THE FRESH WATER ALGAE OF MISSION WELL AND TYKESON POND, MONTANA (EXCLUDING DESMIDS AND DIATOMS)

Thesis for the Degree of M. S.

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Ronald W. Hoham

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ABSTRACT

THE FRESH WATER ALGAE
OF MISSION WELL AND TYKESON POND, MONTANA
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by Ronald W. Hoham

The major objectives in this study were:

1) to collect and identify the fresh water algae, excluding desmids and diatoms;
2) to compare two types of ponds lying at quite different altitudes;
3) to check on variability of flora through summer months over a two year period.

Methods used in collecting algae were as follows:

1) taking plankton hauls using No. 25 silk bolting cloth plankton net;
2) scraping substrates: submerged logs and rocks;
3) dipping vials for bottom samples;
4) squeezing living aquatic plants and non-living debris.

Samples were examined in both living and preserved condition. All samples were preserved in a 6:3:1 solution (water-95% alcohol-formalin) added to the sample in a one to one volume. Each alga collection was examined until no new taxa were noted.

Camera lucida drawings were made of each taxon encountered and measurements were recorded.

The author identified a total of 89 different algal genera, 215 different species, and 244 different taxa from Mission Well and Tykeson Pond, excluding desmids and diatoms. Sieminska[1] recorded four additional taxa from Mission Well not found by the author from either pond. Thus 219 different species and 248 different taxa are known, of which eight or 3.2% of the latter are new. Eighty-seven species and 108 taxa are exclusively in Mission Well, 75 species and 78 taxa are exclusively in Tykeson Pond, and 57 species and 62 taxa are common to both ponds.

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[1]J. Sieminska, "Algae from Mission Well Pond, Montana," Trans. Amer. Microscop. Soc., LXXXIV, No. 1 (1965), 98-126.

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By

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A THESIS

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I also want to thank J. B. Seago, Soil Scientist, and John Cloniger at the Soil Conservation Office in Polson, Montana, for their useful information on soils; and Arthur B. Whitney, Fire Control Ranger Assistant at the Swan Lake District of the Flathead National Forest, Montana, for his general information on both ponds.

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INTRODUCTION

The author began this study in July, 1965, at the University of Montana Biological Station. The research project undertaken was suggested by Dr. G. W. Prescott, Professor of Botany, Michigan State University. The areas studied were Mission Well and Tykeson Pond, both of which lie in the northern Mission Mountains of northwestern Montana. The two ponds are located east of Flathead Lake and west of Swan Lake. In reference to Flathead Lake, Mission Well is approximately 4.5 miles (7.2 kilometers) northeast of Yellow Bay, and Tykeson Pond is approximately 2.5 miles (4.0 kilometers) northeast of Woods Bay.

Mission Well has been referred to as Mission Wells Pond; however, the author used Mission Well throughout this text in reference to this pond as listed on the Flathead National Forest Swan Lake Ranger District Map, 1965. The name Mission Well does not refer to the well at the east end of the pond. Tykeson Pond does not have an official name. The author used Tykeson Pond throughout this text because it is called this by the District Ranger Station, Bigfork, Montana.

The areas studied interested the author initially for several reasons. From previous investigations by alga classes at the University of Montana Biological Station, these two ponds, at markedly different altitudes, were found to have an algal flora exceeding those of other bodies of water examined in the Flathead and Swan Valleys. It was also expected that the abundant aquatic plants and fallen trees in both bodies of water would provide additional suitable substrates for algae.

The major objectives in this study were:

1) to collect and identify the fresh water algae, excluding desmids and diatoms;
2) to compare two types of ponds lying at quite different altitudes;
3) to check on variability of flora through summer months over a two year period.

Minor aspects included a study of the aquatic plants and the pH.

METHODS AND PROCEDURES

Samples of algae were collected from the shoreline as well as from the more open water in both ponds. Refer to Maps I and II and their legends, pages 128-131, for collecting stations. Methods used include the following:

a) taking plankton hauls using No. 25 silk bolting cloth plankton net;

b) scraping substrates: submerged logs and rocks;

c) dipping vials for bottom samples;

d) squeezing living aquatic plants and non-living debris.

Samples were examined in both living and preserved conditions. All samples were preserved in five-dram plastic vials in a 6:3:1 solution (water-95% alcohol-formalin) added to the sample in a one to one volume.

pH readings were taken with a Beckman Pocket pH meter; this instrument was checked against a different pH kit for accuracy. The elevation of Mission Well was recorded by Calvin Ryder (1966), University of Montana, using a Thommen altimeter.

Each alga collection was examined until no new taxa were noted; thus some vials were checked more extensively than others. Camera lucida drawings were made of each taxon encountered and measurements were recorded.

Most of the other aquatic plants were identified in the field; in a few instances, specimens were pressed, then identified in the laboratory. Identifications of these aquatic plants were based primarily on Steward, Dennis, and Gilkey (1960). Other references used were: Fassett (1960) and Fernald (1950).

GENERAL FEATURES OF THE AREAS STUDIED

SOILS

There are currently no soil maps available for the immediate areas concerned. According to J. B. Seago, Soil Scientist, Polson, Montana, soil maps will probably not be available for the Mission Well-Tykeson Pond vicinities within the next fifteen years. Much of the information on this topic was contributed by this soil scientist. Mr. Seago's contribution was supplemented by the United States Department of Agriculture (1960), Soil Survey of Upper Flathead Valley Area, Montana.

1) Soils in the general vicinity of Tykeson Pond of lower Swan Valley, Lake County, Montana.

In the immediate vicinity of the pond and lower elevations to the north and east, Krause gravelly loam is the major soil. This soil has fewer large stones on the surface and in the soil than the other Krause soils.

At higher elevations to the west and south from the pond, Whitefish stony silt loam is the major soil. This soil has large stones and boulders on the surface and in the soil.

2) Soils in the general vicinity of Mission Well, Lake County, Montana.

Holloway stony loam is the major soil. This soil has developed under coniferous forest in materials of quartzite and argillite rock origin. The soil profile consists of a thin (less than two inch) forest mat, a brown iron stained stony loam upper mineral soil horizon 8 to 24 inches thick overlaying a light gray, very cobbly eluviated horizon that extends into fractures of the bedrock. Depth to bedrock ranges from 40 to more than 72 inches below the soil surface.

The Holloway and Krause soils are classified as Brown Podzolics. They differ in that the Holloway has a higher percentage of clay and silt size particles in the lower soil horizons. The Holloway has very cobbly loam texture whereas the Krause has developed in alluvium overlaying outwash.

The Krause series consists of shallow, loamy soils over loose, coarse materials. The parent material was derived mainly from gray, green, and reddish argillite, quartzite, and dolomitic limestone. It contains gravel, cobbles, and large stones. Krause soils developed under a cover of fir, lodgepole pine, and spruce and some deciduous shrubs and coarse grasses. These soils are excessively drained and have a very thin, grayish-brown, gravelly loam surface soil and a yellowish-brown gravelly loam subsoil about one foot thick. Below are gravelly sands.

The Whitefish soil is classified as Gray Wooded. This series consists of deep, well-drained, light-colored, silty soils containing some gravel and underlain by gray, calcareous till. These soils have developed from calcareous, medium-textured, glacial till containing a large percentage of round gravel, cobbles, and large stones. This material was derived from gray, green, and reddish argillite, quartzite, and dolomitic limestone. The native vegetation is a dense forest of ponderosa pine and Douglas-fir, some birch and aspen, and a scattering of balsam fir and white pine. These soils have a light-gray to almost white surface soil, about eight inches thick. The subsoil is a light-brown silty material with a blocky structure.

GLACIOLOGY

A brief note on glaciers of the Mission Range is discussed by Alden (1953, p. 111):

> From Saint Marys Lake (Tabor Reservoir) in T. 17 N., R. 18 W. in the valley of Dry Creek, southeast of Saint Ignatius, northward to the mouth of Swan River near the town of Bigfork, a distance of more than 50 miles, the Western flank of the Mission Range overlooks the Flathead basin. In most of the northern half of this extent the western flank of the range rises abruptly from the eastern shore of Flathead Lake. During the Wisconsin stage of glaciation the great southward-moving Flathead glacier occupied the lake basin and crowded up along the mountain wall to heights decreasing southward from something like 2,000 ft to a few hundred feet in T. 22 N. Here the Polson terminal moraine diverges from the mountain front and extends southwestward to the river below Polson. The Polson moraine appears to mark the southern limit of the advance of ice in the Rocky Mountain Trench during the Wisconsin stage of glaciation. North of this limit small glaciers on the upper west flank of the Mission Range probably merged with the marginal ice of the great trunk glacier. South of the Polson moraine large, separate mountain

> glaciers occupied ten or more of the deep gorges that gash the west flank of the range, and they deposited noteworthy terminal moraine loops at the foot of the range. None of these terminal morainal deposits has been differentiated as of pre-Wisconsin age, and it therefore seems that the mountain glaciers were fully as long as the maximum of the last advance as at any earlier stage.

In another note, Alden (1953, p. 117) discussed the glaciers of the Mission Range and Swan Range:

> East of Lake Blaine and not far south of the point where the northern front of the Swan Range changes from a southerly to a southeasterly trend, a projecting spur ends in a triangular facet. The Swan Range and the Mission Range stand en échelon and between them for 50 to 60 miles south-southeast is the valley that Swan River drains northward through Swan Lake and thence westward to Flathead Lake, through a gap in the hills near the town of Bigfork. Judging from available non-topographic maps and from distant views at intervals from the road near the river, much of the eastern flank of the Mission Range, like its western flank, especially the southern half, is gashed by canyons that have been heavily scoured by mountain glaciers. Apparently the west flank of the Swan Range also was glaciated, although less severely. Presumably the glaciers in these several gorges were tributary to a great branch glacier that moved northward and joined the Flathead glacier almost head-on between Bigfork and Lake Blaine. However, though there is much glacial till along State Route 31 in the valley of Swan River, no striated ledges or other evidences were noted to show that the Swan River glacier moved northward. About a mile south of the village of Bigfork, ledges exposed beside the road show striae made by the Flathead glacier moving southward.

OBSERVATIONS AND RESULTS

MISSION WELL

PHYSICAL FEATURES

On the Mission Mountain divide, Mission Well (SW $\frac{1}{4}$ of SW $\frac{1}{4}$, Section 24, T25N, R19W) lies at an altitude of 5275 feet (1608 meters). On August 5, 1965, the greatest diameter of the pond from NNW to SSE was approximately 127 meters. The greatest lengths recorded were approximately 160 meters from NW to SE and 157 meters from W to E. The greatest depth recorded on July 26, 1966, was 1.3 meters. Refer to Map III, page 133.

WATER

Arthur B. Whitney, Fire Control Ranger Assistant at the Swan Lake District of the Flathead National Forest, took several borings in 1945 in search of a possible water source for Mission Well. He found the water body not to be spring fed, and the well dug several years ago at the east end received its water supply directly from Mission Well itself. Thus, one would have to assume that water runoff from the surrounding mountain sides is the only means by which Mission Well is replenished. Mission Well is situated far above the water table to receive any supply from this source. If the water level were ever high enough to overflow, it would drain in a NW direction toward Bohannon Creek which flows from east to west.

Sieminska (1965) states the pH of Mission Well during summer months to be approximately 6.7 (according to information provided for her by Dr. R. B. Brunson). At no time did the author find the pH to be that low. pH, as recorded for August 5, 1965, and July 26-27, 1966, varied between 7.2-8.3. Refer to Map III and its legend, pages 132-133. Undoubtedly, the pH varies throughout the year. According to Prescott (1962), the algal species *Eremosphaera viridis* DeBary may be used as an index organism for acid conditions in which the pH is 6.0-6.8. It is interesting to note that this species was found in Mission Well on August 5, 1965, when two pH readings were recorded as 8.1 and 8.3.

VEGETATION (other than algae)

Mission Well is surrounded by towering spruce, the one exception being the south shoreline. This open exposed area was logged in 1962, and the log piles were burned in 1963.

Eleven different taxa of mostly higher aquatic plants were found. Of these *Carex rostrata* Stokes is the dominant marginal plant and *Nuphar variegatum* Engelmann is the prominant species in the more open water. *Carex rostrata* and *Menyanthes trifoliata* Linnaeus are the dominant species on the two floating mats. For other taxa, refer to Map V and its legend, pages 136-137.

VEGETATION (algae)

The author recorded 74 genera, 139 species, and 165 taxa from Mission Well, excluding desmids and diatoms. Sieminska (1965) recorded five additional species not found by the author, thus 144 species and 170 taxa are known. These are as follows:

DIVISION	GENERA		SPECIES		ALL TAXA	
	Total No.	% Found	Total No.	% Found	Total No.	% Found
CHLOROPHYTA	38	51.3	82	56.9	106	62.3
CHRYSOPHYTA	8	10.8	12	8.3	12	7.1
EUGLENOPHYTA	5	6.8	8	5.6	9	5.3
PYRRHOPHYTA	4	5.4	5	3.5	5	2.9
CYANOPHYTA	19	25.7	37	25.7	38	22.4

Sieminska (1965) recorded 84 taxa of desmids from Mission Well. The author did not undertake this group of Chlorophyta since D. C. Jackson, Michigan State University, is currently working on these from Mission Well. He has thus far recorded (personal communication) approximately 145 desmid taxa. All algae considered (except diatoms), approximately 315 different taxa are known from Mission Well.

TYKESON POND

PHYSICAL FEATURES

At the base of the Mission Mountains, Tykeson Pond (NW ¼ of NW ¼, Section 15, T26N, R19W) lies at elevation 3100-3200 feet (940-970 meters). On August 5, 1965, the greatest diameter of the pond from S to N was approximately 54 meters. The greatest length recorded was approximately 86 meters from WSW to ENE. The greatest depth recorded on July 26, 1966, was 2.1 meters. Refer to Map IV, page 135.

WATER

As in Mission Well, Arthur B. Whitney found no evidence that Tykeson Pond was spring fed. It too is replenished by water runoff from the surrounding mountain and hill sides. This pond is situated high enough above the water table to receive any supply from this source. If Tykeson Pond were ever high enough to overflow, it would drain in an easterly direction towards Loon Lake.

The pH, as recorded for July 15, 1965, August 3, 1965, and August 5, 1965, varied between 7.4-8.2. Refer to Map IV and its legend, pages 134-135.

VEGETATION (other than algae)

Tykeson Pond is surrounded primarily by <u>Pinus contorta</u> Douglas var. <u>murrayana</u> Engelmann (lodgepole pine), <u>Thuya</u>

plicata D. Don (western red cedar), *Abies grandis* Lindley (grand fir), and *Larix occidentalis* Nuttall (western larch). The northwest shoreline is primarily exposed where the logging road nears the pond.

Twenty-three different taxa of mostly higher aquatic plants were found, two other taxa of macroscopic algae were recorded. Refer to Map VI and its legend, pages 138-139. *Potentilla palustris* (Linnaeus) Scopoli is the more dominant plant both along the margin and on the floating mat. *Nuphar variegatum* Engelmann is a prominent species in the more open water. Other dominant species on the floating mat are *Menyanthes trifoliata* Linnaeus and *Utricularia vulgaris* Linnaeus.

VEGETATION (algae)

The author recorded 70 genera, 131 species, and 140 taxa from Tykeson Pond, excluding desmids and diatoms. These are as follows:

DIVISION	GENERA		SPECIES		ALL TAXA	
	Total No.	% Found	Total No.	% Found	Total No.	% Found
CHLOROPHYTA	37	52.9	69	52.7	74	52.9
CHRYSOPHYTA	8	11.4	15	11.5	15	10.7
EUGLENOPHYTA	4	5.7	7	5.3	8	5.7
PYRRHOPHYTA	4	5.7	5	3.8	5	3.6
CYANOPHYTA	17	24.3	35	26.7	38	27.1

Dennis C. Jackson, Michigan State University, is currently working on the desmids from Tykeson Pond. He has thus far recorded (personal communication) approximately 97 desmid taxa. All algae considered (except diatoms), approximately 237 different taxa are known from Tykeson Pond.

The author recorded a total of 89 different algal genera, 215 different species, and 244 different taxa from Mission Well and Tykeson Pond, excluding desmids and diatoms. Sieminska (1965) recorded four additional species from Mission Well not found by the author from either pond. Thus, 219 different species and 248 different taxa are known, of which eight or 3.2% of the latter are new. Eighty-seven species and 108 taxa are exclusively in Mission Well, 75 species and 78 taxa are exclusively in Tykeson Pond, and 57 species and 62 taxa are common to both ponds. These 248 taxa are discussed in the following section on systematics. For individual comparisons between the two ponds, refer to Table I, page 15.

TABLE I

COMPARATIVE TABLE OF THE TWO AREAS STUDIED

	MISSION WELL	TYKESON POND
Elevation	5275 feet (1608 meters)	3100-3200 feet (940-970 meters)
Greatest diameter of pond	127 meters	54 meters
Greatest length of pond	160 meters	86 meters
Greatest depth of pond	1.3 meters	2.1 meters
pH ranges: summer months	7.2-8.3	7.4-8.2
Aquatic plants no. of taxa	11	23
Algae (excluding desmids)		
no. of genera	74	70
no. of species	144	131
no. of taxa	170	140
no. of new taxa	6	2
Algae (including desmids)		
no. of desmids	145	97
no. of all taxa	315	237

SYSTEMATICS

The following is a list of all algae encountered by the author from both Mission Well and Tykeson Pond. The arrangement of taxa above the generic level follows that of Prescott (1962). All taxa below the family level are listed alphabetically under the family. Information is included in the following sequence:

1. Complete author citation followed by reference, page number, and year.
2. Plate and figure numbers for this text.
3. Reference from which the alga was identified.
4. Cell dimensions, colony dimensions, etc. (based upon the author's collections).
5. This may be followed by a discussion if identification is questionable or if clarity is needed.
6. Occurrence (vial number).

Division Chlorophyta

Class Chlorophyceae

Order Volvocales

It should be noted that few members of this order were found during this study although one might expect to find more taxa from such a large group of flagellates in the type of habitat studied.

Family Volvocaceae

Eudorina Ehrenberg, Phys. Abhandl. Konigl. Akad. Wiss. Berlin, 78. 1832a.

Eudorina elegans Ehrenberg, Phys. Abhandl. Konigl. Akad. Wiss. Berlin, 78. 1832a.

(Pl. XXVIII, Fig. 1)

See Prescott (1962, p. 76).

Cells 8.5-10.0μ diam.; colony 57.0μ diam.

Tykeson Pond. Collector: D. C. Jackson, coll. no. 2067 and 2081, Michigan State University. It is noteworthy that this species was not found in the author's 1965-1966 collections, but was very abundant in 1962 collections.

Pandorina Bory, Dictionnaire d'histoire naturelle, 600. 1824.

Pandorina morum Bory, *Dictionnaire d'histoire naturelle*, 600. 1824.

(Pl. I, Fig. 1)

See Prescott (1962, p. 75).

Cells 12.4-13.9μ diam.; 14.3-17.4μ long.

Mission Well (A-7; H-22, 23); Tykeson Pond (x-3, B-14).

Volvox Linnaeus, *Systema naturae*. *Regnum animale*. 1: 820. 1758.

Volvox tertius A. Meyer, *Bot*. *Z*. 54: 188. 1896.

(Pl. I, Fig. 3)

See Prescott (1962, p. 79).

Cells 5.0-5.7μ diam.; colony 302.6μ diam.; daughter colonies 34.8-38.3μ diam.

A spherical colony; individual cell sheaths evident; eight daughter colonies visible.

Tykeson Pond (C-2).

Volvox sp.

An unidentified species of *Volvox* was found in Mission Well.

Order Tetrasporales

Family Palmellaceae

Asterococcus Scherffel, *Ber*. *Deut*. *Bot*. *Ges*. 26(A): 762. 1908.

Asterococcus limneticus G. M. Smith, *Trans*. *Wisc*. *Acad*. *Sci*. 19: 627. 1918.

(Pl. I, Fig. 6)

See Prescott (1962, p. 86).

Cells 16.5-20.9μ diam.; colony 52.5μ diam.

Mission Well (G-1); Tykeson Pond (x-2).

Asterococcus superbus (Cienkowski) Scherffel, *Ber*. *Deut*. *Bot*. *Ges*. 26(A): 762. 1908.

(Pl. I, Fig. 5)

See Pascher (1915, Part 5, p. 33).

Cells 27.9μ diam.

Tykeson Pond (x-8).

Gloeocystis Naegeli, *Gattungen einzelligen Algen*, *physiologische und systematische bearbeitet*, 65. 1849.

Gloeocystis ampla (Kuetzing) Lagerheim, *Oefv*. *Kongl*. *Sv*. *Vet*.-*Akad*. *Forhandl*. 40(2): 63. 1883.

(Pl. II, Fig. 4)

See Prescott (1962), p. 84).

Cells 7.0-8.7μ diam.; 7.0-10.4μ long.

Somewhat globular colonies with unlamellated gelatinous envelopes; sheaths for each group of cells not confluent, but distinct and angular from mutual compression.

Mission Well (H-22); Tykeson Pond (x-15).

Gloeocystis botryoides (Kuetzing) Naegeli, *Gattungen einzelligen Algen, physiologische und systematische bearbeitet*. 1849.

(Pl. II, Fig. 3)

See Pascher (1915, Part 5, p. 35).

Cells 3.5 diam., 7.0μ long.

According to Pascher(1915), this species is dubious; however, the specimens found agree with the given description in Pascher. Cells are usually spherical, seldom elongate as in this instance.

Mission Well (H-18); Tykeson Pond (x-15).

Gloeocystis gigas (Kuetzing) Lagerheim, *Oefv. Kongl. Sv. Vet.-Akad. Forhandl.* 40(2): 63. 1883.

(Pl. I, Fig. 4)

See Prescott (1962, p. 84).

Cells 9.0-12.0μ diam.

Colony spherical, usually of eight cells; cells spherical or slightly oblong; the colonial mucilage and cell sheaths regularly lamellate.

Mission Well (H-15); Tykeson Pond (x-2). Previously reported from Mission Well by Sieminska (1965).

Gloeocystis major Gerneck *ex* Lemmermann, *Tetrasporales*. In A. Pascher, *Die Süsswasserflora Deutschlands, Oesterreiches und der Schweiz*. Heft 5. *Chlorophyceae* 2: 35. 1915.

(Pl. II, Fig. 1)

See Prescott (1962, p. 84).

Cells 17.8μ diam., 21.4μ long.

Chloroplast massive; cells surrounded by concentric layers of mucilage.

Tykeson Pond (x-2).

Gloeocystis planctonica (West & West) Lemmermann, *Tetrasporales*. In A. Pascher, *Die Süsswasserflora Deutschlands, Oesterreiches und der Schweiz*. Heft 5. *Chlorophyceae* 2: 34. 1915.

(Pl. I, Fig. 2)

See Prescott (1962, p. 85).

Cells 7.0μ diam.; colony 20.9μ diam.

Cells spherical; three-sided mucilaginous sheath; free-floating colony.

Mission Well (H-19).

Gloeocystis vesiculosa Naegeli, *Gattungen einzelligen Algen, physiologische und systematische bearbeitet*, 66. 1849.

(Pl. II, Fig. 2)

See Prescott (1962, p. 85).

Cells 4.0-6.0μ diam.; colony 53.5μ diam., 107.1μ long.

Colony of an amorphous expanded jelly-like mass with lamellate mucilage; cells spherical.

Tykeson Pond (x-2). Previously reported from Mission Well by Sieminska (1965).

Palmella Lyngbye, *Tentamen Hydrophytologiae Danicae*, 203. 1819.

Palmella mucosa Kuetzing, *Phycologia generalis, oder Anatomie, Physiologie und Systemkunde der Tange*, 172. 1843.

(Pl. III, Fig. 6)

See Prescott (1962, p. 83).

Cells 7.0-10.4μ diam., 8.0-11.0μ long.

Shapeless gelatinous mass, containing many spherical cells without any order of arrangement; cell sheaths distinct at first, becoming confluent with colonial mucilage as illustrated.

Mission Well (H-11); Tykeson Pond (x-9).

Palmodictyon Kuetzing, *Phycologia germanica, Deutschlands Algen in bündigen Beschreibungen*, 155. 1845.

Palmodictyon varium (Naegeli) Lemmermann, *Tetrasporales*. In A. Pascher, *Die Süsswasserflora Deutschlands, Oesterreiches und der Schweiz*. Heft 5. *Chlorophyceae* 2: 37. 1915.

(Pl. III, Fig. 1)

See Prescott (1962, p. 85).

Cells 5.2-7.0μ diam., 4.0-5.2μ long; filament 12.2-13.9-(24.0μ) diam.

Cells without individual sheaths; cells mostly spherical (this latter characteristic is very important, for at times, this species may resemble *Radiofilum flavescens* G. S. West which generally has larger cells mostly broader than long).

Mission Well (H-11).

Sphaerocystis Chodat, *Bull. Herb. Boiss.*, 119. 1897.

Sphaerocystis schroeteri Chodat, *Bull. Herb. Boiss.*, 119. 1897.

(Pl. III, Fig. 5)

See Prescott (1962, p. 83).

Cells 10.5-15.7μ diam.; larger daughter colony cells 5.2-5.8μ diam.; smaller daughter colony cells 3.0-3.5μ diam.

Mission Well (H-6); Tykeson Pond (x-2; B-8, 10, 14; C-2).

Family Tetrasporaceae

Schizochlamys A. Braun in Kuetzing, *Species algarum*, 891. 1849.

Schizochlamys gelatinosa A. Braun in Kuetzing, *Species algarum*, 891. 1849.

(Pl. III, Fig. 2)

See Prescott (1962, p. 90).

Cells 10.4-12.2μ diam.; colony 425.0μ diam.

Mission Well (H-12).

Family Coccomyxaceae

Elakatothrix Wille, *Biol. Centralbl.*, 302. 1898.

Elakatothrix viridis (Snow) Printz, *Mat.-Nat. Kl.* 1913(6): 31. 1914.

(Pl. III, Figs. 3, 4)

See Prescott (1962, p. 93).

Cells 5.2-7.1μ diam., 29.6-38.3μ long; colonies 20.9-31.3μ diam., 48.7-73.0μ long.

Cells taper to points at both poles, not having one rounded pole as in *E. gelatinosa* Wille, 1898.

Mission Well (H-12).

Order Ulotrichales

Family Ulotrichaceae

Radiofilum Schmidle, *Flora* 78: 47. 1894.

Radiofilum conjunctivum Schmidle, *Flora* 78: 48. 1894.

(Pl. IV, Fig. 1)

See Prescott (1962, p. 103).

Cells 7.1μ diam., 7.1μ long; filament 321.4μ long.

Cell wall halves evident.

Tykeson Pond (x-3).

Radiofilum flavescens G. S. West, *J. Bot.* 37: 57. 1899.

(Pl. IV, Fig. 2)

See Prescott (1962, p. 103).

Cells 6.0μ diam., 5.2μ long; filament 24.4μ diam.

Cells ellipsoid; cell wall halves not apparent.

Mission Well (H-18).

Ulothrix Kuetzing, *Flora* 16: 517. 1833.

Ulothrix subconstricta G. S. West, *J. Bot.* 53: 82. 1915.

(Pl. IV, Fig. 3)

See Prescott (1962, p. 96).

Cells 7.0μ diam., 13.9-26.1μ long.

Chloroplast extends through two-thirds of the cell; cells constricted at the cross walls.

Mission Well (H-18).

Ulothrix subtilissima Rabenhorst, *Florae Europaea algarum aquae dulcis et submarinae*, *Alg. Exsic.* No. 655, 1868.

(Pl. IV, Fig. 4)

See Prescott (1962, p. 96).

Cells 4.6μ diam., 10.7-12.4μ long.

Chloroplast nearly extending entire cell length; cells constricted at the cross walls.

Tykeson Pond (x-3).

Order Microsporales

Family Microsporaceae

Microspora Thuret, *Ann. Sci. Nat. Bot.* 14(3); 221. 1850.

Microspora loefgrenii (Nordstedt) Lagerheim, *Ber. Deut. Bot. Ges.* 5: 417. 1887.

(Pl. IV, Fig. 5)

See Prescott (1962, p. 107).

Cells 13.9μ diam., 12.1-13.9μ long.

Cells have thick wall-sections; cells short-cylindric, rectangular; three-fourths to twice the diameter in length.

Mission Well (H-4); Tykeson Pond (x-20).

Microspora pachyderma Lagerheim, *Ber. Deut. Bot. Ges.* 5: 415. 1887.

(Pl. IV, Figs. 6, 7)

See Prescott (1962, p. 108).

Cells 7.1-10.4μ diam., 14.3-17.4μ long.

Cells cylindrical, up to twice the diameter in length; wall sections evident.

Mission Well (H-4); Tykeson Pond (x-2, 15).

Microspora stagnorum (Kuetzing) Lagerheim, *Ber. Deut. Bot. Ges.* 5: 417. 1887.

(Pl. IV, Fig. 8)

See Prescott (1962, p. 108).

Cells 8.7μ diam., 24.4-38.8μ long.

Juncture of wall sections not evident in most cells; cells three to four times longer than broad; chloroplast a granular sheet not completely covering the wall. According to Pascher (1914, Part 5, p. 51), there are no constrictions at the cross walls. According to Prescott (1962, p. 108), cells are slightly constricted at the cross walls, as seen in this instance.

Mission Well (A-6).

Microspora tumidula Hazen, *Mem. Torrey. Bot. Club* 11: 117. 1902.

(Pl. IV, Fig. 9)

See Prescott (1962, p. 108).

Cells 7.1μ diam., 8.8-10.7μ long.

Cells are slightly constricted at the cross walls; chloroplast densely granular; cells one to two times as long as broad.

Mission Well (H-15); Tykeson Pond (x-2).

Order Cylindrocapsales

Family Cylindrocapsaceae

Cylindrocapsa Reinsch, *Abhandl. Naturh. Ges. Nürnberg* 3(1866): 66. 1867.

Cylindrocapsa conferta W. West, *J. Roy. Microscop. Soc.*, 735. 1892.

(Pl. V, Fig. 1)

See Prescott (1962, p. 110).

Cells 12.2-13.9μ diam., 7.0-12.2μ long; filament 15.7-17.4μ diam.

Cells short, quadrate to quadrangular-ovate; cells not as wide as usually found.

Tykeson Pond (B-4).

Cylindrocapsa geminella Wolle, *Freshwater algae of the U. S.*, 104. 1887.

(Pl. V, Fig. 2)

See Prescott (1962, p. 110).

Cells 14.3µ diam., 21.4µ long.

Tykeson Pond (x-2).

Order Chaetophorales

Family Chaetophoraceae

Microthamnion Naegeli in Kuetzing, *Species algarum*, 352. 1849a.

Microthamnion kuetzingianum Naegeli in Kuetzing, *Species algarum*, 352. 1849a.

(Pl. V, Fig. 4)

See Prescott (1962, p. 122).

Cells 4.0µ diam., 10.0-15.0µ long.

Main axis of the filament soon lost in the ramifications.

Mission Well (G vials).

Microthamnicn strictissimum Rabenhorst, *Die Algen Sachsen's*, No. 289. 1859.

(Pl. V, Fig. 3)

See Prescott (1962, p. 122).

Cells 3.0-3.5μ diam., 24.4μ long (max. length).

Main axis of the filament is distinct throughout the thallus.

Mission Well (G vials); Tykeson Pond (x-20).

Protoderma Kuetzing, *Phycologia generalis, oder Anatomie, Physiologie und Systemkunde der Tange*, 295. 1843.

Protoderma viride Kuetzing, *Phycologia generalis, oder Anatomie, Physiologie und Systemkunde der Tange*, 295. 1843.

(Pl. V, Fig. 5)

See Prescott (1962, p. 123).

Cells 7.1μ diam. (max.); 10.7μ long (max.).

Pseudoparenchymatous disc of horizontally growing filaments, closely arranged and semiradiate; branches become free and apparent at margin of thallus; walls thin, without setae; chloroplast a parietal disc with one pyrenoid.

Attached to filamentous green algae.

Tykeson Pond (x-2).

Family Coleochaetaceae

Chaetosphaeridium Klebahn, *Pringsh. Jahrb. Wiss. Bot.* 24: 276. 1892.

Chaetosphaeridium pringsheimii ? conferta Klebahn, *Pringsh. Jahrb. Wiss. Bot.* 24: 307. 1893.

(Pl. VI, Fig. 1)

See Pascher (1914, Part 6, p. 145).

Cells 10.5μ diam.

Because of dimensions and the presence of a short utricle, this has been identified as *C. pringsheimii* f. *conferta*; this form differs from the typical by presence of a short utricle; cells as originally described, 9.0-12.0μ diam.; this form has cells densely arranged into layers; the form found is somewhat questionable since only a single cell appeared.

Epiphytic on *Microchaete* sp.

Tykeson Pond (x-2).

Chaetosphaeridium sp.

(Pl. VI, Fig. 2)

Cells 4.7-5.1μ diam.; setae 104.3μ long (max.).

This species has smaller cells than other described species of the genus. The combination of a small cell with a reticulate parietal chloroplast makes this indeed unusual; however, there may not be enough valid information to warrant this as a new taxon since it was very possible that such structures as connecting tubes were overlooked at the time this was observed; chloroplast with a single pyrenoid.

Attached to *Mougeotia* sp.

Tykeson Pond (x-5). (It should also be noted that the genus *Chaetosphaeridium* was found in the G vials from Mission Well).

Order Oedogoniales

Family Oedogoniaceae

Bulbochaete C. A. Agardh, *Synopsis algarum Scandinaviae, adjecta dispositione universali algarum*, XXIX. 1817.

Bulbochaete sp.

(Pl. VI, Fig. 3)

See Tiffany (1930, p. 28).

Veg. cells 17.4μ diam., 38.3μ long; oogonium 41.7μ diam., 34.8μ long; male cell 10.4μ diam., 31.3μ long.

Since androspores are not present and the exact position of the suffultory cells may be difficult to determine, this illustration may key to any of the following three species which have similar dimensions and characteristics:

B. intermedia: division of suffultory cell inframedium - median - supramedian.

B. nordstedii: gynandrosporous; suffultory cell superior (occasionally submedian).

B. polyandria: idioandrosporous; suffultory cell superior (rarely submedian).

Mission Well (H-22); the genus also reported from Tykeson Pond (Q-1).

Oedogonium Link, In C. G. H. Nees von Esenbeck, *Horae physicae berolinenses*, 5. 1820.

Oedogonium ambiceps (Jao) Tiffany, N. Amer. Flora 11(1): 79. 1937.

(Pl. VI, Fig. 6)

See Prescott (1962, p. 203).

Veg. cells 9.0-12.0-13.0μ diam., 22.0-42.0μ long; oogonia 32.0-38.0μ diam., 19.0-33.0μ long; oospores 19.0-33.0μ diam., 19.0-27.0μ long; androsporangia 11.0-13.0μ diam., 4.0μ long.

Mission Well (G vials).

Oedogonium sp.

(Pl. VI, Figs. 4, 5)

Cells 10.4μ diam., 38.3μ long; oogonia 31.3μ diam., 29.6μ long.

Since this specimen lacked oospores, identification was not possible.

Tykeson Pond (x-20).

It should be noted that other species of Oedogonium occur in both Mission Well and Tykeson Pond; however, they did not have reproductive structures necessary for identification.

Order Chlorococcales

Family Endosphaeraceae

Kentrosphaera Borzi, Studi algolocici 1: 87. 1883.

Kentrosphaera gloeophila (Bohlin) Brunnthaler, Protococcales. In A. Pascher, Die Süsswasserflora Deutschlands, Oesterreichs und der Schweiz. Heft 5. Chlorophyceae 2: 68. 1915.

(Pl. VI, Fig. 7)

See Prescott (1962, p. 214).

Cells 24.4μ diam., 31.3μ long.

Chloroplast axial, with extensions flattened at the wall to form irregularly shaped processes. This genus is often intermingled with other algae, sometimes found in the mucilage of blue-greens.

Mission Well (H-15, 20).

Family Characeae

Characium A. Braun in Kuetzing, Species algarum, 208. 1849.

Characium coronatum Reinsch, Abhandl. Naturh. Ges. Nürnberg 3(1866), 1867.

(Pl. VI, Fig. 11)

See Pascher (1915, Part 5, p. 78).

Cell 7.1μ diam., 28.6μ long (incl. stipe).

The dimensions given slightly exceed those reported in Pascher (1915). This species very closely resembles C. ambiguum Herman, 1863, the latter having a much shorter stipe.

Attached to Oedogonium sp.

Tykeson Pond (x-2).

Characium ornithocephalum A. Braun, *Algarum unicellularum genera nova vel minus cognita*, 42. 1855.

(Pl. VI, Fig. 10)

See Pascher (1915, Part 5, p. 80).

Cell 13.5μ diam., 32.1μ long from cell base to spine tip, 24.4μ long (excl. stipe and spine), 48.8μ long (from attaching disc to spine tip).

The illustration does not show the usual curvature; perhaps the position as viewed did not show this feature.

Epiphytic on *Scytonema* sp.

Tykeson Pond (x-2).

Characium pringsheimii A. Braun, *Algarum unicellularum genera nova vel minus cognita*, 37, 106. 1855.

(Pl. VI, Figs. 8, 9)

See Pascher (1915, Part 5, p. 80).

Cells 4.8-7.0μ diam., 15.7-17.4μ long (without stipe).

Attached to *Oedogonium* sp.

Mission Well (H-15); Tykeson Pond (x-20).

Family Hydrodictyaceae

Pediastrum Meyen, *Nova Acta Acad. Caes. Leop.-Carol.* 14: 772. 1829.

Pediastrum araneosum var. *rugulosum* (G. S. West) G. M. Smith, *Bull. Torrey Bot. Club.* 43: 476. 1916.

(Pl. VII, Fig. 1)

See Prescott (1962, p. 222).

Cells 15.7-22.2μ diam., 13.9-20.9μ long; colony 128.8μ diam. (longest dimen.).

Colonies found were of 32 cells; cell wall with coarse reticulations; processes of peripheral cells short.

Mission Well (H-12); Tykeson Pond (B-5).

Pediastrum boryanum (Turpin) Meneghini, Linnaea 14: 210. 1840.

(Pl. VII, Figs. 2-4)

See Prescott (1962, p. 222).

Cells 7.0-15.6μ diam., 10.2-17.4μ long; colonies 34.8-42.0-86.9μ diam.

Colonies of 8-16-32 cells. Incision of peripheral cells widely open, cell wall smooth or granulate.

Tykeson Pond (x-1, 8, 9; C-4).

Pediastrum braunii Wartman in Wartman & Schenk, Schweiz. Kryptogamen. Exsic. 1(32). 1862.

(Pl. VII, Figs. 6, 9)

See Skuja (1964, p. 124) and Pascher (1915, Part 5, p. 104).

4-celled colonies, cells 14.2-17.4μ diam., 10.4-12.2μ long; 8-celled colonies, cells 10.4-13.9μ diam., 10.4μ long; 16-celled colonies, cells 13.9μ diam., 13.9μ long.

In eight-celled colonies, cells connected along one-third their length; small interstices present. As found in the A-9 collection, *P. braunii* has somewhat undulate-warty basal thickenings where cells are in contact, and there are no processes in addition to the apical four. This species closely resembles *P. taylori* Sieminska, a species having more than four processes. Refer to *P. taylori*, page 37.

Mission Well (A-1, 3, 6, 9; H-4, 24).

Pediastrum duplex var. *cohaerens* Bohlin, *Bih. Kongl. Sv. Vet.-Akad. Handl.* 23, Afd. 3(7): 31. 1897.

(Pl. VII, Fig. 7)

See Prescott (1962, p. 224) and Pascher (1915, Part 5, p. 95).

Cells 10.4μ diam., 10.4-12.2μ long.

Cells smaller in diameter; this variety differs from the typical by having granular cell walls.

Tykeson Pond (B-5).

Pediastrum duplex Meyen, *Nova Acta Acad. Caes. Leop.-Carol.* 14: 772. 1829. var. *duplex*.

(Pl. VII, Fig. 8)

See Prescott (1962, p. 223).

Cells 7.8-9.7μ diam., 7.0-9.5μ long.; colony 33.0μ diam.

Colony distinctly perforate; lobes of peripheral cells not bifurcate as in *P. biradiatum* Meyen.

Tykeson Pond (x-8; B-6).

Pediastrum obtusum Lucks, *Jahrb*. *Westpr*. *Lehrevereins Narurk*., (reprint), 13. 1907.

(Pl. VIII, Fig. 1)

See Prescott (1962, p. 226).

Cells 8.7-10.4μ diam., 7.0-9.1μ long; colony 31.3μ diam.

Deep, narrow sinus forming two major lobes; the lobes incised to form bluntly rounded lobules.

Tykeson Pond (x-8).

Pediastrum taylori Sieminska, *Trans*. *Amer*. *Microscop*. *Soc*. 84(1): 100. 1965.

Described as a new species by Sieminska (1965) from Mission Well. This species very closely resembles *P*. *braunii* Wartmann morphologically, the latter having four alternate marginal processes on the peripheral cells. *P*. *taylori* differs by having additional medium processes both on the peripheral and on the inner cells of the colony. Very close attention was given to these two species by the author. A single colony of *P*. *taylori* was found, this being composed of eight cells. The dimensions agree with those given by Sieminska (length of cells with processes 9-17μ; breadth 9-16μ). A fifth median process was detected on two cells, the other six cells appearing to have only four alternate marginal processes as in *P*. *braunii*. According to Sieminska, *P*. *taylori* has delicate granules or punctae on the wall of the processes. This latter marking was not found in the plant observed by the author.

It may be very possible that these two taxa are but a single species.

Mission Well (H-25).

Pediastrum tetras Ralfs, *Ann. Mag. Nat. Hist.* 14(1): 469. 1844. var. *tetras*.

(Pl. VII, Figs. 5, 10)

See Prescott (1962, p. 227).

Cells 7.1-8.1μ diam. and length; colonies of 4-8 cells.

Mission Well (H-3, 22); Tykeson Pond (x-2, 3, 8). Previously reported from Mission Well by Sieminska (1965).

Pediastrum tricornutum Borge, *Bihang. Kg. Svenska Vet.-Akad. Handl.* 17, Afd. 3(4), 1892. var *tricornutum*.

(Pl. VIII, Fig. 2)

See Pascher (1915, Part 5, p. 104).

Cells 7.0-8.1-10.4μ diam., 8.1-10.4μ long.; colony 22.6μ diam.

Mission Well (H-11, 12).

Sorastrum spinulosum Naegeli, *Gattungen einzelligen Algen, physiologische und systematische bearbeitet*, 99. 1849.

(Pl. VIII, Fig. 3)

See Pascher (1915, Part 5, p. 201).

Cells 10.4μ diam., 13.9μ diam. (incl. spines), 6.7μ thick, 13.9μ long (max. length); spines 5.2μ long.

Two spines per angle.

Tykeson Pond (x-8, B-13).

Family Coelastraceae

Coelastrum Naegeli in Kuetzing, *Species algarum*, 195. 1849.

Coelastrum cambricum Archer, *Quart. J. Microscop. Sci.* 8: 65. 1868. var. *cambricum*.

(Pl. VIII, Fig. 4)

See Pascher (1915, Part 5, p. 195).

Cells 8.7μ diam.

There is the remote possibility that this specimen could be *C. cambricum* var. *nasutum* (Schmidle) G. S. West; however, it is very unclear how this variety differs from the typical.

Mission Well (H-14).

Coelastrum cambricum var. *intermedium* (Bohlin) G. S. West, *J. Linn. Soc. Bot.* 38: 136. 1907.

(Pl. VIII, Figs. 5, 6)

See Pascher (1915, Part 5, p. 195).

Cells 13.9-15.7-17.4μ diam.; colonies of 8-16 cells.

Mission Well (H-4, 7, 14, 15, 22; Y-1; Prescott 5 Mon 12, Mich. State Univ.); Tykeson Pond (x-5).

Coelastrum microporum Naegeli in A. Braun, *Algarum unicellularum genera nova minus cognita*, 70. 1855.

(Pl. VIII, Fig. 7)

See Pascher (1915, Part 5, p. 195).

Cells 9.6-20.9μ diam.

Intercellular connections of various widths.

Mission Well (A-9, H-22). Previously reported from Mission Well by Sieminska (1965).

Coelastrum rugulosum sp. nov.

(Pl. VIII, Fig. 8)

This new species differs from previously described species by having cells with wrinkled-like margins and asymmetrically arranged ribs which are usually not complete; cells spherical: 17.4-18.7μ diam.; a hollow spherical colony of eight closely adjoined cells.

C. rugulosum differs from *Enallax coelastroides* in having mostly spherical cells. *E. coelastroides* has smaller *Scenedesmus*-like cells that are longer than wide, 5.0-10.0μ diam. and 13.0-21.0μ long; the cells are generally arranged into a loose colony. Both species have undulate cell margins and ribs; however, the ribs of *E. coelastroides* are more symmetrical and usually complete. Refer to page 55 for additional information on *E. coelastroides*.

Mission Well (H-14).

Family Botryococcaceae

Botryococcus Kuetzing, *Species algarum*, 892. 1849.

Botryococcus braunii Kuetzing, *Species algarum*, 892. 1849.

(Pl. VIII, Fig. 9)

See Prescott (1962, p. 232).

Cells 3.5-4.0μ diam., 5.8-7.2μ long.

Mission Well (H-4); Tykeson Pond (x-9, 21; B-13).

Family Oocystaceae

Ankistrodesmus Corda, *Almanach de Carlsbad*, 196. 1838.

Ankistrodesmus falcatus var. *acicularis* (A. Braun) G. S. West, *A. treatise on the British freshwater algae*, 233. 1904.

(Pl. IX, Fig. 2)

See Prescott (1962, p. 253).

Cell 2.4μ diam., 38.3μ long.

Cells solitary and almost straight.

Mission Well (H-17).

Ankistrodesmus falcatus (Corda) Ralfs, *The British Desmidieae*, 180. 1848. var. *falcatus*.

(Pl. IX, Fig. 1)

See Prescott (1962, p. 253).

Cells 2.3-3.0μ diam., 39.3-59.1μ long.

Mission Well (H-9); Tykeson Pond (x-2). Previously reported from Mission Well by Sieminska (1965).

Ankistrodesmus fractus (West & West) Brunnthaler, *Protococcales*. In A. Pascher, *Die Süsswasserflora Deutschlands, Oesterreichs und der Schweiz*. Heft 5. *Chlorophyceae* 2: 189. 1915.

(Pl. IX, Fig. 3)

See Prescott (1962, p. 254).

Cell 3.0μ diam., 52.2μ long.

Mission Well (H-4).

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

(Pl. IX, Fig. 4)

See Prescott (1962, p. 254).

Cells 2.3-2.6μ diam., 38.3-41.7μ long.

Mission Well (A-7; H-7, 11; Y-1).

Dictyosphaerium Naegeli, Species algarum, 72. 1849.

Dictyosphaerium ehrenbergianum Naegeli, Species algarum, 73. 1849.

(Pl. IX, Fig. 5)

See Pascher (1915, Part 5, p. 183) and Prescott (1962, p. 238).

Cells 3.5-3.7μ diam., 5.2-5.8μ long.

Cells ellipsoidal or ovoid; colony ovoid; cells slightly smaller than in the typical.

Mission Well (G-4); Tykeson Pond (x-3).

Dictyosphaerium pulchellum Wood, Smithsonian Contrib. Knowledge 19: 84. 1874.

(Pl. IX, Fig. 6)

See Prescott (1962, p. 238).

Cells 3.5-5.2μ diam.

Colony usually globose; cells spherical.

Mission Well (H-8, 14); Tykeson Pond (x-15). Previously reported from Mission Well by Sieminska (1965).

Eremosphaera DeBary, _Untersuchunger über die Familie der Conjugaten_ (_Zygnemeen_, _Desmidieen_), 56. 1858.

Eremosphaera viridis DeBary, _Untersuchunger über die Familie der Conjugaten_ (_Zygnemeen_, _Desmidieen_), 56. 1858.

(Pl. IX, Fig. 7)

See Prescott (1962, p. 240).

Cells 156.6-187.7μ diam.

Mission Well (H-7, 11, 14).

Kirchneriella Schmidle, _Ber_. _Natur_. _Ges_. _Freiburg_ 7: 83 (double paging). 1893.

Kirchneriella lunaris (Kirchner) Moebius, _Abhandl_. _Senck_. _Natur_. _Ges_. 18: 331. 1894.

(Pl. X, Fig. 1)

See Prescott (1962, p. 258).

Cells 3.5-4.0μ diam., 12.2-13.9μ long.

Cells arranged into groups of 4 to 16 cells with strongly curved crescents with rather obtuse points.

Mission Well (Y-1); Tykeson Pond (B-1).

<u>Nephrocytium</u> Naegeli, <u>Gattungen einzelligen Algen, physiologische und systematische bearbeitet</u>, 79. 1849.

<u>Nephrocytium lunatum</u> W. West, <u>J. Roy. Microscop. Soc.</u>, 736. 1892.

(Pl. X, Fig. 4)

See Prescott (1962, p. 249).

Cells 4.0-5.0μ diam., 14.5-17.4μ long.

Cells lunate; two to three times longer than broad.

Tykeson Pond (x-1, 9).

<u>Nephrocytium obesum</u> West & West, <u>J. Roy. Microscop. Soc.</u>, 13. 1894.

(Pl. X, Fig. 2)

See Prescott (1962, p. 249).

Cells 13.9-22.4μ diam., 26.1-40.0μ long.; colony 48.7μ diam.

Cells one and one-half times longer than broad, one margin convex, the other straight or concave.

Mission Well (G vials); Tykeson Pond (x-2, 8, 20).

<u>Oocystis</u> Naegeli in A. Braun, <u>Algarum unicellularum genera nova vel minus cognita</u>, 94. 1855.

<u>Oocystis borgei</u> Snow, <u>Bull. U. S. Fish. Comm.</u> 1902, 379. 1903.

(Pl. XI, Fig. 1)

See Prescott (1962, p. 243).

Cells 10.4μ diam., 20.9-22.6μ long.

Identified primarily on basis of cell size; chloroplasts one or as many as four parietal plates; cell walls thin; cell poles rounded without nodular thickenings.

Tykeson Pond (x-20).

Oocystis crassa Wittrock & Nordstedt, Bot. Notiser, 117. 1880.

(Pl. X, Fig. 3)

See Prescott (1962, p. 243).

Cell 10.7μ diam., 19.5μ long.

Cells with nodular thickenings at the poles; cells elliptic; chloroplasts disciform (four to ten); unicellular or in colonies of two to eight.

Tykeson Pond (x-2).

Oocystis elliptica W. West, J. Roy. Microscop. Soc., 736. 1892.

(Pl. X, Fig. 8)

See Prescott (1962, p. 244).

Cells 12.2-14.3μ diam., 20.9-22.6μ long.

Identified on basis of cell size; 10 to 20 small plate-like chloroplasts; poles of cells without nodular thickenings.

Mission Well (H-16); Tykeson Pond (x-2; B-2).

Oocystis lacustris Chodat, Bull. Herb. Boiss. 5: 119, 296. 1897.

(Pl. XI, Fig. 2)

See Prescott (1962, p. 245).

Cells 10.4μ diam., 17.4μ long; colony 31.3μ diam.

Cells one and one-half times longer than wide; both poles with nodular thickenings; chloroplasts fewer than four.

Mission Well (H-12).

Oocystis pusilla Hansgirg, Sitz. Kongl. Böhm. Ges. Wiss. Math.-Nat. Kl. Prag., 9. 1890.

(Pl. X, Fig. 5)

See Prescott (1962, p. 246).

Cells 5.2-6.8μ diam., 8.7-10.5μ long; colony 13.9-(20.9)μ diam., 17.4μ long.

Identified on basis of small cell size; poles rounded; chloroplasts one or two.

Mission Well (H-12); Tykeson Pond (x-8).

Oocystis solitaria var. major Wille, Oefv. Kongl. Sv. Vet.-Akad. Forhandl. 36(5): 26. 1879.

(Pl. X, Fig. 6)

See Prescott (1962, p. 247).

Cells 14.5μ diam., 28.6μ long.

Identified primarily on basis of cell size; both poles with nodular thickenings; chloroplasts 12 to 25.

Tykeson Pond (x-2).

Oocystis submarina Lagerheim, *Bot. Notiser*, 45. 1886.

(Pl. X, Fig. 7)

See Prescott (1962, p. 246).

Cells 7.2μ diam., 15.6-16.2μ long; colony 24.4μ diam., 41.7μ long.

This species closely resembles *O. lacustris*. The latter species has cells one and one-half times longer than broad; whereas in *O. submarina*, cells are two to three times longer than broad and generally much smaller.

Mission Well (H-12).

Quadrigula Printz, *Det. Kgl. Norske Vidensk. Selskabs Skrifter*, 49. 1915.

Quadrigula chodatii (Tanner-Fulman) G. M. Smith, *Wisc. Geol. Nat. Hist. Surv., Bull.* 57: 138. 1920.

(Pl. IX, Fig. 8)

See Prescott (1962, p. 260).

Cells 2.6-3.0μ diam., 24.4-33.0μ long.

Cells tapering to subacute points; chloroplast with a median notch and two pyrenoids.

Mission Well (H-12); Tykeson Pond (x-7). Previously reported from Mission Well by Sieminska (1965).

Quadrigula closterioides Printz, *Det. Kgl. Norske Vidensk. Selskabs Skrifter*, 49. 1915.

(Pl. IX, Fig. 9)

See Prescott (1962, p. 260).

Cells 3.0μ diam., 21.4-25.0μ long.

Cells taper to sharply rounded apices, often found in larger clusters of 8 or 16 cells; chloroplast with a median notch and a single pyrenoid.

Mission Well (H vials); Tykeson Pond (x-3).

Quadrigula lacustris G. M. Smith, Wisc. Geol. Nat. Hist. Surv., Bull. 57: 139. 1920.

(Pl. IX, Fig. 10)

See Prescott (1962, p. 260).

Cells 3.5μ diam., 20.9μ long.

Colony containing short, fusiform cells; chloroplast with a single pyrenoid and lacking a median notch.

Mission Well (H vials); Tykeson Pond (x-7). Previously reported from Mission Well by Sieminska (1965).

Tetraëdron Kuetzing, Phycologia germanica, Deutschlands Algen in bündigen Beschreibungen, 129. 1845.

Tetraëdron caudatum (Corda) Hansgirg, Hedwigia 27: 131. 1888. var. caudatum.

(Pl. XI, Fig. 9)

See Prescott (1962, p. 263).

Cell 8.7μ diam.; spines 1.3μ long (max.).

Cell five-angled, each process ending in a spine.

Mission Well (H-22).

Tetraëdron enorme var. aequisectum Reinsch, Bennett J. Microscop. Soc. 6. 1888.

(Pl. XI, Fig. 5)

See Pascher (1915, Part 5, p. 155).

Cell 20.9μ diam.

Cell slightly smaller than in the typical; according to Pascher (1915), cells 25.0-45.0μ diam. Cell symmetrical, through an isthmus parted into two similar halves, sides are deeply pouched, ends parted into numerous processes which bear two spines on the ends.

Mission Well (H-6).

Tetraëdron enorme f. minor Reinsch, Bennett J. Microscop. Soc. 6. 1888.

(Pl. XI, Fig. 6)

See Pascher (1915, Part 5, p. 155) and Prescott (1962, p. 265).

Cell 27.8μ diam.

Twenty to 30 processes; cells 16.0μ through the middle, 31.0μ with processes.

Mission Well (H-22). Previously reported from Mission Well by Sieminska (1965).

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

(Pl. XI, Figs. 3, 4)

See Prescott (1962, p. 267).

Cells 5.4-6.1μ diam.

Identified on basis of smooth walls and quadrangular cells.

Tykeson Pond (x-8). Previously reported from Mission Well by Sieminska (1965).

Tetraëdron planctonicum G. M. Smith, *Bull. Torrey Bot. Club* 43: 479. 1916. f. *planctonicum*.

(Pl. XXVIII, Fig. 4)

See Smith (1920, p. 123) and Prescott (1962, p. 268).

Cell 23.0μ diam. (without processes), 53.0μ diam. (with processes).

Processes shorter than the diameter of the cell.

Tykeson Pond (Q-1).

Tetraëdron planctonicum f. *polyfurcatum forma nov*.

(Pl. XXVIII, Fig. 6)

Cell 22.0μ diam. (without processes), 49.0μ diam. (with processes).

A form differing from the typical by having the angles produced into many furcate processes.

Tykeson Pond (Q-1).

Tetraëdron regulare var. *granulata* Prescott, *Farlowia* 1: 359. 1944.

(Pl. XI, Fig. 7)

See Prescott (1962, p. 269).

Cells 35.0-51.8μ diam.

Tykeson Pond (C vials).

Tetraëdron starmachii Sieminska, *Trans. Amer. Microscop. Soc.* 84(1): 103. 1965.

Previously reported from Mission Well by Sieminska (1965); not found in the author's 1965-1966 collections.

Tetraëdron trigonum Hansgirg, *Hedwigia* 27: 130. 1888.

(Pl. XI, Fig. 23)

See Pascher (1915, Part 5, p. 149) and Prescott (1962, p. 270).

Cell 19.5μ diam. (through middle), 45.0μ diam. (spine to spine).

Cell margins convex; sides of the cell body concave or straight.

Tykeson Pond (x-2).

Tetraëdron trilobulatum (Reinsch) Hansgirg, *Hedwigia* 1888, 18. 1889.

(Pl. XI, Fig. 8)

See Pascher (1915, Part 5, p. 146); incorrectly given as *T. trilobatum*.

Cell 17.8μ diam. (pole to pole).

Cell walls smooth; cells triangular; sides more deeply crenate than in a very similar species, *T. muticum*.

Tykeson Pond (x-2).

Trochiscia Kuetzing, Linnaea 8: 592. 1833b.

Trochiscia prescottii Sieminska, Trans. Amer. Microscop. Soc. 84(1): 101. 1965.

(Pl. XI, Figs. 16, 17)

See Sieminska (1965, p. 101).

Cells 15.1–17.4μ diam.

As described, cells 8.0-26.0μ diam.; cells spherical; internal cell membrane ornamented with straight or curved ridges forming a reticulum and with irregular pits varying in shape and size.

Mission Well (H-22). Previously reported from Mission Well by Sieminska (1965).

Trochiscia reticularis (Reinsch) Hansgirg, Hedwigia 27: 129. 1888.

(Pl. XI, Fig. 22)

See Prescott (1962, p. 239).

Cell 34.8μ diam.

There may be as many as 35 visible areas on the cell wall.

Tykeson Pond (x-8).

Zoochlorella Brandt, Arch. Anat. Physiol. Abth. 1: 140. 1882.

Zoochlorella parasitica Brandt, Arch. Anat. Physiol. Abth. 1: 140. 1882.

(Pl. XI, Fig. 21)

See Prescott (1962, p. 235).

Cells 1.5-3.0μ diam.

Endozoic within the sponge, _Spongilla_ sp.; chloroplast one (rarely two).

Tykeson Pond (C vials).

Family Scenedesmaceae

Actinastrum Lagerheim, _Oefv_. _Kongl_. _Sv_. _Vet_.-_Akad_. _Förhandl_. 39(2): 70. 1882.

Actinastrum _hantzschii_ var. _fluviatile_ Schroeder, _Forsch_. _Biol_. _Stat_. _Plön_ 7: 20. 1899.

(Pl. XI, Fig. 20)

See Prescott (1962, p. 282).

Cells 3.3-3.5μ diam., 39.0 - 42.0μ long.

Mission Well (G vials).

Crúcigenia Morren, _Ann_. _Sci_. _Nat_. _Bot_. 20(1): 404, 415. 1830.

Crucigenia _apiculata_ (Lemmermann) Schmidle, _Allg_. _Bot_. _Z_. 6: 234. 1901a.

(Pl. XI, Fig. 10)

See Prescott (1962, p. 283).

Cells 3.5-4.0μ diam., 5.8-6.9μ long; colony 7.0μ diam., 11.6μ long.

Cells with an apiculation on outer free wall and at cell base.

Mission Well (H-3, 18, 22).

Crucigenia quadrata Morren, *Ann. Sci. Nat. Bot.* 20(1): 415, 426. 1830.

(Pl. XI, Figs. 14, 15)

See Prescott (1962, p. 285).

Cells 3.5-5.3μ diam., 3.6-4.0μ long.

Tykeson Pond (x-5, 19).

Crucigenia rectangularis (A. Braun) Gay, *Recherches sur le developpement et la classification de quelques algues verts*, 100. 1891.

(Pl. XI, Fig. 11)

See Prescott (1962, p. 285).

Cells 3.5-3.7μ diam., 4.6-6.8μ long.

Cells regularly arranged into quartets. This species is very closely related to *C. irregularis* Wille. In the latter species, cells are generally larger and irregularly arranged within the colony, some in four's.

Mission Well (H-15).

Crucigenia tetrapedia (Kirchner) West & West, *Trans. Roy. Irish Acad.* 32(B): 62. 1902.

(Pl. XI, Fig. 12)

See Prescott (1962, p. 285).

Cells 5.8μ diam., 3.5μ long.

Mission Well (H-22).

Enallax Pascher, *Beih*. *Bot*. *Centralbl*. 62: 183. 1943.

Enallax coelastroides (Bohlin) Skuja, *Nova Acta Reg*. *Soc*. *Sci*. *Upsal*. 18(3): 139. 1964.

(Pl. XI, Fig. 13)

(Pl. XII, Fig. 4)

(Pl. XXVIII, Figs. 2, 5, 7-9)

See Skuja (1964, p. 139).

In 4-celled colonies, cells 6.2-12.2μ diam., 15.4-24.3μ long; in 8-celled colonies, cells 7.0-8.7μ diam., 10.4-13.9μ long.

The pronounced widely spindle-shaped cells are firmly adjoined; there is a tendency to build a more rounded cenobium as the number of cells increase. It should be mentioned that perhaps *Enallax* stands somewhere between the genera *Coelastrum* and *Scenedesmus* morphologically. The basionym is *Scenedesmus costatus* var. *coelastroides* Bohlin, 1893, p. 42, later *Coelastrum bohlini* Schmidle & Senn, 1900, and presently considered *Enallax coelastroides*.

Mission Well (H-15, 25). This is the first record of the genus for all of North America.

Scenedesmus Meyen, *Nova Acta Acad*. *Caes*. *Leop*.-*Carol*. 14: 774. 1829.

The genus Scenedesmus warrants special discussion because of its great abundance and morphological peculiarities. Twenty-two species and 40 different taxa of this genus were found, representing approximately one-sixth of all taxa identified during this study. Of these 40, five are reported as new taxa. Thirty-seven different taxa were reported from Mission Well, and within a single vial, H-18, 13 different taxa were found. The plants identified in vial H-18 were living upon a submerged spruce branch, Picea sp., in the form of a rather loose green mat covering the needles. These 13 have been designated with an asterisk to indicate closely related taxa within a single community. All seven reported subspecific taxa of Scenedesmus armatus Chodat were found in this single vial. Six of the nine taxa appearing in Tykeson Pond were also reported from Mission Well, thus only three different taxa appear in Tykeson Pond which were not found in Mission Well.

*Scenedesmus acutiformis Schroeder, Die Algen der Versuchsteiche des Schles. Fischervereins zu Trachenberg. Forschungsberichte, Plön 5: 45. 1897. var. acutiformis.

(Pl. XI, Figs. 18, 19)

(Pl. XII, Figs. 1-3)

See Uherkovich (1966, p. 65, figs. 302-306).

In 2-celled colonies, cells 4.4μ diam., 13.2μ long; in 4-celled colonies, cells 4.7-5.2μ diam., 10.7-17.4μ long; in 8-celled colonies, cells 7.0μ diam., 17.4-19.1μ long.

All cells with complete ribs.

Mission Well (H-6, 18, 22); Tykeson Pond (x-7). Previously reported from Mission Well by Sieminska (1965).

Scenedesmus acutus Meyen, *Nova Acta Acad. Caes. Leop.-Carol.* 14: 775. 1829. var. *acutus* f. *acutus*.

(Pl. XII, Figs. 5, 6)

See Uherkovich (1966, p. 36, figs. 1-8).

Cells 3.8-5.2μ diam., 13.9-15.7μ long.

Mission Well (H-1, 4, 20).

Scenedesmus acutus f. *costulatus* Uherkovich, *Die Scenedesmus-Arten Ungarns*, 39. 1966.

(Pl. XII, Fig. 7)

See Uherkovich (1966, p. 39, figs. 23-30, 33).

Cells 3.5μ diam., 10.4μ long.

Differentiated primarily on the basis of the loose arrangement of the cells into two rows.

Mission Well (H-4).

**Scenedesmus apiculatus* (West & West) Chodat, *Scenedesmus*, 169. 1926.

(Pl. XII, Figs. 8, 9)

See Uherkovich (1966, p. 61, figs. 248-252).

Cells 5.2-7.0μ diam., 10.4-13.9μ long.

Mission Well (A-2; H-14, 18).

Scenedesmus arcuatus Lemmermann, Das Phytoplankton sachsischer Teiche. Forschungsberichte, Plön. 7: 112. 1899. var. arcuatus.

(Pl. XII, Fig. 13)

See Uherkovich (1966, p. 48, figs. 138-145).

Cells 7.0-10.4μ diam., 13.9-17.4μ long.

It has been suggested by Pascher (1943, p. 193), that perhaps this taxon should be assigned to the genus, Enallax. Mission Well (H-25); Tykeson Pond (B-13). Previously reported from Mission Well by Sieminska (1965).

Scenedesmus arcuatus var. capitatus G. M. Smith, Trans. Wisc. Acad. Sci. 19: 637. 1918.

(Pl. XII, Fig. 17)

See Uherkovich (1966, p. 49, figs. 149-151).

Cells 7.0-8.7μ diam., 11.6μ long.

It has been suggested by Pascher (1943, pp. 192-93), that perhaps this variety should be assigned to the genus, Enallax.

Mission Well (H-25).

*Scenedesmus armatus Chodat, Monographie d'algues en culture pure. Matériaux pour las flore cryptogamique Suisse. 4: 215. 1913. var. armatus.

(Pl. XII, Figs. 10, 11)

See Uherkovich (1966, p. 67, figs. 316-325).

Cells 3.5-4.3µ diam., 10.4-17.4µ long; spines 3.5-7.6µ long.

Spines do not approach cell length in the organisms studied.

Mission Well (A-7; H-18, 20).

*Scenedesmus armatus var. bicaudatus (Guilielmetti-Printz) Chodat, Scenedesmus, 204. 1926. f. bicaudatus.

(Pl. XII, Fig. 12)

See Uherkovich (1966, p. 69, figs. 348-353).

Cells 5.2µ diam., 15.2-15.7µ long; spines 3.7-4.0µ long.

Mission Well (H-18).

*Scenedesmus armatus var. boglariensis f. bicaudatus Hortobagyi, Hidrol. Kozl. 29: 304-305. 1949.

(Pl. XII, Fig. 14)

See Uherkovich (1966, p. 68, figs. 336-341).

Cells 3.5µ diam., 9.1-10.4µ long; spines 4.6-5.2µ long.

This differs from the typical through the diagonal spine position of the bicaudate-type.

Mission Well (H-18).

*Scenedesmus armatus var. boglariensis Hortobagyi, Annal. Biol. Tihany 15: 75-127. 1943. f. boglariensis.

(Pl. XII, Fig. 15)

See Uherkovich (1966, p. 67, figs. 327-334).

Cells 3.5-6.1µ diam., 10.4-14.3µ long; spines 5.2-7.0µ long.

Mission Well (H-18).

*_Scenedesmus_ _armatus_ var. _boglariensis_ f. _multispinosus_ _forma_ _nov_.

(Pl. XII, Fig. 16)

Cells 5.2μ diam., 13.9μ long; spines 4.5μ long (max. length).

A form differing from the typical by having additional spines scattered over the surface of the outer two cells, none of which are as long as those on the poles of the outer cells.

Mission Well (H-18).

*_Scenedesmus_ _armatus_ var. _boglariensis_ f. _semicostatus_ Hortobagyi, _Hidrol_. _Kozl_. 29: 304-305. 1949.

(Pl. XII, Figs. 18, 19)

See Uherkovich (1966, p. 68, figs. 342-347).

Cells 4.3-7.0μ diam., 10.4-15.7μ long; spines 5.8μ long (max. length).

The specimens found had dimensions exceeding those recorded for this taxon. It differs from the typical by having complete ribs on the inner two cells only.

Mission Well (H-18).

*_Scenedesmus_ _armatus_ var. _microspinosus_ _var_. _nov_.

(Pl. XIII, Fig. 4)

Cells 3.9-4.3μ diam., 12.2-13.9μ long; spine-like teeth 1.3-2.0μ long.

This variety differs from the typical by lacking spines of cell length and by having two or three spine-like teeth on both poles of the outer cells. One should refer to Pl. XII, Figs. 10, 11, to compare the typical with this variety.

Mission Well (H-18).

Scenedesmus brasiliensis Bohlin, Bih. Kongl. Sv. Vet.-Akad. Handl., 23, Afd. 3(7): 22. 1897. var. brasiliensis.

(Pl. XII, Fig. 20)

See Uherkovich (1966, p. 77, figs. 441-444).

Cells 3.8-4.3μ diam., 13.9-17.4μ long; colonies of 2-4-8 cells.

Mission Well (A-6, 7; H-14, 22, 23); Tykeson Pond (x-8).

Scenedesmus brevispina (G. M. Smith) Chodat, Scenedesmus, 187. 1926. var. brevispina.

(Pl. XII, Figs. 22, 23)

See Uherkovich (1966, pp. 51, 52, figs. 171-177).

Cells 5.2-7.0μ diam., 10.4-13.9μ long; spines 1.0-2.3μ long.

This is differentiated on rubustness of cells and short spines.

Mission Well (H-22).

Scenedesmus decorus var. bicaudato-granulatus (Hortobagyi) Uherkovich, Die Scenedesmus-Arten Ungarns, 105. 1966.

(Pl. XII, Fig. 21)

See Uherkovich (1966, p. 105, figs. 688-694).

Cells 3.5μ diam., 12.2-13.9μ long.

Mission Well (H-20).

*<u>Scenedesmus</u> <u>denticulatus</u> var. <u>linearis</u> Hansgirg, <u>Prodromus</u> <u>der</u> <u>Algenflora</u> <u>von</u> <u>Böhmen</u>. 1: 268. 1886. f. <u>linearis</u>.

(Pl. XII, Figs. 24, 25)

See Uherkovich (1966, p. 53, figs. 187-196).

Cells 3.5-4.2μ diam., 9.3-14.2μ long.

Mostly one or two teeth on each pole, seldom three.

Mission Well (H-18, 22); Tykeson Pond (x-8). Previously reported from Mission Well by Sieminska (1965).

<u>Scenedesmus</u> <u>denticulatus</u> var. <u>linearis</u> f. <u>costatus</u> <u>forma</u> <u>nov</u>.

(Pl. XIII, Fig. 1)

Cells 4.4μ diam., 13.9-17.4μ long.

This form differs from the typical by having long complete ribs over the surface of all cells. There are usually two teeth on the poles of the inner cells and a single tooth on the poles of the outer cells. This new taxon is very closely related to S. <u>denticulatus</u> var. <u>linearis</u> f. <u>semicostatus</u> (Hortobagyi) Uherkovich, 1966, p. 55, the latter having long complete ribs over the surface of the inner cells only.

Tykeson Pond (x-20).

<u>Scenedesmus</u> <u>denticulatus</u> var. <u>linearis</u> f. <u>perigranulatus</u> (Hortobagyi) Hoham, <u>nom</u>. <u>nov</u>., based on <u>S</u>. <u>brevispina</u> f.

granulatus Hortobagyi, *M. Tud, Akad. Biol. Csop. Közl.* 3: 211-245. 1959, *non S. denticulatus* var. *linearis* f. *granulatus* Hortobagyi.

(Pl. XIII, Fig. 2)

See Uherkovich (1966, p. 52, fig. 179).

Cells 4.3μ diam., 13.9-14.8μ long.

This form differs from the typical by having cells with granules only on the outer margin of the cell; in addition, one or two wart-like granules appear adjacent to the teeth on the outer cells. Uherkovich (1966, p. 52) suggests that this form should be transferred eventually to *S. denticulatus*. This form is more characteristic of the latter species than of the one which it had been assigned to by Hortobagyi (1959), thus it has been reassigned to *S. denticulatus* var. *linearis*. The form name *granulatus* cannot be retained since it has been used already for those forms having granules covering the entire cell surface.

Mission Well (H-9).

Scenedesmus denticulatus var. *polydenticulatus* Hortobagyi, *Nova Hedwigia* 1: 351. 1960.

(Pl. XIII, Fig. 3)

See Uherkovich (1966, p. 55, figs. 210, 211).

Cells 3.5μ diam., 8.7μ long.

This variety differs from the var. *denticulatus* through the great number of teeth and the somewhat loose construction of the cenobium.

Mission Well (A-7).

Scenedesmus ecornis var. *disciformis* Chodat, *Algues vertes de la Suisse*, Fig. 87. 1902. f. *disciformis*.

(Pl. XIII, Fig. 5)

See Uherkovich (1966, p. 46, figs. 110-121).

Cells 3.5μ diam., inner cells 7.0μ long, end cells 8.7μ long.

Tykeson Pond (x-8).

**Scenedesmus ecornis* Chodat, *Scenedesmus*, 170. 1926. var. *ecornis*.

(Pl. XIII, Figs. 6-8)

See Uherkovich (1966, p. 45, figs. 84-109).

Cells 3.3-5.2μ diam., 7.1-17.4μ long.

Mission Well (H-17, 18); Tykeson Pond (x-2, 4, 8, 21). Previously reported from Mission Well by Sieminska (1965).

Scenedesmus granulatus West & West, *J. Roy. Microscop. Soc.*, 500. 1897, f. *granulatus*.

(Pl. XIII, Fig. 10)

See Uherkovich (1966, p. 62, figs. 254-282).

Cells 3.7μ diam., 10.4μ long.

Mission Well (H-20).

Scenedesmus indianensis Sieminska, *Trans. Amer. Microscop. Soc.* 84(1): 105. 1965.

Previously reported from Mission Well by Sieminska (1965); not found in the author's 1965-1966 collections.

Scenedesmus intermedius var. acaudatus Hortobagyi, Annal. Biol. Tihany 15: 75-127. 1943. f. acaudatus.

(Pl. XIII, Figs. 9, 12)

See Uherkovich (1966, p. 95, figs. 605-613).

Cells 2.6-3.5μ diam., 6.1-8.7μ long.

Mission Well (H-4, 17, 25).

Scenedesmus oahunensis var. montanensis Sieminska, Trans. Amer. Microscop. Soc. 84(1): 106. 1965.

Previously reported from Mission Well by Sieminska (1965); not found in the author's 1965-1966 collections.

*Scenedesmus opoliensis Richter, Z. angew. Mikroskop. 1: 7. 1896. var. opoliensis f. opoliensis.

(Pl. XIII, Fig. 11)

See Uherkovich (1966, p. 96, figs. 618-630).

Cells 3.3-3.5μ diam., 8.7-17.4μ long; spines 7.6μ long (max. length).

Mission Well (H-18, 24).

Scenedesmus ovalternus Chodat, Scenedesmus, 164-165. 1926. var. ovalternus.

(Pl. XIII, Figs. 13-15)

See Uherkovich (1966, p. 48, figs. 132-136).

Cells 6.5-8.6μ diam., 10.2-14.8μ long.

Mission Well (H-4, 7, 14, 18, 22); Tykeson Pond (x-2, 7, 20).

*Scenedesmus quadricauda var. longispina (Chodat) G. M. Smith, Bull. Torrey Bot. Club 43: 480. 1916. f. longispina.

(Pl. XIII, Fig. 18)

See Uherkovich (1966, p. 80, figs. 463-468).

Cells 2.6μ diam., 7.2μ long; spines 5.2-6.0μ long.

Mission Well (H-18).

Scenedesmus quadricauda var. maximus West & West, Trans. Linn. Soc. London 2(5): 83. 1895a.

(Pl. XIV, Fig. 3)

See Uherkovich (1966, p. 80, figs. 461, 462).

Cells 8.7-10.4μ diam., 24.4-27.8μ long; spines 12.2-19.1μ long.

As described, spines are approximately the length of the cell; four-fifths cell length in the author's collections.

Mission Well (H-5, 9, 22).

Scenedesmus quadricauda (Turpin) Brébisson, Mem. Soc. Acad. Falsise, 66. 1835. var. quadricauda f. quadricauda.

(Pl. XIV, Fig. 9)

See Uherkovich (1966, p. 78, figs. 446-460).

Cells 5.2μ diam., 17.4-19.1μ long; spines 15.7-17.4μ long.

Mission Well (H-12).

Scenedesmus quadricauda var. quadrispina ? f. granulatus (Hortobagyi) Uherkovich, Die Scenedesmus-Arten Ungarns, 84. 1966.

(Pl. XIII, Fig. 21)

See Uherkovich (1966, p. 84, figs. 503, 504).

Cells 3.5μ diam., 12.2μ long; spines 3.5-7.0μ long.

This form differs from the typical by having some warts on the ends of the cells or scattered over the surface.

Mission Well (A-9).

Scenedesmus quadricauda var. semispinosus var. nov.

(Pl. XIII, Figs. 16, 17)

Cells 3.7μ diam., 10.4μ long; spines two-thirds cell length.

This variety differs from the typical by having on the face of each cell, an additional spine. These spines occur on only one side of the cenobium.

Mission Well (A-10).

Scenedesmus serratus (Corda) Bohlin, Bihang till. K. Ver. Akad. Handl. 24: 44. 1902. f. serratus.

(Pl. XIII, Figs. 22, 23)

See Uherkovich (1966, p. 66, figs. 313, 314).

Cells 3.5-4.3μ diam., 12.2-13.9μ long.

The typical may be very difficult to separate from the dubious existing form S. serratus f. minor Chodat 1926, p. 193. The latter "differs" from the typical by having smaller cells: 8.8-12.0μ x 2.7-3.5μ; whereas the typical has cells measuring: 15.0-20.0μ x 4.0-7.0μ. Since species of Scenedesmus do exist in juvenile stages, it would be logical therefore to assume these two forms to be but a single taxon. It should be further noted that the measurements recorded for these plants in the author's collection are intermediate to those listed for the two forms.

Mission Well (H-14, 19; G-1).

Scenedesmus spinosus var. *semispinosus var. nov.*

(Pl. XIII, Fig. 19)

Cells 3.0μ diam., 8.1μ long.

This variety differs from the typical by having on the face of the inner cells, an additional spine. These spines occur on both sides of the cenobium.

Mission Well (A-7).

Scenedesmus spinosus Chodat, *Monographie d'algues en culture pure. Matériaux pour la flore cryptogamique Suisse* 4: 74. 1913. var. *spinosus*.

(Pl. XIII. Figs. 24-26)

See Uherkovich (1966, p. 107, figs. 709-750).

Cells 3.1-3.7μ diam., 10.4-15.7μ long; on outer cells, spines 3.7-7.0μ long; on inner cells, spines 3.5μ long.

Mission Well (A-7; H-6, 19).

Scenedesmus subspicatus var. *brevicauda* (G. M. Smith) Chodat, *Scenedesmus*, 222-223. 1926.

(Pl. XIII, Fig. 20)

See Uherkovich (1966, p. 110, figs. 776, 777).

Cells 2.4μ diam., 6.6-7.0μ long; spines 1.7-3.5μ long.

This variety is distinguished from the typical by having cells of shorter length and somewhat shorter spines.

Mission Well (H-6).

Scenedesmus tibicensis Uherkovich, *Acta Bot. Acad. Sci. Hung.* 6: 405-426. 1960.

(Pl. XIV, Fig. 8)

See Uherkovich (1966, p. 50, figs. 156-159).

Cells 5.2-5.8μ diam., 12.2-12.8μ long.

This species is differentiated by the morphology of the end cells of the cenobium.

Mission Well (H-17).

Scenedesmus sp.

(Pl. XIV, Fig. 1)

Cells 2.6μ diam., 7.0μ long.

This possibly illustrates a growth form or deformity; the colony bearing a single spine.

Tykeson Pond (x-21).

Scenedesmus sp.

(Pl. XIV, Fig. 2)

Cells 3.5μ diam., 12.2-13.9μ long.

This possibly illustrates a growth form or deformity; the colony bearing a single spine.

Mission Well (H-20).

Tetradesmus G. M. Smith, *Bull. Torrey Bot. Club* 40: 76. 1913.

Tetradesmus wisconsinense G. M. Smith, *Bull. Torrey Bot. Club* 40: 76. 1913.

(Pl. XIV, Figs. 4-7)

See Smith (1920, p. 150) and Prescott (1962, p. 283).

Cells 3.0-4.6μ diam., 13.7-22.6μ long.

Cells longer than those in the typical; cells in two planes with two cells in each plane and joined along the long axes when the colony is viewed from the side; cells in end view spherical, the cells arranged in a quadrangle.

Mission Well (A-7, H-15, 22). Previously reported from Mission Well by Sieminska (1965).

Order Zygnematales

Family Zygnemataceae

Mougeotia C. A. Agardh, *Systema algarum* 1: 83. 1824.

Mougeotia genuflexa (Dillwyn) C. A. Agardh, *Systema algarum*, 1: 83. 1824.

(Pl. XIV, Fig. 13)

See Randhawa (1959, p. 132) and Prescott (1962, p. 301).

Cells 35.7μ diam., 106.4μ long; zygospores 35.7μ diam.

Differentiated on basis of cell diameter; cell length; lateral conjugation; quadrately-ovate brown zygospore (30.0-40.0μ diam.) with a smooth wall; zygospore formed wholly in conjugation tube.

Tykeson Pond (vial x-19). It should be noted that other species of _Mougeotia_ occur in both Mission Well and Tykeson Pond, but they lacked reproductive structures necessary for identification.

Mougeotiopsis Palla, _Ber_. _Deut_. _Bot_. _Ges_. 12: 228. 1894.

Mougeotiopsis calospora Palla, _Ber_. _Deut_. _Bot_. _Ges_. 12: 228. 1894.

(Pl. XIV, Fig. 10)

See Skuja (1929, p. 45) and Transeau (1951, pp. 73-74).

Veg. cells 10.0-18.0μ diam.; 10.0-70.0μ long.

Differentiated by absence of pyrenoids, presence of oil droplets, and a thick-edged chromatophore.

Tykeson Pond (collected by Algae Class, Univ. Mont. Biol. Stat., July 15, 1966).

Spirogyra Link, In C. G. H. Nees von Esenbeck, _Horae physicae berolinenses_, 5. 1820.

Spirogyra communis (Hassall) Kuetzing, _Species algarum_, 439. 1849.

(Pl. XIV, Fig. 12)

See Randhawa (1959, p. 293) and Prescott (1962, p. 312).

Veg. cells 19.0μ diam., 104.2μ long; zygospores 20.9-22.6μ diam., 31.3-45.2μ long.

Tykeson Pond (C-1). Other species of _Spirogyra_ occur in both Mission Well and Tykeson Pond, but they lacked reproductive structures necessary for their identification.

Zygnema C. A. Agardh, *Systema algarum* 1: 77. 1824.

Zygnema spp.

Species of *Zygnema* occur in both Mission Well and Tykeson Pond; however, identifications were not possible since reproductive structures were absent.

Zygogonium Kuetzing, *Phycologia generalis, oder Anatomie, Physiologie und Systemkunde der Tange*, 280. 1843.

Zygogonium ericetorum Kuetzing, *Phycologia germanica, Deutschlands Algen in bundigen Beschreibungen*, 224. 1845. var. *ericetorum*.

(Pl. XIV, Fig. 11)

See Prescott (1962, p. 329).

Veg. cells 28.6µ diam. (incl. membrane), 32.1-39.3µ long.

Vegetative cells one to four times longer than broad, often more or less swollen; membrane firm, often lamellated.

Tykeson Pond (x-3).

Division Chrysophyta

Class Xanthophyceae

Order Rhizochloridales

Family Stipitococcaceae

Stipitococcus West & West, *J. Bot.* 36: 336. 1898.

Stipitococcus vasiformis Tiffany, *The plankton algae of the west end of Lake Erie*, 32. 1934.

(Pl. XV, Fig. 1)

See Rabenhorst (1939, Vol. 11, p. 1062).

Loricas 4.5-7.0μ diam., 8.0-13.0μ long.

Stipes shorter than body length; chromatophore one; lorica ellipsoid to subglobose; neck with subparallel-parallel margins; apical opening not enlarged to slightly enlarged.

Epiphytic on *Mougeotia* sp.

Tykeson Pond (Q-1).

Order Heterococcales

Family Gloeobotrydaceae

Chlorobotrys Bohlin, *Borzi. Bih. Kongl. Sv. Bet.-Akad. Handl.* 27, Afd. 3(4): 34. 1901.

Chlorobotrys regularis (W. West) Bohlin, *Borzi. Bih. Kongl. Sv. Vet.-Akad. Handl.* 27, Afd. 3(4): 34. 1901.

(Pl. XV, Fig. 2)

See Rabenhorst (1939, Vol. 11, pp. 653-654) and Prescott (1962, p. 355).

Cells 12.2-17.1μ diam.

Mission Well (A-5; H-3, 18); Tykeson Pond (x-21).

Family Botryochloridaceae

Chlorellidiopsis Pascher, Heterokonten. In L. Rabenhorst, Kryptogamen-Flora von Deutschland, Oesterreich und der Schweiz. 11: 683. 1939.

Chlorellidiopsis separabilis Pascher, Heterokonten. In L. Rabenhorst, Kryptogamen-Flora von Deutschland, Oesterreich und der Schweiz. 11: 686. 1939.

(Pl. XV, Fig. 3)

See Rabenhorst (1939, Vol. 11, p. 686).

Cells 5.2-5.8μ diam.

Mucilage yellow in color.

Epiphytic on Oedogonium sp.

Mission Well (A-5).

Family Characiopsidaceae

Characiopsis Borzi, Studi algologici. 2: 151. 1894.

Characiopsis acuta Borzi, Studi algologici. 2: 153. 1894.

(Pl. XV, Fig. 4)

See Prescott (1962, p. 358).

Cell 6.0μ diam., 25.0μ long (incl. stipe).

Chromatophores one to two large parietal plates.

Attached to *Oedogonium* sp.

Tykeson Pond (x-2).

Characiopsis heeringiana Pascher, *Heterokontae*, *Phaeophyta*. In A. Pascher, *Die Süsswasserflora Deutschlands, Oesterreichs und der Schweiz*, 11: 63. 1925.

(Pl. XV, Fig. 5)

See Pascher (1925, Part 11, p. 63) and Rabenhorst (1939, Vol. 11, p. 768).

Cell 5.3μ diam., 16.0μ long.

Differentiated by cell shape and size and morphology of apex.

Tykeson Pond (x-2).

Characiopsis ? *sublinearis* Pascher, *Heterokontae*, *Phaeophyta*. In A. Pascher, *Die Süsswasserflora Deutschlands, Oesterreichs und der Schweiz*, 11: 67, Fig. 51a. 1925.

(Pl. XV, Fig. 7)

See Pascher (1925, Part 11, p. 67) and Rabenhorst (1939, Vol. 11, p. 772).

Cell 3.5μ diam., 17.4μ long (incl. stipe).

This perhaps is a young stage of *C. sublinearis*. According to Pascher (1925, p. 67); cells 4.0-6.0μ diam., 20.0-35.0μ long; stipe one-sixth cell length. The stipe in the plant found is one-third cell length. According to Rabenhorst (1939, p. 772), the stipe is less than one-third cell length.

Attached to *Oedogonium* sp. Rabenhorst reports this species epiphytic on *Rhizoclonium* filaments.

Mission Well (H-6).

Characiopsis tuba Lemmermann, *Abhandl. Naturh. Ver. Bremen.* 23: 255. 1914.

(Pl. XV, Fig. 6)

Rabenhorst (1931, Vol. 11, p. 744).

Cell 10.7μ diam., 40.0μ long (incl. stipe); stipe 11.4μ long.

This taxon is very closely related to a similar species, *C. pyriformis* Borzi, the latter having smaller cells and being more radially symmetrical.

Attached to *Microchaete* sp.

Tykeson Pond (x-2).

Family Chlorotheciaceae

Ophiocytium Naegeli, *Gattungen einzelligen Algen, physiologische und systematische bearbeitet*, 87. 1849.

Ophiocytium bicuspidatum (Borge) Lemmermann, *Hedwigia* 38: 31. 1899a.

(Pl. XV, Fig. 8)

See Pascher (1925, Part 11, p. 76) and Prescott (1962, p. 363).

Cells 10.7μ diam., 40.0-42.2μ long; spines 10.5-11.0μ long.

Tykeson Pond (x-2).

Ophiocytium capitatum Wolle, *Freshwater algae of the U. S.*, 176. 1887.

(Pl. XV, Fig. 9)

See Prescott (1962, p. 363).

Cells 7.2-8.7μ diam., 41.7-69.6μ long.

Differentiated by its short spines, one at each pole, and by the cell diameter.

Tykeson Pond (x-15, 20).

Ophiocytium cochleare A. Braun, *Algarum unicellularum genera nova vel minus cognita*, 54. 1855.

(Pl. XV, Fig. 11)

See Prescott (1962, p. 363).

Cells 4.6-7.0μ diam.

Identified on the basis of a curved cell with one pole rounded and one pole with a spine.

Mission Well (H-15, 18); Tykeson Pond (x-3, 21). Previously reported from Mission Well by Sieminska (1965).

Ophiocytium lagerheimii Lemmermann, *Hedwigia* 38: 30. 1899a.

(Pl. XV, Fig. 10)

See Rabenhorst (1939, Vol. 11, p. 890).

Cells 4.6μ diam., 14.8-19.2μ long.

Cells with one pole rounded, the other bearing a very long spine.

Mission Well (H-15). Previously reported from Mission Well by Sieminska (1965).

Ophiocytium majus Naegeli, *Gattungen einzelligen Algen, physiologische und systematische bearbeitet*, 89. 1849.

(Pl. XV, Fig. 13)

See Rabenhorst (1939, Vol. 11, p. 893) and Prescott (1962, p. 365).

Cell 15.7μ diam., 156.5μ long (without spine); spine 17.8μ long.

Cells curved; spines with nodular thickenings.

Tykeson Pond (x-7).

Ophiocytium parvulum A. Braun, *Algarum unicellularum genera nova vel minus cognita*, 55. 1855.

(Pl. XV, Fig. 12)

(Pl. XVI, Fig. 4)

See Prescott (1962, p. 365).

Cells 4.0-7.8μ diam.

Cells curved and without spines.

Mission Well (Prescott 5 Mon 12, Mich. State Univ.); Tykeson Pond (x-2, 7). Previously reported from Mission Well by Sieminska (1965).

"Uncertain Position"

Leuvenia Gardner *Univ. Calif. Berkeley Publ. Bot.* 4(4): 97. 1910.

Leuvenia natans Gardner, *Univ. Calif. Berkeley Publ. Bot.* 4(4): 97. 1910.

(Pl. XVI, Figs. 5, 6)

See Rabenhorst (1939, Vol. 11, p. 908).

Cells 20.0-27.8μ diam., 41.8μ long (max. length).

Cells sessile; scattered irregularly upon parenchyma cells of higher plant tissue; chromatophores parietal.

Mission Well (G vials).

Order Heterotrichales

Family Tribonemataceae

Tribonema Derbes & Solier, *Mémoire sur quelques points de la physiologie des algues*: 1. 1856.

Tribonema bombycinum (C. A. Agardh) Derbes & Solier, *Mémoire sur quelques points de la physiologie des algues*, 18. 1856.

(Pl. XVI, Fig. 1)

See Prescott (1962, p. 367).

Cells 7.0-8.7μ diam., 14.0-27.9μ long.

Cell wall thin, not showing overlapping of the two wall sections; chromatophores four to eight.

Mission Well (H-15); Tykeson Pond (x-15).

Tribonema minus Hazen, *Mem. Torrey Bot. Club* 11: 185. 1902.

(Pl. XVI, Fig. 2)

See Prescott (1962, p. 368).

Cells 4.6-5.2μ diam., 10.4-24.5μ long.

Cells slightly inflated, two to four (rarely six) times the diameter in length; chromatophores two to four irregular discs.

Mission Well (H-4); Tykeson Pond (x-2).

Tribonema utriculosum (Kuetzing) Hazen, *Mem. Torrey Bot. Club* 11: 186. 1902.

(Pl. XVI, Fig. 3)

See Prescott (1962, p. 368).

Cells 11.0μ diam., 17.4-34.8μ long.

Cells stout with relatively heavy walls, clearly showing the overlapping of the two wall pieces in cell midregion; Chromatophores many irregular discs.

Mission Well (H-11).

Class Chrysophyceae

Order Chrysomonadales

Suborder Chromulinineae

Family Mallomonadaceae

Mallomonas Perty, *Zur Kenntnis kleinster Lebensformen nach Bau, Funktionen, Systematik, mit Specialverzeichnis* der in der Schweiz beobachteten, 170. 1852.

Mallomonas acaroides Perty, Zur Kenntnis kleinster Lebensformen nach Bau, Funktionen, Systematik, mit Specialverzeichnis der in der Schweiz beobachteten, 171. 1852.

(Pl. XVI, Fig. 9)

See Prescott (1962, p. 371).

Cells (7.0)-15.0-(23.0)μ diam., 18.0-23.4-(45.0)μ long.

Tykeson Pond (C vials).

Suborder Isochrysidineae

Family Synuraceae

Synura Ehrenberg, Die Infusionsthierchen als vollkommene Organismen, 60. 1838.

Synura uvella Ehrenberg, Die Infusionsthierchen als vollkommene Organismen, 61. 1838.

(Pl. XVI, Fig. 7)

See Prescott (1962, p. 376).

Cells 3.6μ diam., 7.1μ long.

Cells were smaller than in the typical.

Mission Well (Prescott 5 Mon 12, Michigan State Univ.); Tykeson Pond (x-19).

Suborder Ochromonadineae

Family Ochromonadaceae

Dinobryon Ehrenberg, Abhandl. Konigl. Akad. Wiss. Berlin 1833: 279. 1835.

Dinobryon sertularia Ehrenberg, Abhandl. Konigl. Akad. Wiss. Berlin 1833: 280. 1835.

(Pl. XVI, Fig. 10)

See Pascher (1913, Part 2, p. 72) and Prescott (1962, p. 378).

Loricas 8.7-10.4μ diam., 24.4-29.7μ long.

Mission Well (A-2; H-9, 16, 22).

Colorless Flagellates

(In some classification systems, these may be considered a part of the Chrysophyta.)

Order Protomastiginae

Family Amphimonadaceae

Rhipidodendron Stein, Die Infusionsthiere. 1880-1882.

Rhipidodendron huxleyi S. Kent, Manual of the Infusoria. 1880-1882.

(Pl. XVI, Fig. 8)

See Pascher & Lemmermann (1914, Part 1, p. 113).

Cells oval, up to 6.0μ long.

Flagella two to three times body length.

Tykeson Pond (C vials).

Division Euglenophyta

Class Euglenophyceae

Order Euglenales

Family Euglenaceae

Euglena Ehrenberg, *Die Infusionsthierchen als vollkommene Organismen*, 104. 1838.

Euglena ? *gracilis* Klebs, *Untersuch. Bot. Inst. Tübingen* 1: 303. 1883.

(Pl. XVII, Fig. 2)

See Prescott (1962, p. 393).

Cell 10.7μ diam., 42.8μ long.

Paramylon bodies not known for this species; identification somewhat questionable since this taxon is metabolic and was observed in the preserved condition.

Tykeson Pond (x-2, 3).

Euglena sp.

(Pl. XVII, Fig. 1)

Cell 21.4μ diam., 78.5μ long.

Since this was observed in the preserved condition, there would be no way of knowing if this species were metabolic.

Tykeson Pond (x-4). It should be pointed out that other species of this genus occur in both Mission Well and Tykeson Pond.

Lepocinclis Perty, *Natur*. *Ges*. *Bern* *Mitt*., 28. 1849.

Lepocinclis *sp*.

(Pl. XVIII, Fig. 1)

See Huber-Pestalozzi (1955, Vol. 16, Part 4, p. 142) and Conrad (1935, p. 19).

Cell 31.3μ diam., 53.9μ long.

Cell round in cross section; chloroplasts present; paramylon body (bodies?) indistinct. In Huber-Pestalozzi (1955, Vol. 16, Part 4, p. 142), this plant appears closest to *L*. *colligera* Deflandre. This latter species differs from the one found in the author's collection by having a definite collar with dimensions of 3.5-4.0μ diam. and 2.0μ high. In both species, striae spiral to the left and almost perpendicular to the longitudinal axis; membrane heavily striated; cells 48.0-50.0μ long, 28.0-31.0μ diam. In *L*. *colligera*, there are small bodies of paramylon. The species in question cannot be justifiably identified because of the obscurity of paramylon bodies and absence (?) of collar.

Tykeson Pond (B-13).

Phacus Dujardin, *Histoire* *naturelle* *des* *Zoophytes*. In *Suites* *a* *Buffon*, 334. 1841.

Phacus ? hamatus Pochman, Arch. Protistenk. 95(2): 182. 1942.

(Pl. XVIII, Fig. 2)

See Pochman (1942, p. 182) and Huber-Pestalozzi (1955, Vol. 16, Part 4, p. 211).

Cell 31.3μ diam., 38.3μ long (caudus not included); caudus 7.0μ long.

The plant observed agrees well with this species except that longitudinal striae could not be seen. Paramylon bodies appear as two rings, whereas, in most instances, one is ring form and one is concentric.

Tykeson Pond (x-11).

Phacus lismorensis Playfair, Proc. Linn. Soc. N. S. Wales 46: 125. 1921.

(Pl. XVIII, Fig. 4)

See Pochman (1942, p. 197) and Huber-Pestalozzi (1955, Vol. 16, Part 4, p. 219).

Cell 38.3μ diam., 69.6μ long; caudus 41.7μ long.

Mission Well (H-3).

Phacus ? onyx Pochman, Arch. Protistenk. 95(2): 192. 1942.

(Pl. XVIII, Fig. 6)

See Pochman (1942, p. 192).

Cells 33.0-34.8μ diam., 38.3-40.0μ long; caudus 6.2-8.7μ long.

The plants observed agree well with this species except that longitudinal striae could not be seen. Size of paramylon bodies variable.

Mission Well (H-2, 4).

Phacus orbicularis Huebner, *Progr. Realgymnasiums Stralsund*, 5. 1886.

(Pl. XVIII, Fig. 5)

See Pochman (1942, p. 178), Huber-Pestalozzi (1955, Vol. 16, Part 4, p. 209), and Prescott (1962, p. 401).

Cell 38.3μ diam., 41.7μ long, 48.9μ long (with caudus); caudus 7.2μ long.

Periplast finely striated; paramylon bodies two, one large and one small; cell orbicular in outline.

Tykeson Pond (x-15).

Phacus pseudoswirenkoi Prescott, *Farlowia* 1: 368. 1944.

(Pl. XVIII, Fig. 8)

See Prescott (1962, p. 402).

Cell 32.0μ diam., 40.0μ long; caudus 7.0μ long.

Paramylon body, a large circular plate; lateral notches rarely on both sides.

Mission Well (H-16).

Phacus sp.

(Pl. XVIII, Fig. 3)

Cell 19.7μ diam., 27.8μ long (incl. caudus).

The plant observed agrees well with P. minutus Pochman, a species having few paramylon bodies and a caudus turned 180 degrees from that of the observed specimen.

Tykeson Pond (B-9).

Trachelomonas Ehrenberg, Abhandl. Köngl. Akad. Wiss. Berlin 1833, 315. 1835.

Trachelomonas robusta Swirenko, Arch. Hydrobiol. Planktonk. 9: 636. 1914.

Previously reported from Mission Well by Sieminska (1965); not found in the author's 1965-1966 collections.

Trachelomonas rotunda Swirenko, Arch. Hydrobiol. Planktonk. 9: 636. 1914.

(Pl. XVIII, Fig. 10)

See Huber-Pestalozzi (1955, Vol. 16, Part 4, p. 267) and Prescott (1962, p. 415).

Test 21.2μ diam., 26.7μ long.

Mission Well (A-4).

Trachelomonas superba var. swirenkiana Deflandre, Monographie du genre Trachelomonas, 184. 1926.

(Pl. XVIII, Fig. 7)

See Prescott (1962, p. 418).

Test 31.3μ diam., 40.0μ long.

Posterior spines longer and stouter than in the anterior region; flagellum aperture in a low, ring-like collar.

Tykeson Pond (C-2, 3).

Trachelomonas varians (Lemmermann) Deflandre, Bull. Soc. Bot. France 71: 1128. 1924.

(Pl. XVIII, Fig. 9)

See Prescott (1962, p. 418).

Test 24.3μ diam., 26.1μ long.

Wall smooth; canal extends inwardly to test cavity; wall golden- or reddish-brown; as listed, test 23.0μ diam.; 23.0-26.0μ long.

Mission Well (A-7; H-4, 7, 19).

Colorless Euglenoids

Family Astasiaceae

Menoidium Perty, Zur Kenntnis kleinster Lebensformen nach Bau, Funktionen, Systematik, mit Specialvaezeichnis der in der Schweiz beobackteten Arten. 1852.

Menoidium sp.

(Pl. XVIII, Fig. 11)

See Huber-Pestalozzi (1955, Vol. 16, Part 4, pp. 440-449).

Cell 7.8μ diam., 40.0μ long.

Longitudinal striae not visible when specimens are treated with methylene blue. There may also be a difference in measurements of the diameter and thickness of the cell, this not being recorded.

Mission Well (H-2).

Petalomonas Stein, Die Infusionsthiere. 1859.

Petalomonas octocostatus sp. nov.

(Pl. XVII, Figs. 3-9)

Periplast 21.8-26.1-31.3-34.8-40.0-41.7-43.5μ diam., 38.3-40.0-45.2-52.2-53.9-54.2-64.4-67.8-68.3μ long.

For those seen in top and/or bottom view, the following specific periplast measurements were taken: 40.0μ diam., 37.5μ thick; 43.5μ diam., 34.8μ thick; 41.7μ diam., 37.5μ thick.

Cells roundly oval to elongately oval with a firm periplast which allows the cells to retain a definite form. The anterior portion of the cell appears more rounded than the posterior end. Cell margins convex, in contrast to the more or less subparallel margins in smaller forms. The periplast is marked with eight comparatively straight, longitudinal keels extending from the anterior to the posterior end, one keel on the ventral surface does not quite extend the full length of the periplast. It should be emphasized that this particular species is more nearly spherical in cross section than any known species of this genus, the arrangement of the keels and the furrows between them being approximately equally spaced except where more narrow furrows appear adjacent to the one shorter keel on the ventral surface.

The following references were consulted before determining this taxon to be a new species: Bourelly (1961, pp. 312-313), Christen (1959, pp. 297-300; 1962, pp. 169-178), Huber-Pestalozzi (1955, Vol. 16, Part 4, p. 482), Peterfi (1965, pp. 274-275), Shawhan and Jahn (1947, pp. 182-189), Skuja (1956, p. 247; 1964, pp. 283-284), Skvortzow (1958, pp. 177-179), and Thomasson (1960, pp. 13-14).

Mission Well (A-3, 9, 10; H-19).

Division Pyrrhophyta

Class Dinophyceae

Order Gymnodiniales

Family Gymnodiniaceae

Gymnodinium (Stein) Kofoid & Swezy, *Mem. Univ. Calif.* 5: 158. 1921.

Gymnodinium palustre Schilling, *Flora* 74: 248, 277, 278. 1891.

(Pl. XIX, Fig. 1)

See Huber-Pestalozzi (1950, Vol. 16, Part 3, p. 125) and Prescott (1962, pp. 425-426).

Cell 27.8μ diam., 40.0μ long.

Epivalve longer than hypovalve, epivalve convex-conical shaped and apex broadly rounded; hypovalve rounded trapezoid form. Differentiated primarily upon basis of cell size;

this species closely resembles G. uberrimum (Allman) Kofoid and Swezy, the latter being more broad, cells 38.0-42.0μ diam.

Tykeson Pond (x-1).

Gymnodinium skvortzowii Schiller, In Rabenhorst's Kryptogamen-Flora Dinoflagellatae 10(1): 415. 1933.

(Pl. XIX, Figs. 2, 3)

See Huber-Pestalozzi (1950, Vol. 16, Part 3, p. 119-120).

Cells 20.9-24.4μ diam., 27.8-31.0μ long.

Epicone and hypocone are of the same length; chromatophores yellow-brown. Some of the specimens observed were associated epiphytically ? with a colony of Dinobryon sertularia.

Mission Well (H-5).

Gymnodinium undulatum Woloszynska, In Rabenhorst's Kryptogamen-Flora Dinoflagellatae 10(1): 424. 1925.

(Pl. XIX, Figs. 5, 6)

See Huber-Pestalozzi (1950, Vol. 16, Part 3, p. 120).

Cells 20.9-24.4μ diam., 27.8-34.8μ long.

The epivalve may be somewhat smaller than the hypovalve. According to Huber-Pestalozzi (1950, p. 120), the undulations are very likely only an expression of a pathological process.

Mission Well (H-5).

Family Peridiniaceae

Peridinium Ehrenberg, *Abhandl. Köngl. Akad. Wiss. Berlin* 1830, 38. 1832.

Peridinium volzii Lemmermann, *Museums in Bremen*, 143-174. 1904.

(Pl. XIX, Figs. 4,7)

See Huber-Pestalozzi (1950, Vol. 16, Part 3, p. 195) and Eddy (1930, p. 299).

Cells 41.7-50.4μ diam.

Mission Well (H-17); Tykeson Pond (x-9). Previously reported from Mission Well by Sieminska (1965).

Peridinium sp.

(Pl. XIX, Fig. 8)

Cell 31.3μ diam., 38.3μ long.

Cell flattened somewhat dorsiventrally; more views needed for positive identification.

Tykeson Pond (x-5). It should also be noted that other species occur in both Mission Well and Tykeson Pond.

Order Dinocapsales

Family Gloeodiniaceae

Gloeodinium Klebs, *Verhandl. Naturh. med. Vereins Heidelberg* 11(4). 1912.

Gloeodinium montanum Klebs, *Verhandl. Naturh. med. Vereins Heidelberg* 11(4): 367-451. 1912.

(Pl. XIX, Fig. 9)

See Huber-Pestalozzi (1950, Vol. 16, Part 3, p. 285).

Cells 33.0-34.8μ diam. (max. diam.).

Mission Well (G-3); Tykeson Pond.

Order Dinococcales

Family Dinococcaceae

Cystodinium Klebs, *Verhandl. Naturh. med. Vereins Heidelberg* 11(4): 384, 442, 1912.

Cystodinium iners Geitler, *Arch. Protistenk.* 61: 5. 1928.

(Pl. XIX, Fig. 10)

(Pl. XXVIII, Fig. 3)

See Prescott (1962, p. 439).

Cells 26.1-33.0μ diam.,(45.2)-55.7-62.6μ long.; spines 13.9-14.6μ long.

Cells with inner margin slightly tumid or straight, outer margin broadly convex; large nucleus; numerous chromatophores.

Mission Well (H-4, 24); Tykeson Pond (x-21; Q-1).

Division Cyanophyta

Class Myxophyceae

Order Chroococcales

Family Chroococcaceae

Aphanocapsa Naegeli in Kuetzing, *Species algarum*, 52. 1849.

Aphanocapsa elachista var. *conferta* West & West, *J. Linn. Soc. Bot.* 40: 432. 1912.

(Pl. XX, Fig. 1)

See Prescott (1962, p. 453).

Cells 1.7-2.0μ diam.; colony 185.6μ diam.

This variety differs from the typical by having spherical cells crowded within a hyaline colonial mucilage, often with many cells in pairs.

Mission Well (A-7); Tykeson Pond (x-2).

Aphanocapsa elachista West & West, *J. Linn. Soc. Bot.* 30(1893-1895): 276. 1895. var. *elachista*.

(Pl. XX, Fig. 2)

See Prescott (1962, p. 453).

Cells 1.5-1.7μ diam.; colony 55.7μ diam.

Cells small, globose, often in pairs and widely separated in colorless mucilage.

Mission Well (H-22).

Aphanocapsa elachista var. planctonica G. M. Smith, Wisc. Geol. Nat. Hist. Surv., Bull. 57: 42. 1920.

(Pl. XX, Fig. 3)

See Prescott (1962, p. 454).

Cells 2.0-2.4μ diam.

Cells less crowded than in A. elachista var. conferta, evenly dispersed throughout a colorless, colonial mucilage.

Tykeson Pond (x-2).

Aphanocapsa pulchra (Kuetzing) Rabenhorst, Florae Europaea algarum aquae dulcis et submarine. 2: 49. 1865.

(Pl. XXI, Fig. 2)

See Prescott (1962, p. 454).

Cells 3.6-4.4μ diam.

The specimen observed agrees well with this species, having cells spherical, loosely and evenly dispersed through colorless mucilage.

Adhering to Gonatozygon sp.

Mission Well (H-22).

Aphanocapsa rivularis (Carmichael) Rabenhorst, Florae Europaea, algarum aquae dulcis et submarinae 2: 49. 1865.

(Pl. XXI, Fig. 1)

See Prescott (1962, p. 454).

Cells 4.6-5.3-7.0μ diam.

Cells in pairs, not evenly dispersed as in a similar species, A. pulchra. Another closely related species, *A*. *grevillei* (Hassall) Rabenhorst has pseudovacuoles.

Mission Well (A-7; H-20).

Aphanothece Naegeli in Kuetzing, *Species algarum*, 59. 1849.

Aphanothece microscopica Naegeli, *Gattungen einzelligen Algen, physiologische und systematische bearbeitet*: 59. 1849.

(Pl. XXI, Fig. 5)

See Prescott (1962, p. 467).

Cells 3.5-4.0μ diam., 5.2-5.5-(7.0)μ long.

Cells too large for *A*. *gelatinosa* (Hennings) Lemmermann; cells generally too small to be *A*. *prasina* A. Braun. Portion of colony adhering to other algae.

Mission Well (A-1, 7).

Aphanothece nidulans P. Richter, *Bot. Notiser*: 128. 1884. var. *nidulans*.

(Pl. XXI, Fig. 4)

See Prescott (1962, p. 468).

Cells 1.2-1.5-1.7μ diam., 3.0-3.5μ long.

Cells short-cylindric, broadly rounded at the apices, densely and evenly distributed.

Mission Well (H-22); Tykeson Pond (x-7).

Aphanothece saxicola Naegeli, *Gattungen einzelligen Algen, physiologische und systematische bearbeitet*, 60. 1849.

(Pl. XXI, Fig. 3)

See Prescott (1962, p. 468).

Cells 1.0μ diam., 3.5μ long (max. length).

Cells cylindrical with rounded ends, two to three and one-half times longer than wide, loosely arranged, solitary or in pairs.

Tykeson Pond (x-14).

Chroococcus Naegeli, Gattungen einzelligen Algen, physiologische und systematische bearbeitet, 45. 1849.

Chroococcus limneticus Lemmermann, Bot. Centralbl. 76: 153. 1898. var. limneticus.

(Pl. XX, Fig. 5)

See Prescott (1962, p. 448).

Cells 7.0μ diam.

Individual cell sheath usually indistinct; distinct in this case. This agrees most closely with C. limneticus which according to Prescott (1962, p. 448), can sometimes occur in groups of two to four cells because of rapid cell division.

Tykeson Pond (x-8).

Chroococcus minor (Kuetzing) Naegeli, Gattungen einzelligen Algen, physiologische und systematische bearbeitet, 47. 1849.

(Pl. XX, Fig. 6)

See Prescott (1962, p. 449).

Cells 2.7-3.5-4.2μ diam.

Cells (spherical or angular from mutual compression) are irregularly scattered, singly, in pairs, or in larger groups; individual cell sheaths scarcely visible; colony entangled among other algae.

Mission Well (H-22); Tykeson Pond (x-8, 15).

Chroococcus minutus (Kuetzing) Naegeli, *Gattungen einzelligen Algen, physiologische und systematische bearbeitet*, 46. 1849.

(Pl. XX, Fig. 4)

See Prescott (1962, p. 449).

Cells 5.2-5.8-(10.0)μ diam.

Individual cell sheaths are not distinct; entangled among other algae.

Mission Well (H-11, 22). Previously reported from Mission Well by Sieminska (1965).

Chroococcus prescottii Drouet & Dailey in Drouet, *Field Mus. Bot. Ser.* 20: 127. 1942.

(Pl. XX, Fig. 8)

See Prescott (1962, p. 450).

Cells 4.5-5.3μ diam.; Colony (32-celled) 29.6μ x 34.8μ.

Cells not lamellated; cells not dense as in *Eucapsis alpina* Clements and Shantz; cube or sarciniform clusters.

Mission Well (H-8); Tykeson Pond (x-5).

Chroococcus turgidus (Kuetzing) Naegeli, Gattungen einzelligen Algen, physiologische und systematische bearbeitet, 46. 1849.

(Pl. XX, Fig. 7)

See Desikachary (1959, p. 101) and Prescott (1962, p. 450).

Cells 12.2-17.4μ diam.

Lamellate sheath; cells inclosed by individual sheaths.

Mission Well (H-22; G-1); Tykeson Pond (B-1). Previously reported from Mission Well by Sieminska (1965).

Coelosphaerium Naegeli, Gattungen einzelligen Algen, physiologische und systematische bearbeitet, 54. 1849.

Coelosphaerium ? dubium Grunow in Rabenhorst, Flora Europ. Algar. 2: 55. 1865.

(Pl. XXII, Fig. 1)

See Prescott (1962, p. 470).

Cells 5.2-7.0μ diam.

The author has identified this taxon on cell diameter, presence of pseudovacuoles in the cell contents, and the colony being a hollow sphere with cells on the periphery. This particular plant is somewhat questionable due to the smallness of the colony.

Tykeson Pond (x-8).

Coelosphaerium kuetzingianum Naegeli, *Gattungen einzelligen Algen, physiologische und systematische bearbeitet*, 54. 1849.

(Pl. XXII, Fig. 2)

See Prescott (1962, p. 470).

Cells 3.0-3.5μ diam.

According to Prescott (1962), cells round 2.5-4.0μ diam.

Tykeson Pond (x-8).

Coelosphaerium naegelianum Unger, *Denskr. Akad. Wiss. Wien* 7: 196. 1854.

(Pl. XXII, Fig. 3)

See Prescott (1962, p. 470).

Cells 1.5-3.5μ diam., 3.5-4.0μ long; colony 27.8μ diam., 48.7μ long.

Cell contents having pseudovacuoles; colonial mucilage with fibrillar concretions.

Tykeson Pond (x-1, 13).

Coelosphaerium pallidum Lemmermann, *Bot. Centralbl.* 76: 154. 1898.

(Pl. XXII, Fig. 4)

See Prescott (1962, p. 471).

Cells 1.2-1.7μ diam., 3.0-3.3μ long; colony 20.9μ diam.

Cell contents lacking pseudovacuoles; colonial mucilage without radiating fibrillar concretions.

Mission Well (A-1).

Dactylococcopsis (Reinsch) Hansgirg, Notarisia 3: 590. 1888a.

Dactylococcopsis fascicularis Lemmermann, Bot. Centralbl. 76: 153. 1898.

(Pl. XXII, Fig. 5)

See Prescott (1962, p. 464).

Cells 1.5-1.7μ diam., 22.6μ long.

Mission Well (H-12).

Dactylococcopsis rhaphidioides Hansgirg, Notarisia 3: 590. 1888a.

(Pl. XXII, Fig. 6)

See Prescott (1962, p. 464).

Cells 1.7μ diam., 19.0-20.2μ long.

Tykeson Pond (x-8).

Eucapsis Clements & Shantz, Minn. Bot. Studies 4: 134. 1909.

Eucapsis alpina var. minor Skuja, Acta Horti Bot. Univ. Latviensis 1: 155. 1926.

(Pl. XXII, Fig. 7)

See Geitler in Rabenhorst (1932, Vol. 14, p. 258).

Cells 2.3-3.0μ diam.; colony 20.9μ x 26.1μ.

Mission Well (H-11; Y-1). Previously reported from Mission Well by Sieminska (1965).

Glaucocystis Itzigsohn in Rabenhorst, No. 1935. 1866. _emend_. Geitler, _Arch_. _Protist_. 1923.

Glaucocystis _oocystiformis_ Prescott, _Farlowia_ 1: 372. 1944.

(Pl. XXII, Fig. 10)

See Prescott (1962, p. 475).

Cells 20.0-27.3μ diam., 40.0-45.0μ long.

Cells solitary.

Mission Well (G vials).

Holopedia Lagerheim, _Nuova_ _Notarisia_ 4: 208. 1892.

Holopedia _irregularis_ Lagerheim, _Nuova_ _Notarisia_ 4: 208. 1892.

(Pl. XXII, Fig. 9)

See Geitler in Rabenhorst (1932, Vol. 14, p. 267).

Cells 3.4-3.7μ diam., 5.2-7.0μ long.

Mission Well (H-24).

Merismopedia Meyen, _Arch_. _Nuturg_., 67. 1839.

Merismopedia _elegans_ A. Braun in Kuetzing, _Species algarum_, 472. 1849.

(Pl. XXII, Fig. 8)

See Geitler in Rabenhorst (1932, Vol. 14, p. 265) and Prescott (1962, p. 459).

Cells 5.2-5.8μ diam., 7.0-7.5μ long; colony 31.3μ x 52.2μ.

This species usually has larger cells than found in a very closely related species, M. glauca (Ehrenberg) Naegeli.

Mission Well (H vials); Tykeson Pond (x-11).

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

(Pl. XXIII, Figs. 1-3)

See Geitler in Rabenhorst (1932, Vol. 14, p. 264) and Prescott (1962, p. 459).

Cells 3.2-5.2μ diam., 3.5-5.8μ long; colony 34.8μ x 45.2μ.

This species usually has smaller cells than found in a very closely related species, M. elegans.

Mission Well (A-1; H-11, 13, 20, 22); Tykeson Pond (x-6, 8).

Merismopedia minima Beck, Ann. K. K. Naturh. Hofmus. 12: 83. 1897.

(Pl. XXII, Fig. 12)

See Geitler in Rabenhorst (1932, Vol. 14, p. 263) and Desikachary (1959, p. 154).

Cells 0.7-0.9μ diam.; colony 4.9μ diam.

According to Geitler (1932), this species may be considered doubtful.

Mission Well (H-22).

Merismopedia punctata Meyen, Arch. Naturg., 67. 1839.

(Pl. XXII, Fig. 11)

See Geitler in Rabenhorst (1932, Vol. 14, p. 263) and Prescott (1962, p. 459).

Cells 2.4-3.0μ diam., 3.5-4.8μ long; colony 34.8μ diam. (32-celled).

Mission Well (H-22); Tykeson Pond (x-3).

Merismopedia tenuissima Lemmermann, Bot. Centralbl. 76: 154. 1898.

(Pl. XXII, Fig. 13)

See Geitler in Rabenhorst (1932, Vol. 14, p. 263) and Prescott (1962, p. 459).

Cells 1.2-1.6μ diam.; colony 7.5μ diam.

Cells mostly crowded, brightly blue-green.

Tykeson Pond (x-7).

Microcystis Kuetzing, Linnaea 8: 372. 1833a.

Microcystis aeruginosa Kuetzing emend. Elenkin, No. Syst. Inst. Crypt. Horti. Bot. Petropol. 3(1): 14. 1924.

(Pl. XXIII, Fig. 4)

See Prescott (1962, p. 456).

Cells 2.3-3.2μ diam.

Differentiated on the basis of a clathrate colony.

Mission Well (H-11); Tykeson Pond (x-8).

Microcystis incerta Lemmermann, Das Phytoplankton sachsischer Teiche. Forschungsberichte, Plön. 7: 132. 1899.

(Pl. XXIII, Fig. 5)

See Prescott (1962, p. 457).

Cells 1.6-3.0μ diam.

The small size and compact arrangement of the cells aid in the identification of this species.

Mission Well (H vials); Tykeson Pond (x-2). Previously reported from Mission Well by Sieminska (1965).

Rhabdoderma Schmidle & Lauterborn, Ber. Deut. Bot. Ges. 18: 148. 1900.

Rhabdoderma gorskii Woloszynska, Bull. Acad. Cracovie, 127. 1917.

(Pl. XXIII, Fig. 7)

See Prescott (1962, p. 463).

Cells 1.5-1.7μ diam., 8.7-10.8μ long.

Cells seven to ten times their diameter in length, arcuate or somewhat sigmoid; longitudinal axes approximately parallel with that of the colony.

Mission Well (H-12).

Rhabdoderma lineare Schmidle & Lauterborn in Schmidle, Ber. Deut. Bot. Ges. 18: 148-149. 1900.

(Pl. XXIII, Fig. 6)

See Prescott (1962, p. 463).

Cells 1.8-2.3μ diam., 4.3-8.4μ long.

Cells straight; longitudinal axis of cells mostly parallel; individual cell sheaths entirely confluent with the colonial mucilage.

Mission Well (H-12).

Synechococcus Naegeli in Kuetzing, *Species algarum*, 56. 1849.

Synechococcus euryphyes G. Beck, *Vestn. Kralov. Ceske Spolecnosti Nauk* 2: 17, Fig. 40. 1926.

(Pl. XXIV, Figs. 1-3)

See Geitler in Rabenhorst (1932, Vol. 14, p. 275).

Cells 29.6-34.8μ diam., 38.2μ long (max. length).

Geitler (1932) states that as far as the diagnosis and the figure are concerned it is evident that this species should be dealt with best as *Synechocystis* rather than *Synechococcus*.

Mission Well (G-1; Y-1).

Order Hormogonales

Suborder Homocystineae

Family Oscillatoriaceae

Lyngbya C. A. Agardh, *Systema algarum* 1: xxv. 1824.

Lyngbya aestuarii Liebmann, *Bemärkninger og Tillag til den danske Algeflora*. *Kröyers Tidsk*., 492. 1841.

(Pl. XXIV, Fig. 4)

See Prescott (1962, p. 499).

Cells 8.2μ diam., 3.6-6.2μ long; filaments 10.7μ diam.

This species is separated from a closely related taxon, L. major Meneghini, in that the former does not have a thickened outer membrane on the apical cell.

Tykeson Pond (x-2).

Lyngbya martensiana Meneghini, Conspectus algologiae euganeae, 23. 1837.

(Pl. XXIV, Fig. 5)

See Prescott (1962, p. 502).

Cells 5.2-7.2μ diam., 3.0-3.5μ long; filaments 8.7-10.0μ diam.

This species differs from a closely related species, L. putealis Montagne, in that the former does not have trichomes constricted at the cross walls.

Mission Well (H-1, 15).

Lyngbya putealis Montagne, Ann. Sci. Nat. Bot. Biol. Vegetale 13: 200. 1840. ex Gomont, Monogr. Oscillariées, 143, Pl. 3, Fig. 14. 1892.

(Pl. XXIV, Fig. 6)

See Desikachary (1959, p. 318).

Cells 4.0μ diam., 7.3μ long; filaments 9.8-10.0μ diam.

Cells constricted at the cross walls.

Mission Well (H-11).

Oscillatoria Vaucher, *Histoire des confervés d'eau douce*, 165. 1803.

Oscillatoria agardhii Gomont, *Ann. Sci. Nat. Bot. Biol. Vegetale* 16(7): 205. 1892.

(Pl. XXIV, Fig. 7)

See Prescott (1962, p. 484).

Cells 3.2μ diam., 2.8–3.1μ long.

Identified on basis of: trichome straight with capitate anterior end; apical cell truncate-conical; cells not constricted at the cross walls, which are granular; length one-half to equal the width.

Mission Well (H-22).

Oscillatoria amphibia C. A. Agardh, *Flora* 10: 632. 1827.

(Pl. XXIV, Fig. 8)

See Prescott (1962, p. 485) and Desikachary (1959, p. 204).

Cells 2.9-3.0μ diam., 3.5-5.2μ long.

Apical cell broadly rounded; cells not constricted at the cross walls, with a single large granule on each side, a series of paired granules showing throughout trichome length.

Tykeson Pond (Q-1).

Oscillatoria angustissima West & West, *J. Bot.* 35: 300. 1897a.

(Pl. XXIV, Fig. 9)

See Prescott (1962, p. 485).

Cells 0.9μ diam., 2.4μ long.

This is one of the smallest species within the genus.

Tykeson Pond (x-5).

Oscillatoria rubescens De Candolle, Mem. Soc. Phys. Nat. Geneve 2: 29. 1825.

(Pl. XXIV, Fig. 10)

See Prescott (1962, p. 490).

Cells 7.0μ diam., 3.5μ long.

Distinguished by pseudovacuoles; no constrictions at the cross walls; apical cell capitate; little or no tapering.

Tykeson Pond (x-8).

Oscillatoria subbrevis Schmidle, Engler's Bot. Jahrb. 30: 243. 1901.

(Pl. XXIV, Fig. 11)

See Prescott (1962, p. 491).

Cells 3.5μ diam., 1.7-3.0μ long.

Cells not granular at the cross walls; trichome not tapering in apical region; apical cell not capitate; frequent necridia.

Mission Well (H-22).

Oscillatoria tenuis var. natans Gomont, Ann. Sci. Nat. Bot. Biol. Vegetale 16(7): 221. 1892.

(Pl. XXIV, Fig. 12)

See Prescott (1962, p. 491).

Cells 7.2μ diam., 3.8-5.2μ long.

This variety differs from the typical by having more stout trichomes; cells longer; apical cell truncately rounded.

Tykeson Pond (x-13).

Oscillatoria tenuis C. A. Agardh, *Algarum Decades*, 25. 1813. var. *tenuis*.

(Pl. XXIV, Fig. 13)

See Prescott (1962, p. 491).

Cells 4.0-7.0-7.8μ diam., 2.3-3.0-3.5μ long.

Cells constricted and granular at the cross walls; apical cell convex, smooth, and not capitate; trichome straight or slightly flexuous.

Mission Well (H-11); Tykeson Pond (x-3, 9).

Phormidium Kuetzing, *Phycologia generalis, oder Anatomie, Physiologie und Systemkunde der Tange*: 190. 1843.

Phormidium ambiguum Gomont, *Ann. Sci. Nat. Bot. Biol. Vegetale* 16(7): 178. 1892.

(Pl. XXV, Fig. 1)

See Geitler in Rabenhorst (1932, Vol. 14, p. 1015).

Cells 4.0μ diam., 1.2-2.3μ long; filament 5.2μ diam.

This species has very light constrictions; and cells rounded without a calyptra; cross walls often granulated; sheath many times thick; forming plant masses.

Mission Well (A-9).

Phormidium ? *subcapitatum* Boye-Petersen, *Freshw*. *Cyan*. *Iceland*, 282, Fig. 3. 1923.

(Pl. XXV, Fig. 2)

See Geitler in Rabenhorst (1932, Vol. 14, p. 1009) and Prescott (1962, p. 493).

Cells 2.3μ diam., 2.3μ long.

The plant in question best fits for this species. It is questionable since the trichomes were not "lightly" constricted at the cross walls, and it has been previously found on soil. Also, there is no mention in Geitler (1932) of granules at the cross walls as were observed in these plants.

Mission Well (H-25).

Phormidium *tenue* (Meneghini) Gomont, *Ann*. *Sci*. *Nat*. *Bot*. *Biol*. *Vegetale* 16(7): 169. 1892.

(Pl. XXV, Fig. 3)

See Prescott (1962, p. 496).

Cells 1.0-1.2μ diam., 2.3-5.1μ long.

Cells constricted at the cross walls; not granulate; cell contents homogeneous; filaments blue-green.

Mission Well (A-7).

Suborder Heterocystineae

Family Nostocaceae

Anabaena Bory, In *Dictionnaire* *d'histoire* *naturelle*: 307. 1822.

Anabaena cylindrica Lemmermann, *Ber. Biol. Stat. Plön* 4: 186, **Fig.** 1. 1896.

(Pl. XXV, Figs. 4, 5)

See Geitler in Rabenhorst (1932, Vol. 14, pp. 883-884).

Vegetative cells 3.2-3.5μ diam., 5.2-7.0μ long; heterocysts 4.8-5.2μ diam., 4.8-7.2μ long; gonidia 5.2-6.0μ diam., 17.4-26.1μ long.

Gonidia were observed on both sides of the heterocyst in some plants. According to Geitler (1932), trichomes mostly straight without a gelatinous sheath; cells quadrate to cylindrical with rounded ends, 3.0-4.0μ diam., 3.0-5.0μ long; heterocysts almost spherical, 5.0μ diam., 6.0-8.0μ long; gonidia on both sides of heterocyst, 5.0μ diam., 16.0-30.0μ long; free-floating or attached to aquatic plants.

Mission Well (H-3); Tykeson Pond (x-7).

Anabaena inaequalis (Kuetzing) Bornet & Flahault, *Ann. Sci. Nat. Bot. Biol. Vegetale* 7(7): 231. 1888.

(Pl. XXV, Fig. 6)

See Geitler in Rabenhorst (1932, Vol. 14, pp. 896-897).

Vegetative cells 4.0μ diam., 4.0-6.0μ long; heterocysts 6.5μ diam., 7.0μ long; gonidia 5.2μ diam., 11.2μ long.

Cells mostly one and one-half times longer than wide. According to Geitler (1932), the mucilaginous sheath may be absent; cells short-barrel-shaped, 4.0-6.0μ diam.; end cells rounded; heterocysts spherical to elongate, 6.0μ diam. and up to 10.0μ long; gonidia cylindrical, 6.0-8.0μ diam., 14.0-20.0μ long.

Tykeson Pond (x-8).

Anabaena lapponica Borge, Bot. Notiser, 101. 1913.

(Pl. XXV, Fig. 7)

See Prescott (1962, p. 516).

Vegetative cells 8.7-10.4μ diam.; heterocysts 12.1μ diam.; gonidia 13.9-15.6μ diam., 27.8-59.1μ long.

Both vegetative cells and heterocysts globose; gonidia cylindrical, developing on both sides of the heterocyst.

Tykeson Pond (Q-1).

Anabaena torulosa (Carmichael) Lagerheim, Oefv. Kongl. Sv. Vet.-Akad. Förhandl. 40(2): 47. 1883.

(Pl. XXV, Fig. 8)

See Prescott (1962, p. 518).

Vegetative cells 4.6μ diam., 5.2μ long; heterocysts 6.9μ diam., 5.2μ long; gonidia 8.7μ diam., 27.8μ long.

Mission Well (H-6).

Anabaena ? variabilis Kuetzing, Phyc. gen., 210. 1843.

(Pl. XXV, Figs. 9, 10)

See Geitler in Rabenhorst (1932, Vol. 14, pp. 876-877) and Prescott (1962, p. 519).

Vegetative cells 3.0-3.5μ diam., 2.3-5.2μ long; heterocysts 4.6-5.2μ diam., 5.2-7.0μ long; gonidia 3.7-5.2μ diam., 5.2-7.3μ long.

The Montana plants agree closely with this species. There is some question because in two instances gonidia appeared adjacent to heterocysts, but this certainly was the exception. According to Geitler (1932): trichomes forming a definite layer in mucilage; individual trichomes without sheaths; cells with gas vacuoles; cells 4.0-6.0μ diam., 2.5-6.0μ long, constricted at the cross walls; heterocysts 6.0μ diam., up to 8.0μ long; gonidia 7.0-9.0μ long. Trichomes were greatly entangled in plant debris; gonidia in series of six to nine.

Mission Well (H-11).

Nodularia Mertens in Jürgens, Algae aquaticae, Dec. 15 (4). 1822.

Nodularia spumigena Mertens in Jürgens, Algae aquaticae, Dec. 14 (4). 1822.

(Pl. XXV, Fig. 11)

See Prescott (1962, p. 527).

Vegetative cells 8.7-10.4μ diam., 4.6-6.0μ long; heterocysts 12.1μ diam., 7.0μ long; gonidia not found; filaments 13.9μ diam.

Tykeson Pond (C-1).

Nostoc Vaucher, Histoire des confervés d'eau douce, 203. 1803.

Nostoc caeruleum Lyngbye, _Tentamen Hydrophytologiae Danicae_, 201. 1819.

(Pl. XXV, Fig. 12)

See Prescott (1962, p. 522).

Vegetative cells 6.5μ diam.; heterocysts 6.8-7.5μ diam.; gonidia absent; colonies 0.5-7.5 mm. diam.

Tykeson Pond (B-5, C-3). Appearing very abundantly in the east end in mid summer.

Family Scytonemataceae

Microchaete Thuret, _Ann_. _Sci_. _Nat_. _Bot_. _Biol_. _Vegetale_ 1(6): 378. 1875.

Microchaete calothrichoides Hansgirg, _Beih_. _Bot_. _Centralbl_., 494. 1905.

(Pl. XXVII, Fig. 1)

See Geitler in Rabenhorst (1932, Vol. 14, pp. 671-672).

Vegetative cells (3.8)-6.7μ diam., (3.0)-6.6μ long; basal heterocyst 7.0-8.7μ diam., 7.6-8.1μ long; intercalary heterocysts 4.0-5.2μ diam., 9.8-20.8μ long; filaments (6.7)-10.4μ diam.

According to Geitler (1932): sheath lamellated; filaments 10.0-16.0μ diam.; cells at filament base, 6.0-8.0μ diam.; cells constricted at the cross walls; heterocysts mostly basal, ovoid to long-elliptical, 6.0μ diam., up to 8.0μ long.

Tykeson Pond (x-16; B-14).

Microchaete tenera Thuret, Ann. Sci. Nat. Bot. Biol. Vegetale 1(6): 378. 1875.

(Pl. XXVII, Fig. 2)

See Geitler in Rabenhorst (1932, Vol. 14, p. 668) and Prescott (1962, p. 542).

Vegetative cells 5.3μ diam., 4.0-5.3μ long; intercalary heterocyst 6.5μ diam., 14.3μ long; filament 7.0μ diam.

Distinguished on basis of cell, heterocyst, and filament size; sheath simple, not lamellated.

Tykeson Pond (x-2).

Scytonema C. A. Agardh, Systema algarum 1: xxii. 1824.

Scytonema bohnerii Schmidle, Eng. Bot. Jahrb. 30: 60. 1902.

(Pl. XXVI, Fig. 1)

See Geitler in Rabenhorst (1932, Vol. 14, p. 753).

Vegetative cells 4.0μ diam. (main filament), 5.3μ diam. (branches); heterocysts 4.2μ diam., 10.7μ long; filaments 10.7μ diam.; sheath 2.7-3.2μ thick.

Tykeson Pond (x-2).

Scytonema fritschii Ghose, J. Linn. Soc. Bot. 46: 342. 1923.

(Pl. XXVI, Figs. 4, 5)

See Desikachary (1959, p. 458) and Geitler in Rabenhorst (1932, Vol. 14, p. 755).

Vegetative cells 6.0μ diam., 7.0-13.9μ long; heterocysts 8.2-8.7μ diam., 13.9-20.9μ long; filament 27.8μ diam.

The plant in question best agrees with this species on the basis of vegetative cell length and width, heterocyst length and width, cross walls distinct, and false branches geminate; one exception being that the sheath is wider in the plant observed than in plants already described for this species.

Mission Well (H-22).

Tolypothrix Kuetzing, Phycologia generalis, oder Anatomie, Physiologie und Systemkunde der Tange, 227. 1843.

Tolypothrix distorta var. pencillata (Agardh) Lemmermann, Kryptogamenflora der Mark Brandenburg. Algen. 3: 218. 1910.

(Pl. XXVI, Fig. 3)

See Geitler in Rabenhorst (1932, Vol. 14, p. 719).

Vegetative cells 7.0-7.3μ diam., 5.2-7.0μ long; heterocysts 10.0μ diam., 10.4-12.2μ long; filament 13.0μ diam.

Cells quadrate or shorter than wide; heterocysts almost conical up to cylindrical; cells lightly constricted at the cross walls.

Tykeson Pond (x-5).

Tolypothrix tenuis Kuetzing emend. J. Schmidt, Bot. Tidsskr. 22: 383. 1899.

(Pl. XXVI, Fig. 2)

See Prescott (1962, p. 538).

Vegetative cells 4.7-5.8μ diam., 5.2-7.0-(10.4)μ long; heterocysts 6.3-7.5μ diam., 8.7-13.9μ long; filaments 8.7-10.4μ diam.

Cells quadrate to longer than wide, generally not constricted at the cross walls.

Mission Well (A-8; H-15); Tykeson Pond (x-8).

Stigonema C. A. Agardh, *Systema algarum* 1: xxii. 1824.

Stigonema hormoides (Kuetzing) Bornet & Flahault, *Ann. Sci. Nat. Bot. Biol. Vegetale*, 68. 1887.

(Pl. XXVII, Fig. 6)

See Geitler in Rabenhorst (1932, Vol. 14, p. 499).

Vegetative cells 5.2μ diam., 3.0-4.6μ long; filament 10.4μ diam.

Filaments small and almost uniseriate.

Tykeson Pond (x-20).

Stigonema sp.

(Pl. XXVII, Fig. 7)

Vegetative cells 7.0μ diam., filament 17.4-20.9μ diam.

Mission Well (A-8). This genus was previously reported from Mission Well by Sieminska (1965).

Family Rivulariaceae

Calothrix C. A. Agardh, *Systema algarum* 1: xxiv. 1824.

Calothrix atricha Frémy, *Les Myxophycées de l'Afrique équatoriale francaise*, 261. 1930.

(Pl. XXVII, Fig. 3)

See Prescott (1962, p. 552).

Vegetative cells at base of colony 8.7μ diam., 8.1μ long; heterocysts 10.4μ diam., 12.2μ long.

Trichome not tapering sharply; heterocysts basal, usually in pairs; vegetative cells one to one and one-half times longer than wide.

Tykeson Pond (x-9).

Calothrix parietina (Naegeli) Thuret, _Ann_. _Sci_. _Nat_. _Bot_. _Biol_. _Vegetale_ 1(6): 381. 1875.

(Pl. XXVII, Fig. 5)

See Geitler in Rabenhorst (1932, Vol. 14, p. 604).

Vegetative cells 3.5-10.4μ diam., 3.5-17.4μ long; heterocysts 10.4-12.2μ diam., 10.4-15.7μ long; filament 13.9μ diam.

Filament yellow-brown, occasionally occurring singly; cells mostly one and one-half to three times as long as wide, at the base shorter than wide; trichome ending in a hair; heterocyst basal, seldom intercalary, wider than vegetative cells.

Tykeson Pond (x-21).

Calothrix _stellaris_ Bornet & Flahault, _Ann_. _Sci_. _Nat_. _Bot_. _Biol_. _Vegetale_ 3(7): 365. 1886.

(Pl. XXVII, Fig. 4)

See Geitler in Rabenhorst (1932, Vol. 14, p. 610) and Prescott (1962, p. 554).

Basal cell 8.7μ diam., 7.0μ long; heterocyst 8.9μ diam. 9.3μ long; filament 15.6μ diam. (at base).

Cells constricted at the cross walls; filaments curved. This species closely resembles _C_. _fusca_ Bornet & Flahault, 1886, which has a lamellated sheath; the former also is close to _C_. _castellii_ Bornet & Flahault, 1886, which has cells one-half to one-fourth as long as wide.

Tykeson Pond (x-5).

DISCUSSION

Speculation is invited as to why some groups of algae were more prevalent in either Mission Well or Tykeson Pond. The Chlorococcales, a group of green algae, occurred abundantly in both ponds. The number occurring in each body of water would be relatively equal if the genus *Scenedesmus* were not considered. Twenty-one species and 37 different *Scenedesmus* taxa were found in Mission Well of which 13 of the latter were found to be living upon a submerged spruce branch. It is interesting that submerged spruce branches should offer the most favorable habitat for *Scenedesmus*, and perhaps microelements provided by the spruce bark helped induce environmental forms. In Tykeson Pond, where only seven species and nine taxa of *Scenedesmus* were found, there are no spruce trees or branches to be found in the area. Other chlorococcalean greens would not appear to be influenced in their proliferation and growth forms by spruce branches since these algae occur in almost equal numbers in both ponds; however, some species may be influenced.

The desmids, a large group of Chlorophyta not studied by the author, occurred in great numbers. There were approximately 145 taxa found in Mission Well as opposed to approximately 97 in Tykeson Pond. In Mission Well, the predominant marginal aquatic plant was Carex rostrata, whereas the genus Carex occurred less frequently in proportion to other aquatic plants in Tykeson Pond. In other ponds and bogs examined where the predominant aquatic plants were species of Carex, the author has found desmids to occur in great numbers and variety.

In Tykeson Pond, more surface area was occupied with fallen trees and branches and more species of aquatic plants were noted than in Mission Well. This may have allowed for more suitable substrates for attached and entangling forms of filamentous Chlorophyta, Chrysophyta, and Cyanophyta. Perhaps these filamentous forms just mentioned would provide more suitable substrates for the unicellular epiphytes. These unicells appeared more predominantly in Tykeson Pond and included the following: Characium and Chaetosphaeridium in the Chlorophyta, and Stipitococcus, Characiopsis, and Ophiocytium in the Chrysophyta. The diatoms, a major group of the Chrysophyta not studied by the author, should be mentioned here. Many attached forms were observed in this group growing on other filamentous algae. These epiphytic forms were more predominant in Tykeson Pond. Free floating forms of diatoms were found in both ponds, but this was not extraordinary since unattached diatoms were usually noted in other bodies of water examined by the author. If diatoms had been studied, it would seem obvious that a higher percentage of the plants recorded would be from the Chrysophyta.

The flagellates in the Chlorophyta, Euglenophyta, and Pyrrhophyta were found in both ponds. These did not comprise a major portion of all taxa encountered; however, their occurrence in both ponds was significant. In other ponds studied which were also relatively shallow, the author has found a notable abundance of flagellates.

SUMMARY

Mission Well and Tykeson Pond both lie in the northern Mission Mountains of northwestern Montana, the former at elevation 5275 feet (1608 meters) and the latter at 3100-3200 feet (940-970 meters).

Sieminska (1965) published a paper on fresh water algae from Mission Well. Other published works on this subject matter are not known for either area.

One objective in this current investigation was to collect and identify the fresh water algae, excluding desmids and diatoms. To carry out this objective, representative algal samples were collected from both ponds. The author examined 40 vials from each study area; in addition, vials 5 Mon 12 from Mission Well and 2067 and 2081 from Tykeson Pond were studied. These latter three vials are in the algal herbarium, Michigan State University, whereas the former vials are in the author's personal collection.

Both bodies of water are almost completely encircled by coniferous growth, a wider variety of species occurring at lower elevations. More taxa of aquatic plants, other than algae, occur in Tykeson Pond than in Mission Well; 23 were recorded in the former and 11 in the latter. During the summer months, the pH was found to vary between 7.2-8.3 in Mission Well and 7.4-8.2 in Tykeson Pond.

The author recorded a total of 89 different algal genera, 215 different species, and 244 different taxa from Mission Well and Tykeson Pond, excluding desmids and diatoms. Sieminska (1965) recorded four additional taxa from Mission Well not found by the author from either pond. Thus 219 different species and 248 different taxa are known, of which eight or 3.2% of the latter are new. Eighty-seven species and 108 taxa are exclusively in Mission Well, 75 species and 78 taxa are exclusively in Tykeson Pond, and 57 species and 62 taxa are common to both ponds. These are as follows:

DIVISION	GENERA		SPECIES		ALL TAXA	
	Total No.	% Found	Total No.	% Found	Total No.	% Found
CHLOROPHYTA	45	50.6	117	53.4	142	57.3
CHRYSOPHYTA	11	12.4	21	9.6	21	8.5
EUGLENOPHYTA	6	6.7	15	6.9	15	6.0
PYRRHOPHYTA	4	4.5	7	3.2	7	2.8
CYANOPHYTA	23	25.8	59	26.9	63	25.4

Another group of Chlorophyta, the desmids, were not investigated by the author. Sieminska (1965) recorded 84 desmid taxa from Mission Well. D. C. Jackson, Michigan State University, has thus far recorded approximately 191 different desmid taxa from Mission Well and Tykeson Pond. All algae considered (except diatoms), approximately 439 different taxa are known from these two ponds. Of these, approximately 202 are exclusively in Mission Well and 124 in Tykeson Pond, 113 being common to both ponds.

Having presented ~~the~~ list of algae, some interesting aspects of this study are noteworthy:

A) Over 50% of the genera, species, and taxa found belong to the Chlorophyta. This figure does not include the desmids, a group of green algae occurring abundantly in the two areas studied.

1) Fewer members of the Volvocales were identified than one might expect to find in such habitats encountered.

2) Eremosphaera viridis was found in water where the pH was recorded as 8.1-8.3. This species is usually an indicator for pH 6.0-6.8.

3) A new species of Coelastrum was found from Mission Well.

4) A new form of Tetraëdron planctonicum was found in Tykeson Pond.

5) The genus Ennalax was recorded for the first time in North America.

6) The genus Scenedesmus represented approximately one-sixth of all taxa found during this study.

a) Five new taxa of this genus were described.

b) Thirteen different taxa were identified living upon a submerged spruce branch, indicating closely related taxa within a single community.

B) Approximately 12% of the genera, 10% of the species, and 8% of the taxa found belong to the Chrysophyta. These figures do not include the diatoms, a group of golden-brown algae occurring abundantly in the two areas studied.

C) Approximately 7% of the genera and species, and 6% of the taxa found belong to the Euglenophyta.

  1) A new species of Petalomonas was found from Mission Well.

D) Approximately 5% of the genera, 3% of the species, and 3% of the taxa identified belong to the Pyrrhophyta.

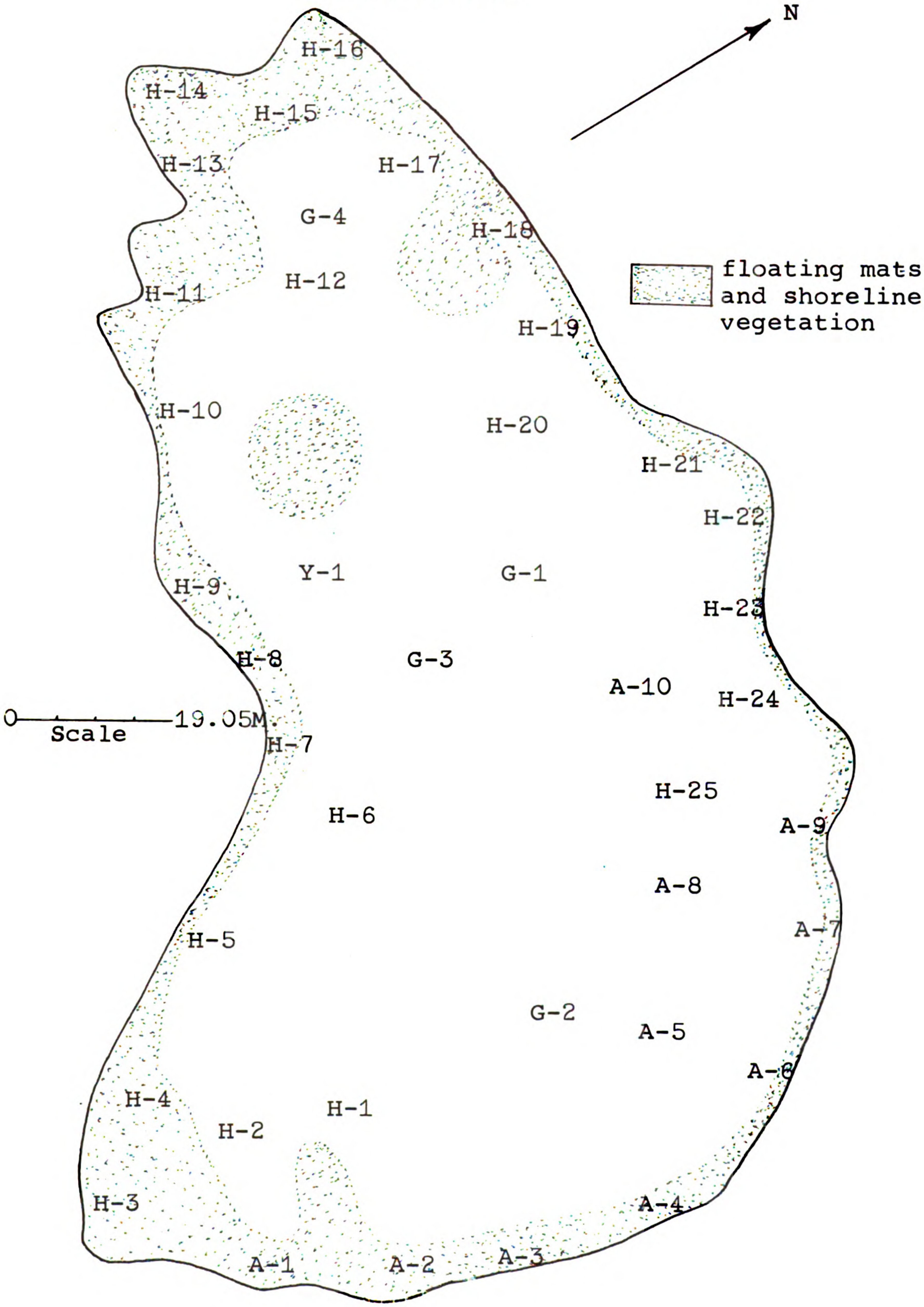
E) Approximately one-fourth of all genera, species, and taxa identified belong to the Cyanophyta.

  1) Different Chroococcalean Cyanophyta are more prominant in Mission Well, whereas different Hormogonales appear more frequently in Tykeson Pond.

MAP I. MISSION WELL: COLLECTING STATIONS.

"A" collections (1-10) made July 15, 1965. H collections (1-25) made August 5, 1965. G collections (1-4) made July 15, 1966. Y collection (1) made July 26, 1966.

MISSION WELL

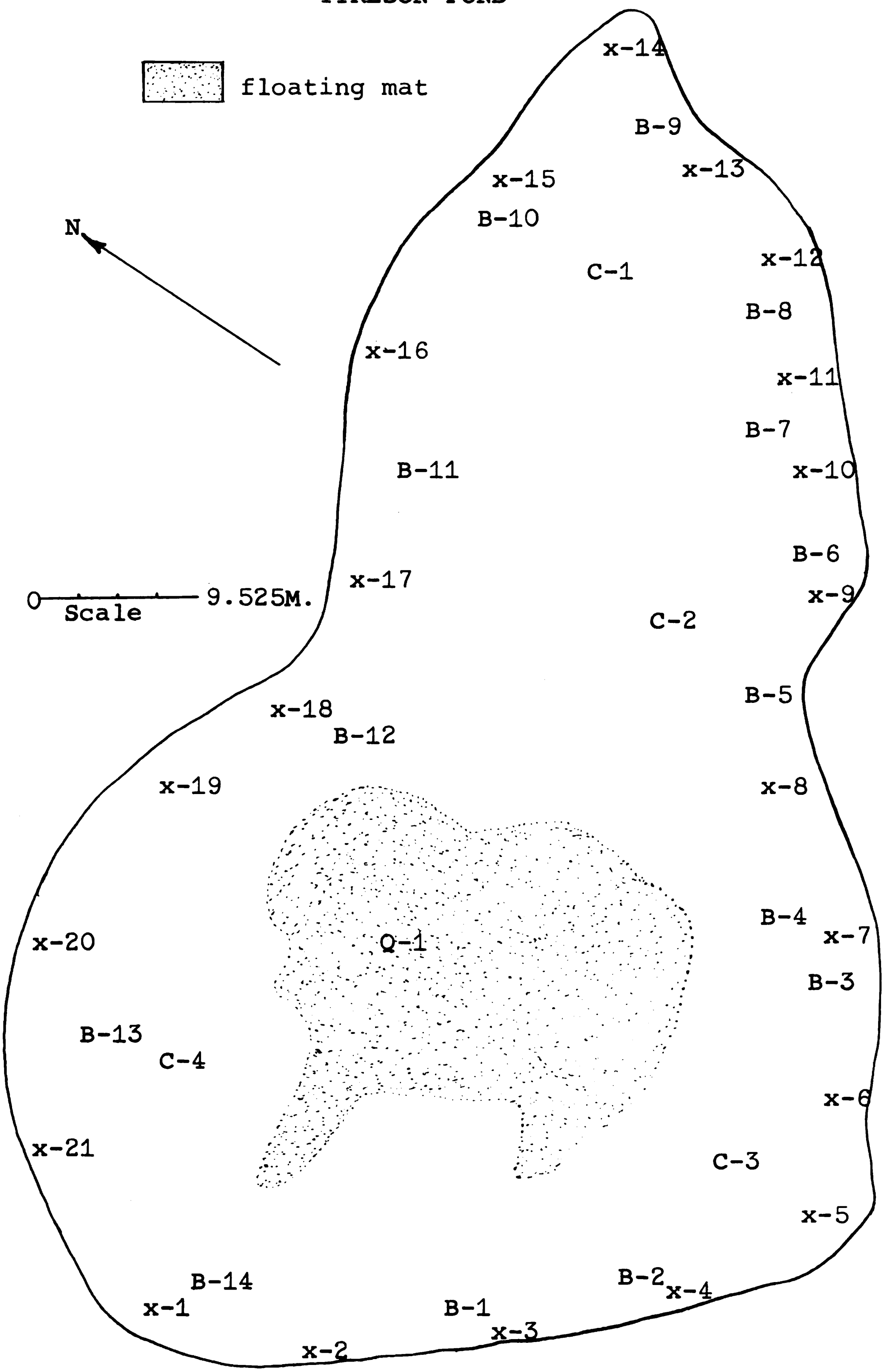


MAP I

MAP II. TYKESON POND: COLLECTING STATIONS.

x collections (1-21) made July 15, 1965. B collections (1-14) made August 3, 1965. C collections (1-4) made July 15, 1966. Q collection (1) made July 26, 1966.

TYKESON POND



MAP II

MAP III. MISSION WELL: DEPTH CONTOURS, pH STATIONS, and TEMPERATURE STATIONS

1965. Readings taken at STATION V on August 5th with a heavy overcast sky.

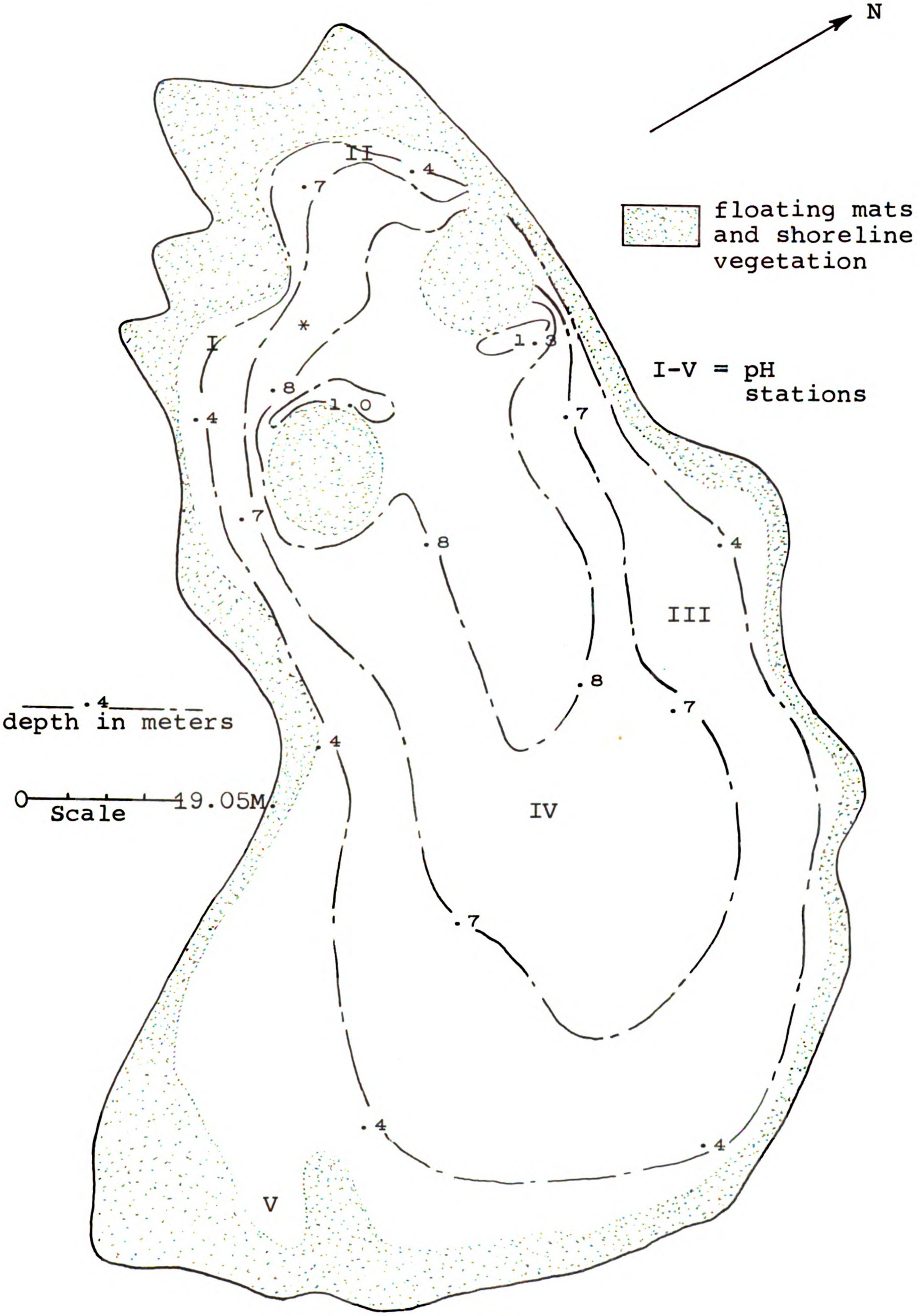
TIME	pH	H_2O TEMP. C	AIR TEMP. C
10:30 A.M.	8.1	14.0	15.0
12:30 P.M.	8.3	15.0	16.5

1966. Readings taken at STATIONS I-V on July 26th-27th with a cloudless sky; moon three-quarters full, visible until 9:30 P.M; night wind movement: very slight from E to W; and day wind movement (July 27th): moderate from W to E (9:00 A.M.).

TIME	pH READINGS at STATIONS:					H_2O TEMP.*	AIR TEMP.
	I	II	III	IV	V	C	C
2:30 P.M.	7.8	7.6	7.5	7.5	7.4		
4:30 P.M.	7.6	7.3	7.4	7.4	7.6	23.0	
6:30 P.M.	7.2	7.3	7.4	7.3	7.4	22.0	
8:30 P.M.	7.3	7.3	7.4	7.2	7.2	21.0	11.0
10:30 P.M.	7.5	7.5	7.6	7.5	7.4	20.0	
12:30 A.M.	7.3	7.2	7.3	7.3	7.2	19.0	5.0
2:30 A.M.	7.3	7.3	7.3	7.3	7.4	18.5	4.5
4:30 A.M.	7.4	7.2	7.4	7.3	7.4	17.5	3.5
9:00 A.M.	7.4	7.4	7.5	7.4	7.4	18.0	15.5
12:15 P.M.	7.6	7.7	7.8	7.7	7.9	20.5	20.0
2:30 P.M.	7.7	7.5	7.7	7.8	7.5	22.5	24.0

*indicates location where H_2O temperatures were taken (on map).

MISSION WELL



MAP III

MAP IV. TYKESON POND: DEPTH CONTOURS, pH STATIONS, and TEMPERATURE STATIONS

1965. Readings taken at STATIONS I-IV on July 15th with a partly cloudy sky.

TIME	pH READINGS followed by H_2O TEMP. READINGS* at STATIONS: I	II	III	IV
9:30 A.M.	8.2	7.9	7.8	7.7
	20.0	20.2	17.8	16.9
12:30 P.M.	8.0	8.0	8.0	7.4
	21.5	21.0	22.0	17.5

*H_2O temp. C at 3-5 cm. below surface.

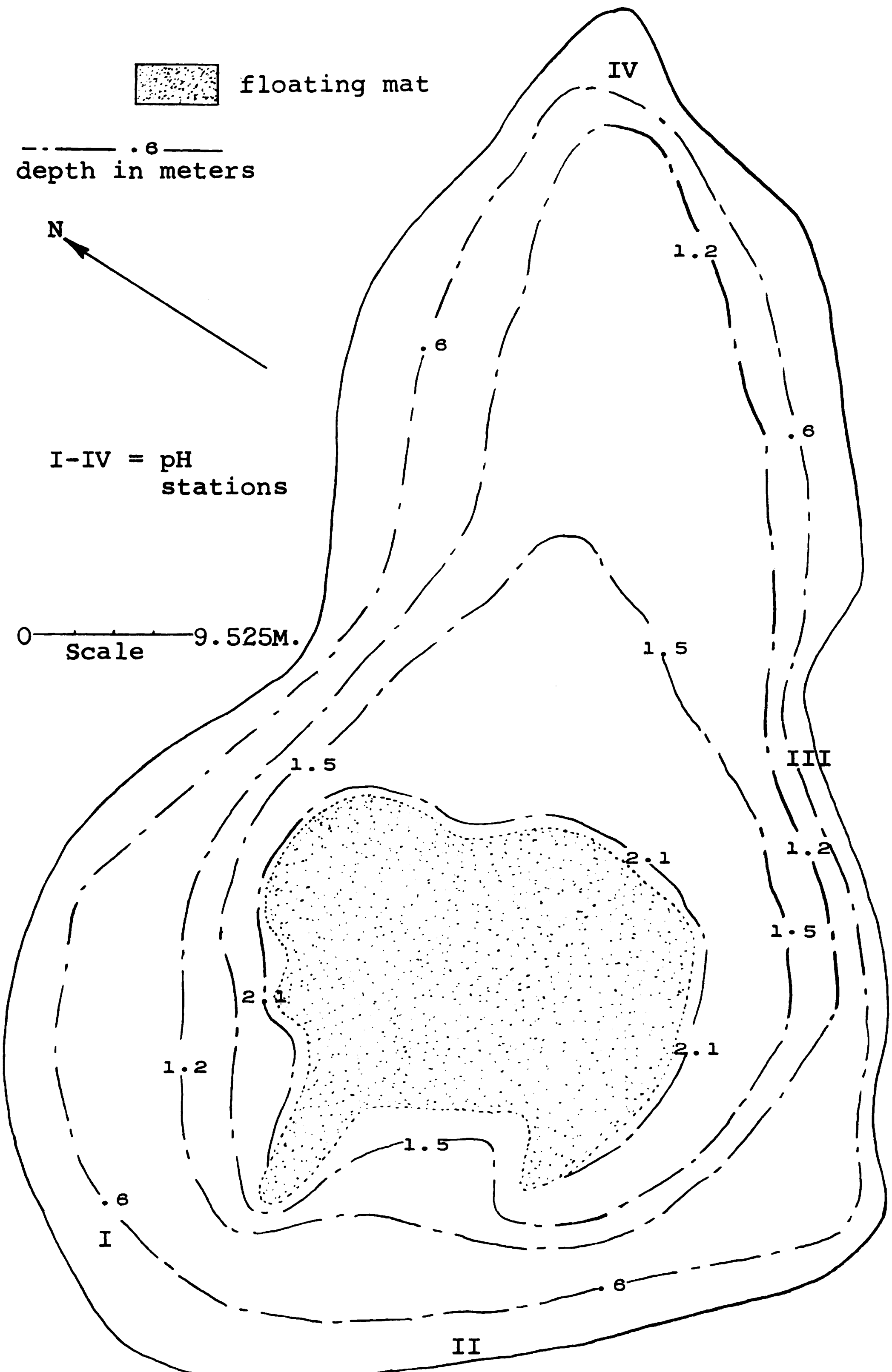
1965. Readings taken at STATIONS I-II on August 3rd with an overcast sky with moderate rain and air temp. 18.0 C.

TIME	pH READINGS followed by H_2O TEMP. READINGS at STATIONS: I	II
4:15 P.M.	7.5	7.9
	20.5	21.0

1965. Readings taken at STATION I on August 5th with a cloudy sky and air temp. 19.0 C.

TIME	pH READING followed by H_2O TEMP. READING at STATION: I
2:15 P.M.	8.0
	20.0

TYKESON POND



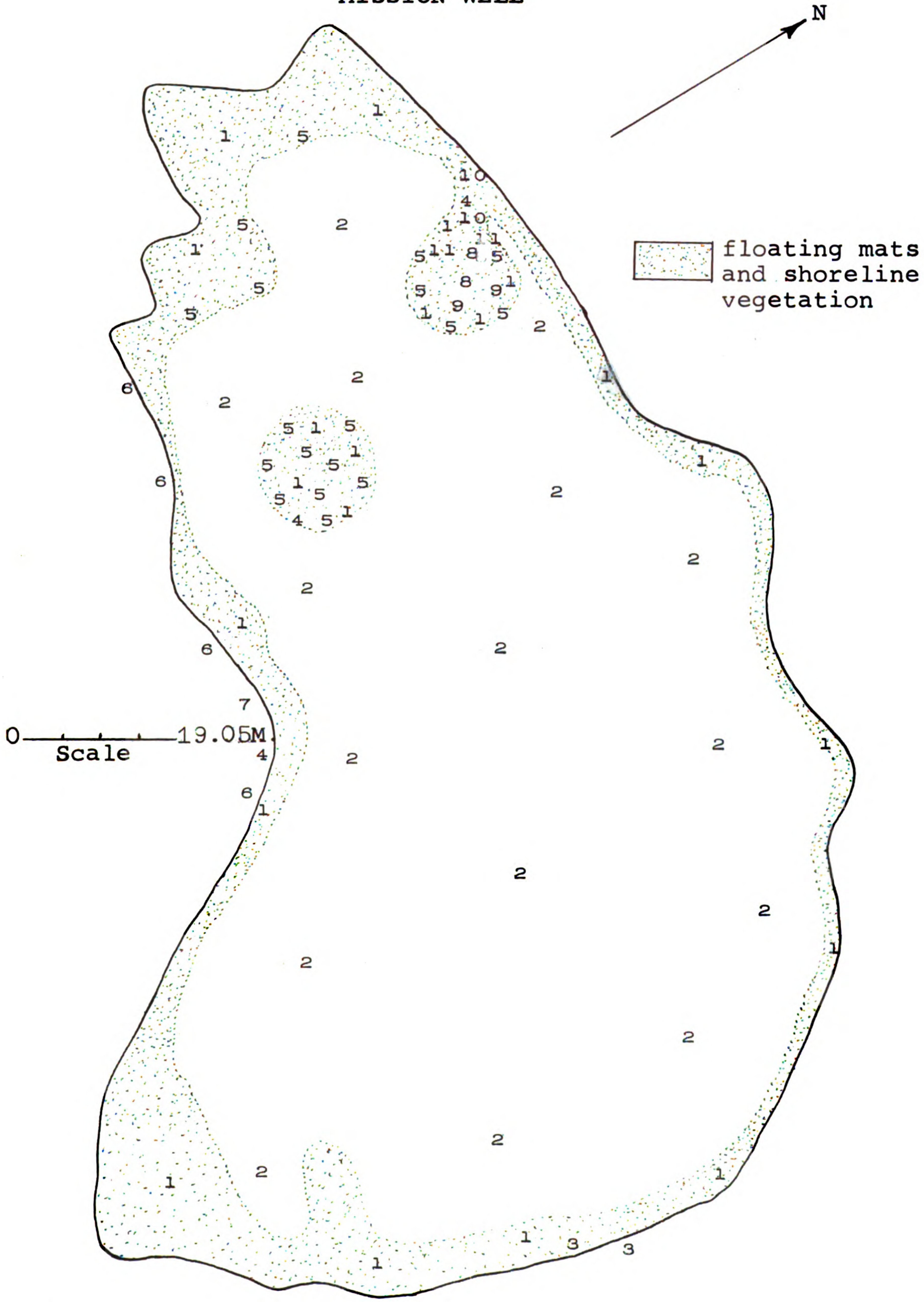
MAP IV

MAP V. MISSION WELL: AQUATIC PLANTS

The number indicates general distribution only.

1. *Carex rostrata* Stokes.
2. *Nuphar variegatum* Engelmann.
3. *Eleocharis* sp.
4. *Potentilla palustris* (Linnaeus) Scopoli.
5. *Menyanthes trifoliata* Linnaeus.
6. *Marchantia polymorpha* Linnaeus.
7. *Epilobium* sp.
8. *Carex* sp.
9. *Calamagrostis* sp.
10. *Carex limosa* Linnaeus.
11. *Toefieldia pusilla* (A. Michaux) Persoon.

MISSION WELL



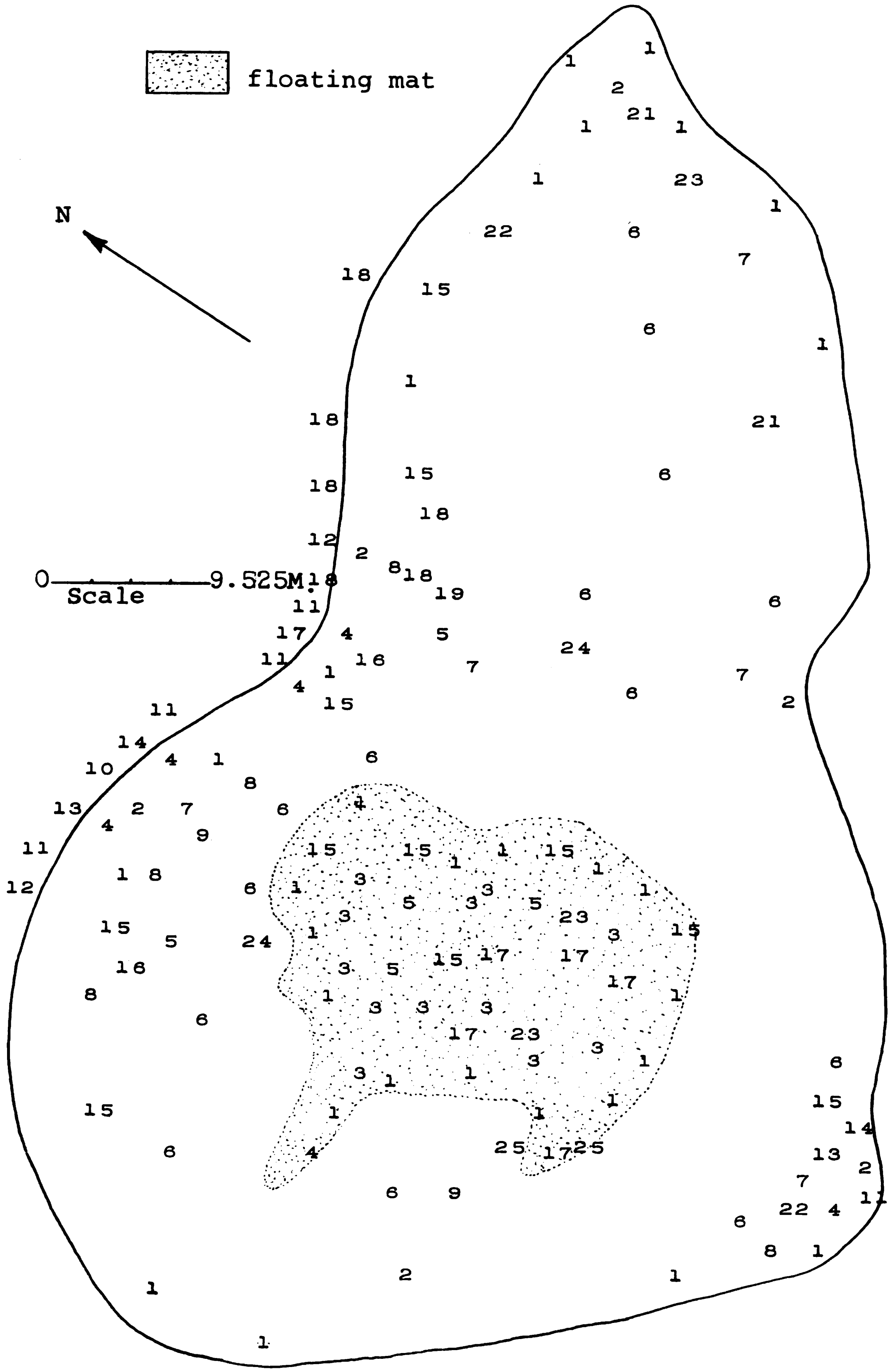
MAP V

MAP VI. TYKESON POND: AQUATIC PLANTS

The number indicates general distribution only.

1. *Potentilla palustris* (Linnaeus) Scopoli.
2. *Sium suave* Walter.
3. *Menyanthes trifoliata* Linnaeus.
4. *Drepanocladus* sp.
5. *Nostoc caeruleum* Lyngbye.
6. *Nuphar variegatum* Engelmann.
7. *Potamogeton natans* Linnaeus.
8. *Sparganium minimum* (Hartman) Fries.
9. *Potamogeton pusillus* Linnaeus.
10. *Eleocharis* sp.
11. *Epilobium* sp.
12. *Mentha arvensis* Linnaeus.
13. *Lycopus uniflorus* A. Michaux.
14. *Scutellaria epilobifolia* Hamilton.
15. *Utricularia vulgaris* Linnaeus.
16. *Spirodela polyrhiza* Schleiden.
17. *Carex* sp.
18. *Salix* sp.
19. *Polygonum natans* (A. Michaux) Eaton.
20. *Populus* sp.
21. *Potamogeton alpinus* var. *tenuifolius* (Rafinesque-Schmaltz) Ogden.
22. *Lemna minor* Linnaeus.
23. *Utricularia minor* Linnaeus.
24. *Phormidium* sp.
25. *Mnium* sp.

TYKESON POND



MAP VI

PLATES

PLATE I

FIGS. 4, 6 (430x); 1, 2, 5 (900x).

[1]indicates vial from which taxon was illustrated.

PLATE I

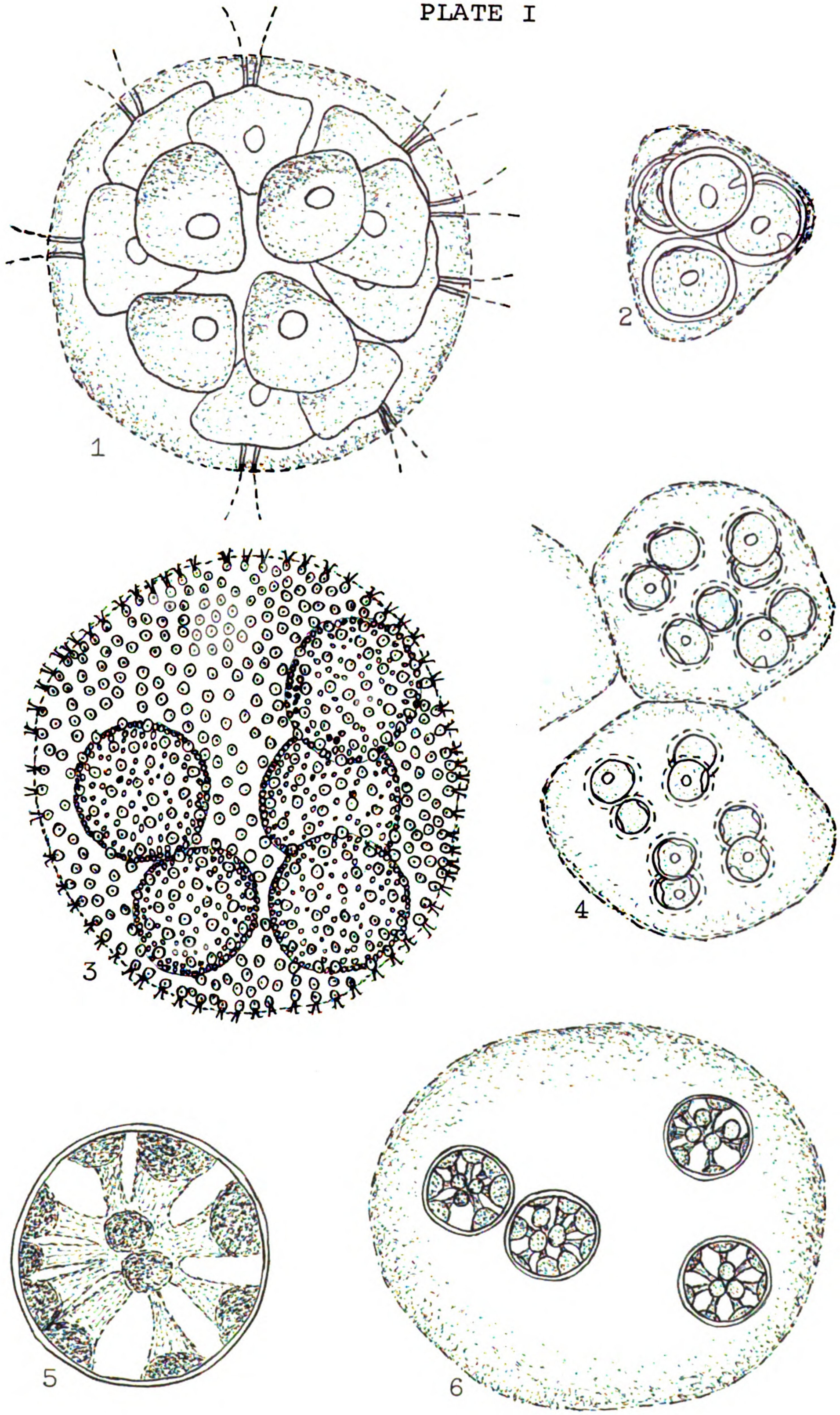
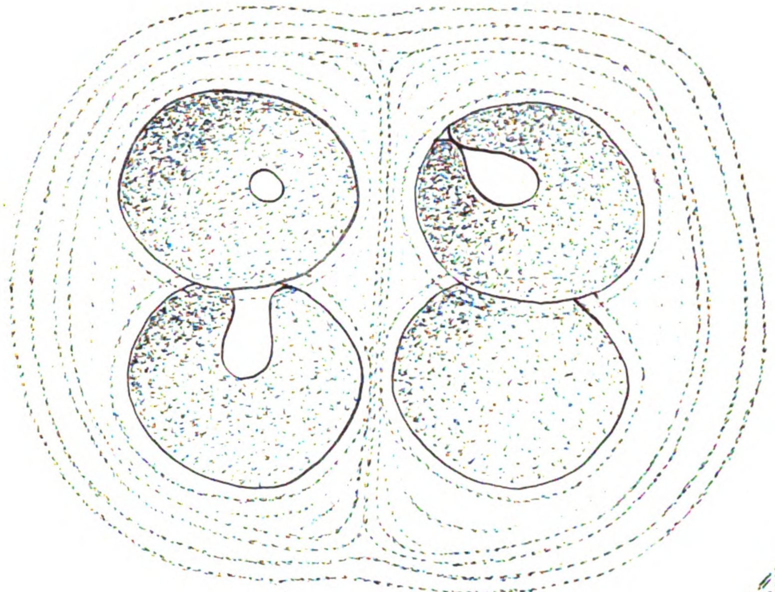


PLATE II

FIGS. 2 (430x); 1 (860x); 3, 4 (900x).

PLATE II



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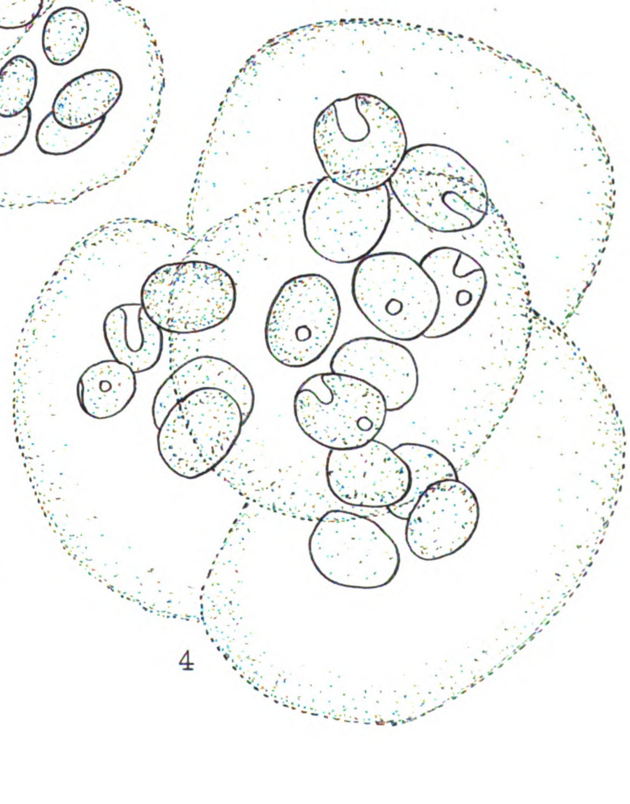

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PLATE III

FIGS. 5, 6 (450x); 1-4 (900x).

PLATE III

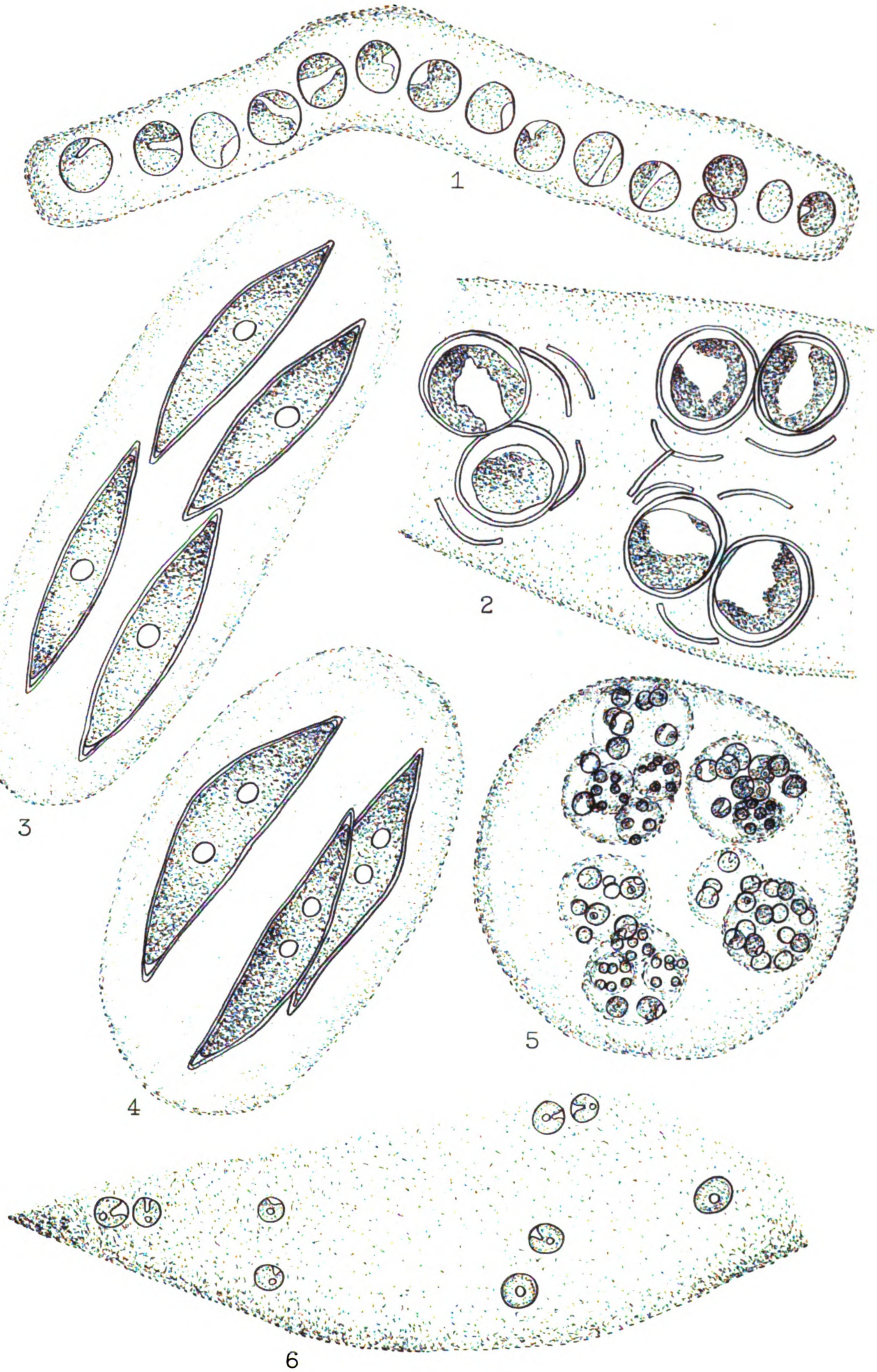
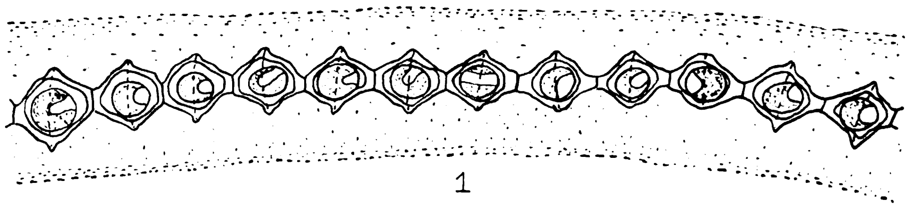


PLATE IV

FIGS. 1, 4, 7, 9 (860x); 3, 5, 6, 8 (900x).

PLATE IV



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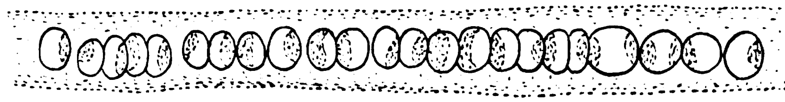

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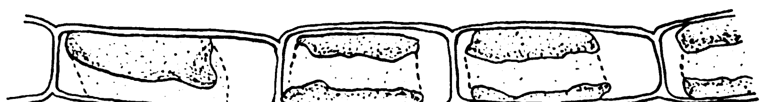

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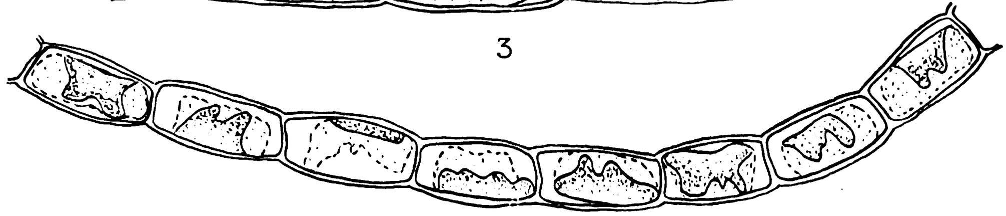

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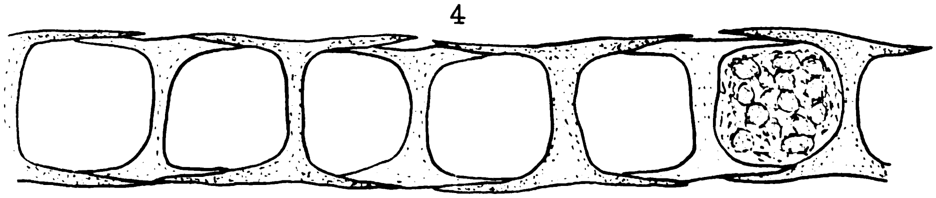

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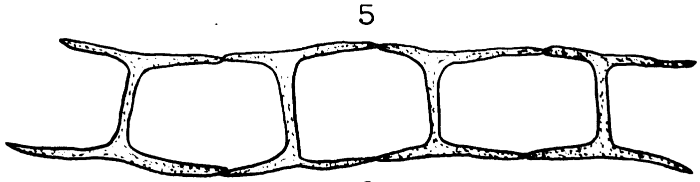

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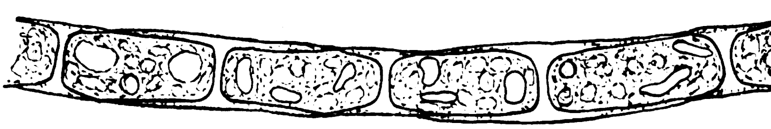

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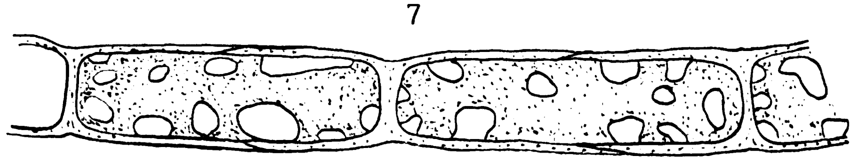

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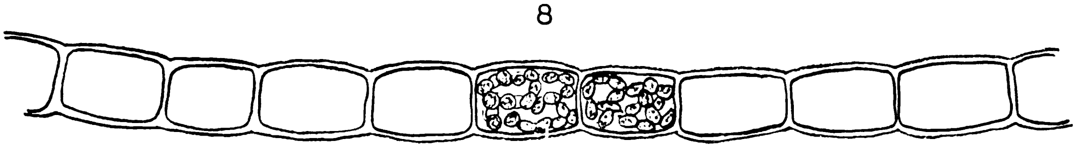

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PLATE V

FIGS. PAGE

1. *Cylindrocapsa conferta* W. West, (B-4) 27

2. *Cylindrocapsa geminella* Wolle, (x-2) 28

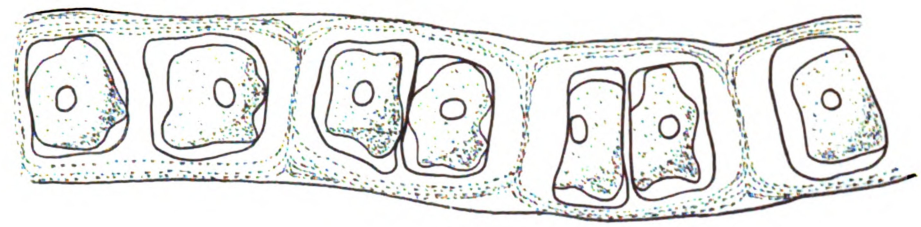
3. *Microthamnion strictissimum* Rabenhorst, (x-20) 28

4. *Microthamnion kuetzingianum* Naegeli in Kuetzing, (Redrawn from Prescott 1962, p. 682) 28

5. *Protoderma viride* Kuetzing, (x-2) 29

FIGS. 2, 5 (860x); 1, 3 (900x).

PLATE V



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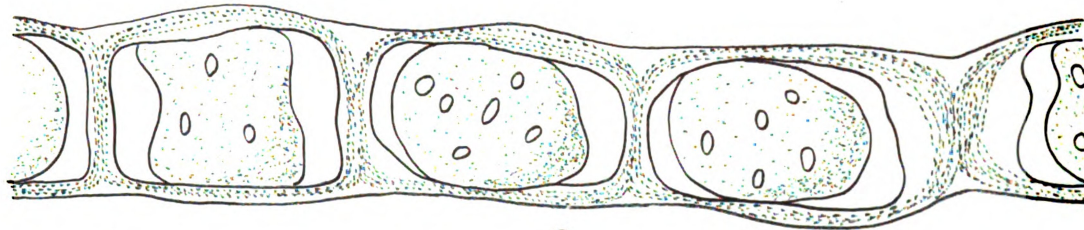

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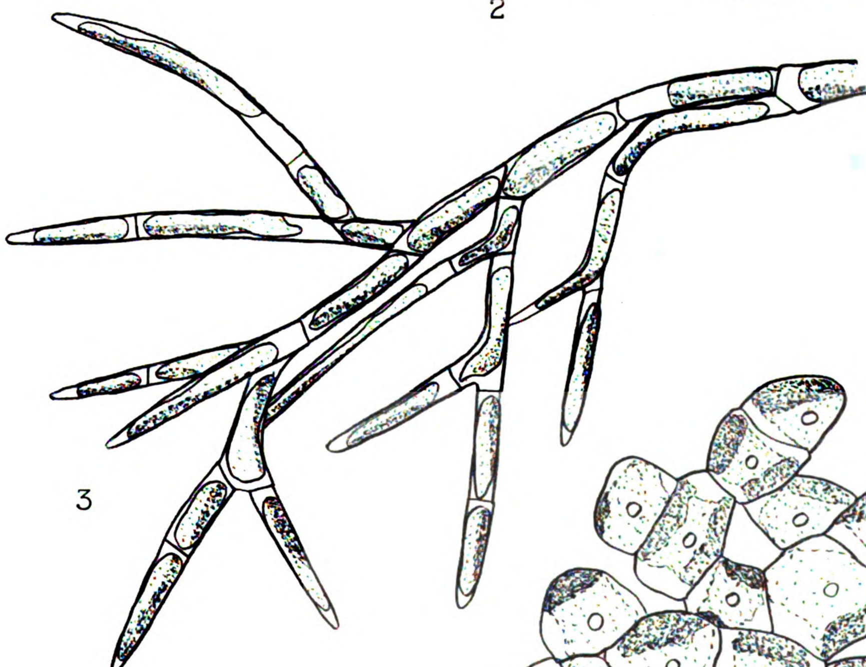

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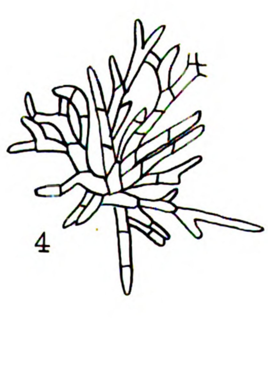

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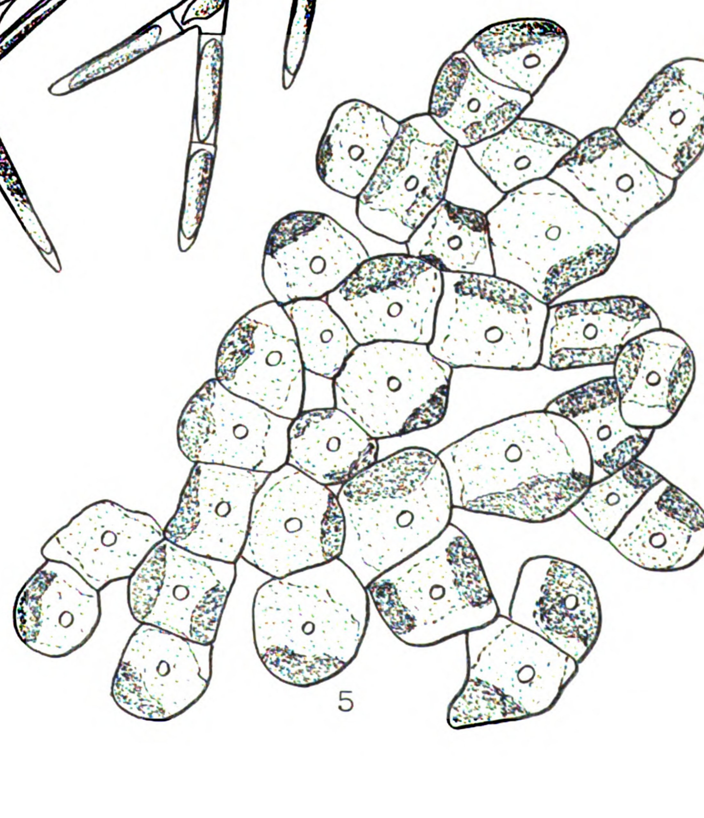

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PLATE VI

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FIGS. 5, (200x); 3, (450x); 1, 10, 11 (860x); 2, 4, 7-9 (900x).

PLATE VI

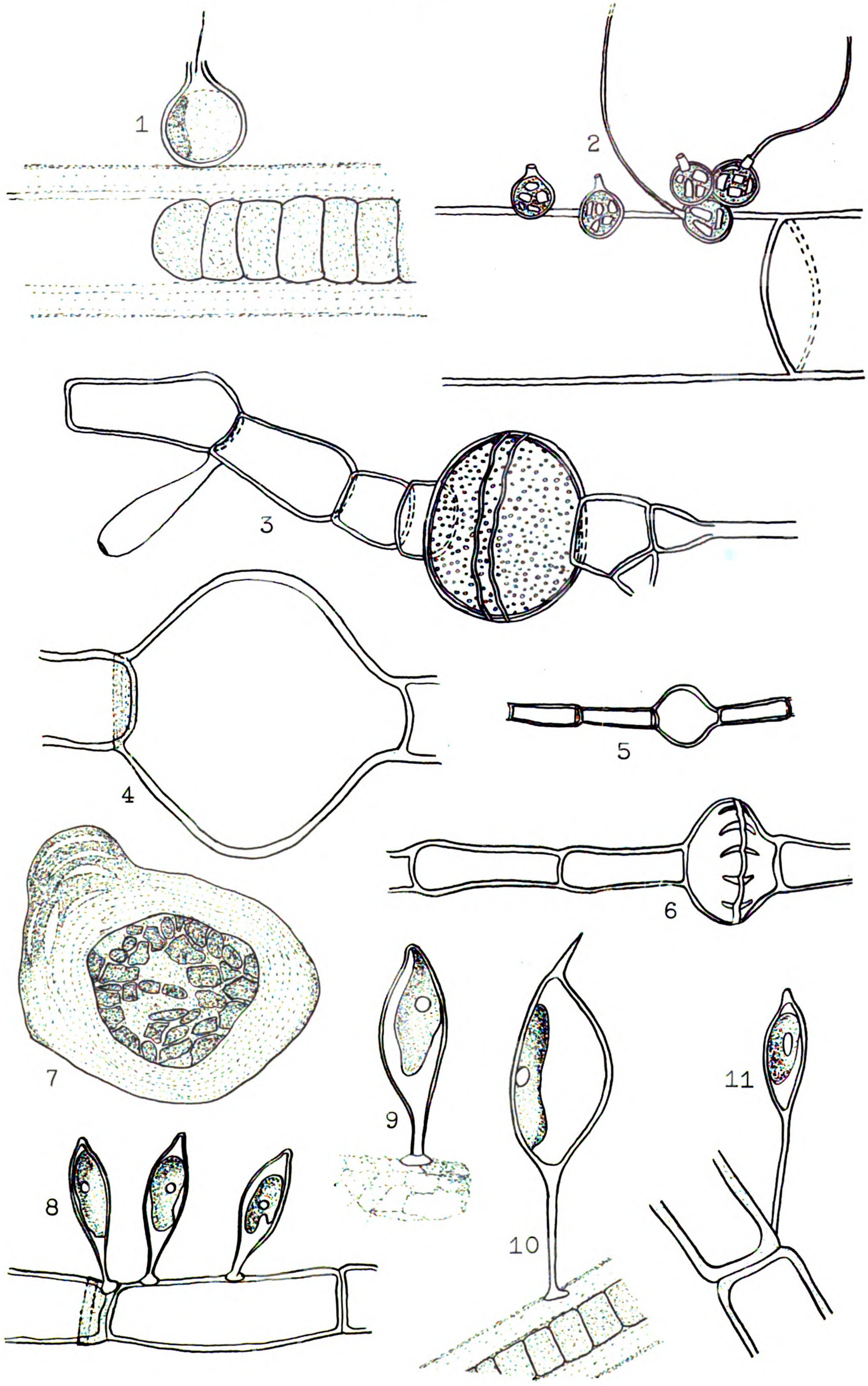


PLATE VII

FIGS. 1, 4 (450x); 10 (860x); 2, 3, 5-9 (900x).

PLATE VII

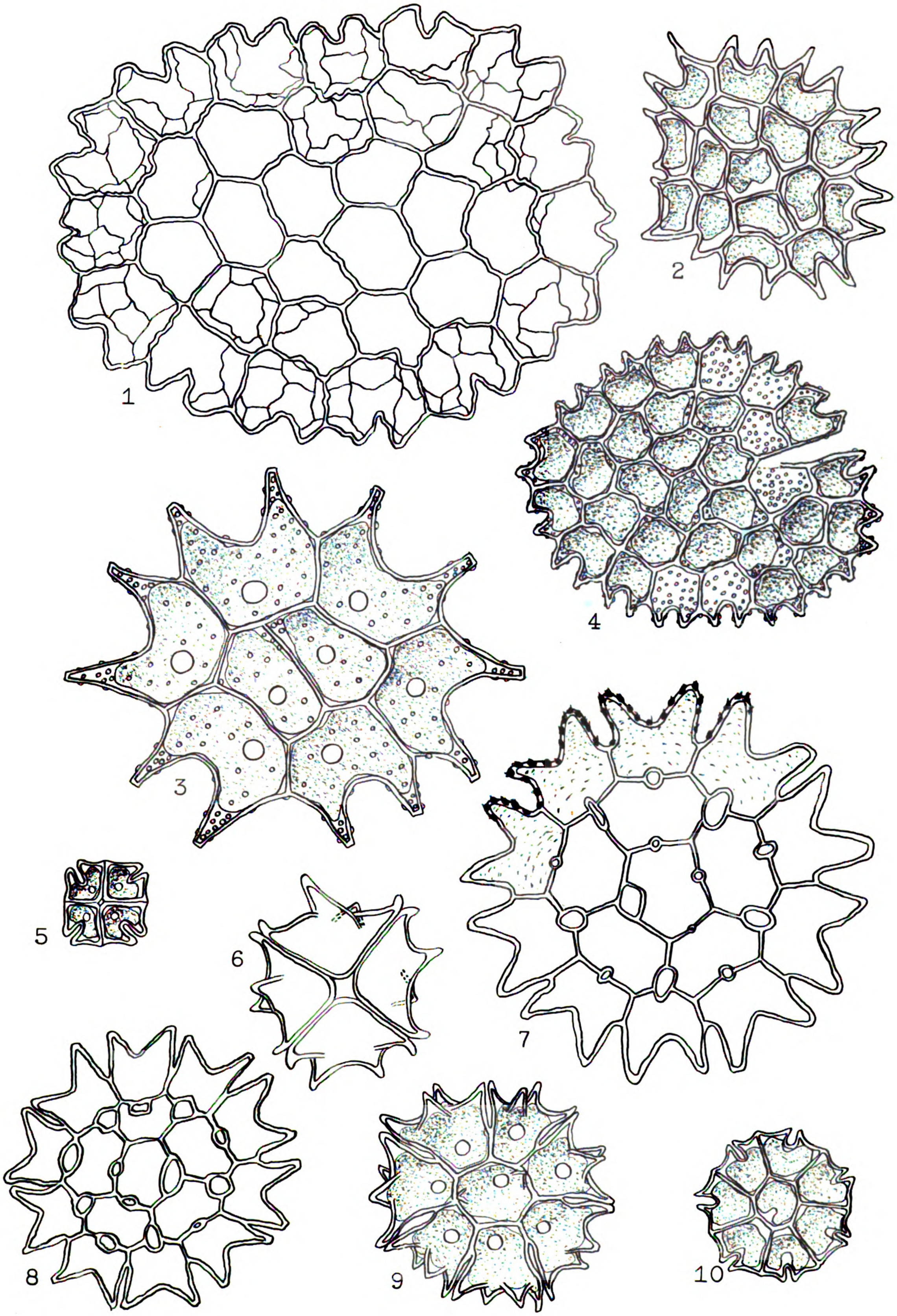


PLATE VIII

FIGS. 1-9 (900x).

PLATE VIII

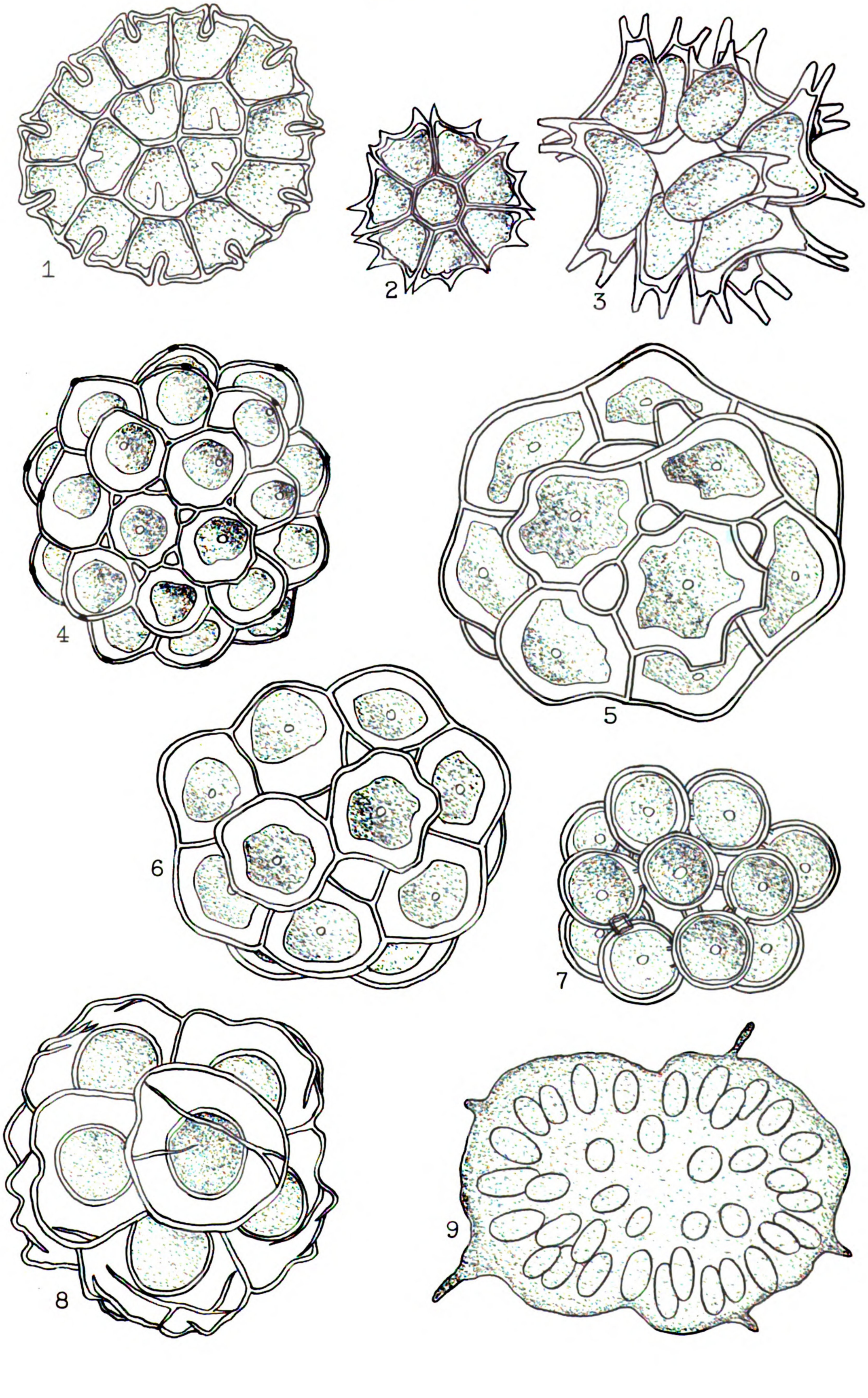


PLATE IX

FIGS. 7 (200x); 1, 5, 9 (860x); 2-4, 6, 8, 10 (900x).

PLATE IX

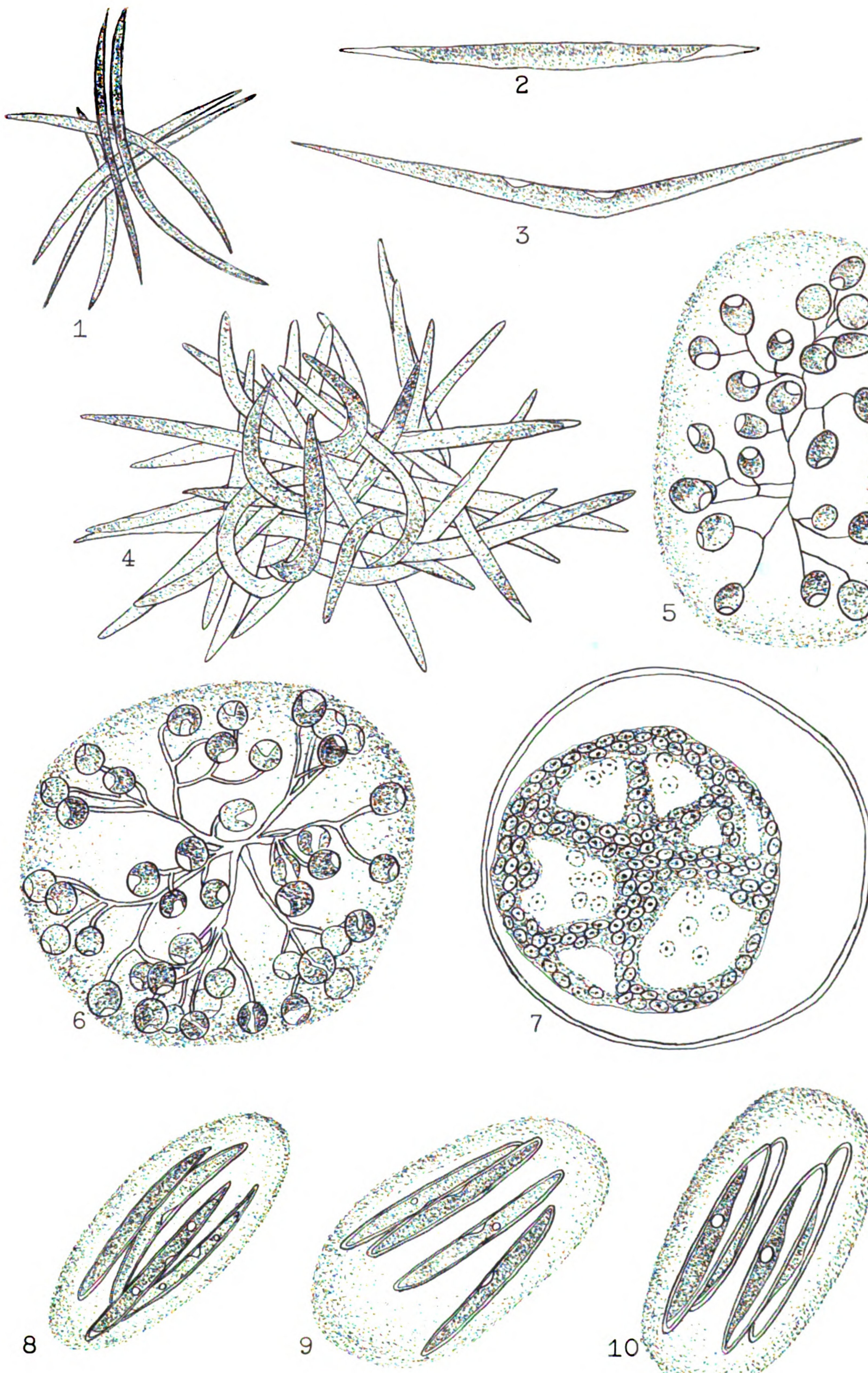


PLATE X

FIGS. 1 (450x); 3, 6, 8 (860x); 1 (enlarged cell), 2, 4, 5, 7 (900x).

PLATE X

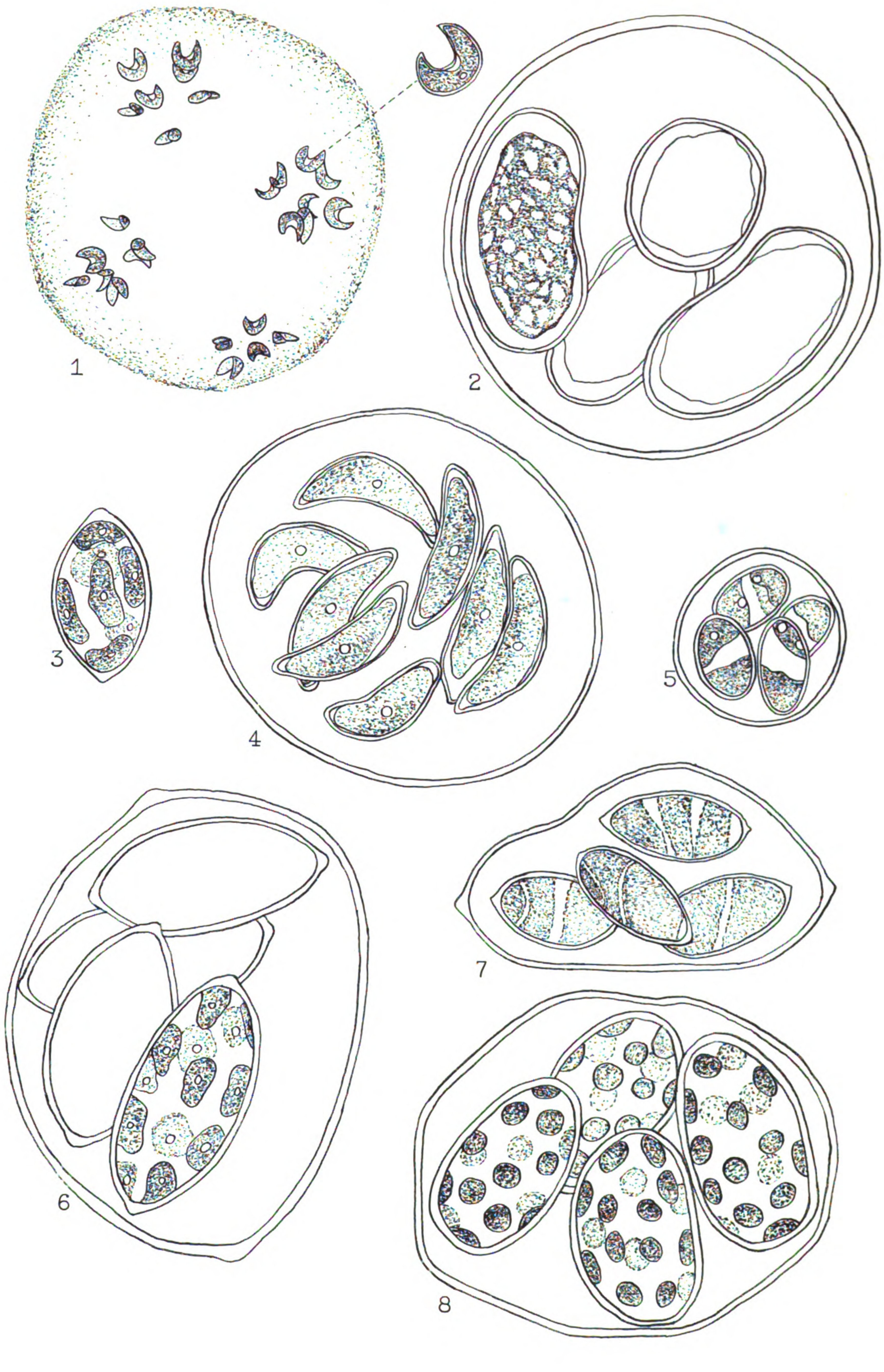
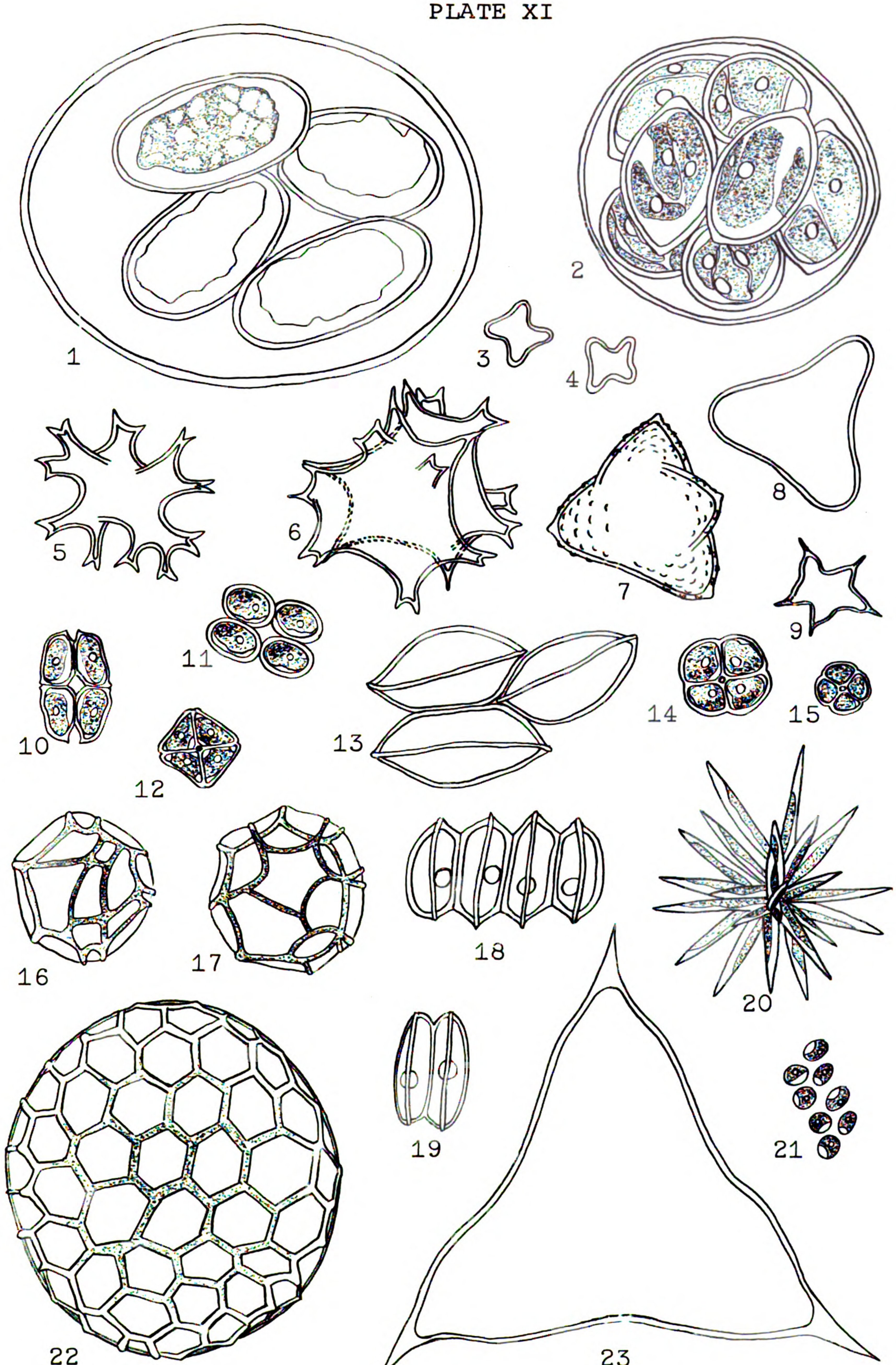


PLATE XI

FIGS. 8, 14, 15, 23 (860x); 1-6, 9-13, 16-19, 22 (900x).

PLATE XI



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FIGS. 1-25 (900x).

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FIGS. 6, 13 (860x); 1-5, 7-12, 14-26 (900x).

PLATE XIII

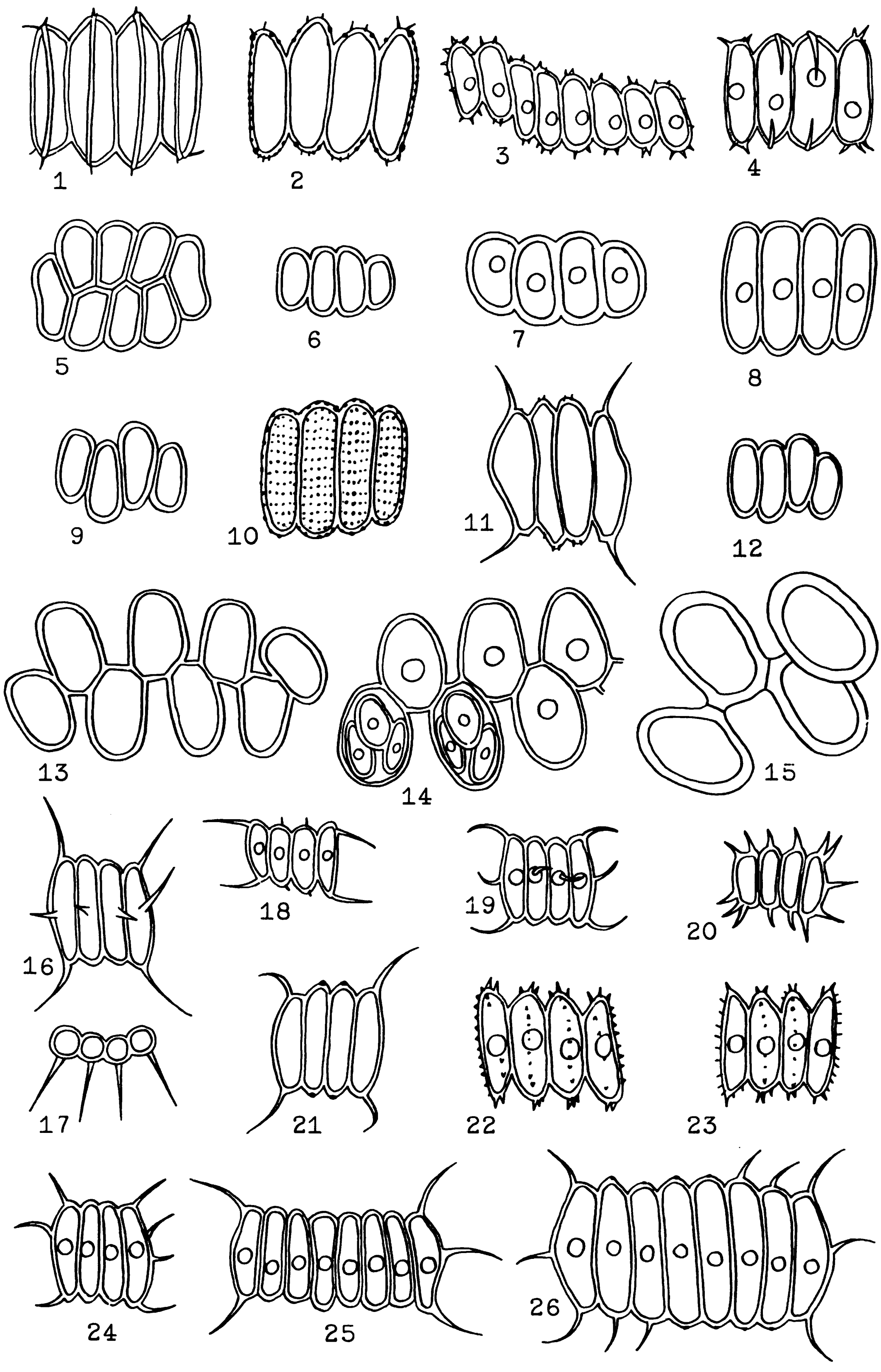

PLATE XIV

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FIGS. 13 (200x); 11 (860x); 1-9 (900x).

PLATE XV

FIGS. 13 (450x); 4-6, 8, 11, 12 (860x); 3, 7, 9, 10 (900x).

PLATE XV

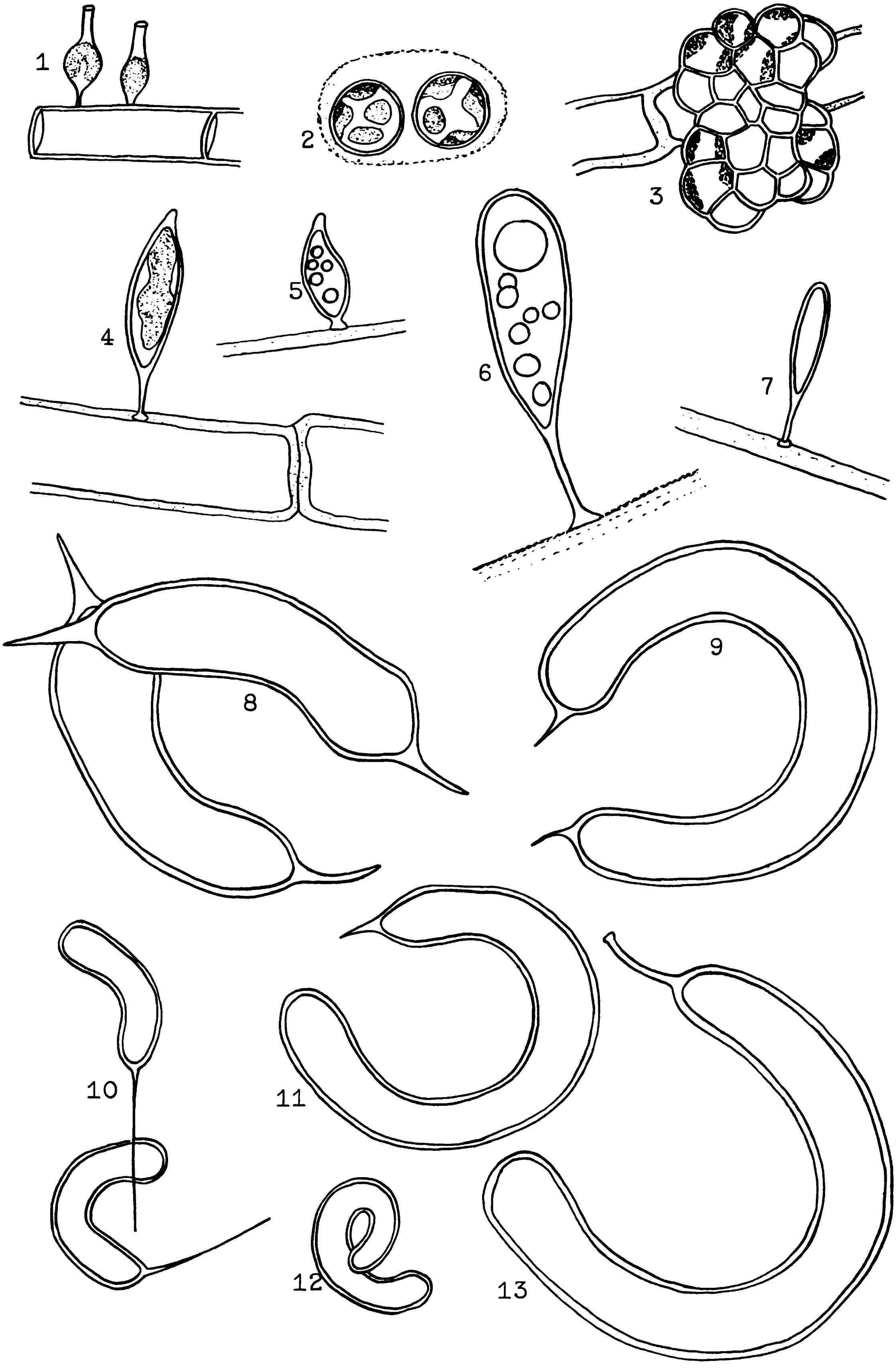


PLATE XVI

FIGS. 5, 6 (450x); 2, 7 (860x); 1, 3, 4, 10 (900x).

PLATE XVI

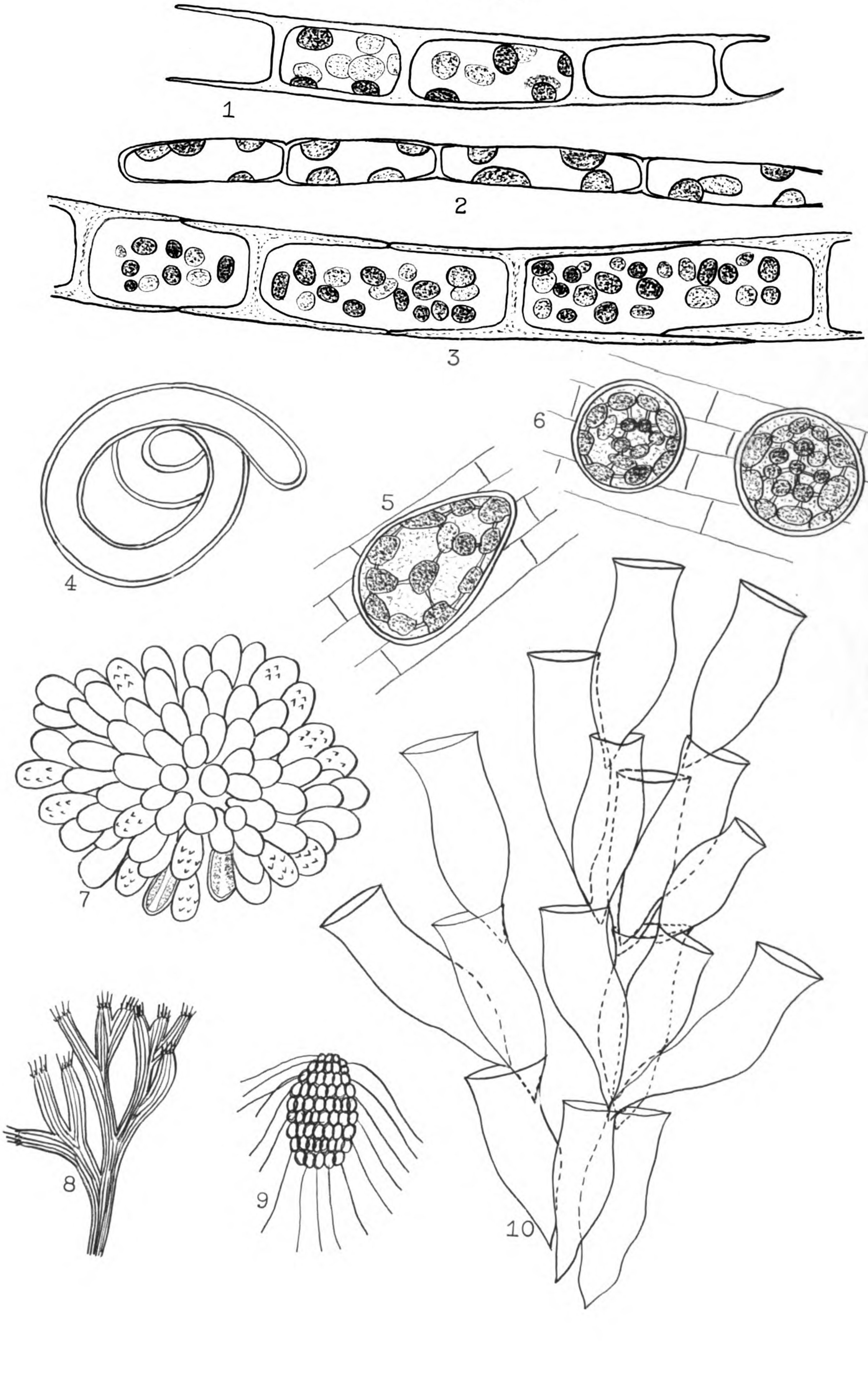


PLATE XVII

FIGS. 1, 2, 6-9 (860x); 3-5 (900x).

PLATE XVII

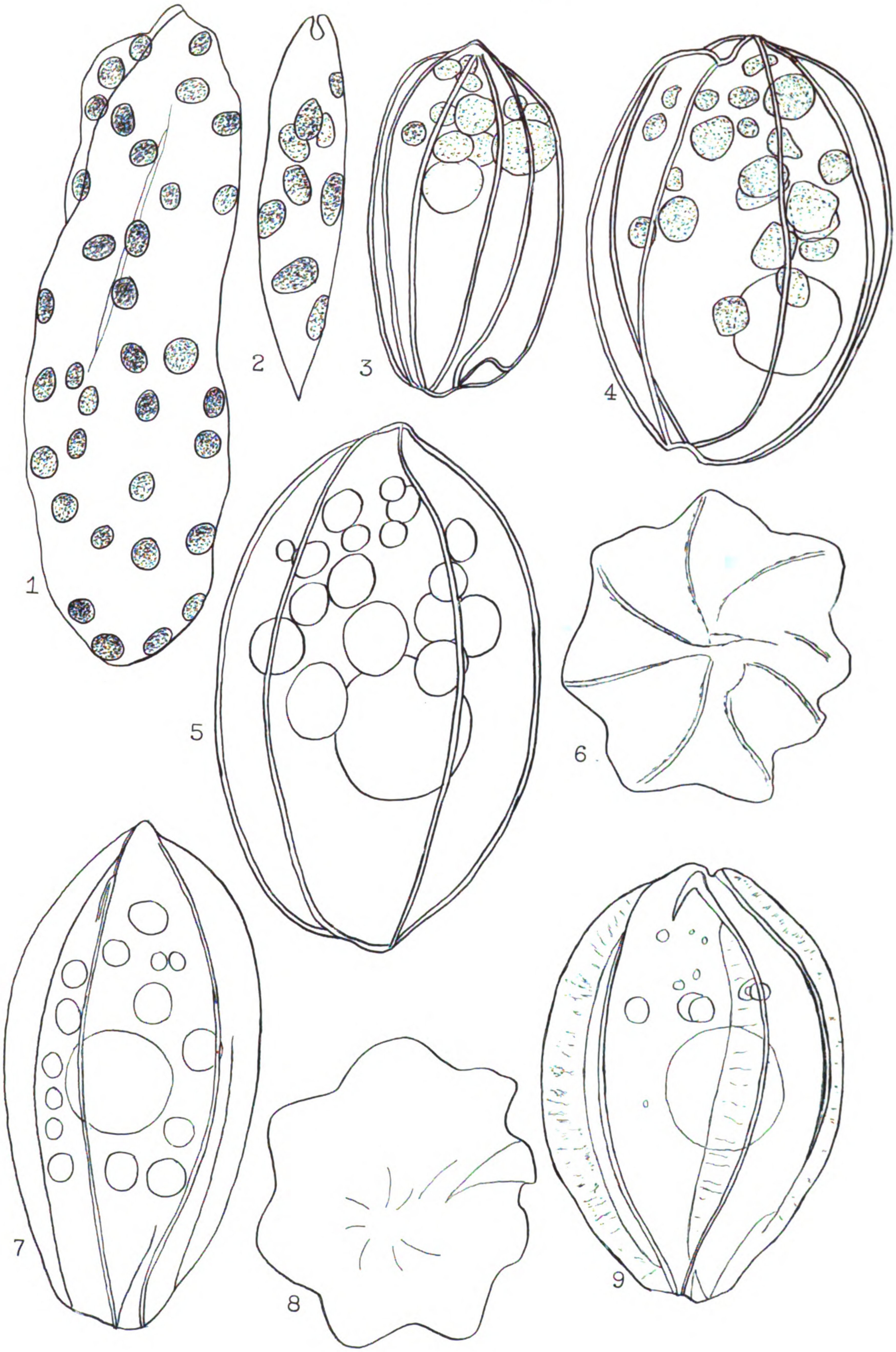


PLATE XVIII

FIGS. 4 (450x); 1-3, 5, 6, 8-11 (900x).

PLATE XVIII

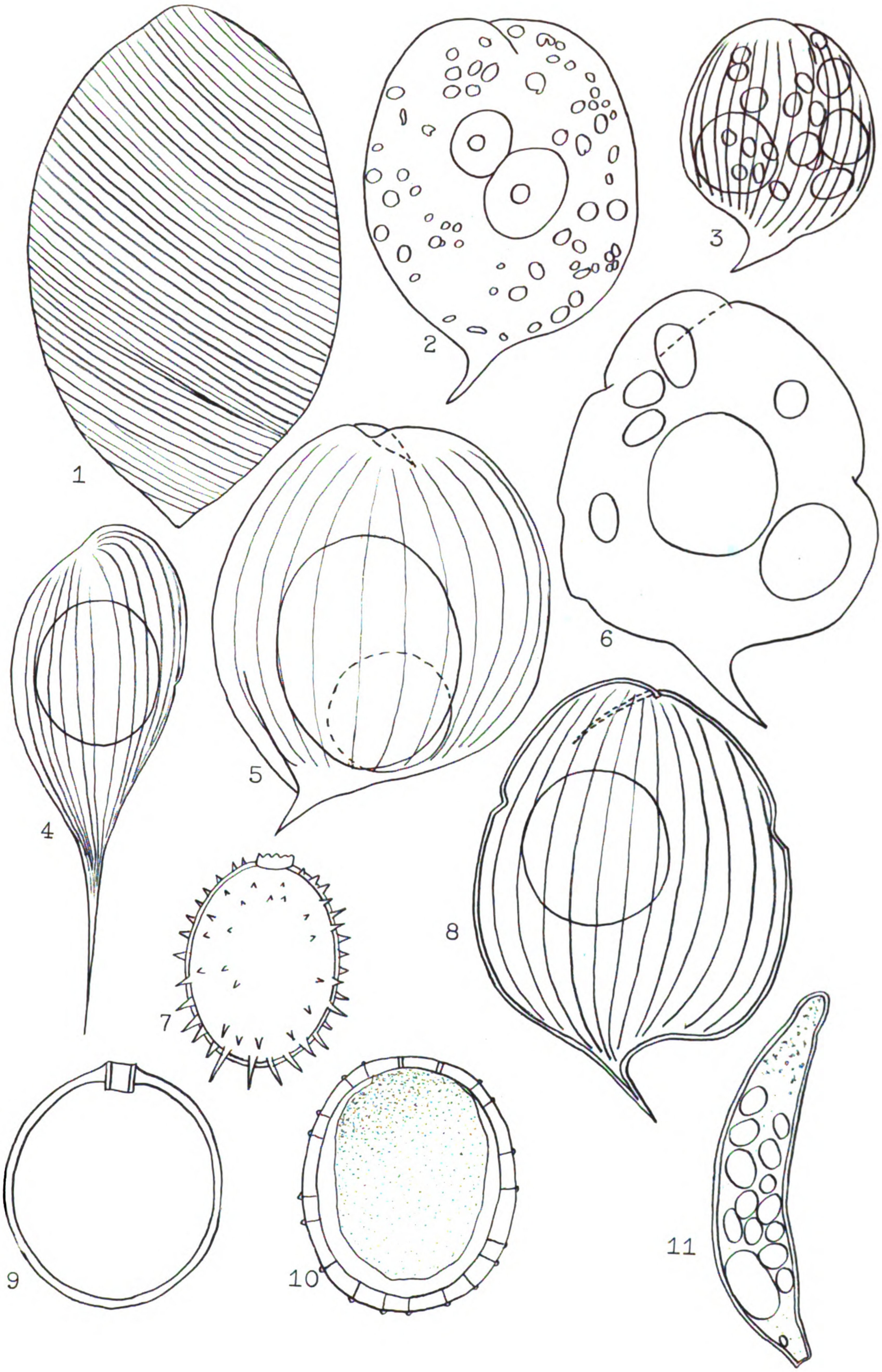


PLATE XIX

FIGS. 9 (450x); 1-6, 8, 10 (900x).

PLATE XIX

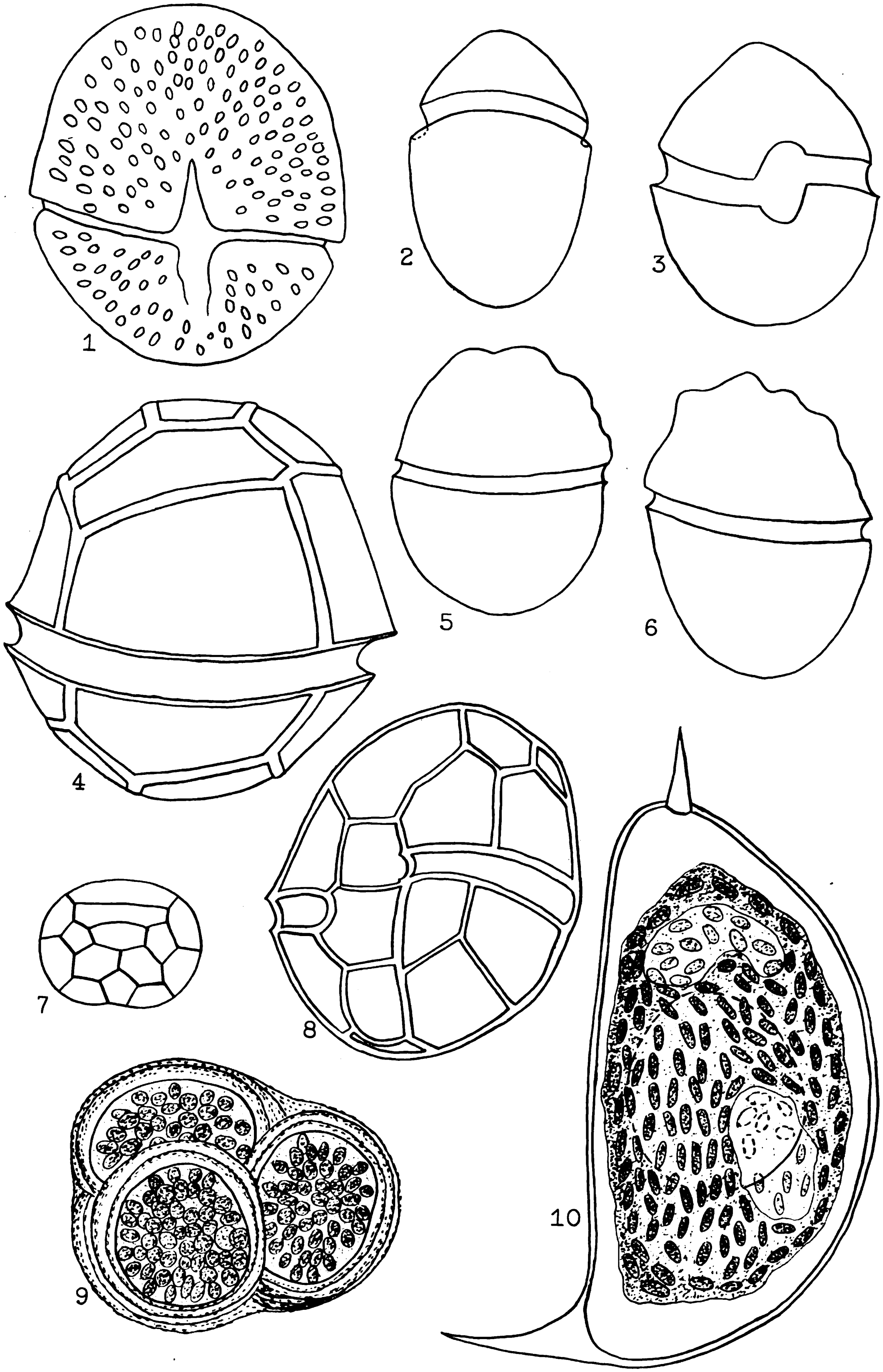


PLATE XX

FIGS. 1, 3 (430x); 2, 4-8 (900x).

PLATE XX

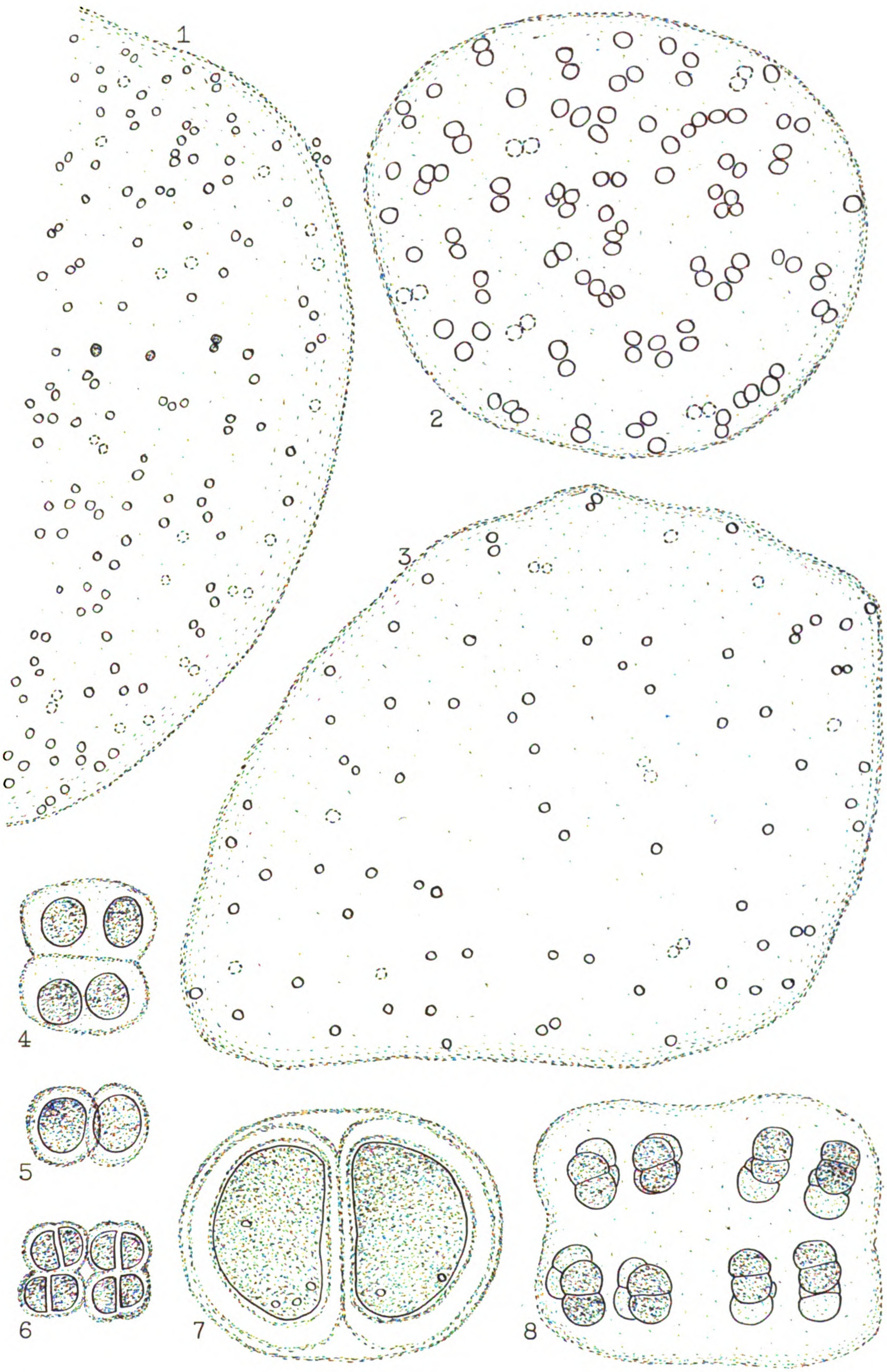


PLATE XXI

FIGS. 1-5 (900x).

PLATE XXI

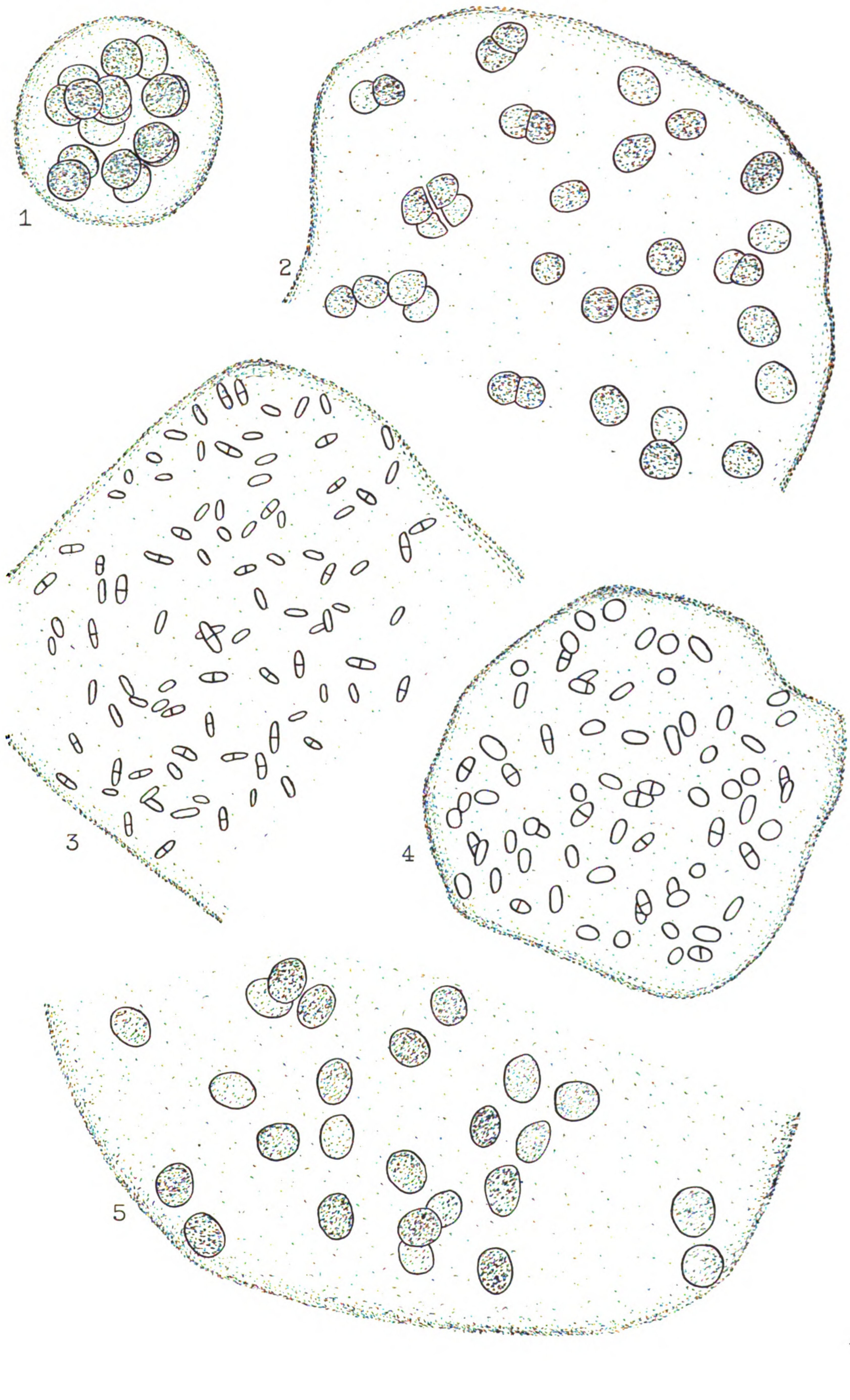


PLATE XXII

FIGS. 11 (860x); 1-9, 12, 13 (900x).

PLATE XXII

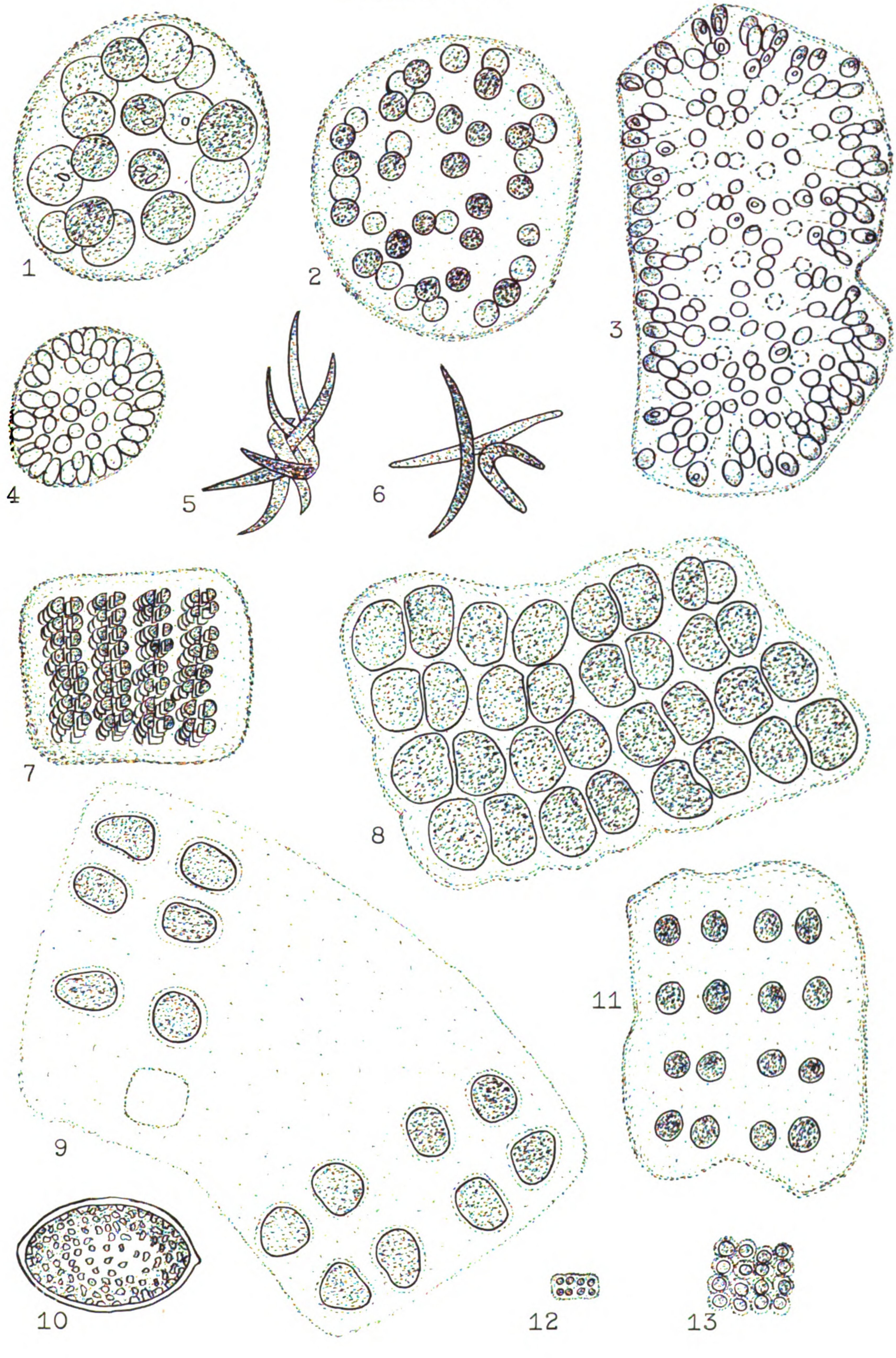


PLATE XXIII

FIGS. 5 (430x); 1-4, 6, 7 (900x).

PLATE XXIII

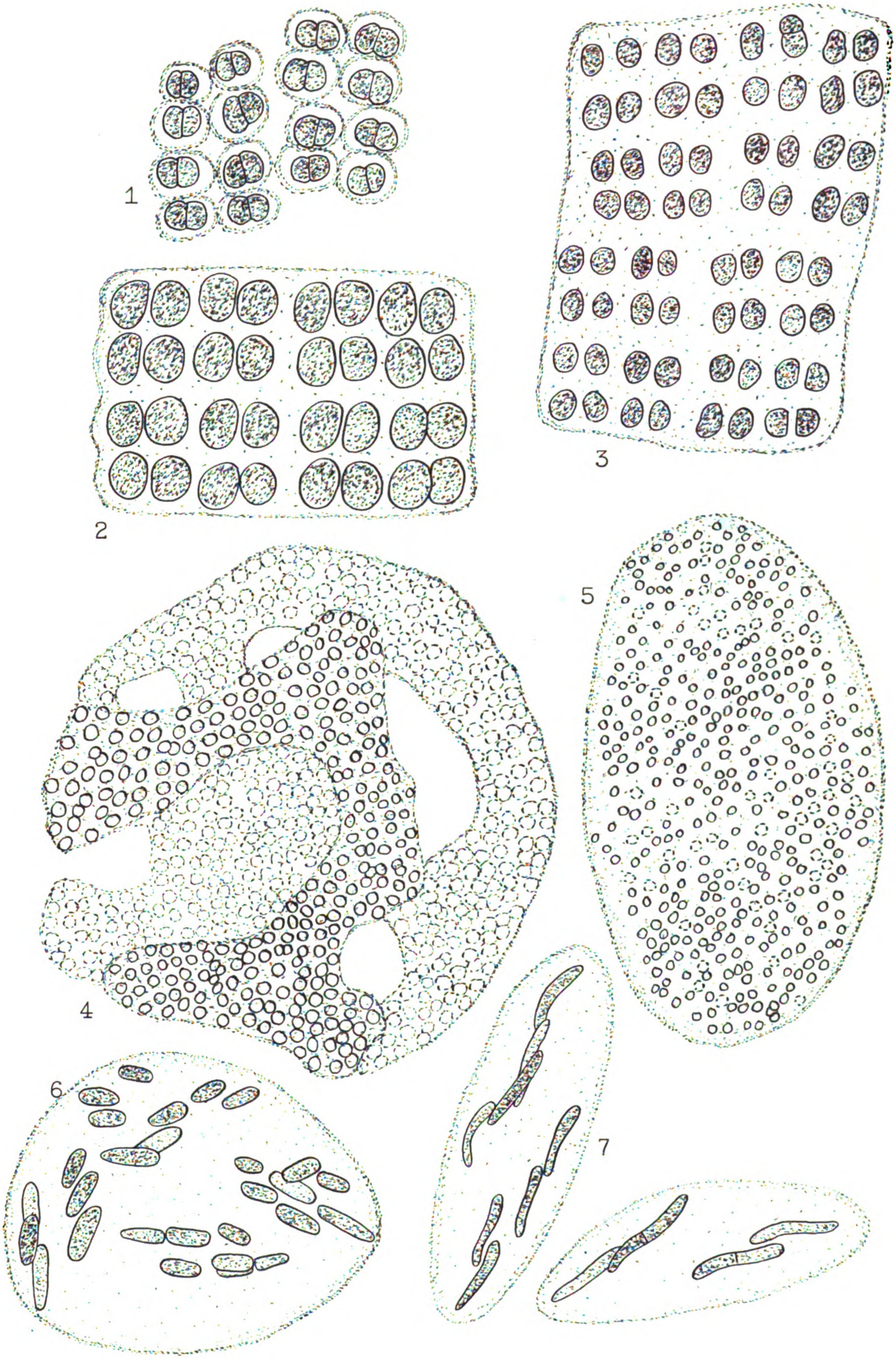


PLATE XXIV

FIGS. 2, 3 (450x); 4, 13 (860x); 1, 5-7, 9-12 (900x).

PLATE XXIV

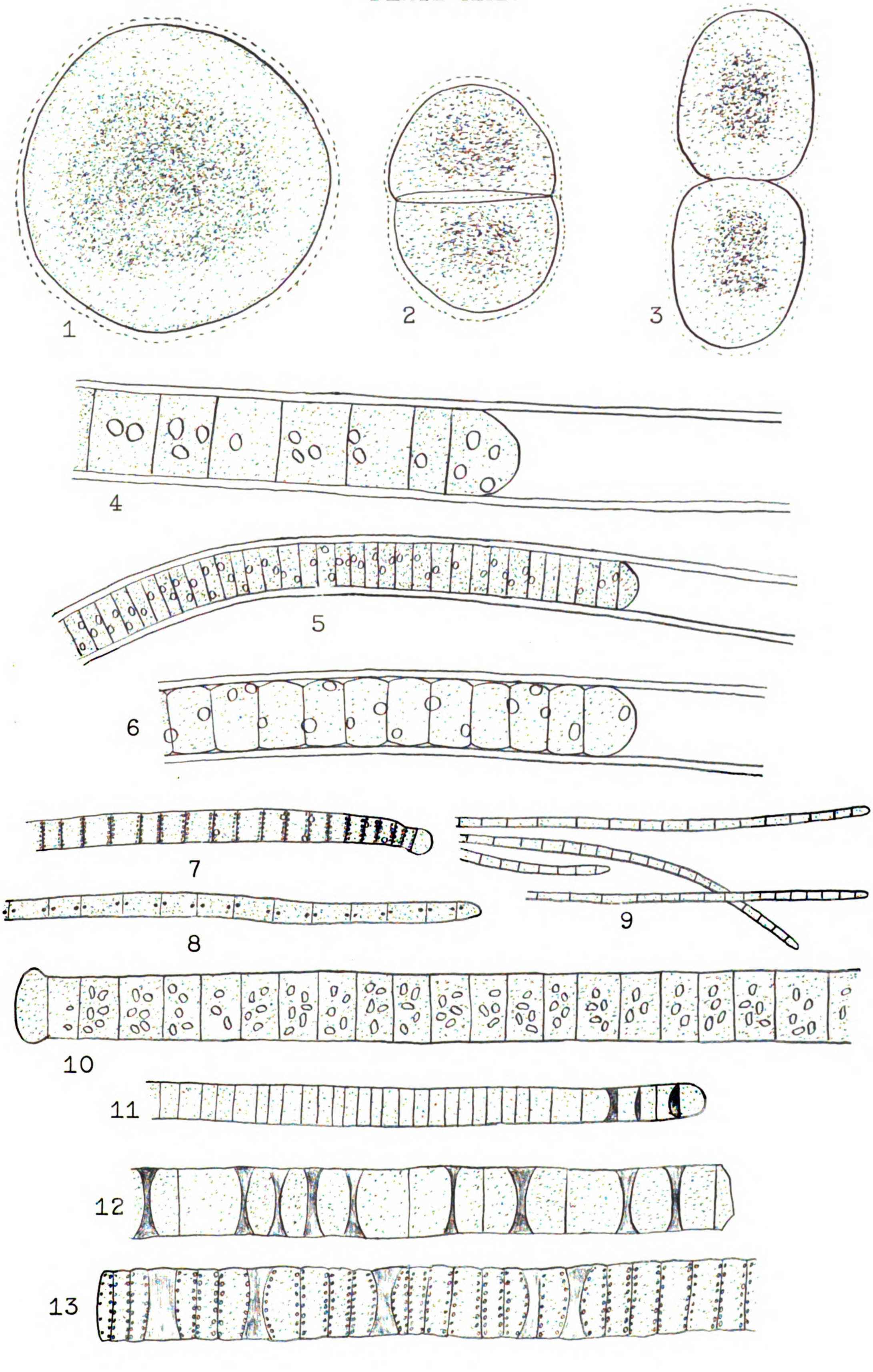


PLATE XXV

FIGS. 1-6, 8-10, 12 (900x).

PLATE XXV

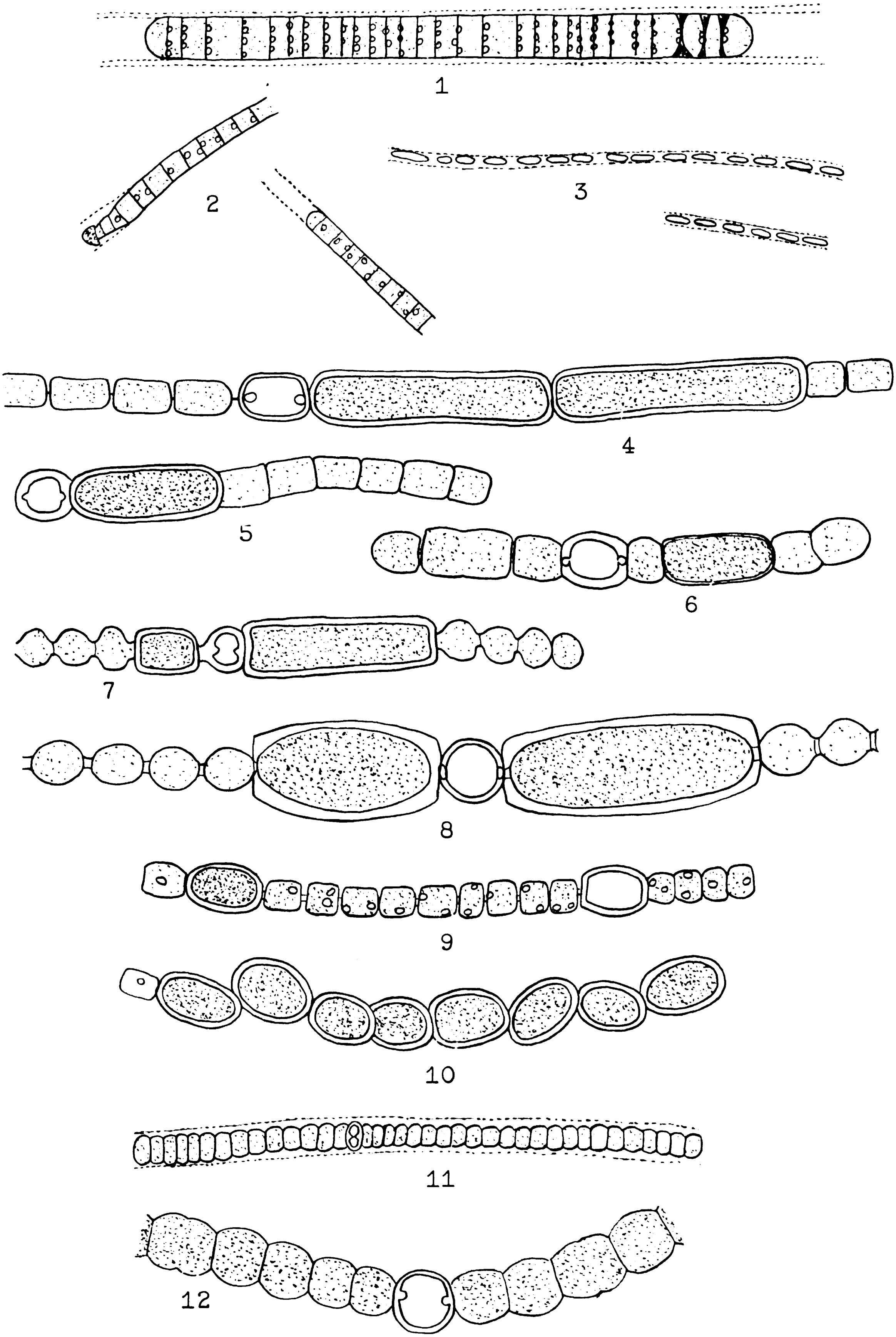


PLATE XXVI

FIGS. 4 (200x); 1 (860x); 2, 3, 5 (900x).

PLATE XXVI

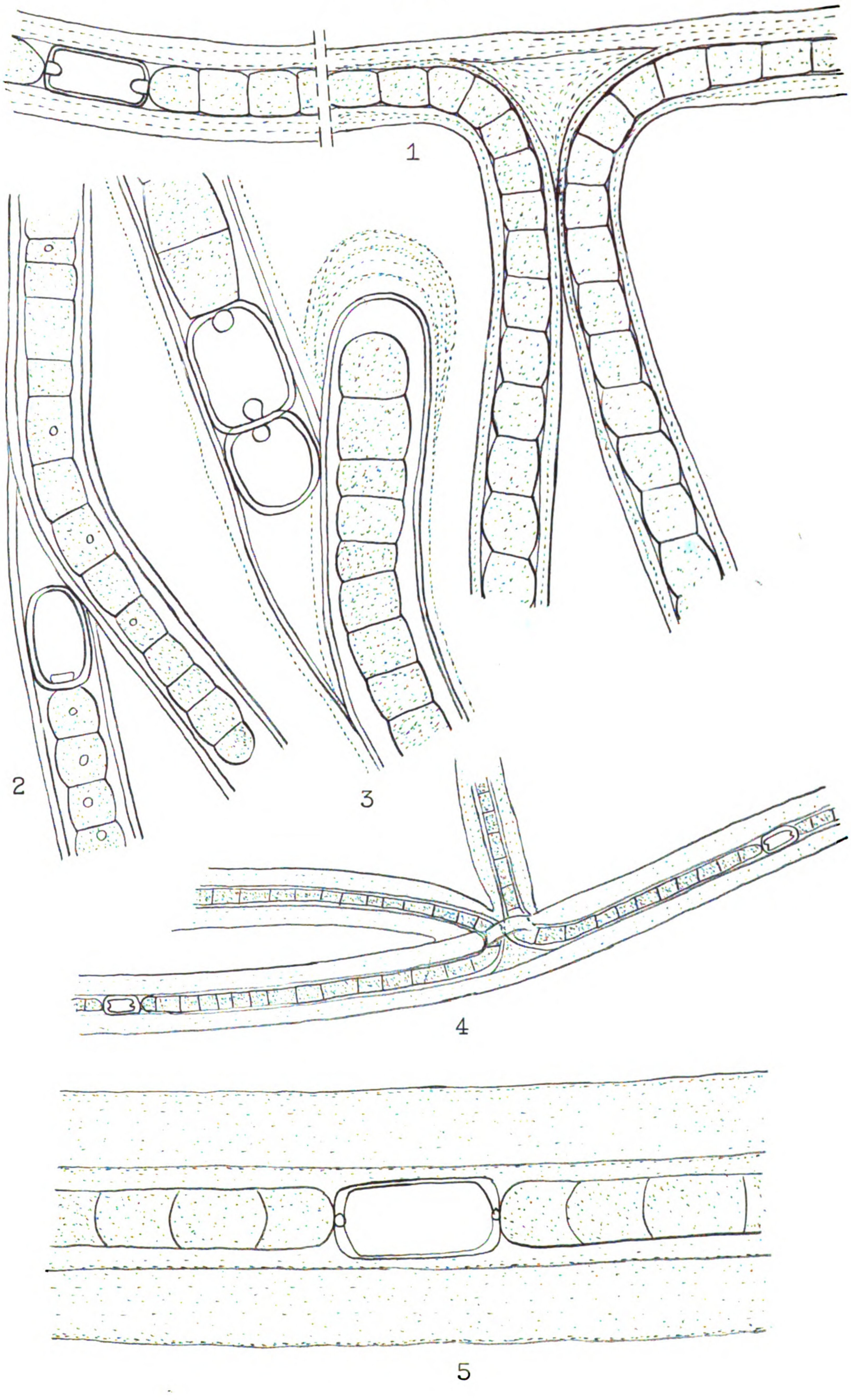


PLATE XXVII

FIGS. 4 (450x); 2 (860x); 1, 3, 5-7 (900x).

PLATE XXVII

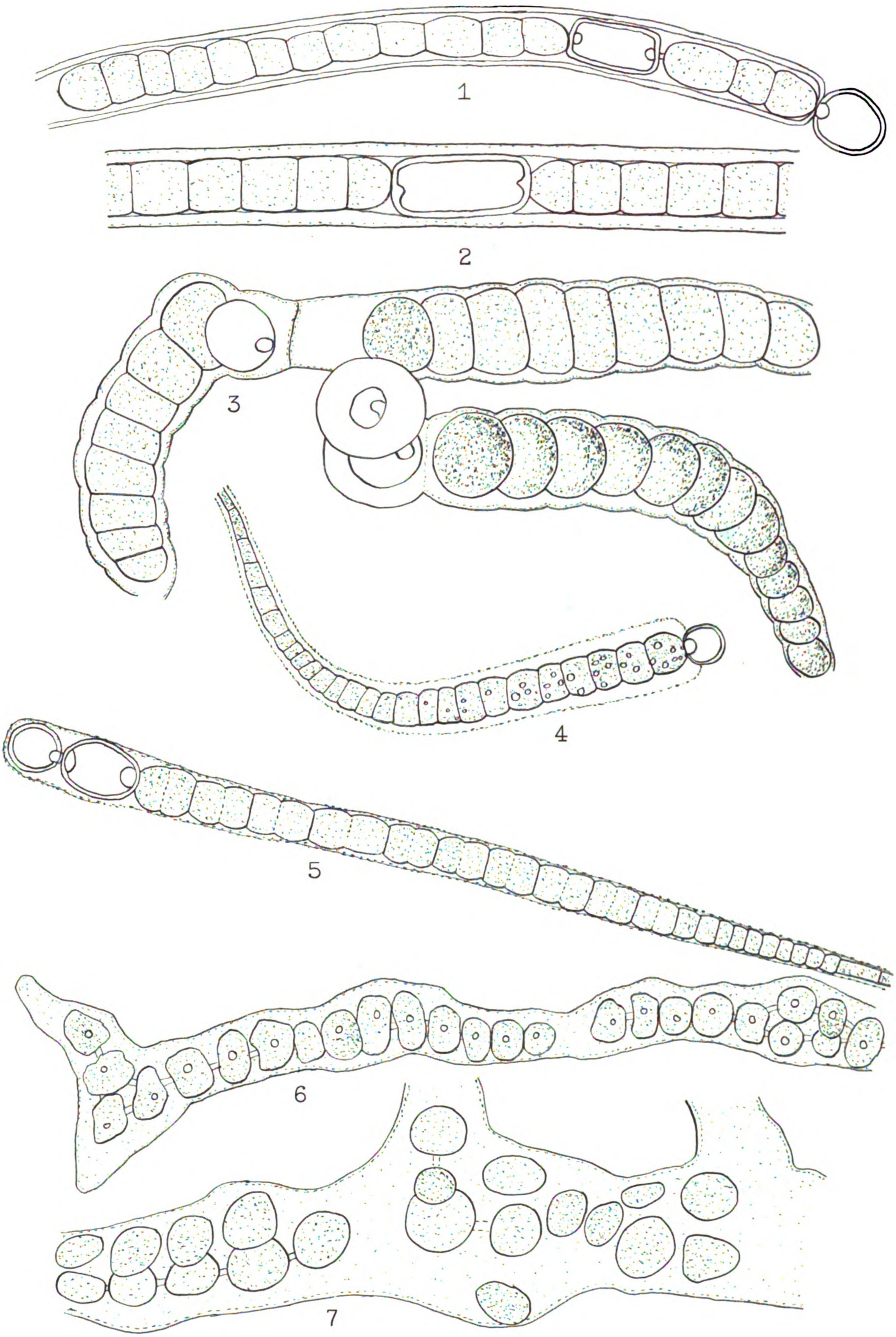
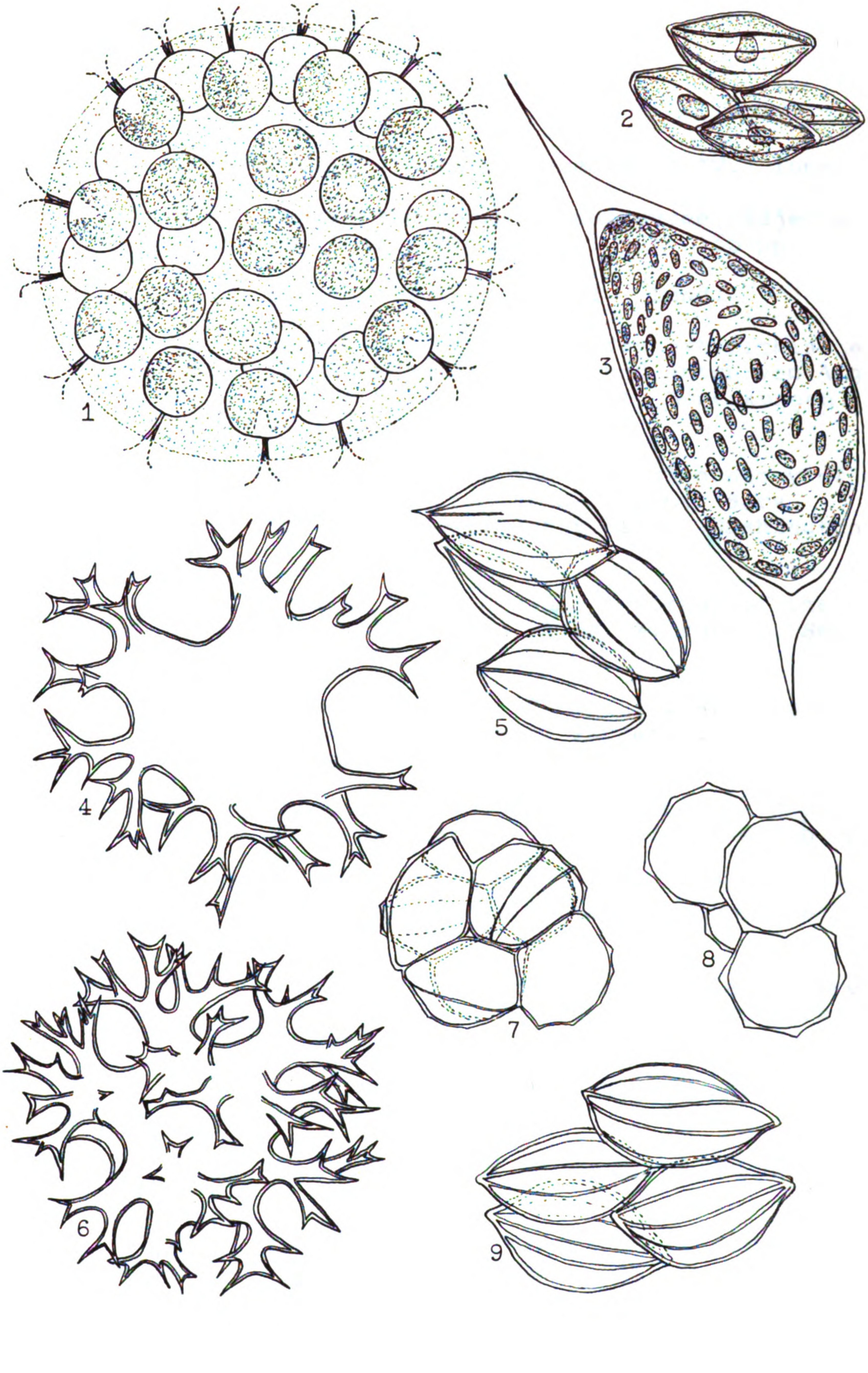


PLATE XXVIII

FIGS. 1, 3, 4, 6 (860x); 2, 5, 7-9 (900x).

PLATE XXVIII



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