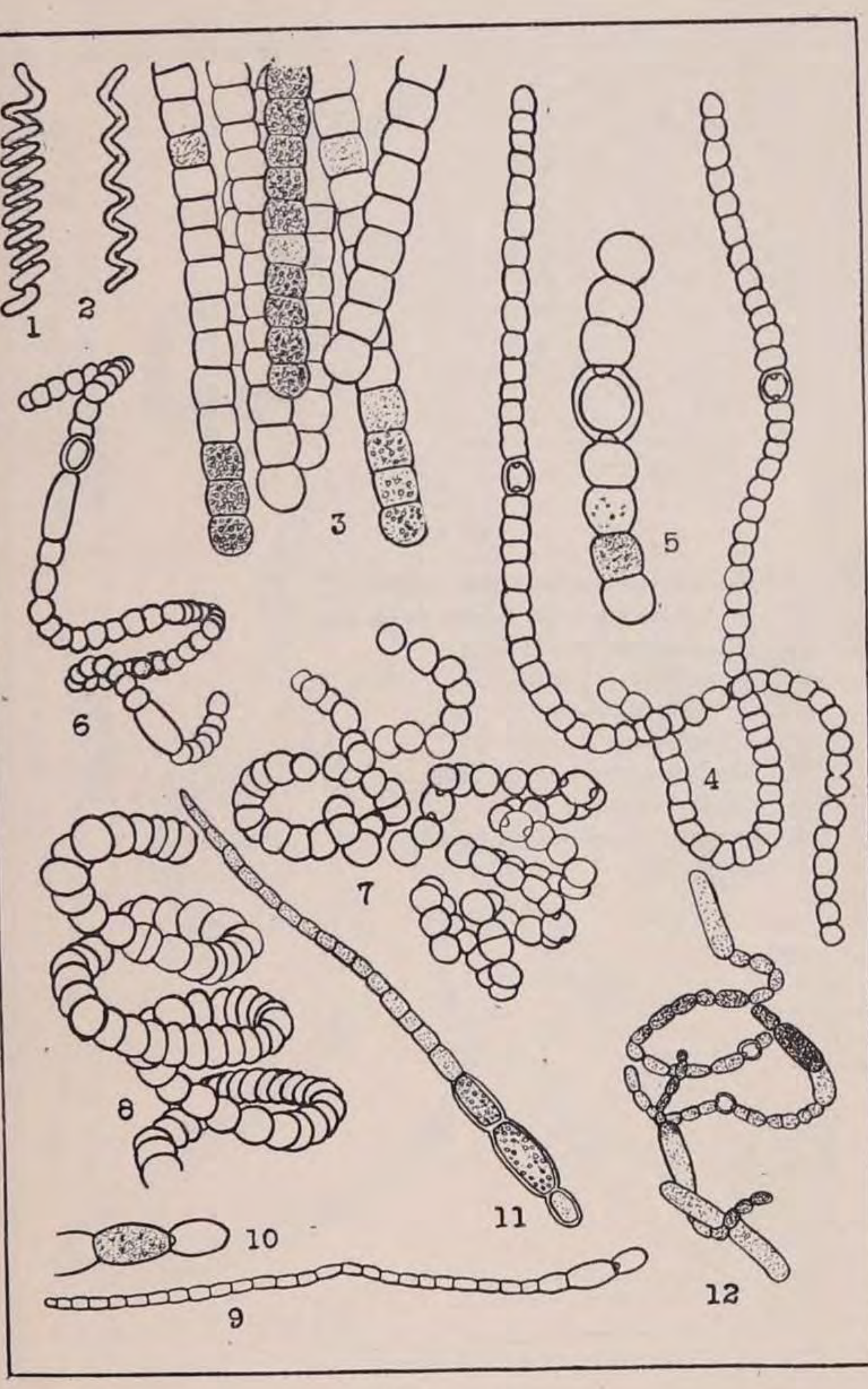

PLATE IV

PLATE V.

Fig. 1. Aphanizomenon flos-aquae (x 775).
2. Nostoc linckia after Bornet ex Geitler.
3. N. coeruleum (x 775).
4. N. commune (x 620).
5. N. commune, colony (x 0.8).
6. N. cuticulare (x 310).
7. Anabaena cycadeae (x 500).
8. Calothrix braunii (x 355).
9. Gloeotrichia echinulata (x 465).

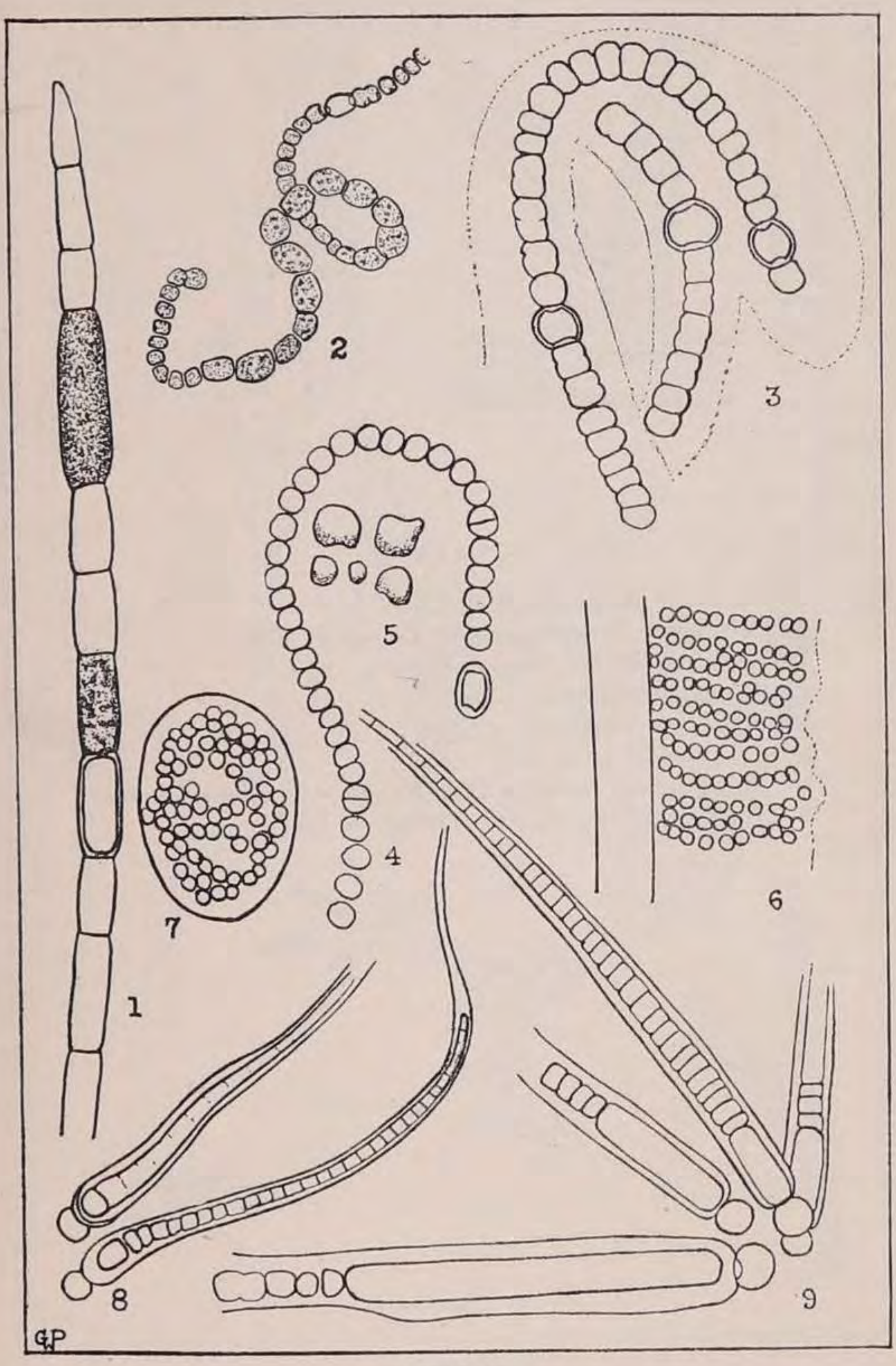

PLATE V

PLATE VI.

Fig. 1. Rivularia compacta (?) (x 310).
2. Scytonema cincinnatum after Tiffany (x 270).
3. S. figuratum after West ex Geitler.
4. Tolypothrix limbata (x 542).
5. Stigonema hormoides (x 775).
6. S. hormoides (x 270).
7. Porphyridium cruentum after Pascher and Schiller (x 465).
8. Toplypothrix lanata after Tiffany (x 270).

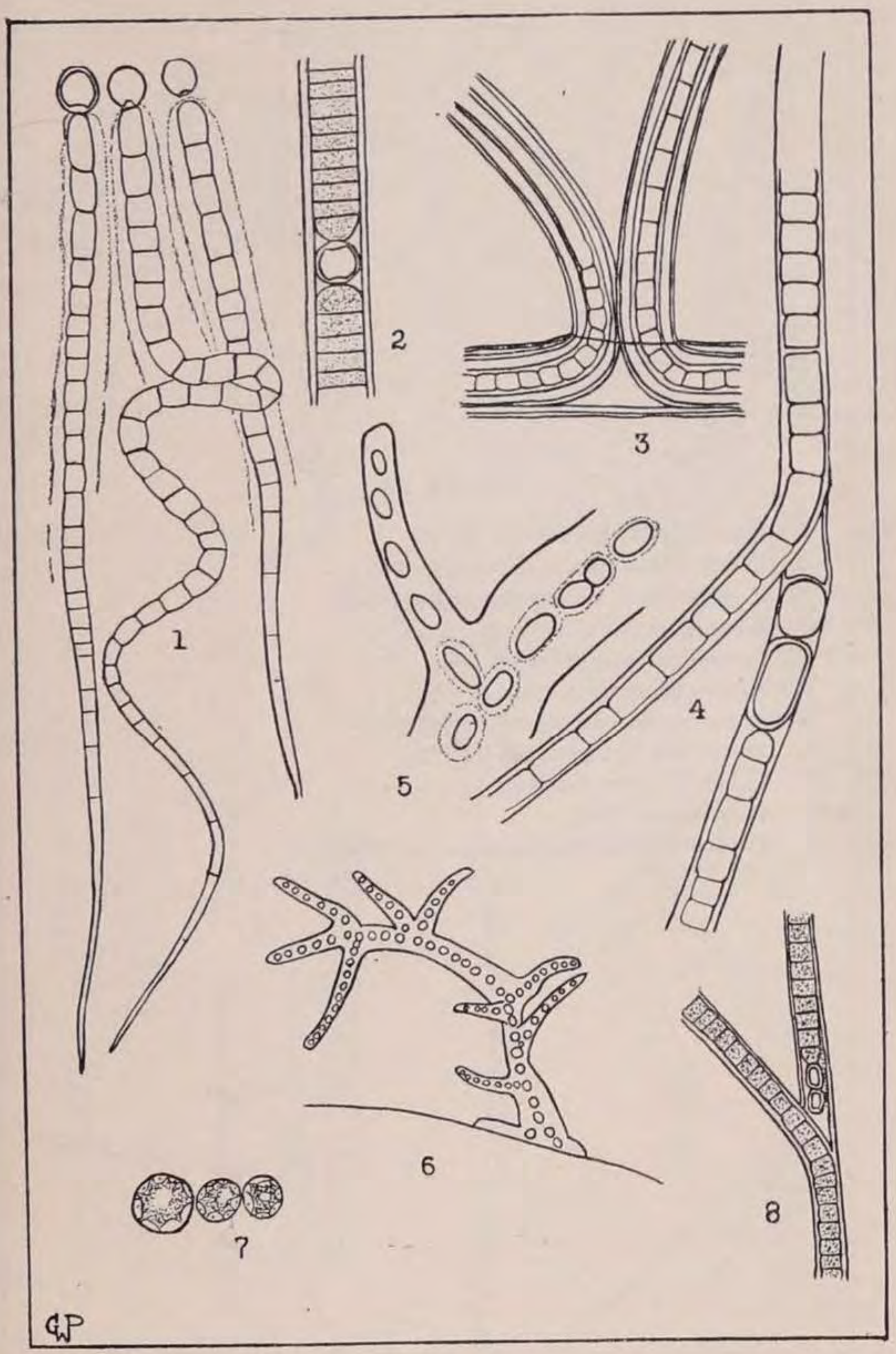

PLATE VI

PLATE VII.

Fig. 1. Botryococcus braunii (x 775).
2. Pseudotetraëdron neglectum (x 580).
3. P. neglectum, undergoing cell division.
4-5. Mischococcus confervicola (x 580).
6. Peroniella hyalotheca (x 500).
7. Stipitococcus urceolatus (x 775).
8. S. urceolatus, single cell (x 3875).
9. Tribonema bombycinum (x 775).
10. T. bombycinum (x 310).
11-12. T. minus (x 500).
13. T. utriculosum, fragmentation of filament.

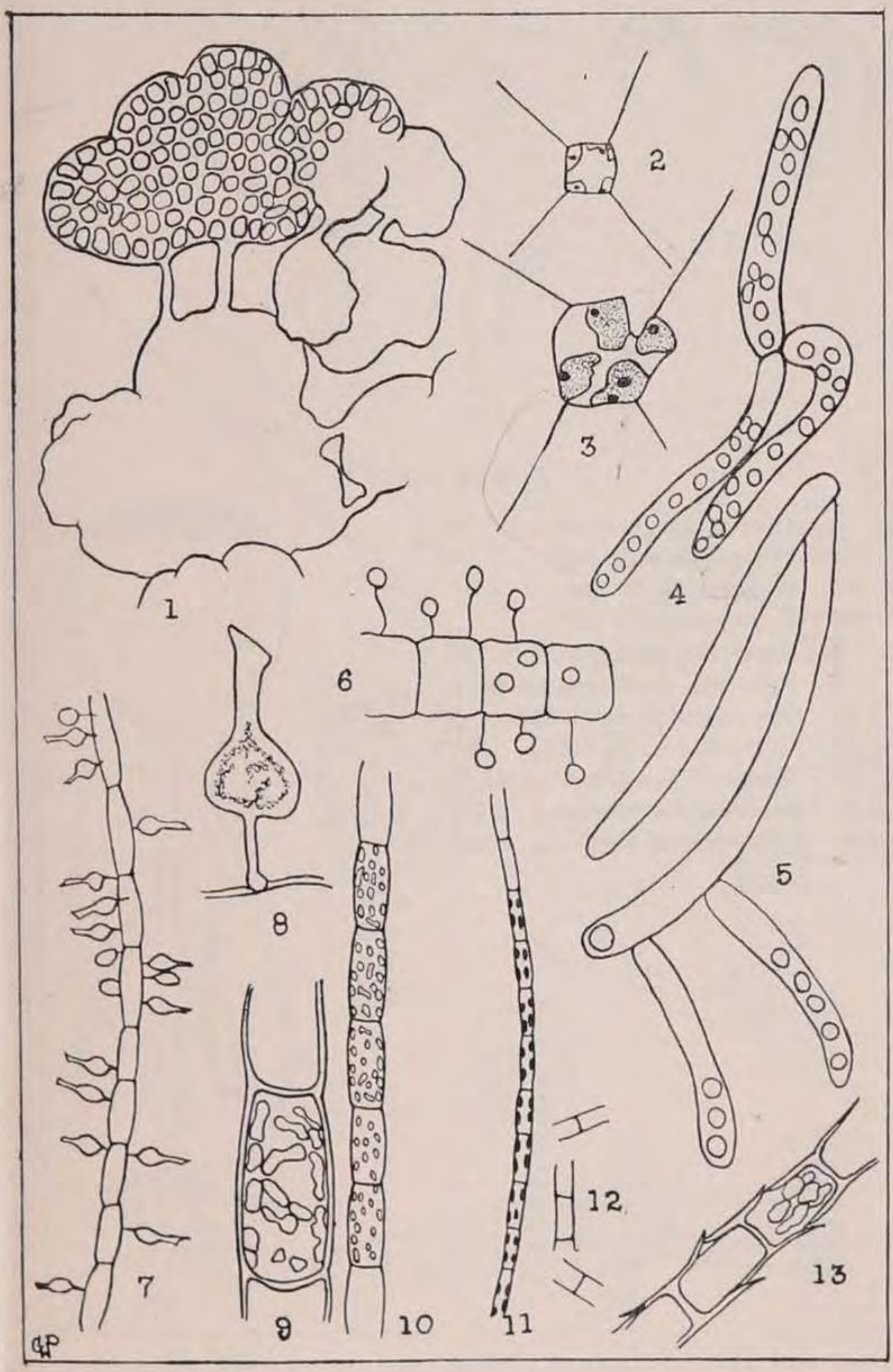

PLATE VII

PLATE VIII.

Fig. 1. Ophiocytium arbuscula (x 580).
2-3. O. capitatum (x 580).
4-5. O. cochleare (x 580).
6-7. O. parvulum (x 580).
8. Botrydium granulatum (x 19).
9. Apiocystis brauniana (x 165).
10. Gloeocystis gigas (x 775).
11. G. vesiculosa (x 390).
12. Hormotila mucigena (x 390).
13. Sphaerocytis schroeteri (x 580).
14. Chlorococcum humicola (x 465).

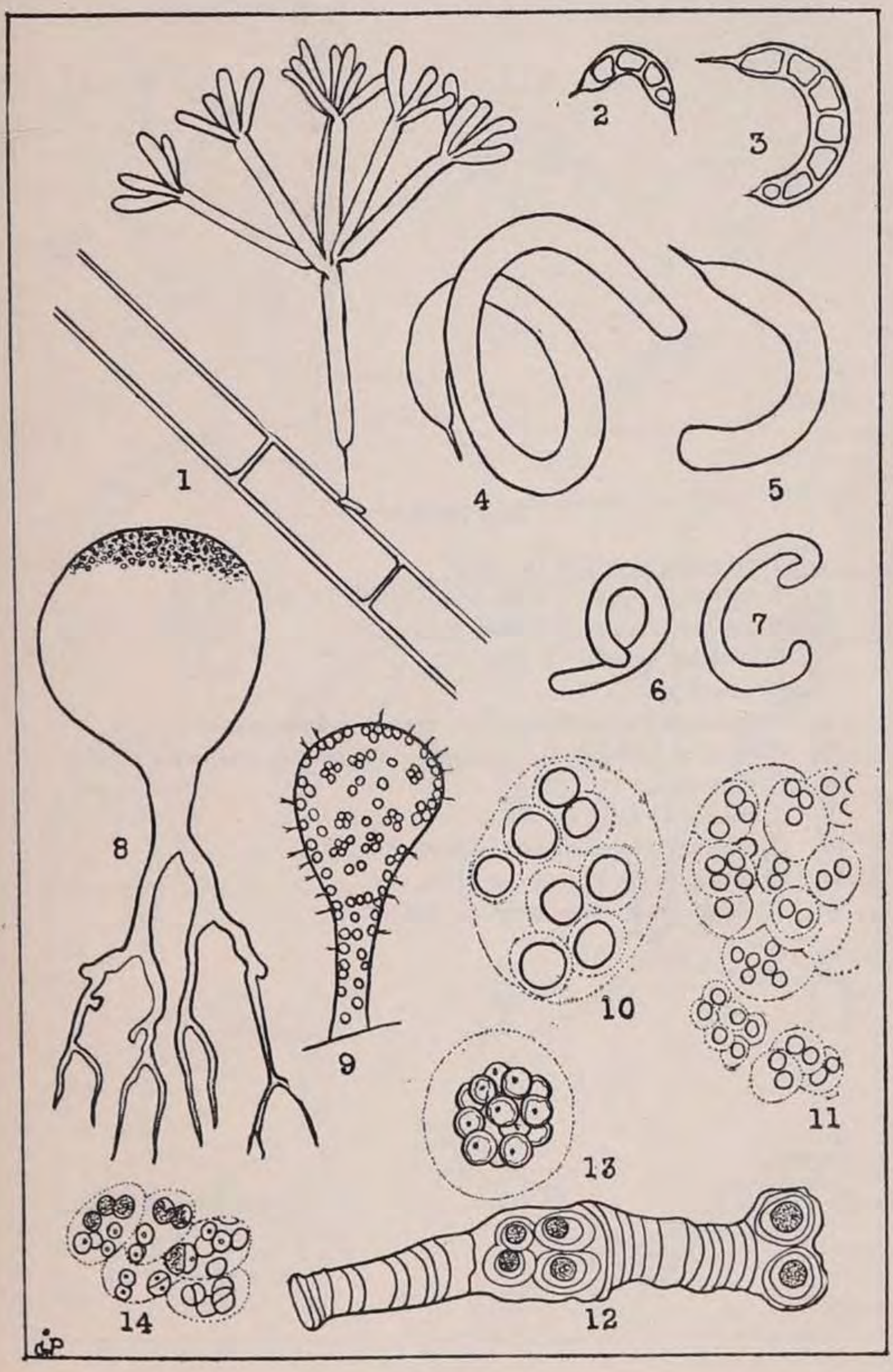

PLATE VIII

PLATE IX.

Fig. 1. Tetraspora lacustris (x 580).
2. T. lacustris, ciliated cells, after Smith (x 390).
3. T. lubrica, fragment of colony (x 580).
4. Characium braunii (x 580).
5. C. gracilipes (x 580).
6. Characiopsis naegelii after A. Braun ex Brunnthaler.
7. Characium pringsheimii, zoospores forming in one cell (x 775).
8. C. limneticum (x 775).
9. Characiopsis tuba (x 775).
10. Characium curvatum after Smith (x 775).
11-12. Chlorochytrium lemnae (x 248).
13. Hydrodictyon reticulatum (x 310).

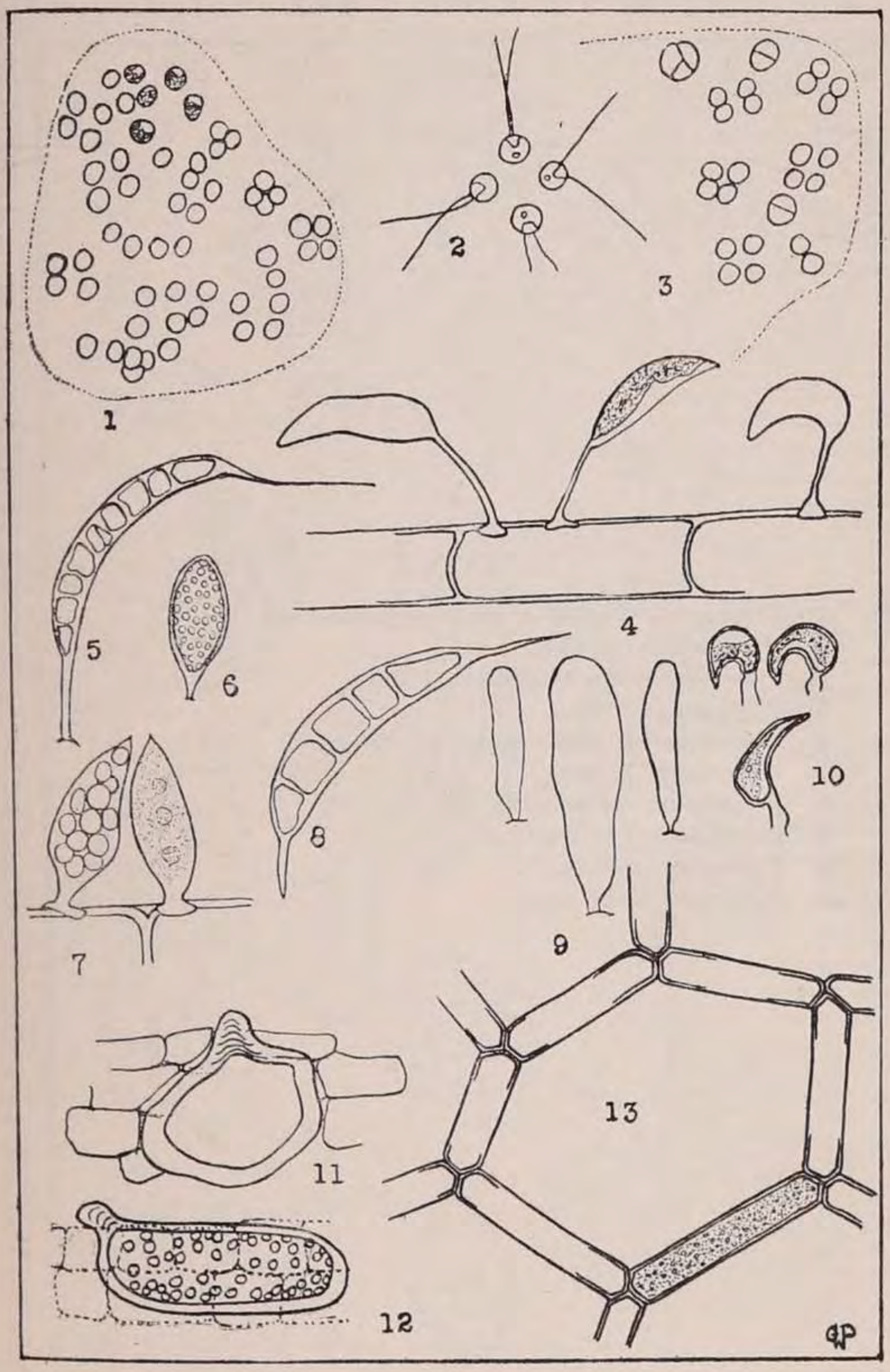

PLATE IX

PLATE X.

Fig. 1. Pediastrum biradiatum var. emarginatum (x 775).
2-3. P. boryanum (x 580).
4. P. boryanum var. longicorne (x 580).
5. P. duplex (x 580).
6. P. simplex var. duodenarium (x 580).
7. P. integrum (x 580).
8. P. integrum var. priva (x 580).
9. P. kawraiskyi (x 580).
10. P. simplex (x 580).
11. P. simplex, single cell.

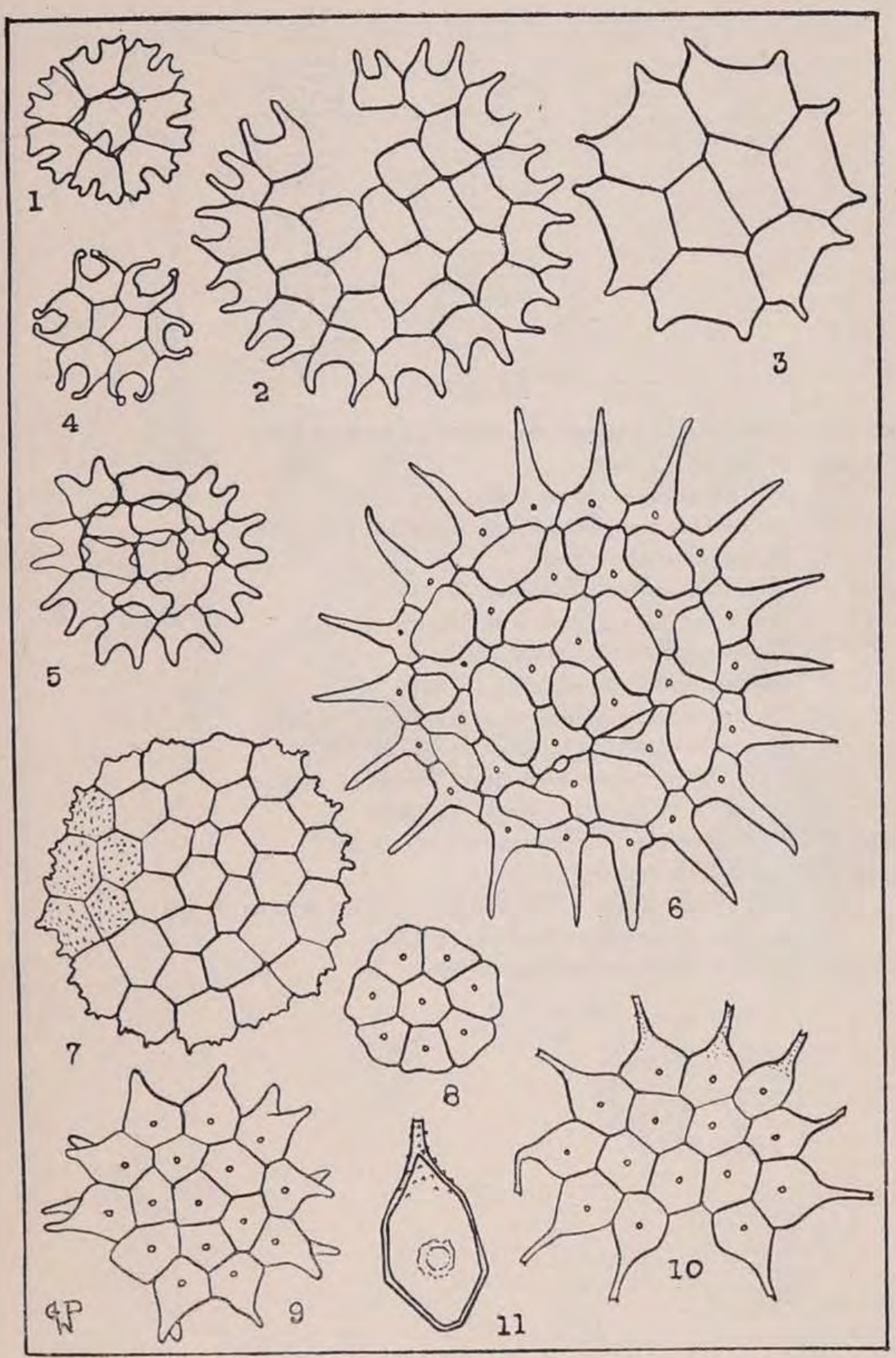

PLATE X

PLATE XI.

Fig. 1. Pediastrum simplex var. duodenarium (x 580).
2. P. tetras (x 580).
3-4. P. tricornutum forma evoluta (x 580).
5. Sorastrum americanum var. undulatum (x 580).
6. S. spinulosum (x 580).
7. Acanthosphaera zachariasi (x 580).
8. Cerasterias irregularis after Smith (x 580).
9. Eremosphaera viridis (x 580).
10. Gloeoactinium limenticum (x 542).
11. Gloeocystopsis limneticus after Smith (x 542).
12. Franceia tuberculata after Smith (x 465).
13. Errerella bornhemiensis after Smith (x 542).
14. Franceia ovalis after Smith (x 465).
15-17. Gloeotaenium loitelsbergerianum (x 580).
18-19. Golenkinia radiata (x 465).
20. Golenkinia radiata var. longispina after Smith (x 390).
21. Nephrocytium agardhianum (x 580).
22. Palmellococcus miniatus (x 580).

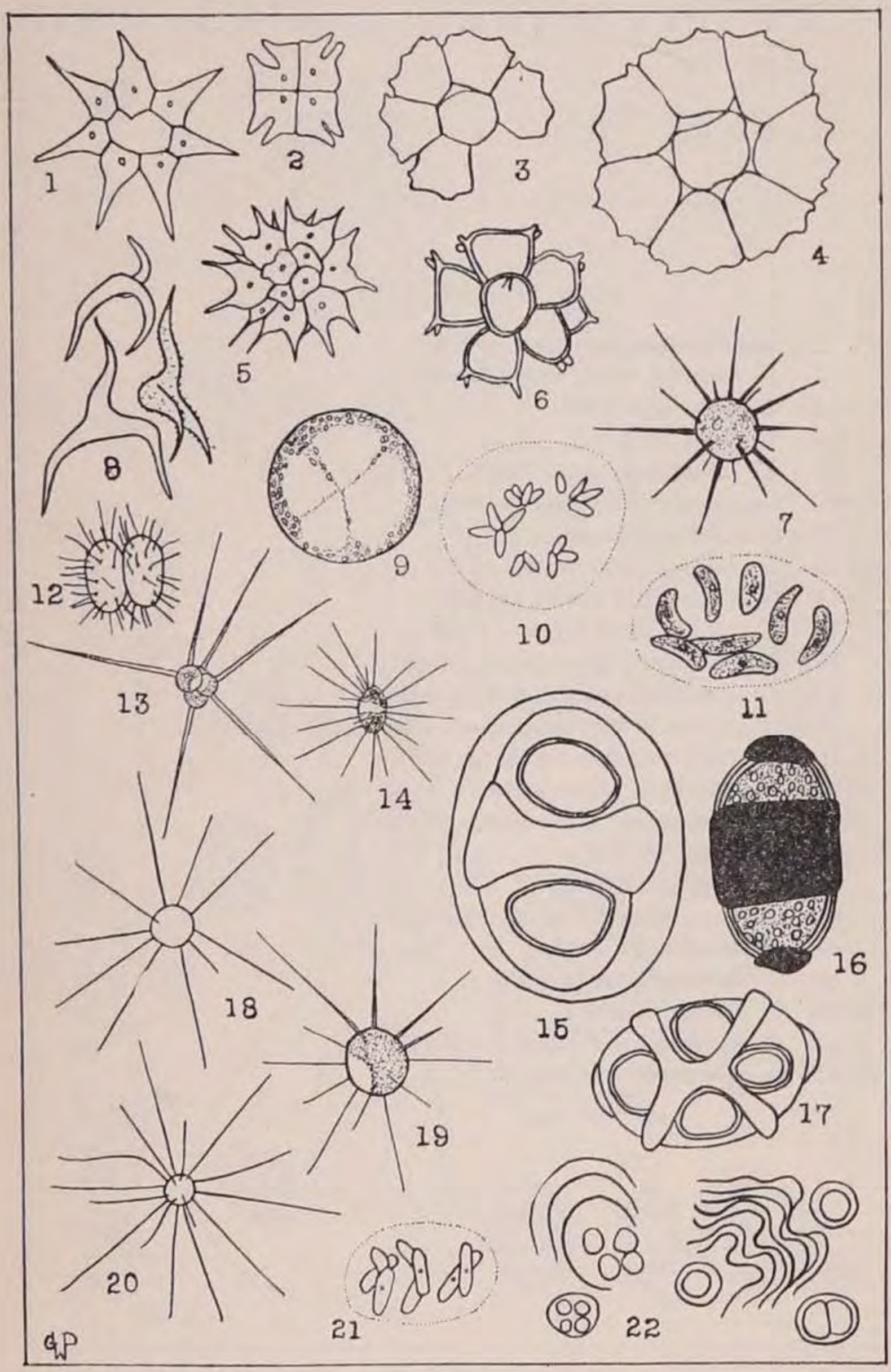

PLATE XI

PLATE XII

Fig. 1. Kirchneriella contorta (x 580).
2. K. elongata after Smith (x 775).
3. K. lunaris (x 775).
4. K. obesa (x 580).
5-7. K. subsolitaria after Smith (x 542).
8-9. Lagerheimia subsalsa (x 580).
10. L. wraitislawiensis (x 580).
11-13. L. chodatii after Smith (x 542).
14. L. ciliata after Smith (x 465).
15. L. cingula after Smith (x 465).
16. L. citriformis after Smith (x 465).
17. L. droescheri after Smith (x 465).
18. L. genevense var. subglobosa after Smith (x 542).
19. L. longiseta after Smith (x 542).
20-21. L. quadriseta after Smith (x 465).
22. Oocystis crassa after Smith (x 542).
23. O. borgei (x 580).
24. O. elliptica (x 580).
25. O. parva after Smith (x 542).
26. O. lacustris (x 580).
27. O. eremosphaera (x 580).
28-29. O. pusilla (x 390).
30. O. solitaria after Smith (x 542).
31-32. O. submarina (x 580).

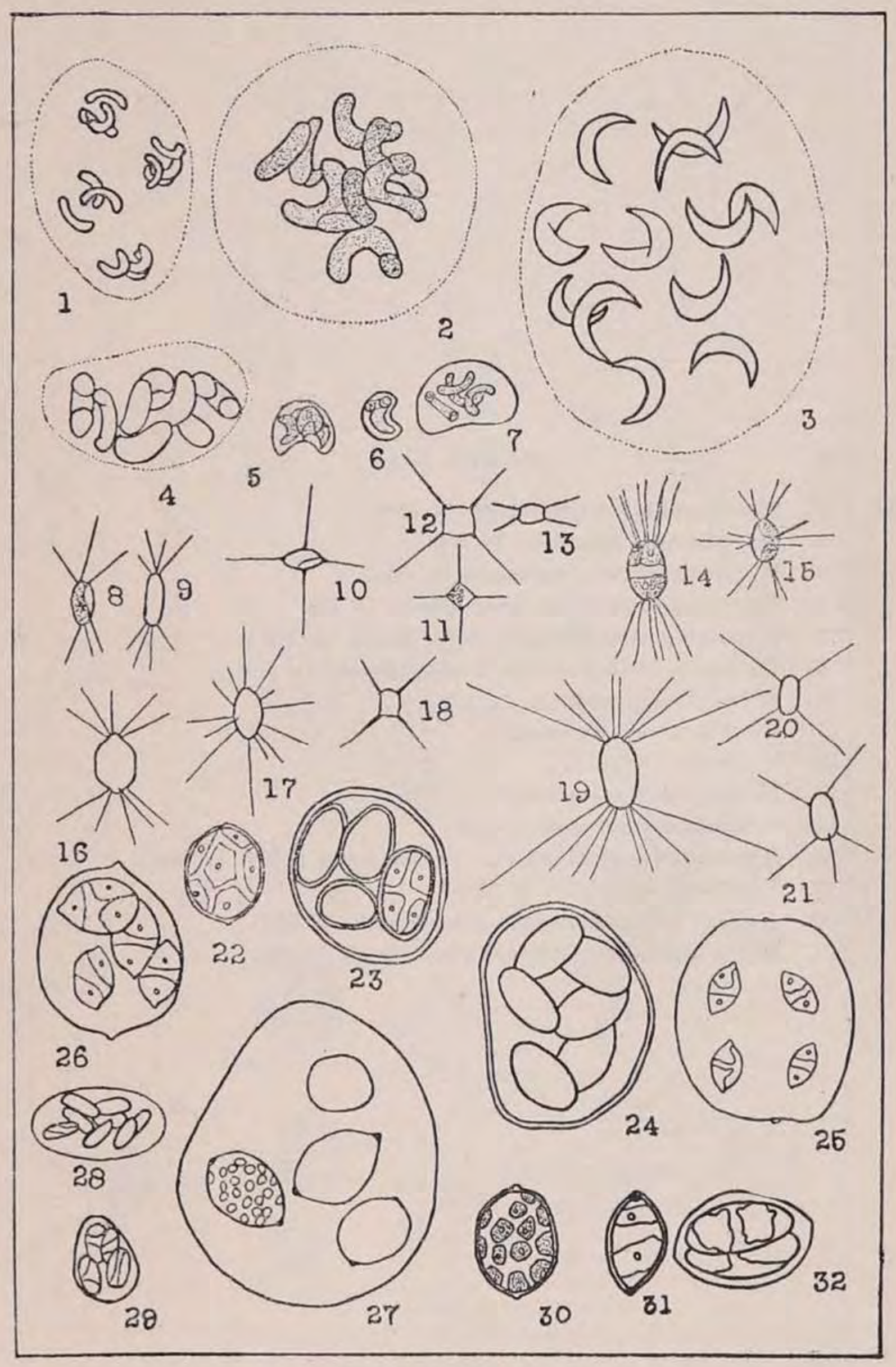
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PLATE XII

PLATE XIII.

Fig. 1. Planktosphaeria gelatinosa (x 580).
2. Polyedriopsis spinulosa (x 580).
3-4. P. spinulosa var. excavatum (x 580).
5-6. Treubaria crassispina after Smith (x 390).
7-8. Polyedriopsis quadrispina after Smith (x 465).
9. Treubaria triappendiculata after Smith (x 390).
10. Micractinium pusillum (x 775).
11. Trochiscia aspera (x 620).
12. T. obtusa (x 310).
13. T. reticularis after Smith (x 542).
14. Actinastrum hantschii (x 465).
15. Micractinium pusillum var. elegans after Smith (x 390).
16-17. Trochiscia sporoides (x 580).
18-19. Actinastrum gracillimum after Smith (x 332).
20. Micractinium quadrisetum after Smith (x 390).

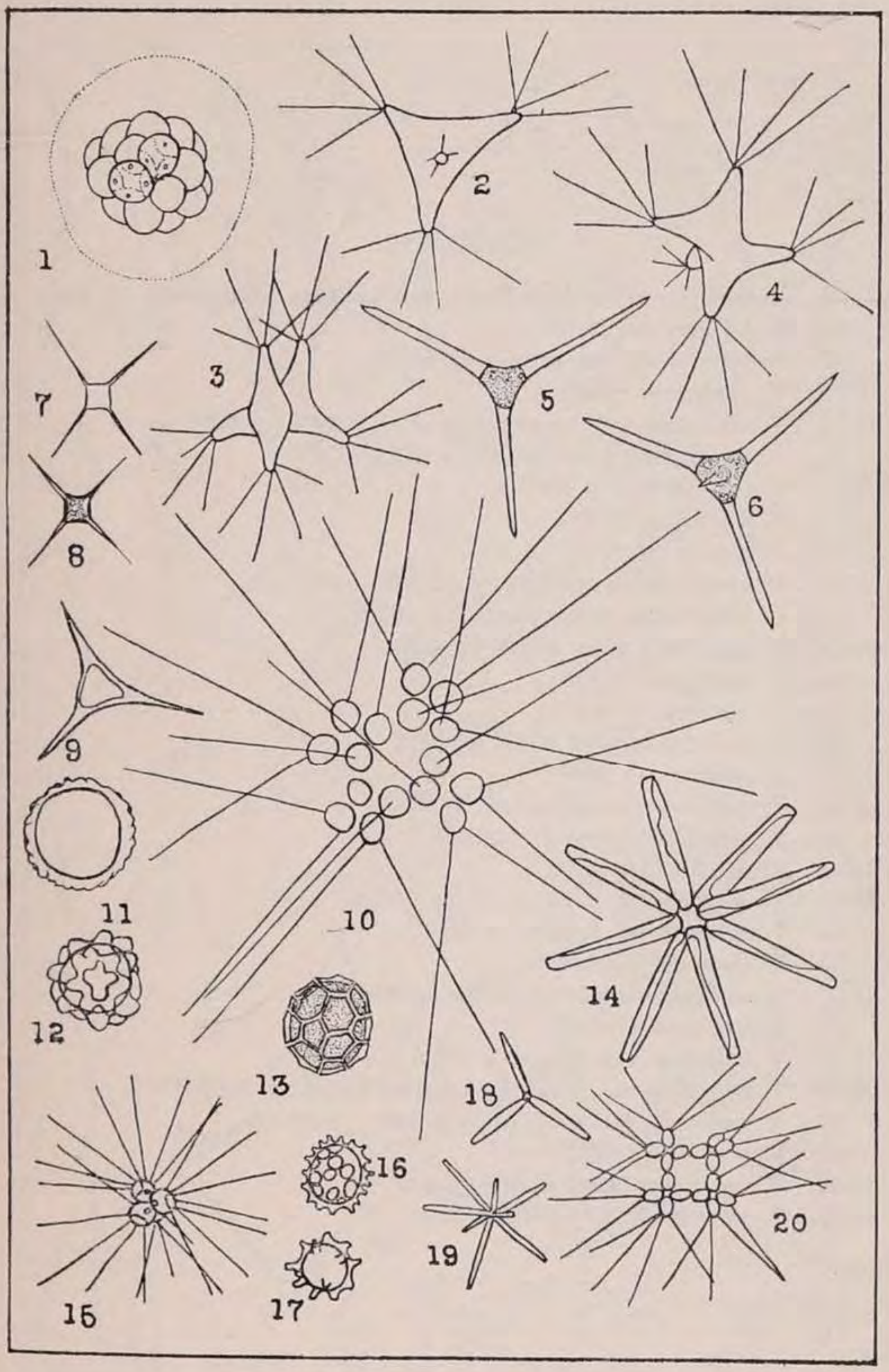

PLATE XIII

PLATE XIV.

Fig. 1-3. Tetraedron arthrodesmiforme var. contorta after Smith (x 542).
4-6. T. bifurcatum (x 580).
7-9. T. bifurcatum var. nudum (x 580).
10-11. T. caudatum (x 542).
12-13. T. caudatum var. longispinum after Smith (x 542).
14. T. constrictum after Smith (x 542).
15. T. constrictum (x 580).
16. T. cruciatum (x 465).
17. T. gracile (x 465).
18. T. hastatum var. palatinum (x 580).
19. T. limneticum after Smith (x 465).
20-21. T. lobulatum after Smith (x 465).
22. T. minimum (x 930).
23. T. muticum (x 580).
24. T. planctonicum (x 580).
25-26. T. pusillum (x 580).
27-28. T. pusillum var. angolense (x 580).
29. T. quadrilobulatum (x 580).
30-31. T. regulare (x 580).
32-33. T. regulare var. bifurcatum (x 580).
34. T. regulare var. torsum (x 580).
35. T. siamensis (x 580).
36-37. T. staurastroides after Smith (x 542).
38. T. trigonum (x 580).
39-40. T. trigonum var. minor (x 580).
41-42. T. trigonum var. papilliferum after Smith (x 542).
43. T. trigonum var. setigerum (x 580).
44. T. sp. nov. (x 620).
45-48. T. tumidulum after Smith (x 542).
49-50. T. victoriae after Smith (x 542).

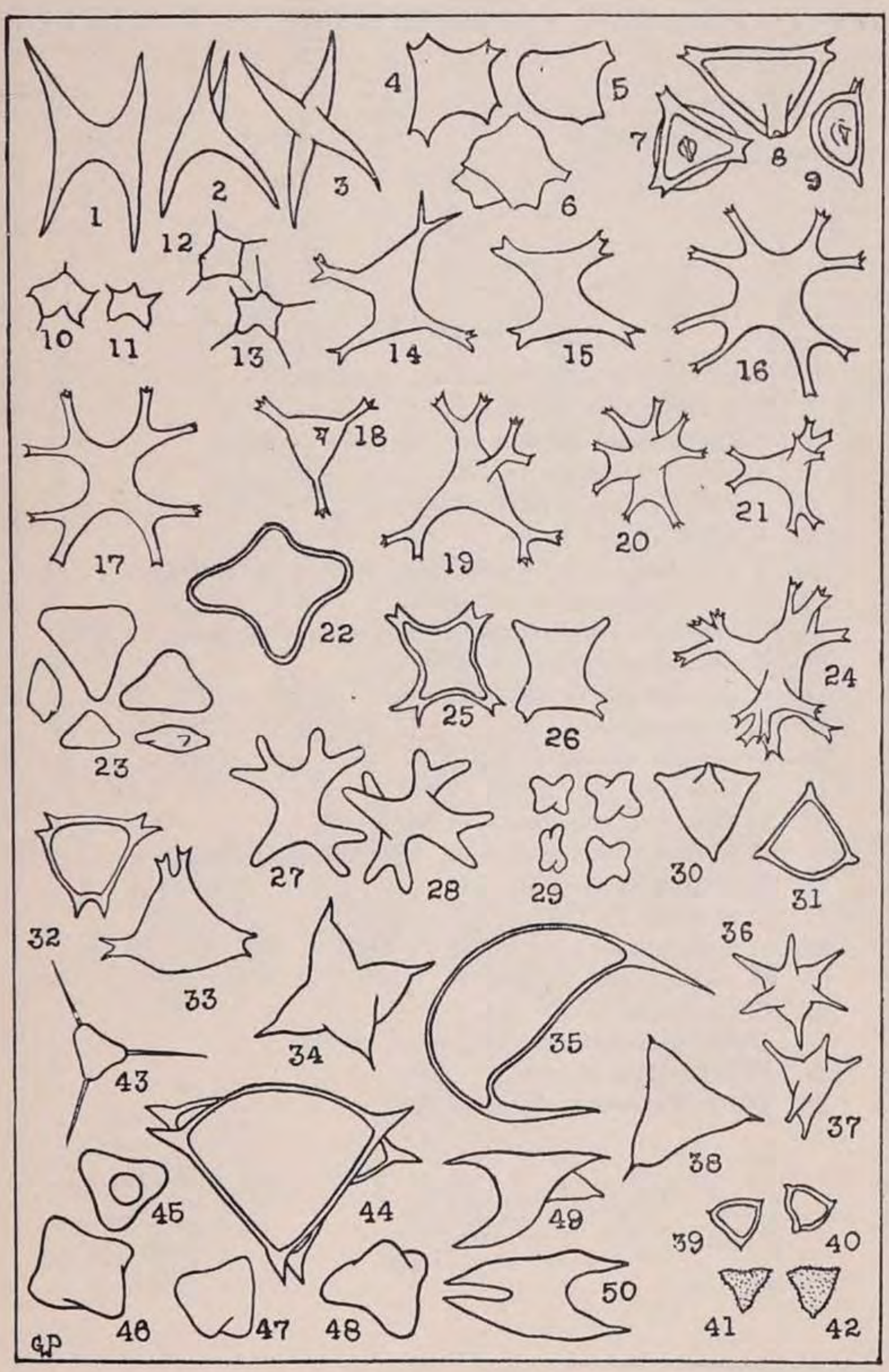
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PLATE XIV

PLATE XV.

Fig. 1-2. Tetraedron enorme (?) or var. (x 580).
3. T. pentaedricum (x 580).
4. Ankistrodesmus falcatus var. mirabilis (x 465).
5. Schroederia setigera (x 580).
6. Ankistrodesmus spiralis (x 580).
7. A. spiralis, after Smith (x 775).
8. A. falcatus var. acicularis, after West ex Brunnthaler.
9. Coelastrum cambricum (x 580).
10. Closteriopsis longispinum var. aciculare, after Smith (x 542).
11. Coelastrum cornutum (x 620).
12. C. microporum (x 580).
13. C. proboscideum (x 580).
14. Crucigenia apiculata (x 542).
15. C. alternans, after Smith (x 542).
16. C. divergens, after Smith (x 542).
17. C. fenestrata var. mucronata, after Smith (x 542).
18. C. irregularis (x 580).
19. C. quadrata (x 775).
20. C. lauterbornei, after Smith (x 542).
21. C. rectangularis (x 580).
22. C. tetrapedia (x 580).
23. Dictyosphaerium ehrenbergianum (x 775).
24. D. pulchellum (x 465).
25. Dimorphococcus cordatus (x 390).

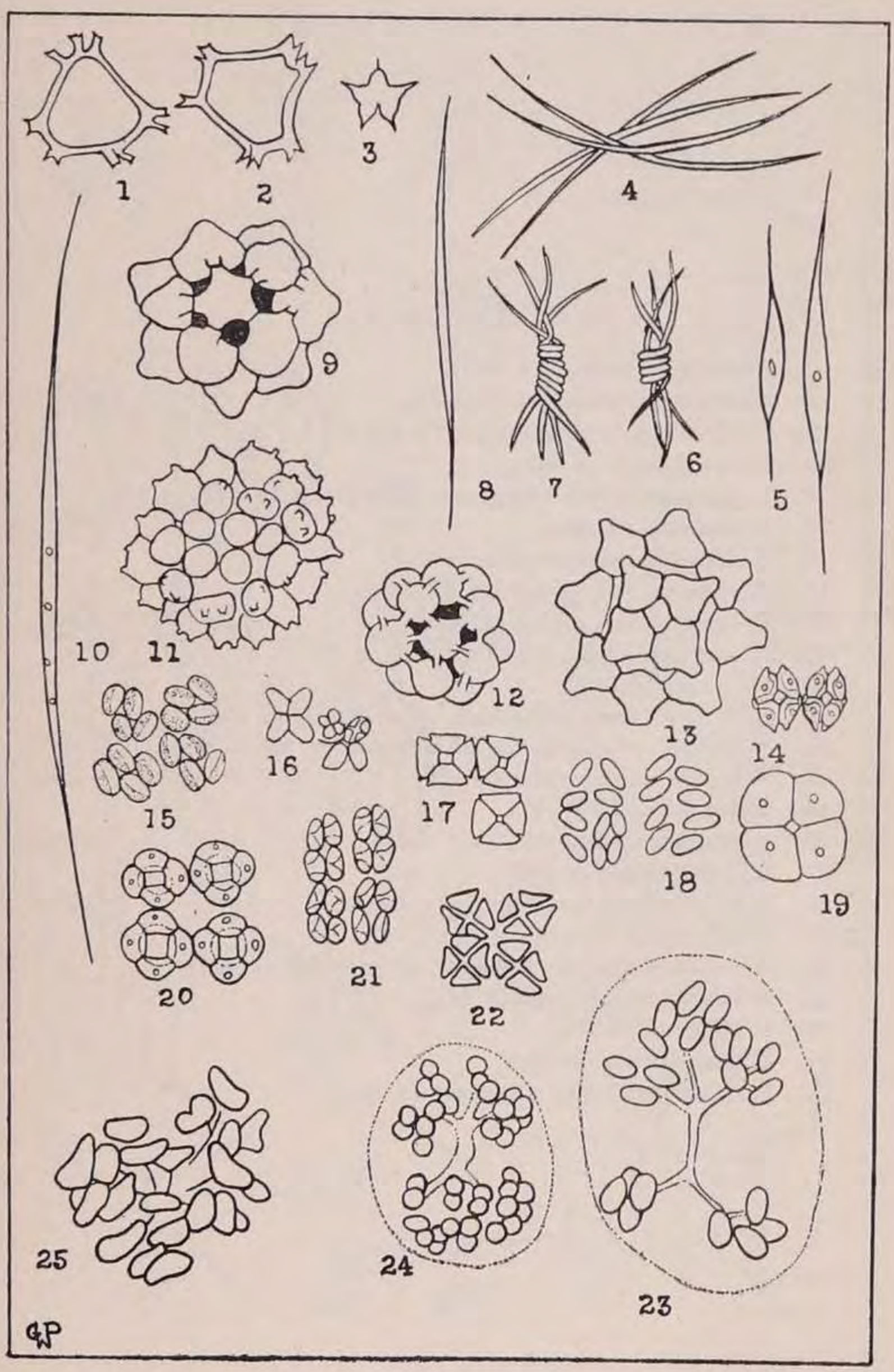

PLATE XV

PLATE XVI.

Fig. 1. Quadrigula pfitzeri (x 580).
2. Scenedesmus abundans (x 580).
3. S. abundans var. brevicauda (x 580).
4-5. S. acuminatus (x 542).
6. S. acuminatus var. elongatus, after Smith (x 542).
7-8. S. arcuatus (x 580).
9. S. arcuatus var. capitatus (x 775).
10. S. arcuatus var. platydisca (x 580).
11. S. armatus var. major (x 580).
12. S. bernardii, after Smith (x 700).
13-14. S. bijuga (x 580).
15. S. bijuga forma irregularis, after Smith (x 542).
16. S. bijuga var. flexulosus, after Smith (x 465).
17. S. bijuga var. radiatus (x 580).
18. S. braziliensis (x 580).
19. S. carinatus, after Smith (x 465).
20. S. denticulatus (x 580).
21. S. denticulatus var. lunatus (x 580).
22-23. S. dimorphus (x 580).
24. S. incrassatulus var. mononae, after Smith (x 465).
25. S. longus var. naegelii (x 542).
26. S. obliquus (x 580).
27. S. quadricauda (x 580).
28. S. quadricauda var. alternans (x 465).

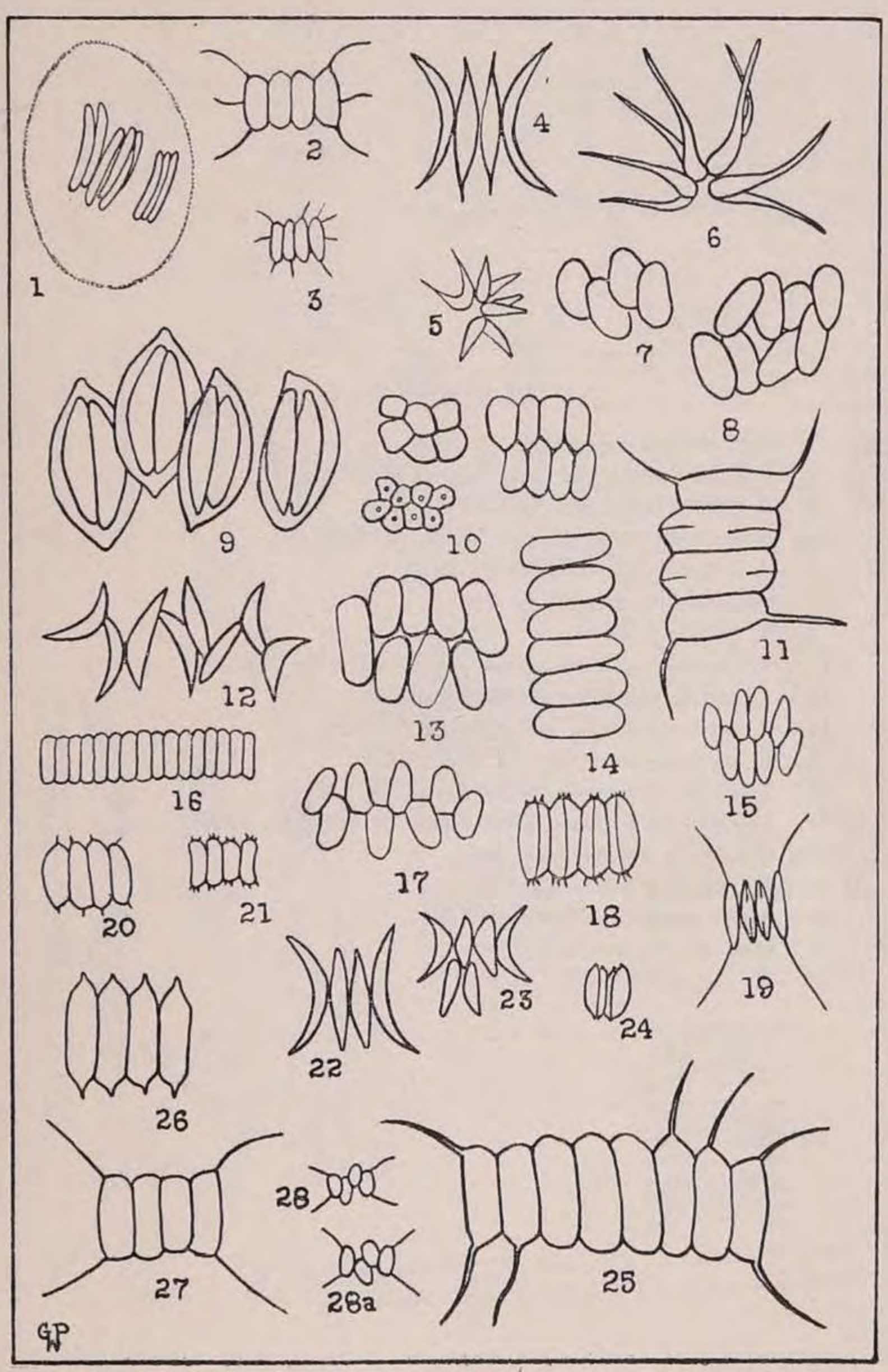
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PLATE XVI

PLATE XVII.

Fig. 1. Scenedesmus opoliensis (x 580).
2. S. quadricauda var. quadrispina (x 580).
3. S. quadricauda var. westii (x 775).
4-5. Schroderia judayi, after Smith (x 542).
6. S. setigera, after Smith (x 542).
7. Selenastrum gracile (x 580).
8. S. westii (x 580).
9-10. Tetradesmus wisconsensis, after Smith (x 775).
11. T. anomalum, after Smith (x 542).
12. T. heterocanthum, after Smith (x 542).
13. T. staurogeniaeforme (x 775).
14. Westella botryoides, after Smith (x 542).
15-17. Binuclearia tatrana, after Lewis ex West (x 340).
17a. Geminella ordinata (x 248).
18-19. Hormidium nitens (x 574).
20. Stichococcus bacillaris (x 580).
21. Ulothrix tenerrima (x 580).
22. U. zonata (x 580).

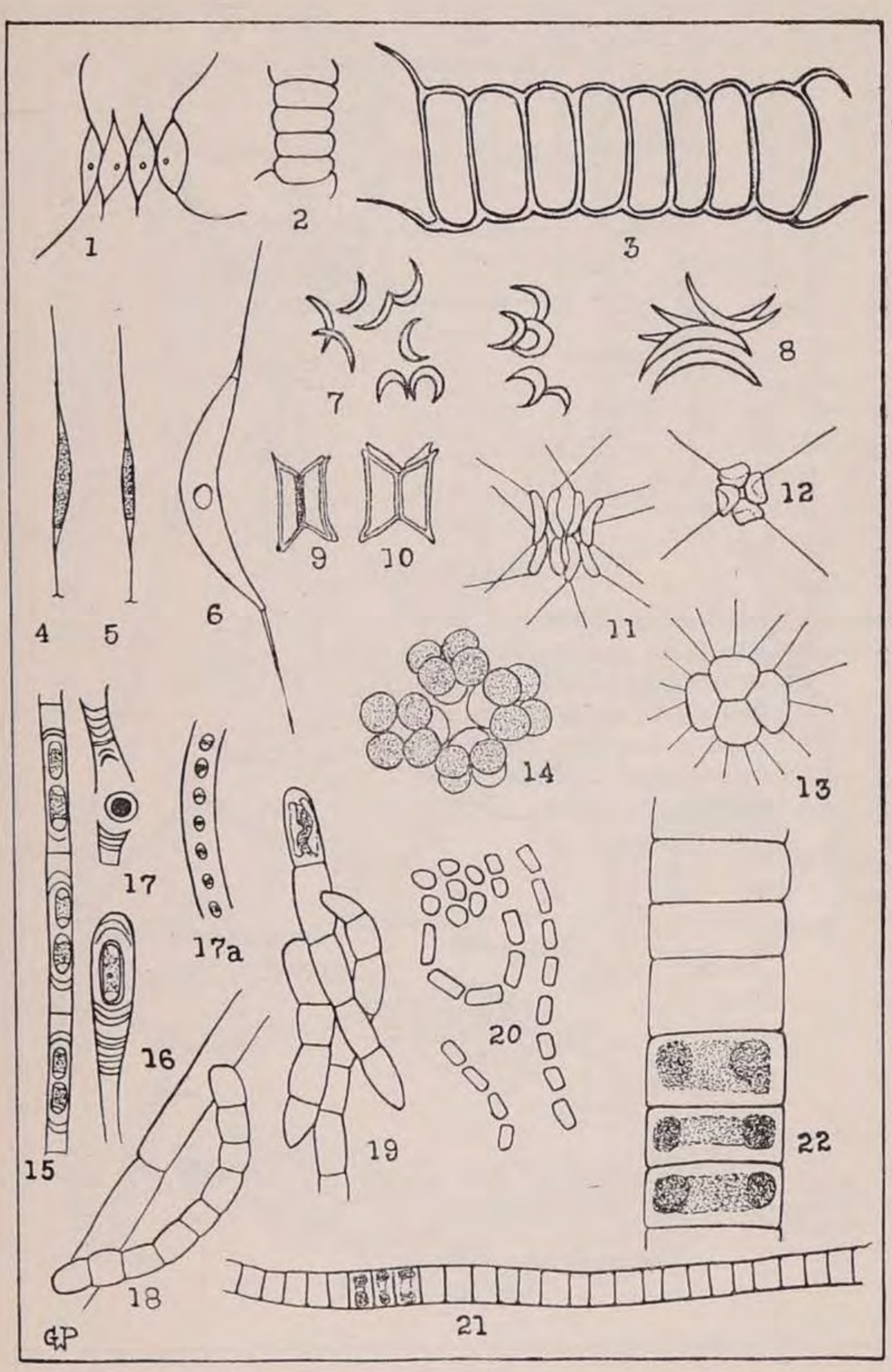

PLATE XVII

PLATE XVIII.

Fig. 1-2. Schizomeris leibleinii (x 580).
3. Microspora pachyderma (x 1085).
4. M. tumidula (x 580).
5. Protoderma viride (x 580).
6. Prasiola calophylla, frond (x 108).
7. Cylindrocapsa conferta (x 580).
8-9. C. geminella (x 580).

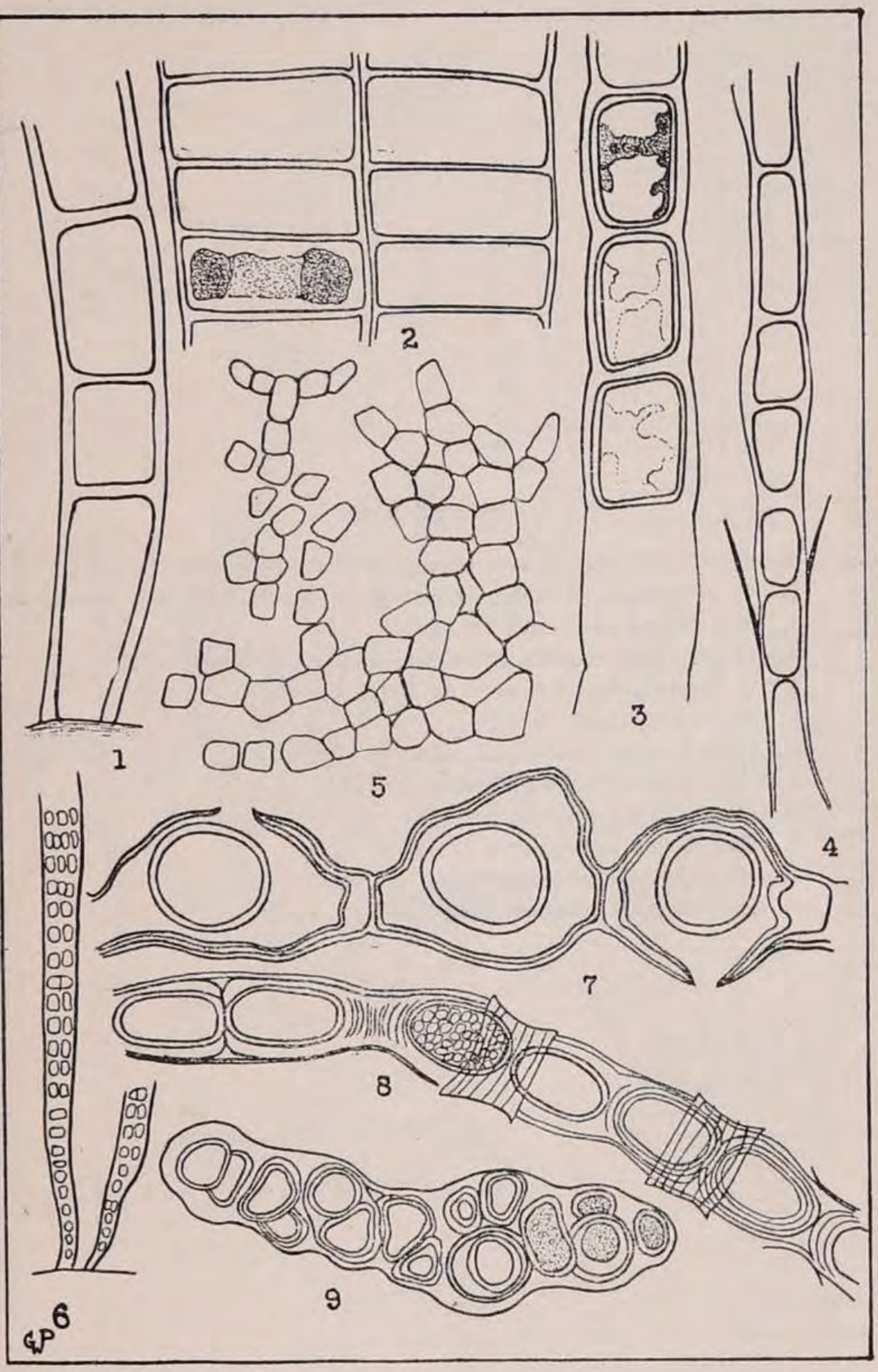

PLATE XVIII

PLATE XIX.

Fig. 1. Chaetopeltis americana, edge of disk showing setae (x 310).
2. C. americana, showing fragment of colony with cell arrangement, after Snow ex Collins (x 310).
3. Chaetophora elegans, after Berthold ex Heering (x 155).
4. C. elegans, tip of branch (x 580).
5. C. elegans, thalli (x 1.5).
6. C. incrassata, outline of colony (x 0.8).
7. Chaetosphaeridium globosum (x 310).
8. Draparnaldia plumosa (x 130).
9. Endoderma pithophorae (x 116).
10. Microthamnion kuetzingianum (x 580).
11. Draparnaldia plumosa, single cell (x 310).

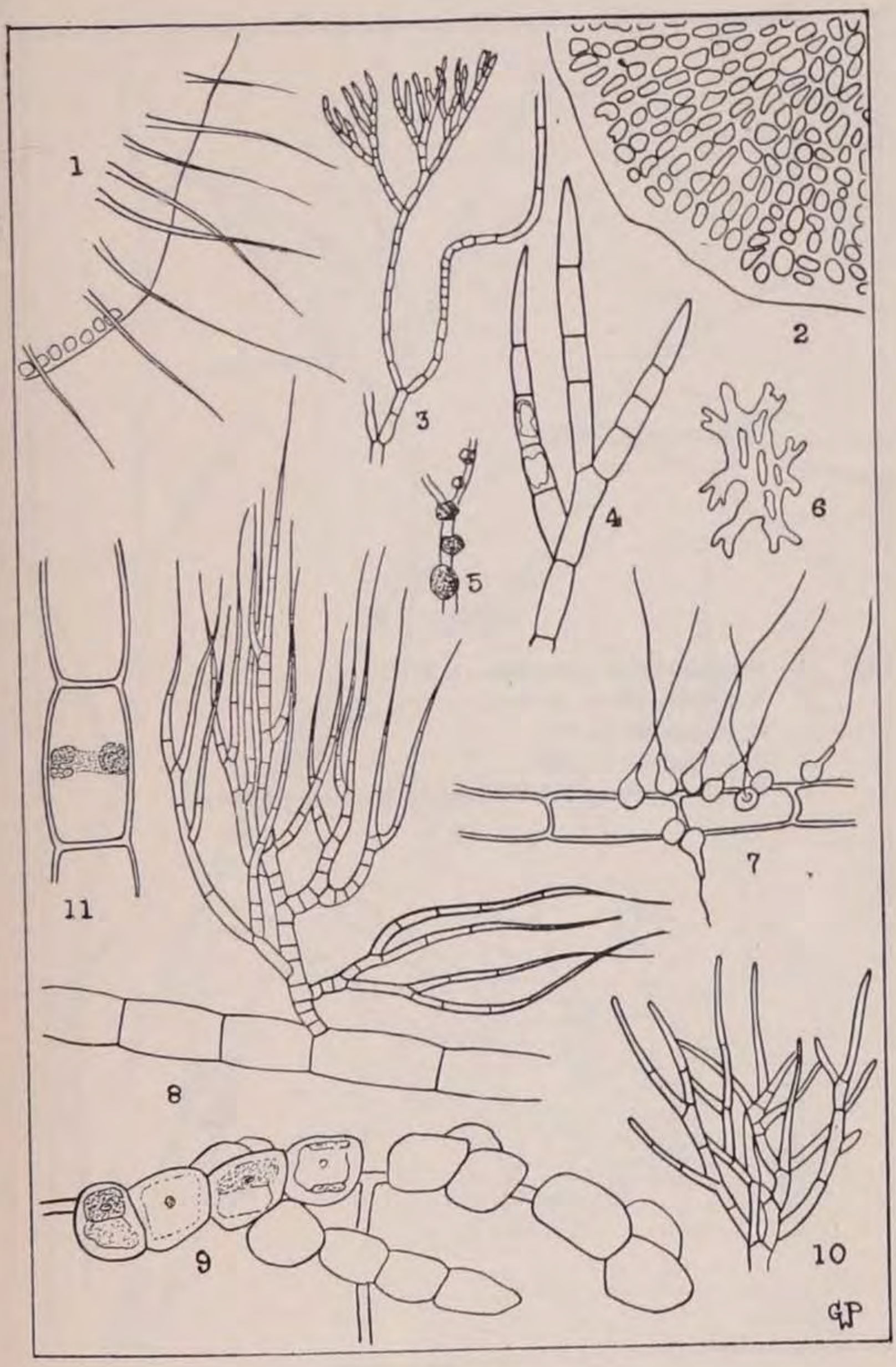

PLATE XIX

PLATE XXI.

Fig. 1. Aphanochaete repens (x 580).
2. A. hyalotheca (x 580).
3. A. vermiculoides (x 580).
4. Coleochaete divergens var. minor (x 310).
5. C. irregularis (x 310).
6. C. nitellarum (x 310).
7. C. nitellarum (x 580).

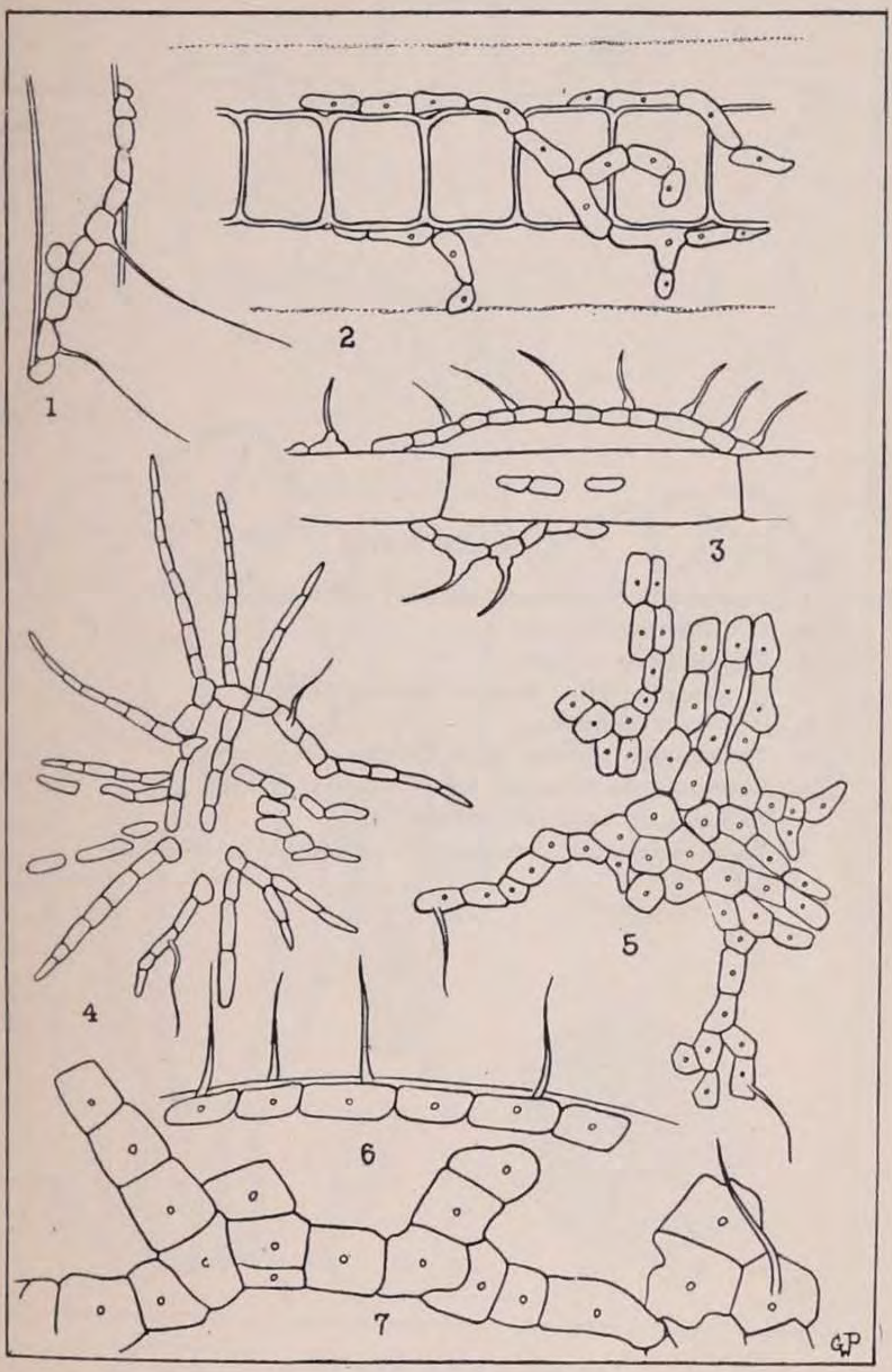

PLATE XXI

PLATE XXII.

Fig. 1. Coleochaete nitellarum, oogonium and oospore (x 580).
2. C. nitellarum (x 580).
3. C. orbicularis (x 580).
4. C. pulvinata, after West ex Heering (x 248).
5. C. scutata (x 580).
6. Trentepohlia odorata, after Kuetzing ex Heering.
7. Chaetomorpha chelonum, tip of filament (x 116).
8. C. chelonum, basal holdfast (x 116).
9. Coleochaeta soluta, adapted from Prinsheim ex Heering.

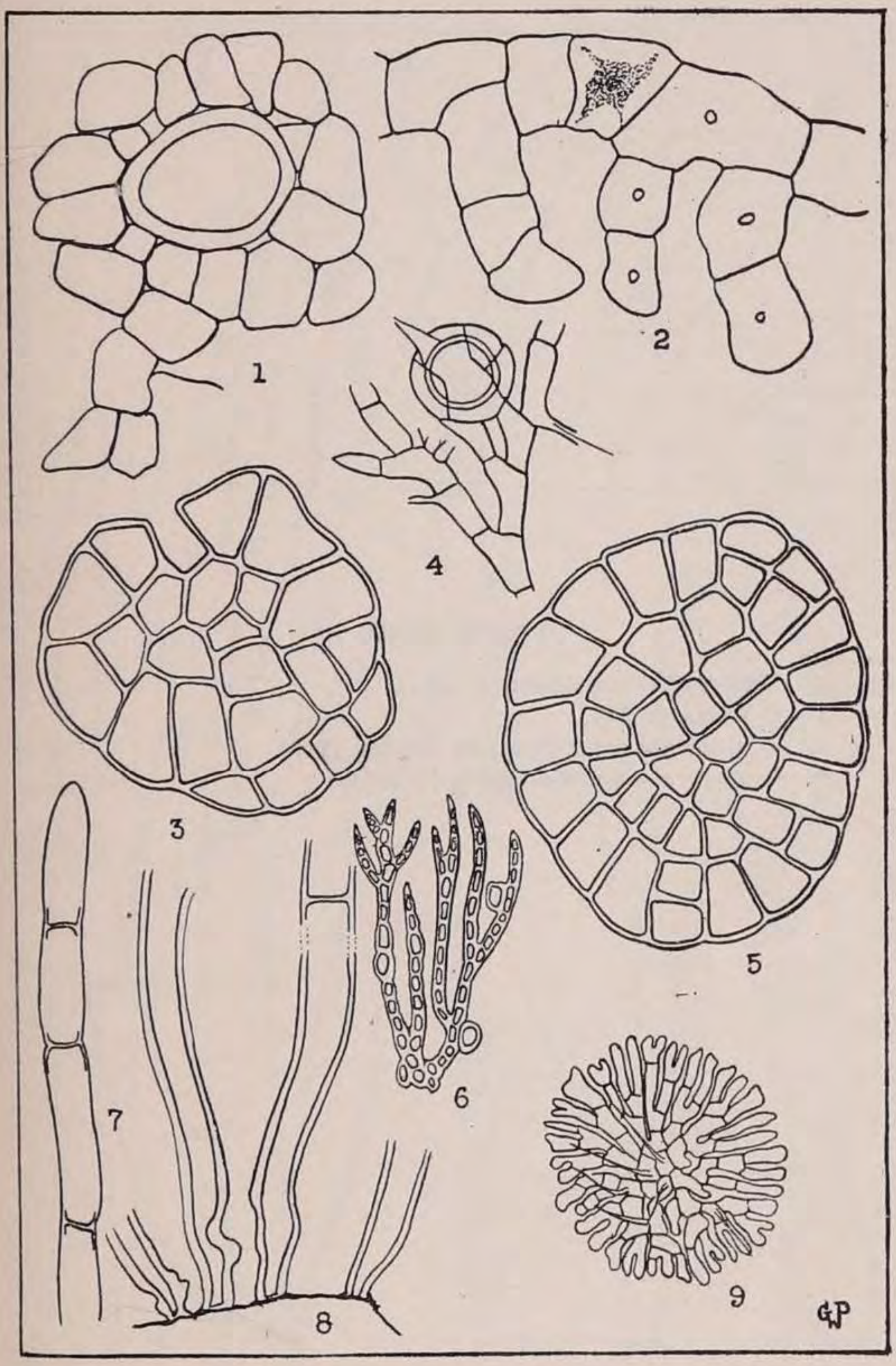

PLATE XXII

PLATE XXIII.

Fig. 1. Cladophora canalicularis (x 116).
2. C. fracta (x 116).
3. C. glomerata after Brand ex Heering (x 23).
4. C. glomerata forma rivularis (x 116).

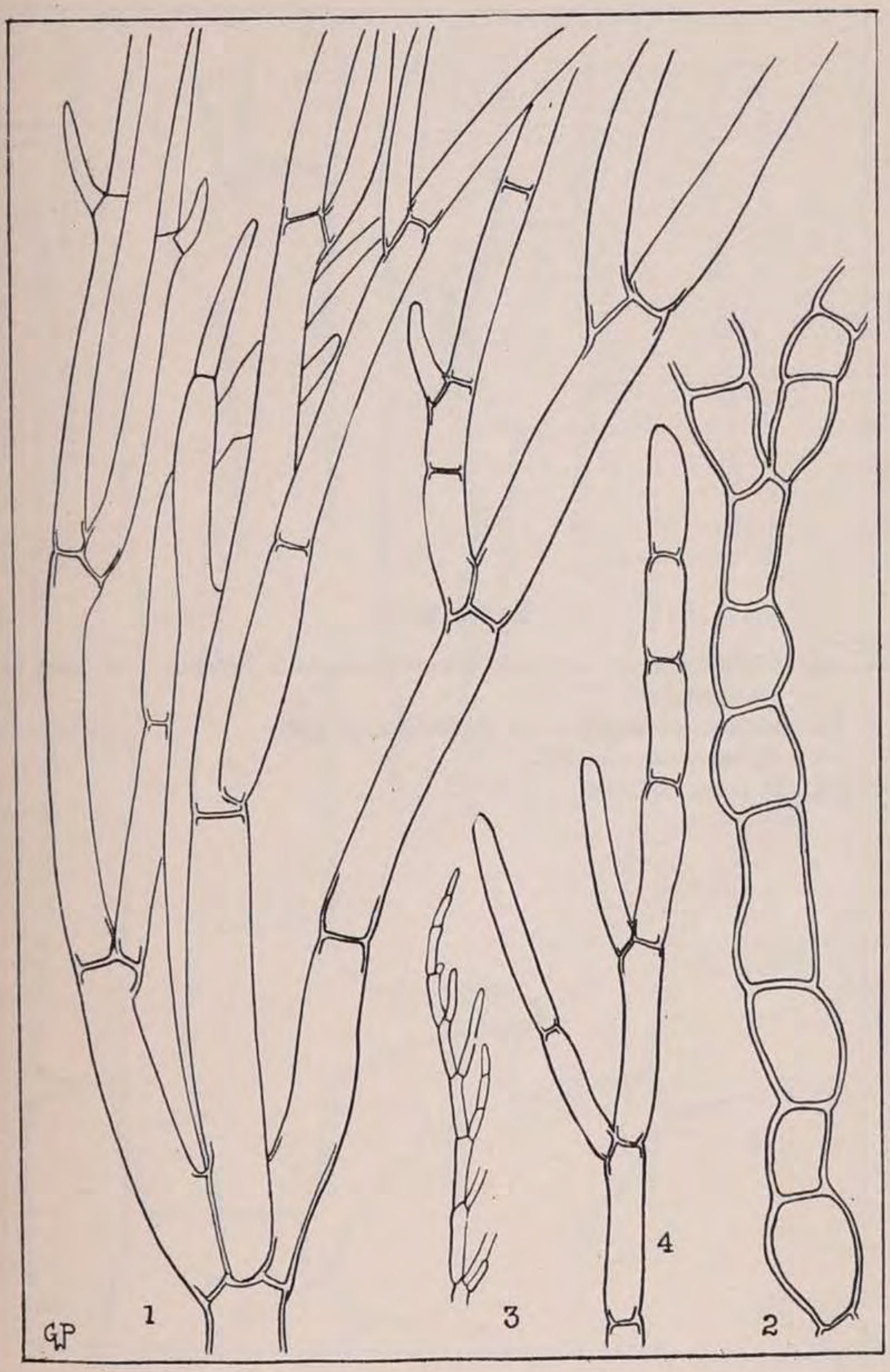

PLATE XXIII

PLATE XXIV.

Fig. 1-2. Cladophora sp. showing delayed cross-wall formation at base of branches.
3-4. Pithophora aequalis var. floridensis (x 116).
5-6. P. oedogonia (x 116).
7-8. P. varia (x 116).

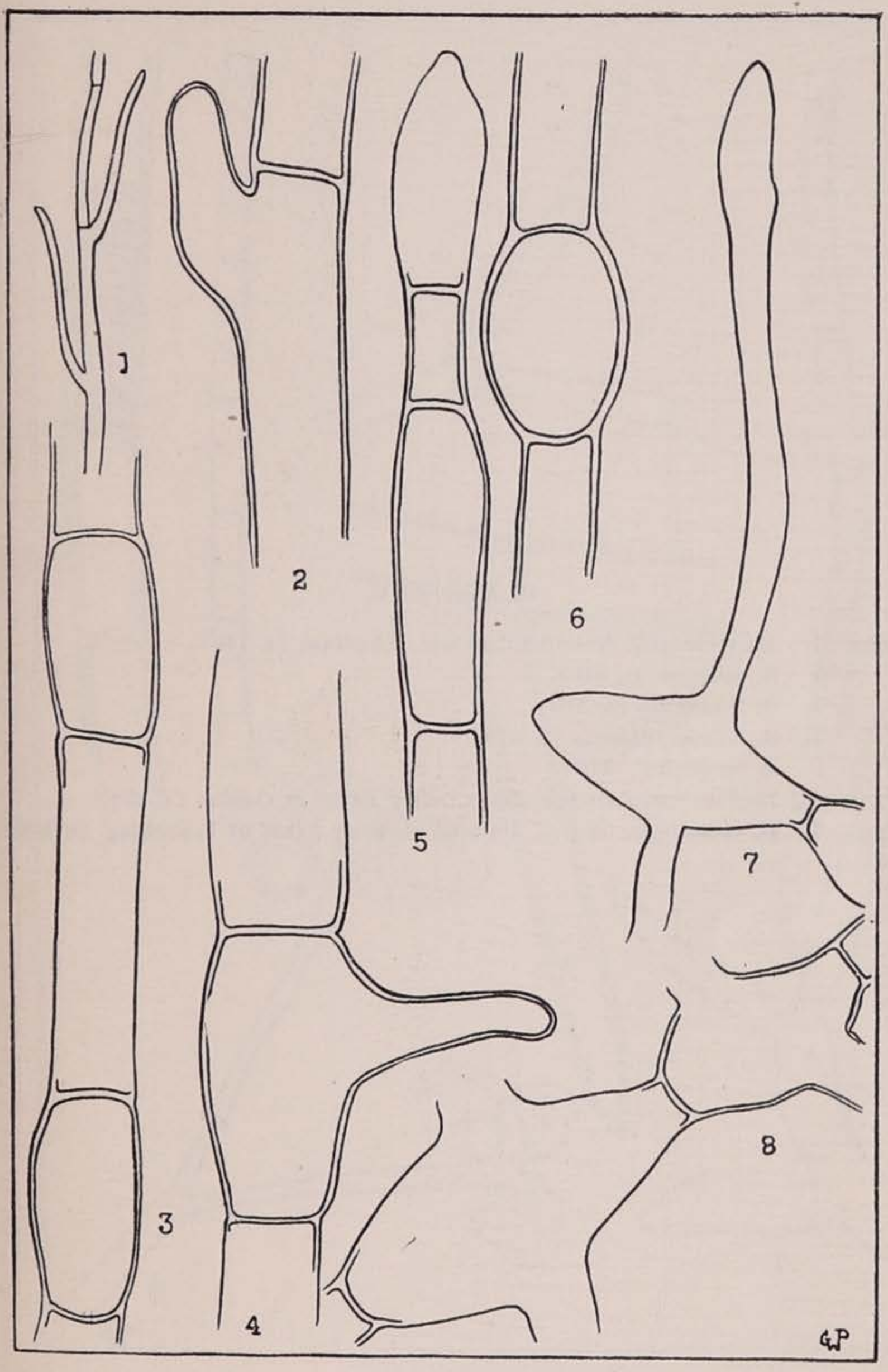

PLATE XXIV

PLATE XXV.

Fig. 1. Rhizoclonium crassipelitum var. robustum (x 116).
2. R. crispum (x 310).
3. R. fontanum (x 310).
4. R. heiroglyphicum (x 310).
5. R. hookeri (x 310).
6. Dichotomosiphon tuberosum, after Ernst ex Collins (x 39).
7. D. tuberosum, end of filament showing habit of branching (x 116).

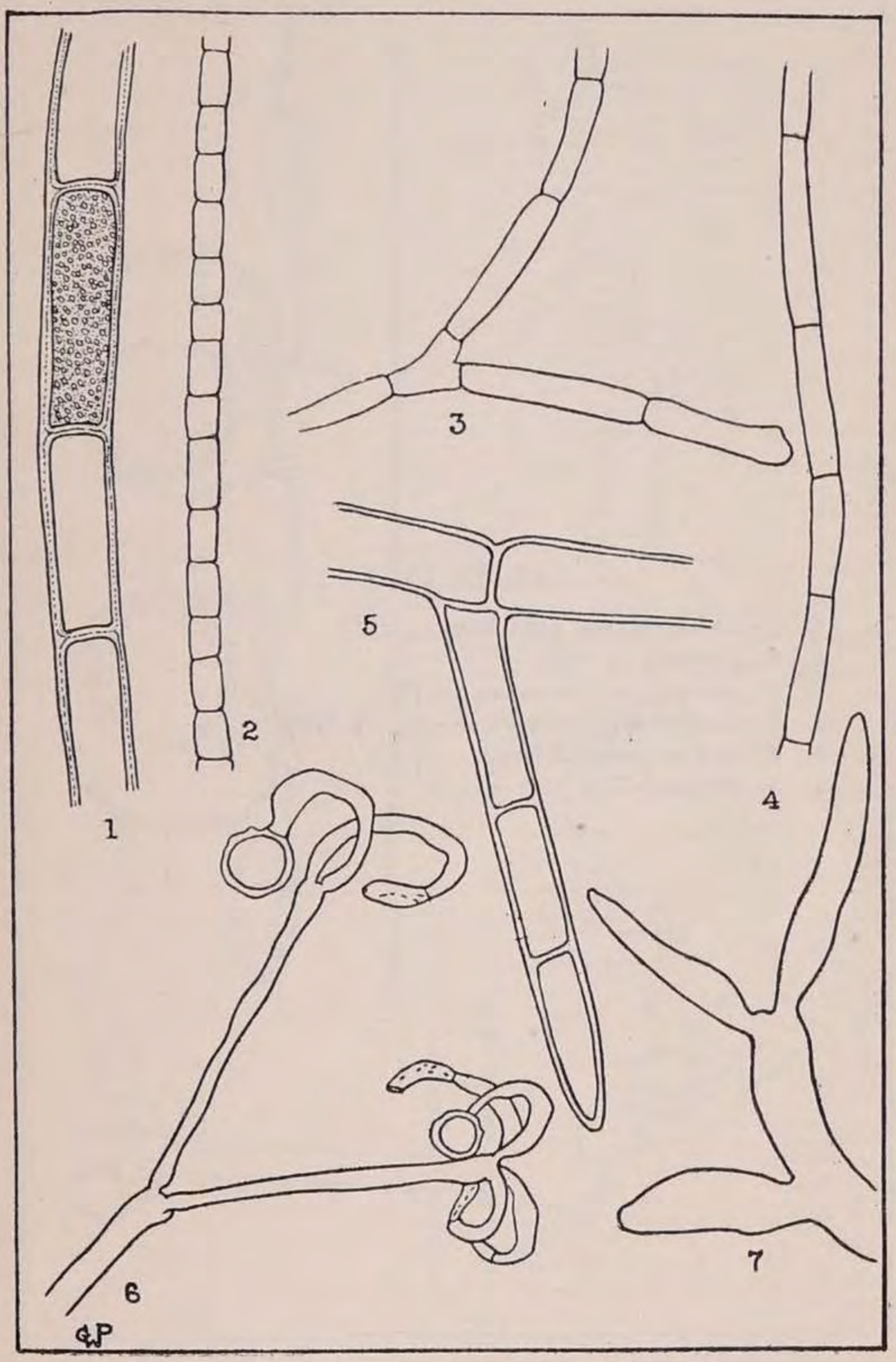

PLATE XXV

PLATE XXVI.

Fig. 1. Vaucheria aversa, after Götz (x 217).
2. V. geminata (x 120).
3. V. geminata var. racemosa (x 120).
4. V. hamata, after Götz ex Heering (x 150).
5. V. longipes, after Tiffany.
6. V. polysperma (x 116).

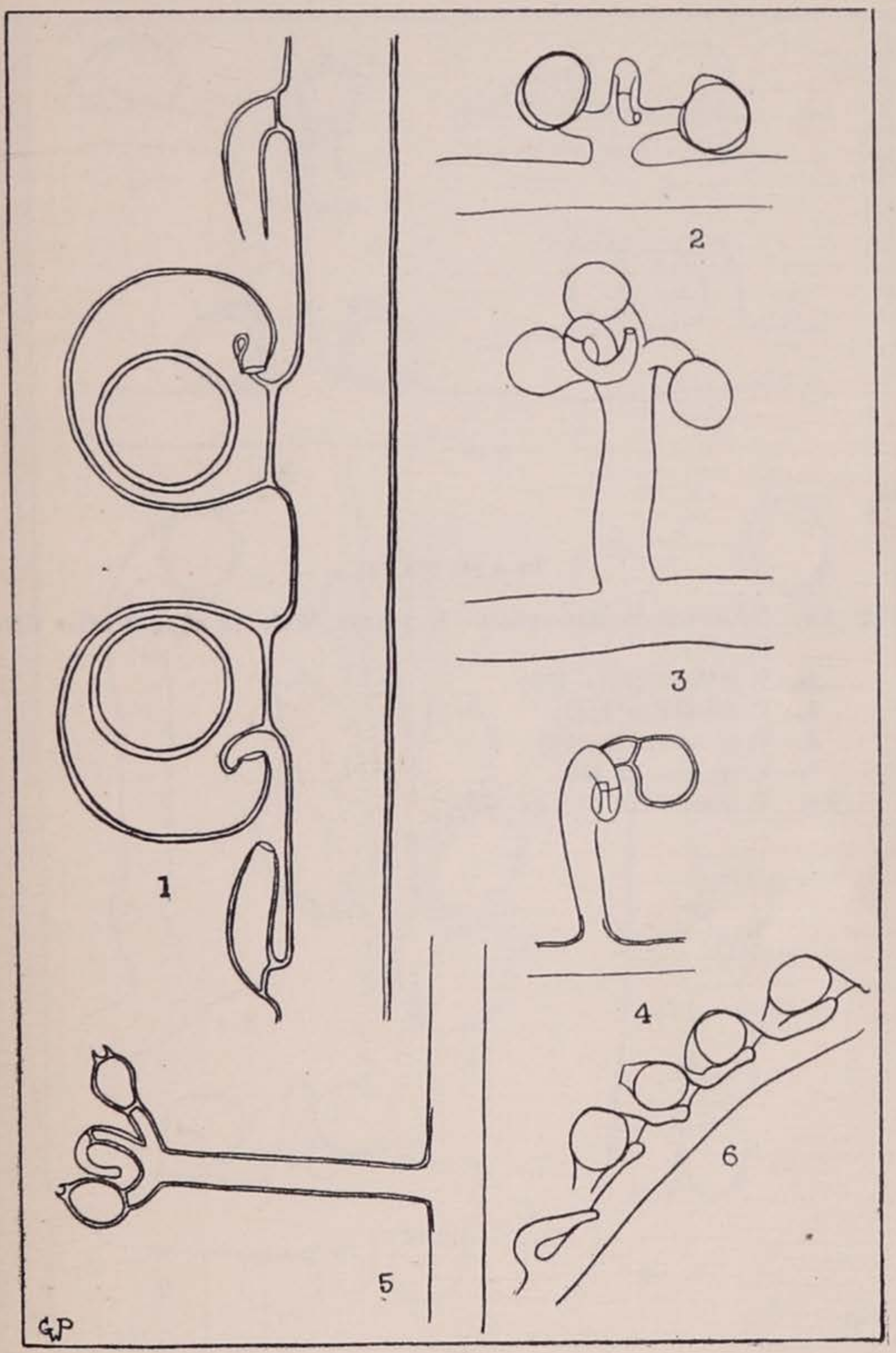

PLATE XXVI

PLATE XXVII.

Fig. 1-3. Vaucheria ornithocephala: 1, 3 after Walz (x 80); 2 after Götz (x 150).
4. V. orthocarpa (x 155).
5. V. sessilis (x 116).
6. V. terrestris (x 116).
7. V. sp. nov. (x 116).
8-9. V. sessilis var. nov. (x 116).

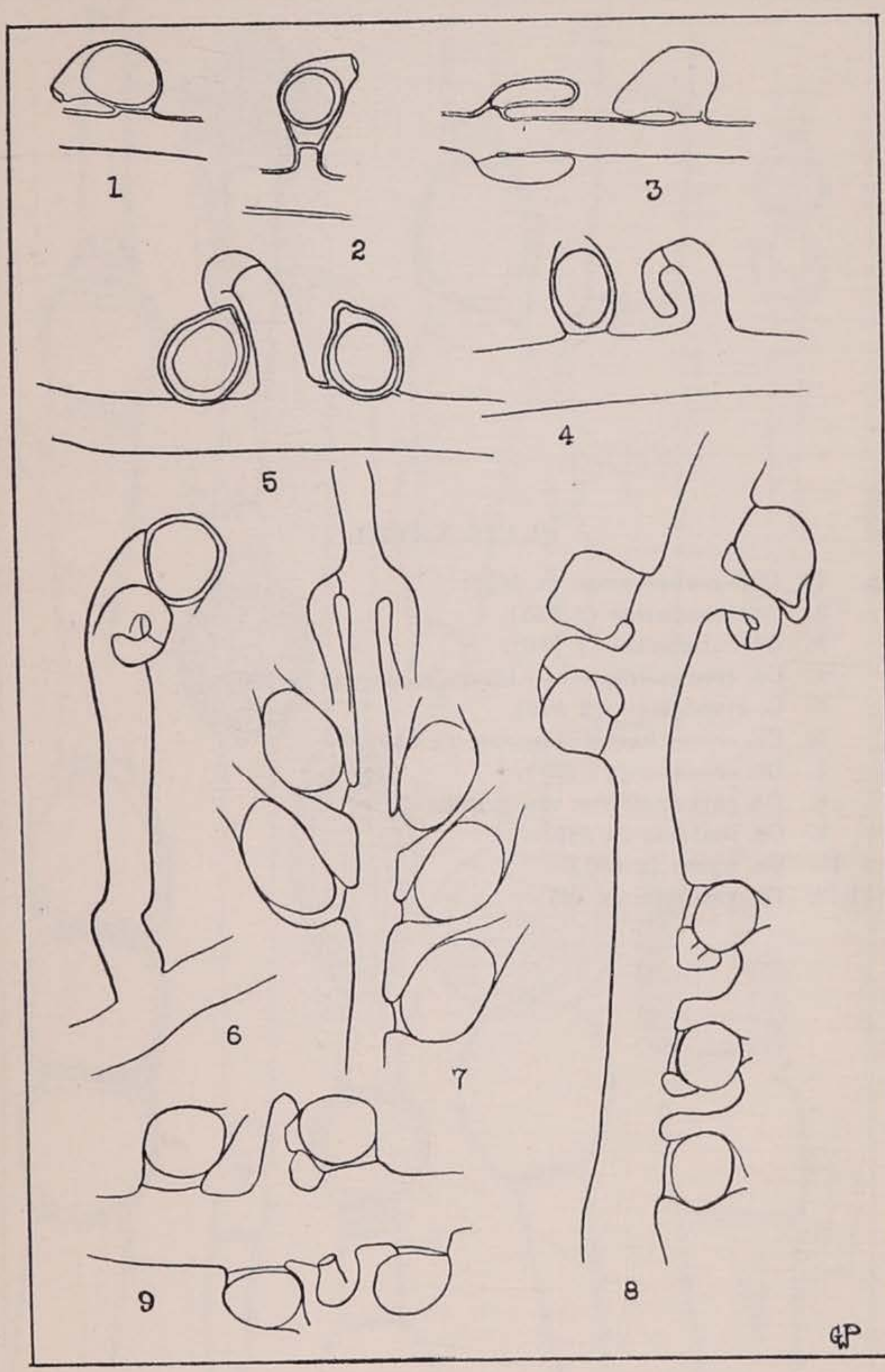

PLATE XXVII

PLATE XXVIII.

Fig. 1. Oedogonium hians (x 465).
2. Oe. acrosporum (x 465).
3. Oe. borisianum (x 580).
4. Oe. crassiusculum var. idioandrosporum (x 580)
5. O. hystricinum (x 580).
6. Oe. oryzae var. seriosporum (x 580).
7. Oe. areolatum (x 580).
8. Oe. paucocostatum var. gracilis (x 580).
9. Oe. wolleana (x 580).
10. Oe. wyliei (x 580).
11-12. Oe. vaucherii (x 465).

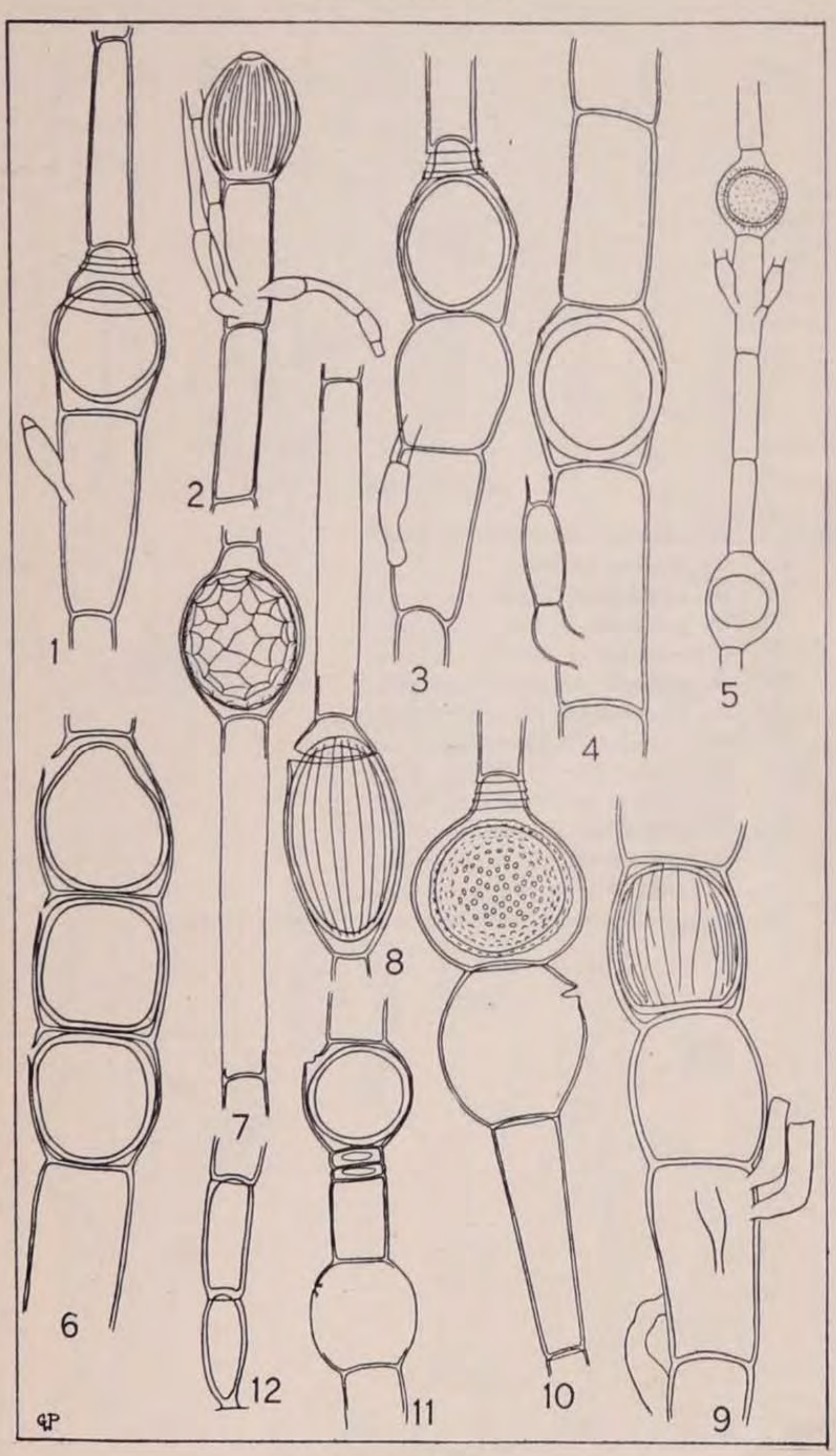

PLATE XXVIII

PLATE XXIX.

Fig. 1. Oedogonium victoriense (x 580).
2-3. Oe. varians (x 465).
4-5. Oe. undulatum (x 465).
6-7. Oe. rufescens (x 465).
8. Oe. reinschii (x 465).
9-10. Oe. pisanum var. gracilis (x 465).
11-13. Oe. martinicense after Hirn (x 248).
14. Oe. intermedium (x 580).
15-17. Oe. gracillimum (x 465).
18. Bulbochaete intermedia (x 580).
19. B. varians var. subsimplex (x 580).
20. B. gigantea after Tiffany (x 245).
21. B. congener after Tiffany (x 245).
22. Oedogonium crenulato-costatum var. aureum (x 465).

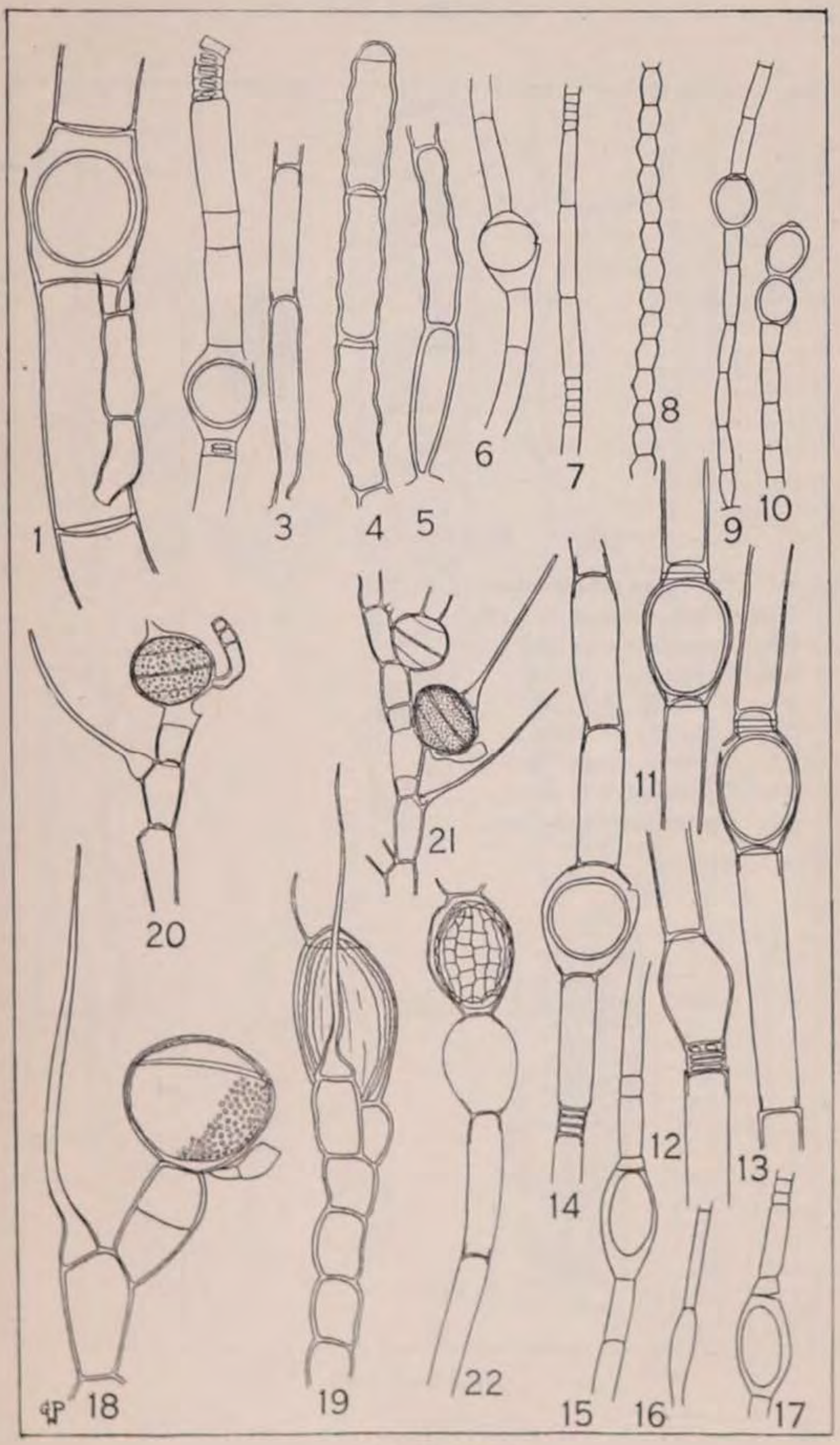

PLATE XXIX

PLATE XXX.

Fig. 1-2. Spirogyra subreticulata (x 97).
3-4. S. subreticulata (x 310).
5-6. S. communis (x 542).
7. S. decimina (x 310).
8-9. S. jugalis (x 97).
10. S. stictica (x 155).
11. Zygnema insigne (x 542).
12. Z. insigne (x 97).
13. Phacus suecica var. nov.

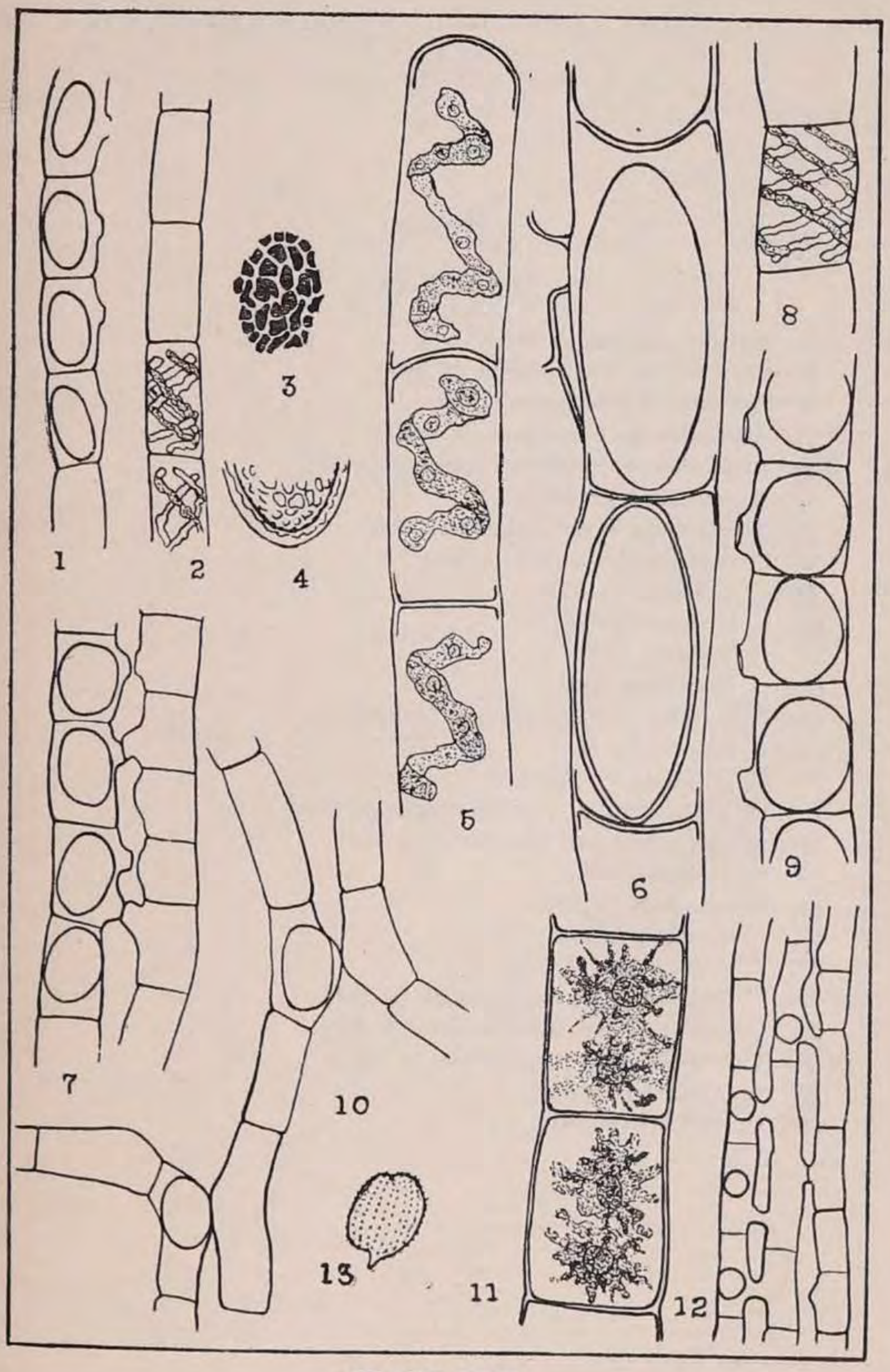

PLATE XXX

PLATE XXXI.

Fig. 1. Netrium digitus (x 580).
2. Roya obtusa var. montana (x 580).
3. Spirotaenia condensata (x 390).
4. Arthrodesmus convergens (x 465).
5-5a. Arthrodesmus incus var. extensus (x 580).
6. A. octocornis (x 580).
7. A. triangularis var. inflatus (x 580).
8. Cosmarium abreviatum (x 580).
9. C. amoenum (x 580).
10. C. biretum (x 580).
11. C. blytii (x 580).
12. C. boeckii (x 580).
13. C. botrytis var. subtumidum (x 580).
14. C. broomei (x 580).
15. C. globosum (x 580).
16. C. contractum var. ellipsoideum (x 580).
17. C. contractum var. jacobensii (x 580).
18. C. cucumis (x 580).
19. C. cucurbita (x 580).
20. C. circulare (x 580).
21. C. cyathiforme (x 580).
22-22a. C. decachondrum var. ornatum (x 580).
23. C. granatum var. subgranatum (x 580).
24-24a. C. hammeri var. protuberans (x 390).
25. C. nitidulum (x 580).
26. C. lundellii (x 580).

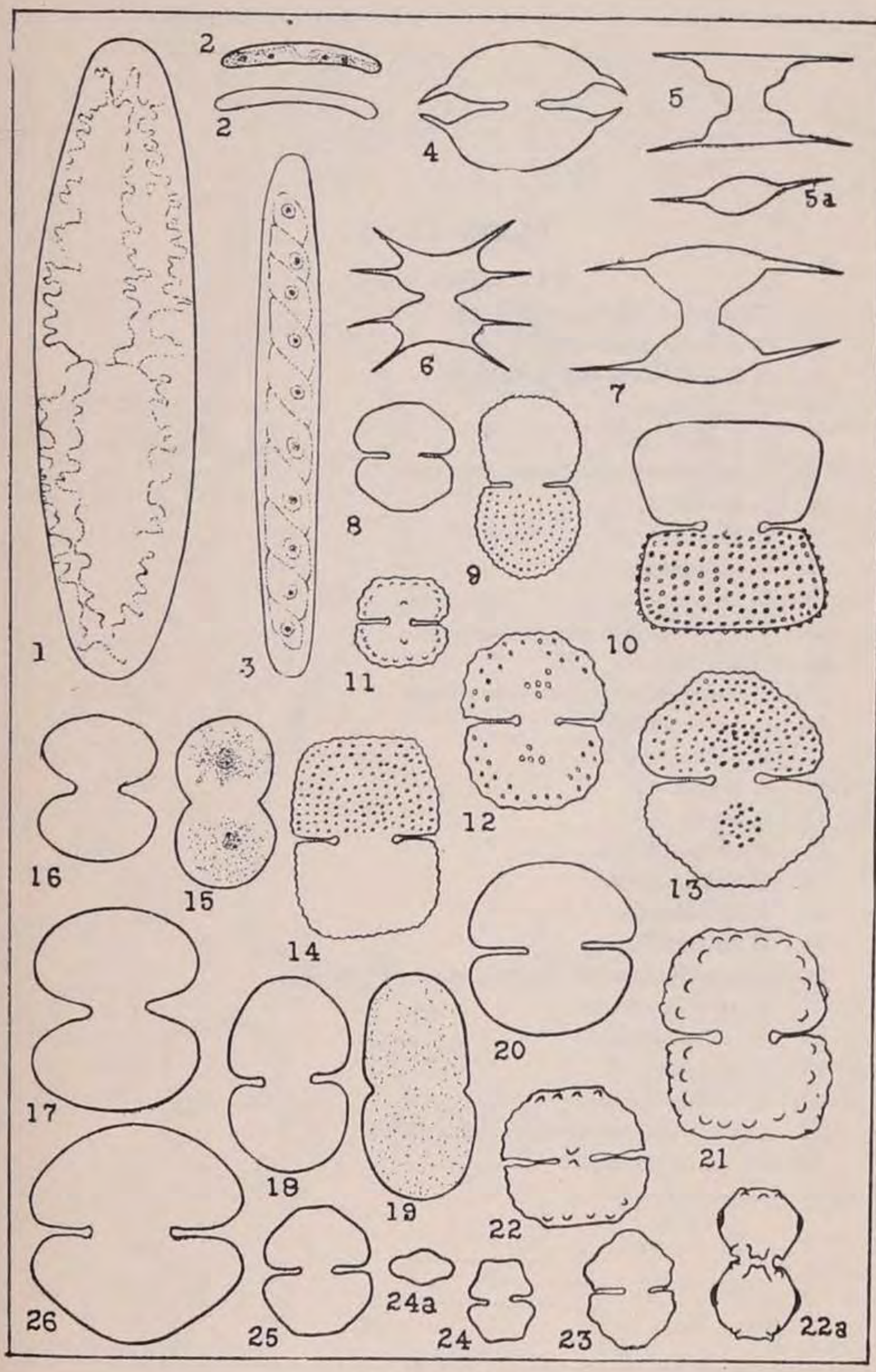
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PLATE XXXI

PLATE XXXII.

(All figures x 542).

Fig. 1. Cosmarium didymochondrum.
2. C. didymoprotusum.
3. C. formulosum var. nathorstii.
4. C. garrolense.
5. C. granatum.
6-6a. C. norimbergense forma depressa.
7. C. notabile.
8. C. moniliforme.
9. C. obtusatum.
10. C. ornatum.
11. C. rectangulare var. hexagonum.
12. C. portianum.
13. C. novae-semliae var. sibericum.
14. C. protractum.
15. C. sexangulare.
16. C. reniforme.
17. C. ovale.
18. C. smolandicum.
19. C. subtumidum.
20. C. undulatum.
21. C. turpinii.
22. C. trachypleurum var. minus.
23. C. taxichondrum.
24. C. subcucumis.
25. C. regnesii.
26. C. sphagnicolum.
27. Cosmarium venustum forma minor.
28. C. subretusiforme.
29-30. C. polygonum.

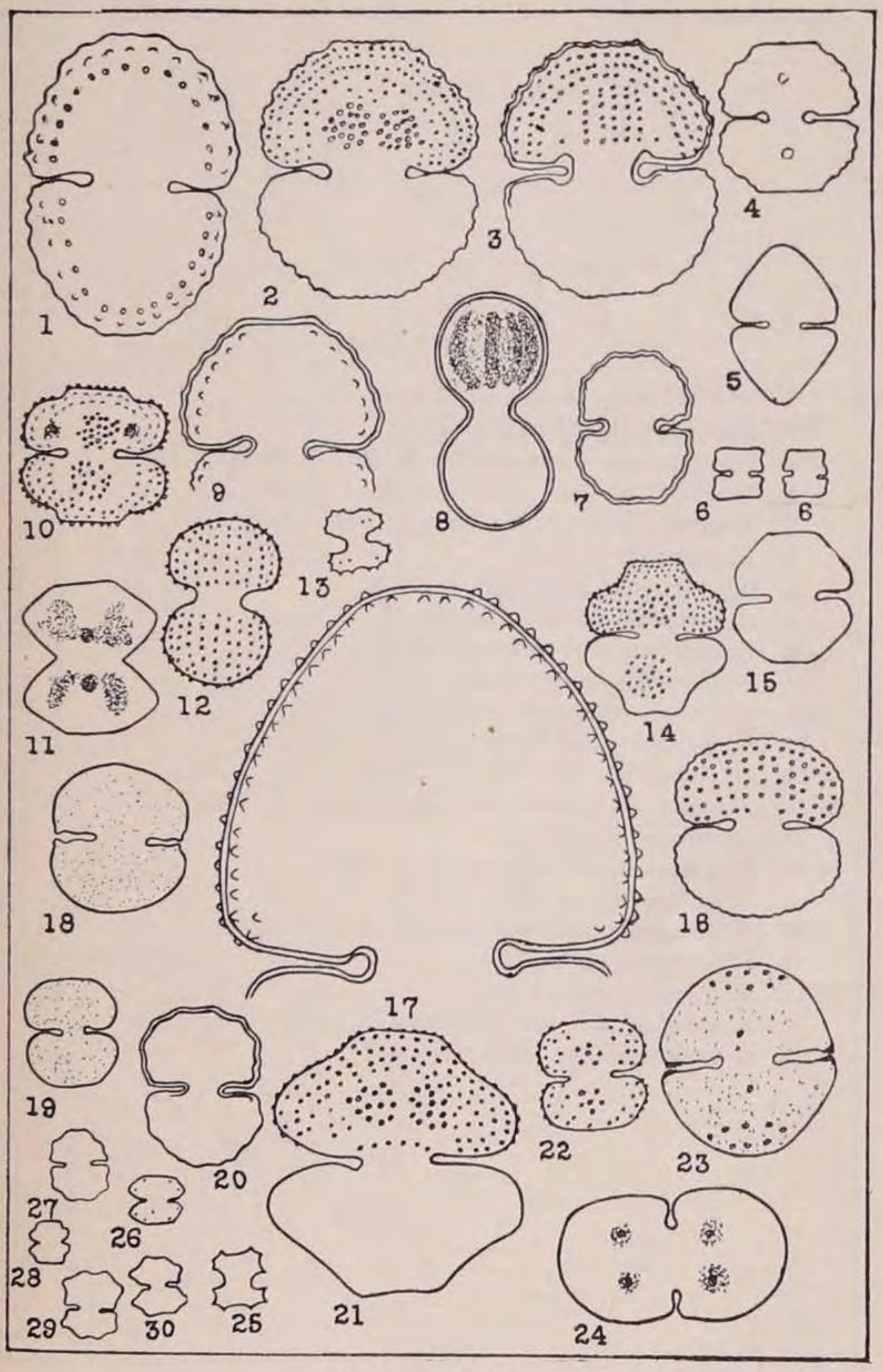
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PLATE XXXII

PLATE XXXIII.

Fig. 1. Cosmocladium saxonicum (x 542).
2-2a. Desmidium aptogonum (x 542).
3-3a. Desmidium occidentale after W. & G. S. West (x 310).
4. Docidium baculum, after G. S. West (x 330).
5. Euastrum binale forma hians (x 542).
6. E. crassicole (x 542).
7. Spondylosium pulchellum (x 542).
8. Onychonema filiforme (x 542).
9. Sphaerozosma granulatum (x 580).
10. Onychonema laeve (x 542).
11. Euastrum denticulatum (x 542).
12. E. verrucosum (x 542).
13. E. bidentatum (x 542).
14-14a. Staurastrum vestitum var. semivestitum (x 542).
15. S. striolatum (x 542).
16-16a. S. setigerum var. pectinatum (x 542).
17. S. spongiosum (x 542).
18. S. tohopekaligense var. trifurcatum (x 542).
19. S. teliferum (x 542).
20-20a. S. polymorphum (x 542).
21. S. pseudosebaldi var. simplicius (x 542).
22. S. tetracerum var. validum (x 542).

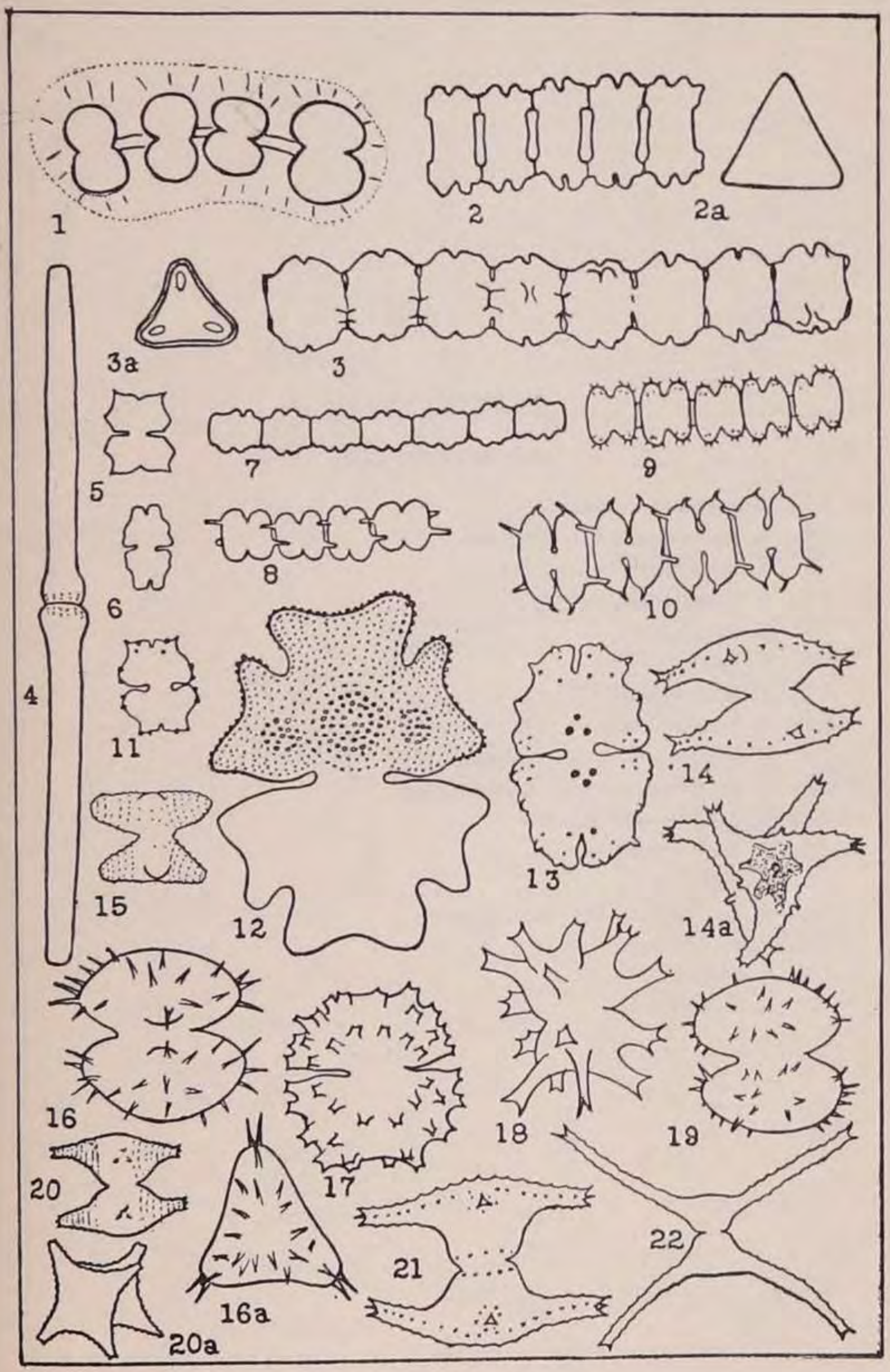

PLATE XXXIII

PLATE XXXIV.

(All figures x 542).

Fig. 1-1a. Staurastrum muticum.
2. S. paradoxum var. longipes.
3. S. orbiculare var. ralfsii.
4-4a. S. longiradiatum.
5. S. irregulare.
6. S. laeve.
7-7a. S. hexacerum.
8-8a. S. haaboeliense.
9. S. leptocladum var. insigne.
10-10a. S. grallatorium var. americanum.
11-11a. S. gracile var. nanum.
12-12a. S. breviculeatum.
13. S. glabrum.
14-14a. S. furcigerum var. eustephanum.
15-15a. S. floriferum.
16-16a. S. dickei.
17. S. erostellum.

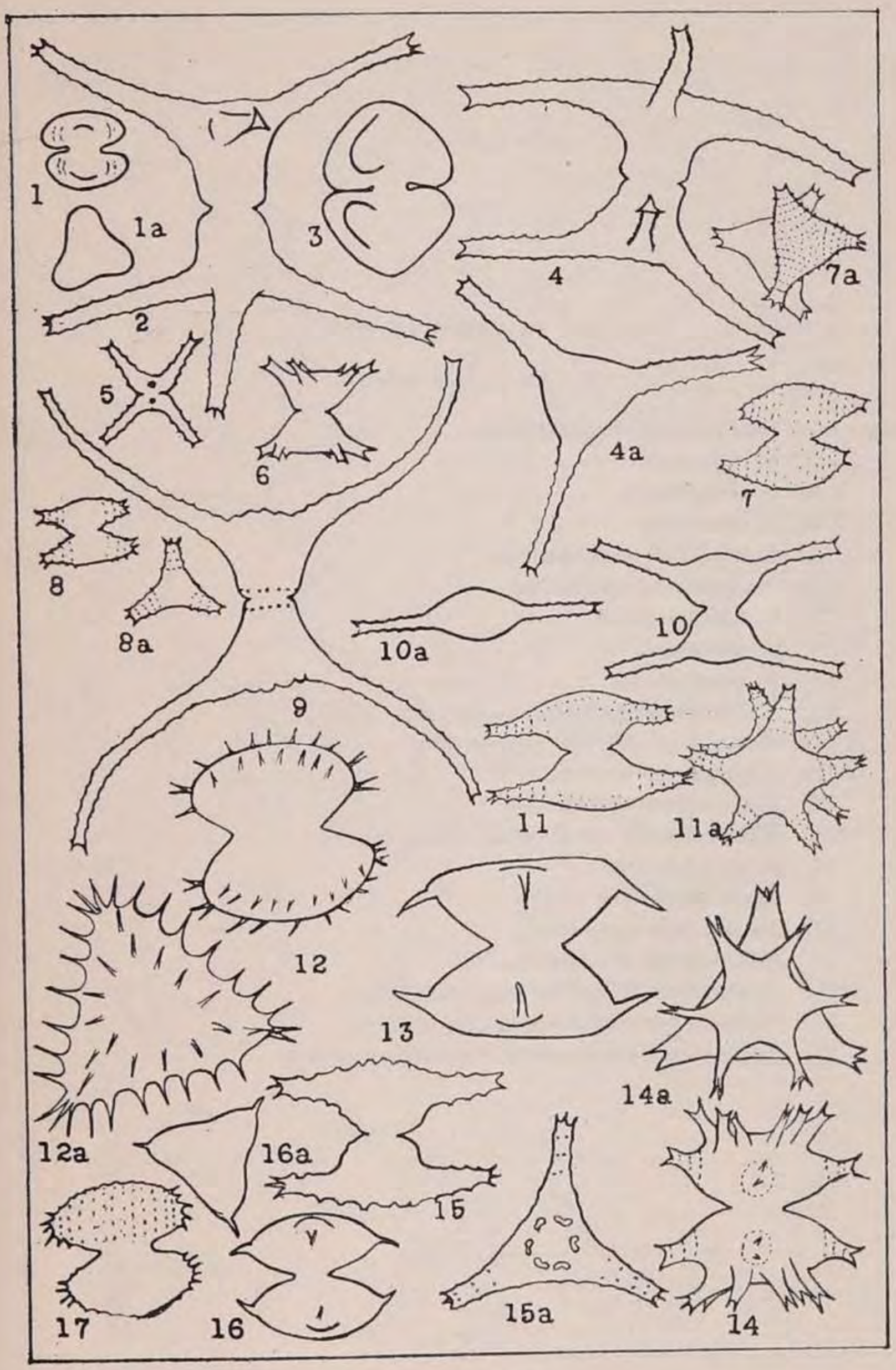
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PLATE XXXIV

PLATE XXXV.

(All figures x 542).

Fig. 1-1a. Staurastrum denticulatum.
2. S. dejectum.
3-3a. S. crenulatum.
4-4a. S. alternans.
5. Xanthidium antilopaeum.
6-6a. Staurastrum apiculatum.
7. S. controversum.
8. S. connatum.
9-9a. S. brevispinum.
10. Xanthidium antilopaeum var. nov. (?).
11-11a. X. antilopaeum var. polymazum.
12-12a. Staurastrum avicula.
13. Staurastrum chaetoceros.
14. Sphaerozosma vertebratum forma minor.
15. S. vertebratum.
16. Staurastrum punctulatum.
17. Xanthidium concinum.
18. Staurastrum articulatum.
19. Xanthidium cristatum var. uncinatum.
20. Sphaerozosma aubertiana var. archeri.
21. Xanthidium antilopaeum var. minneapolense.

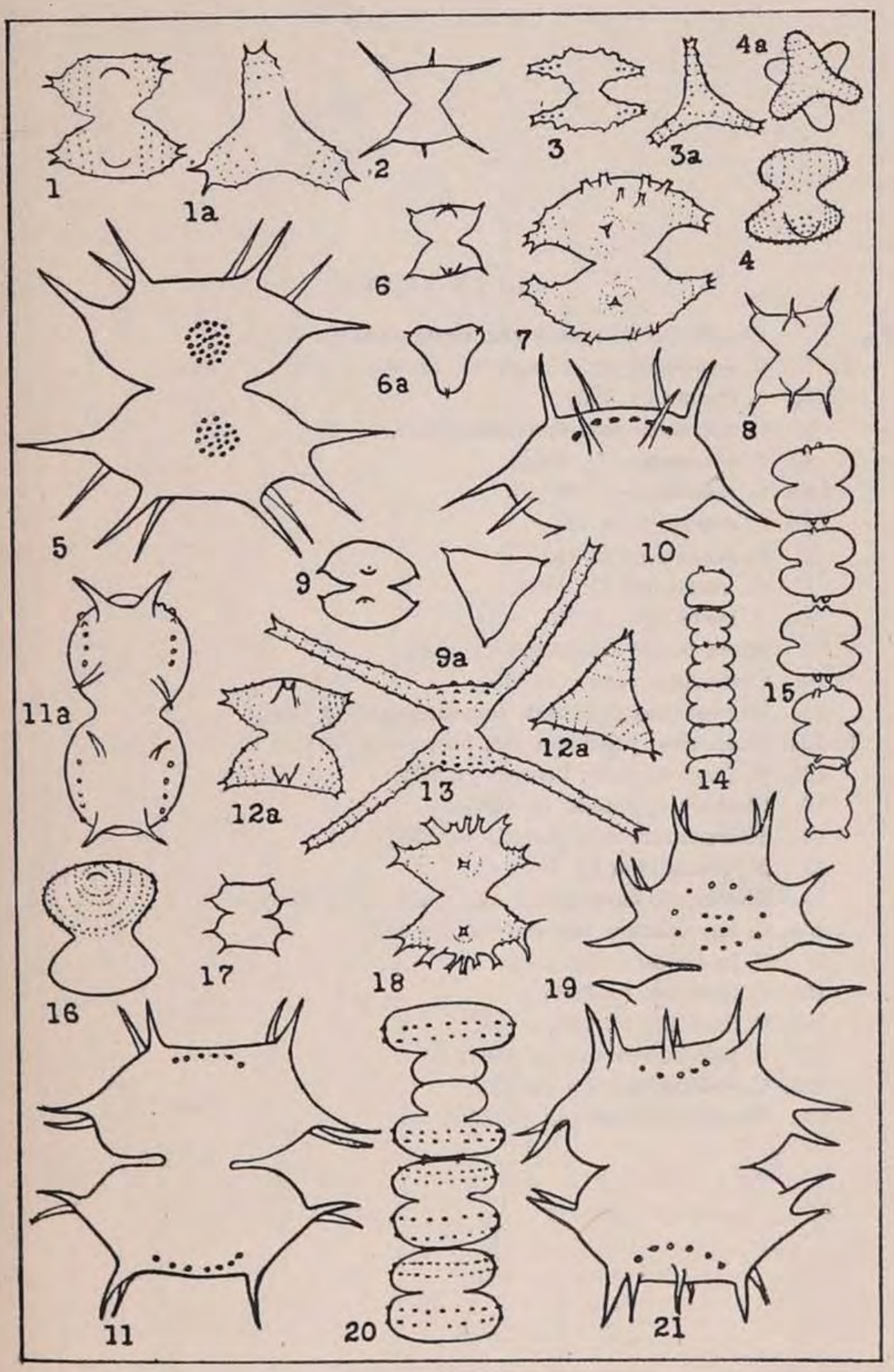
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PLATE XXXV

PLATE XXXVI.

Fig. 1. Closterium acerosum var. elongatum (x 73).
2. C. acerosum var. elongatum (x 350).
3. C. dianae (x 350).
4. C. acerosum var. minus (x 250).
5. C. eboracense (x 350).
6-6a. C. costatum (x 350).
6b. C. costatum (x 73).
7. C. jenneri (x 325).
8. C. kuetzingii (x 350).
8a. C. kuetzingii (x 73).
9. Micrasterias americana (x 350).
10. Closterium venus (x 350).
11. Micrasterias apiculata var. fimbriata (x 350).
12-12a. Closterium juncidum var. brevior (x 73).
12b. C. juncidum var. brevior (x 73).
13. Closterium gracile (x 350).
14. Micrasterias rabenhorstii (x 350).
15. M. pinnatifida (x 350).
16. Closterium lanceolatum var. parvum (x 280).
16a. C. lanceolatum var. parvum (x 135).
17. C. laterale (x 73).
18. C. lineatum (x 350).
18a. C. lineatum (x 73).
19. C. pritchardianum (x 350).
19a. C. pritchardianum (x 73)
20. Micrasterias radiata (x 350).

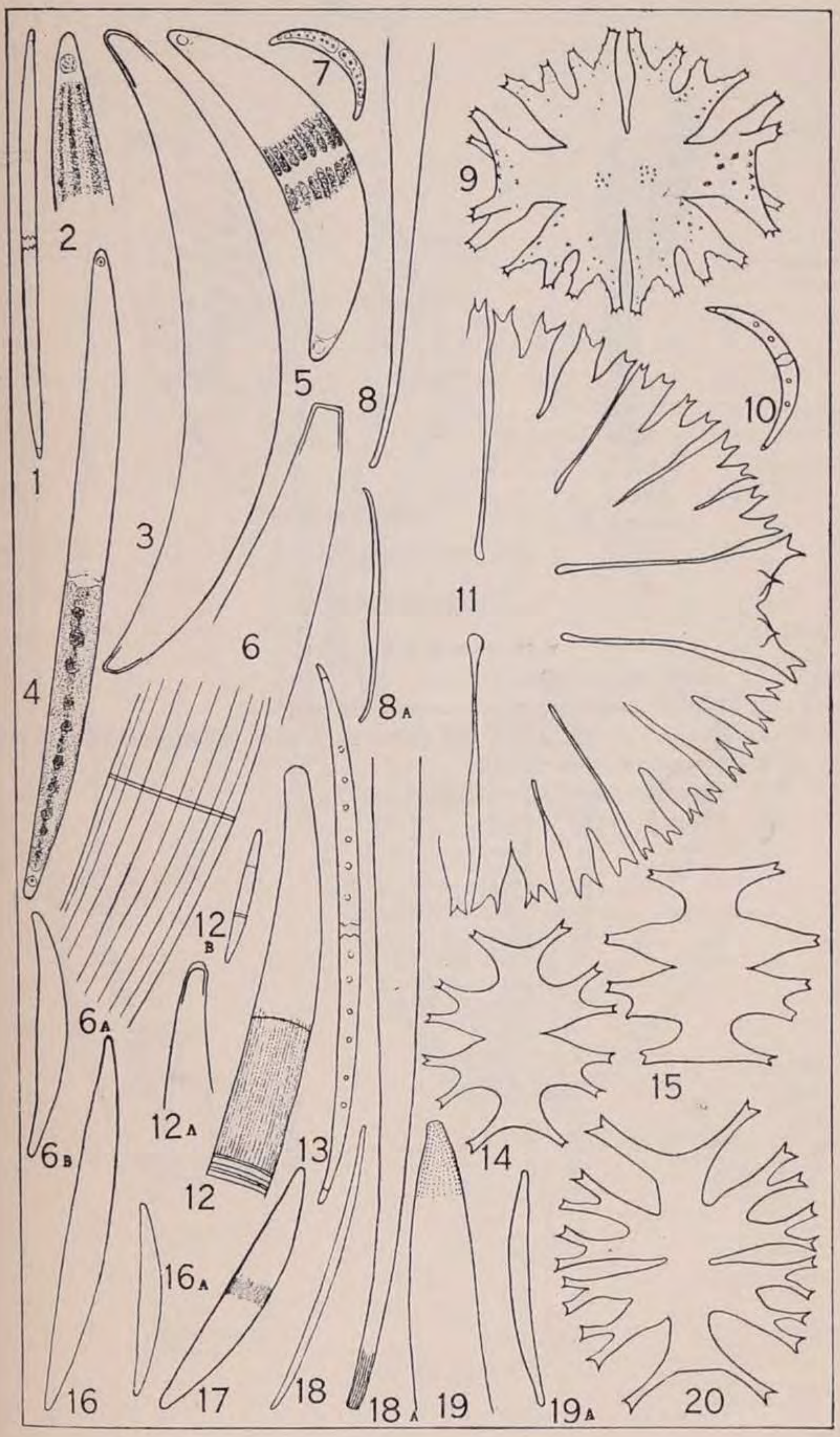
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PLATE XXXVI

PLATE XXXVII.

Chara inconnexa

(All figures after Allen)

Fig. 1. Lower sterile section (x 77).
2. Higher verticel with sex organs (x 77).
3. Upper verticel, (3 of the 7 leaves, 1 with fertile node). (x 77).
4. Section of stem (x 77).
5. Terminal articulations of leaf (x 77).
A. Plant (x 0.8).

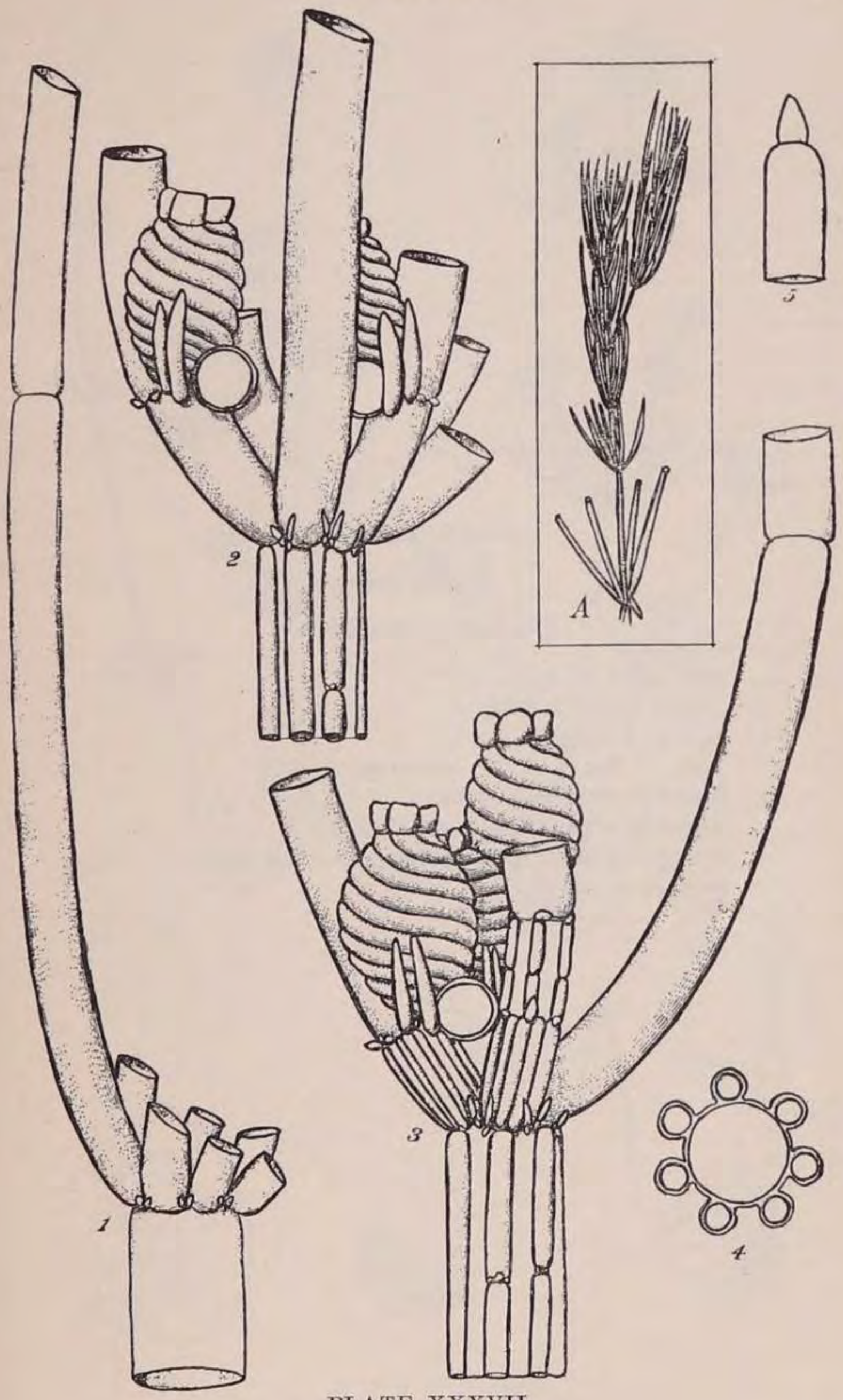

PLATE XXXVII

PLATE XXXVIII.

Nitella opaca

(All figures after Groves)

Fig. 1. Male plant (x 0.8).
2. Female plant (x 0.8).
3-6. Apices of dactyls (x 30).
7. Apex of dactyl of var. attenuata (x 30).
8. Branchlet-node with antheridium (x 15).
9. Branchlet-node with oogonia (x 30).
10. Mature oogonium after shedding coronula (x 30).
11. Oospore (x 30).

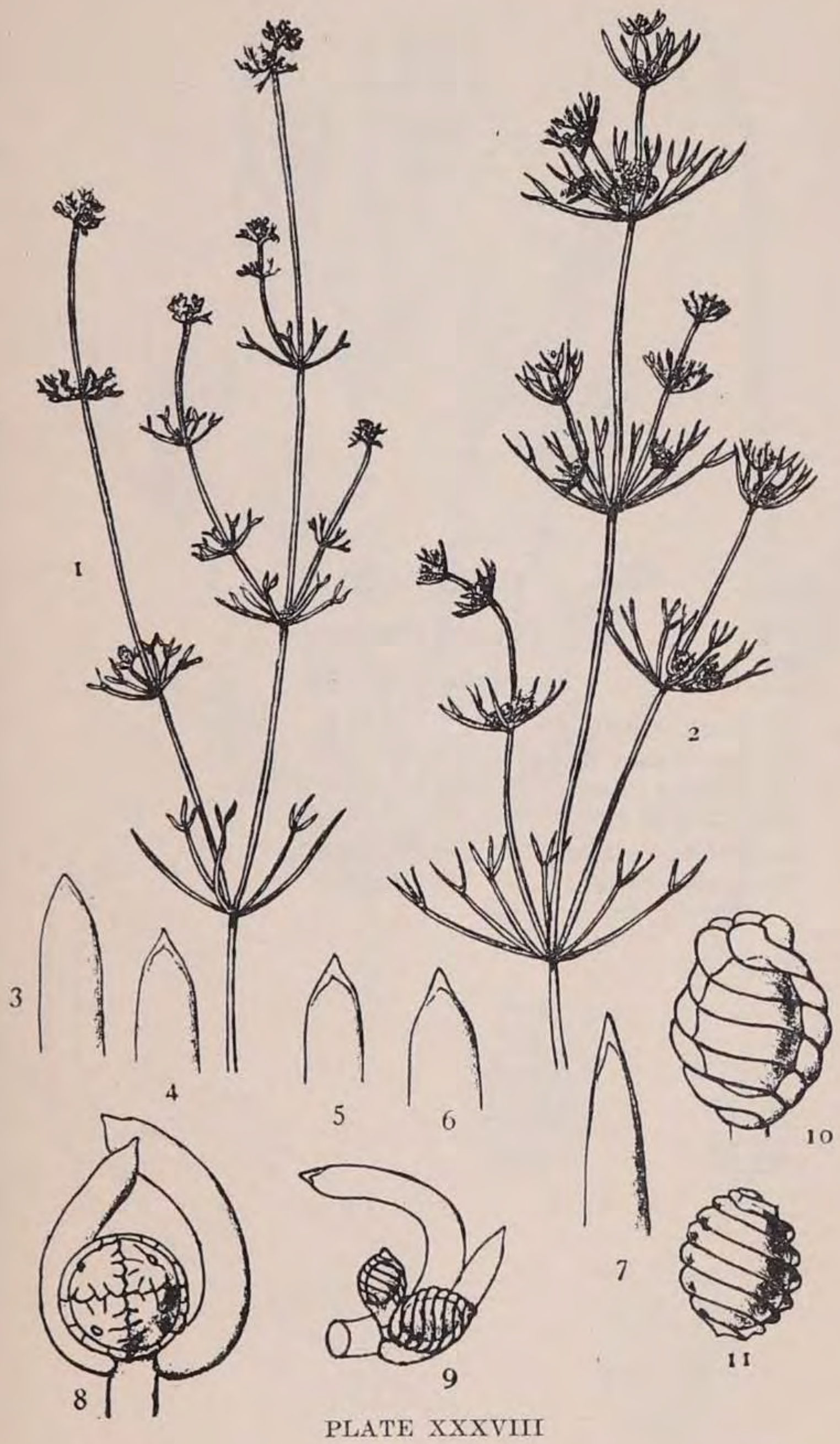

PLATE XXXVIII

PLATE XXXIX.

Tolypella glomerata

(All figures after Groves)

Fig. 1. Plant (x 0.8).
2. Tip of plant (x 0.8).
3. Fruiting branchlet (x 15).
4. Oogonium (x 30).
5. Mature oogonium after shedding coronula (x 30).
6. Oospore (x 30).

PLATE XXXIX

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