A TAXONOMIC STUDY OF THE ALGAE IN PARK LAKE, CLINTON COUNTY, MICHIGAN

Thesis for the Degree of M. S.

MICHIGAN STATE UNIVERSITY
NORMAN A. ANDRESEN

1968

THESIS

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ABSTRACT

A TAXONOMIC STUDY OF THE ALGAE IN PARK LAKE, CLINTON COUNTY, MICHIGAN

By

Norman A. Andresen

The investigation was undertaken with the following objectives:

1) to compile a species list of the algal flora in the lake and record the habitat for each taxon;
2) to record the time of year when the taxon was found to be in the lake; and
3) to contribute to the knowledge of the algal flora of Michigan.

The methods used to collect algae included:

1) plankton hauls using a No. 20 silk bolting cloth plankton net;
2) scraping of natural and artificial substrates;
3) squeezing living aquatic plants and non-living debris; and
4) the taking of bottom samples.

The samples were examined in the living condition and preserved in 6:3:1 solution (water-95% alcohol-Formalin) or FAA solution (formalin-acetic acid-alcohol) for subsequent study.

Each algal collection was examined until no additional taxa were observed. Camera lucida drawings were made of each taxon and measurements of each were recorded as well as the time of year that the taxon appeared. Alkalinity and pH data were recorded for the lake during a ten month period.

The author identified a total of 132 algal genera and 335 specific and infraspecific algal taxa from the lake. Of these taxa 27 are newly recorded for Michigan, 12 are newly recorded for North America and two are new to science. An algal bloom was observed in the summer of 1967.

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By

Norman A. Andresen

A THESIS

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1968

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To Dr. G. W. Prescott, my major professor, who gave inspiration, guidance and friendship throughout this study I wish to express my sincerest appreciation. I wish to thank Drs. R. C. Ball, E. S. Beneke, J. C. Elliott, I. W. Knobloch and W. E. Wade, members of my guidance committee, for their helpfulness and their critical advice.

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University were greatly appreciated. Special thanks must be given to Mr. Forrest M. Begres, formerly of Eastern Michigan University, who helped in and confirmed the author's identification of diatoms.

I also wish to acknowledge assistance of the Botany and Plant Pathology Department of Michigan State University for supplying financial assistance and Dr. Richard Solberg, Director, The University of Montana Biological Station for the use of laboratory space.

Finally, I wish to thank my wife Sandra for her encouragement throughout this study.

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INTRODUCTION

Park Lake represents a rapidly aging, eutrophic lake in southern Michigan, where 'time' and the disturbance of man are causing a profound and destructive influence. As in many Michigan lakes pollution of various kinds is rapidly annihilating them for water supplies, for recreational use and for home sites.

In the spring of 1966 it was suggested to the writer by Dr. G. W. Prescott that he consider Park Lake as a possible area for conducting an investigation of the algal flora. The habitat of the flora has been undergoing a modification and a record of the present state was desirable in reference to the changing water quality for future study.

Park Lake is of interest because it has been neglected biologically and chemically even though it is very close to the Michigan State University campus and phycology classes have made incidental collections there for many years especially during the spring. Knowledge of the biota and the lake chemistry are pertinent both for the history of this lake and for comparison with other lakes in southern Michigan. Further, the lake is of interest because the physiography and the hydrography together with pollution factors present a

unique combination of characters. The individuality of Park Lake results in part from its extreme shallowness; high percentage of floating and emergent vascular aquatic plants; and its pollution, organic and inorganic, by the residents of the area.

Therefore it is appropriate to examine the lake and to add to our knowledge of the biota as it exists now for future reference. Accordingly the investigation was undertaken with the following objectives:

1) To compile a species list of the algal flora in the lake and record the habitat for each taxon;
2) To record the time of the year when the taxon was found to be in the lake;
3) Possibly to add to the knowledge of Michigan's algal flora.

THE LAKE

General Information

Park Lake is located in the southeast corner of Clinton County, Michigan (T 5 N, R 1 W, Sec. 28,29), six miles to the northeast of the campus of Michigan State University. The general outline is approximately pyriform with its long axis lying in a northeast-southwest direction. It is a very shallow, productive lake of glacial origin. In 1931 it was described in the Michigan Lakes and Streams Directory, East Lansing as follows:

> Park Lake, Clinton County; near M 78, south of Bath, near Lansing, 120 acres. A road touches lake. Extensive resort development, boat livery, good swimming, sand beach, woods on one side, flat land, lake much frequented. Large- and small-mouth bass, bluegills, perch, pike.

The situation encountered by the author is quite different from that in the above description. The community has deteriorated and the resort development is non-existent. There is little use of the lake for swimming and the dirty sand beaches are cluttered with refuse and discarded items of every variety. It was reported by Bratt (1957) that the Michigan Health Department had closed the beaches in years past because of what was referred to as chemical toilet pollution.

Along the northwest and part of the west side of the lake there is a swampy zone with marginal vegetation including a floating mat of Decodon verticillatus bordered shoreward by a zone of trees. The land beyond this is occupied by a muck farm. Toward the south end, the Decodon mat merges with a Larix laricina bog mat and beyond this, toward the south there is a swampy lowland area. At the northeast end of the lake there is a public park with a boat landing. The complete shoreline of the public park is overgrown with Typha latifolia. Along the northern shore there is a fish bait shop and boat livery near an abandoned 'beach house' which at one time apparently offered some of the same services as the present establishment. Most of the lake supports dense growths of partly emergent vascular aquatic plants so that during the summer there is no large area of open water.

The residential community almost completely encircles the lake leaving only the margin along the Larix bog mat and about one-half the Decodon mat free from residential use.

Type and Classification

The lake is eutrophic according to Thienemann's classification system as given in Odum (1959). Bratt (1957) mentions Park Lake as a temporate lake of the third order according to the Forel and Whipple classification system, with a temporary thermocline being formed when wind and wave

action are limited. Bratt did not indicate at what time of year the thermocline occurs. Observations bear out Bratt's statement that the lake is an eutrophic hard water type with some marl precipitation.

The lake is surrounded by two major types of soil according to Veatch (1953). These are: (1) Sandy loams, plains sands or sand-gravel substratum; the land characters being:

> Undulating plains, broken by swampy depressions, in part a complex of flats of upland and swampy lowland irregular in shape and size. Relief 10-50 feet. Textures mostly sandy loams, but various textures included. Substrata locally gravelly, but also sands, silt and clay. Stone-free or not excessively bouldery. Acid soils; medium fertility. . . .*

and the Geologic-Pedologic relations are:

> Till plains and outwash. Grey drift weathering to reddish-yellow colors. Medium influence from limestone and shale formations. Profiles on upland mostly Grey-Brown Podzolic. Forest--on upland mostly oaks-hickory type.*

and (2) peat mucks; with the land characters being:

> Mostly swamp but includes some marsh. A few low mounds and ridges of upland. Mostly blackish muck on surface, but in part brown and yellow strongly acid peat. Locally very thin deposits over variable substratum clay, sands, marl.*

and the Geologic-Pedologic relations are:

> Post-glacial accumulations. Soil characteristics autogenous, but in local instances plant matter highly decomposed. Strongly developed glei horizons; locally mineral substratum strongly mottled with iron oxide; local bog iron or pans. Forest--elm, ash, soft maples, swamp white oak; in part tamarack.*

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*Veatch 1953. Legend on map.

The 1938 hydrographic survey party reported most of the bottom to be covered by a pulpy peat of from four to twenty feet thick.

Park Lake is, in the opinion of the author, considered to be a highly productive lake. No direct productivity studies were conducted during this study to evaluate the productiveness or to give experimental data to classify the lake as a productive lake. The lake is classified as a productive lake on the basis of the following inferential evidence:

1) the observation of the lake and its abundance of vascular aquatic plants;
2) the large number of taxa recorded for the lake;
3) the algal blooms recorded for the lake (1938 "very abundant"; 1967, present study); (On all other occasions of water bloom reports, the lake in which the bloom occurred was reported to be productive and no unproductive lake has had a water bloom recorded for it.);
4) the high alkalinity with an abundance of bicarbonate tends to indicate production because of increased photosynthesis. Photosynthesis has been shown to be proportional to the concentration of bicarbonates by Anglestein in 1910. Chambers (1912) summarizes Anglestein's work by saying:

> Anglestein ('10), working with a number of different kinds of water plants, found that photosynthesis, as shown by the bubble method, was proportional to the concentration of bicarbonates present in the water and that in distilled water, free from carbonates, but saturated with free CO_2, the photosynthesis was very slight.*

Previous Survey of Park Lake

In 1938 the Institute for Fisheries Research, Department of Fisheries, Michigan Department of Conservation, conducted a survey of the lake. This was made by a party headed by Dr. R. C. Ball and was concerned mostly with fish and the ecological factors affecting their biology. A list of aquatic vascular plants (see Appendix) was compiled along with some morphometric observations resulting in the hydrographic map from which the map on page 8 was taken.

The hydrographic map of 1938 shows the area to be 185 acres with a maximum depth of 25 feet. Bratt (1957) estimated the area to be 120 acres with a maximum depth of twenty feet. Bratt also calculated the surface areas over given depths from the 1938 map. They are:

58% of surface over a depth of less than five feet

33% of surface over a depth of between five and ten feet

9% of surface over a depth of ten feet and greater.

With 91% of the lake's surface over a depth of less than ten feet or less the shallowness of the lake is emphasized.

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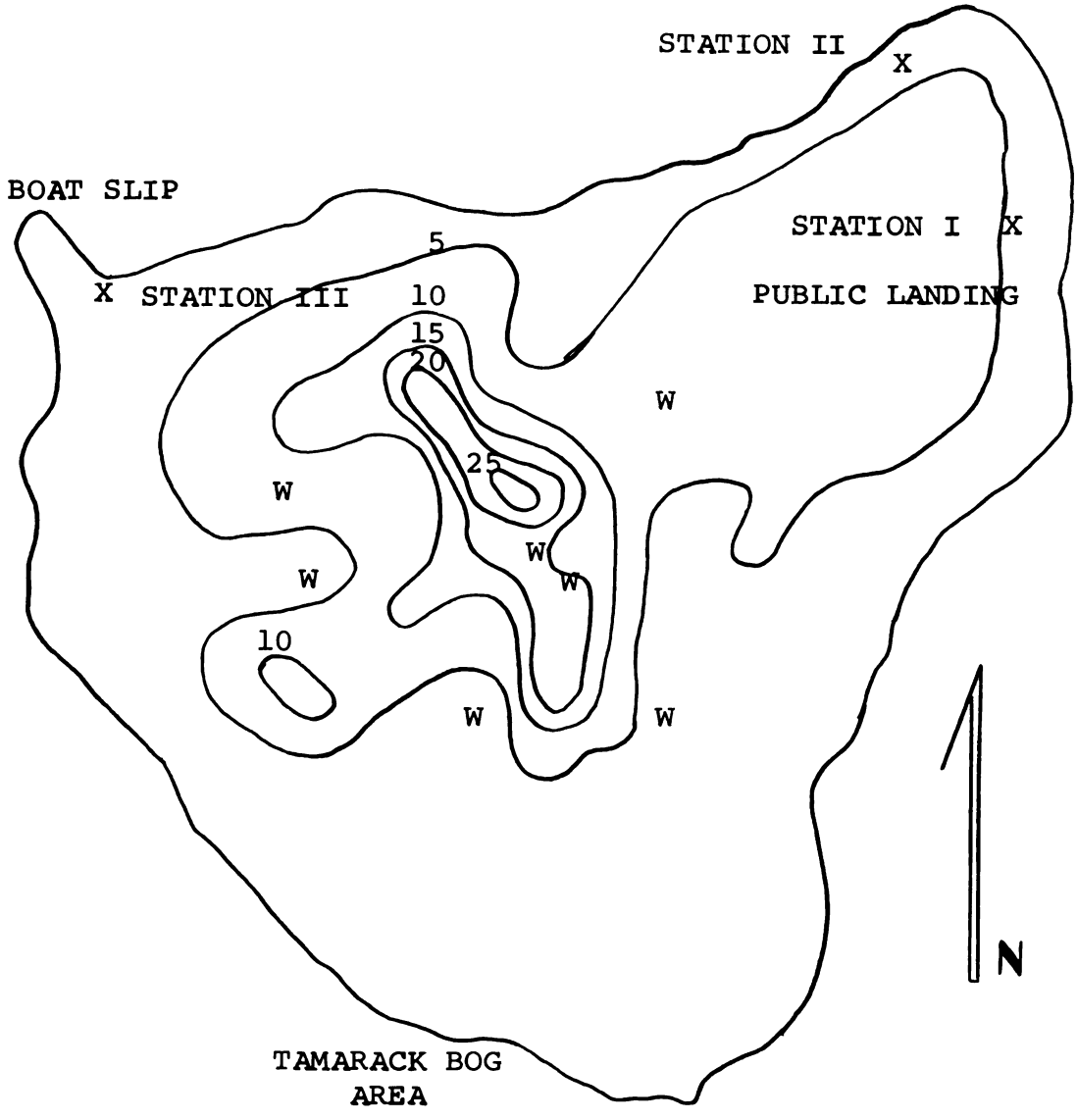
*Veatch 1953. Legend on map.



PARK LAKE, CLINTON COUNTY T. 5 N, R. 1 W, SEC. 28,29

Redrawn from the Institute for Fisheries Research, Division of Fisheries, Michigan Conservation Department, Lake Inventory Map of August 16, 1938.

Symbols:

X - Water sampling stations and plankton stations

W - Winter plankton stations

Scale: 0' 740'

The author was not able to obtain a recent aerial photograph of the lake to update the above calculations of area and surface areas over given depths. During frequent collecting trips to the lake, the author was impressed by the considerable area of shallow water. The observations tend to support the calculations Bratt made concerning the shallowness of the lake.

The 1938 survey party noted that the vegetation was dense in most parts of the lake and that on two sides of the lake there were extensive encroaching bogs.

In 1947 and 1948 United States Geological Survey bench marks were established; however the author could not locate them. The 1947 bench marks were 841.52 feet (USGS staff gauge on concrete headwall near a boathouse and stores) and 847.75 feet (a chiseled square at the eat end northeast corner of concrete wall supporting cyclone fence). The 1948 bench mark located approximately 75 feet south of the boat slip, at the northeast corner of the lake, was a nail and washer in the south root of a 28 inch elm, with the elevation 848.54 feet.

In 1957 A.D. Bratt submitted a Master of Science thesis to the Department of Zoology, Michigan State University, East Lansing entitled A QUANTITATIVE STUDY OF THE INVERTEBRATE POPULATION OF PARK LAKE, CLINTON COUNTY, MICHIGAN. The thesis provides some limited field data which as Bratt stated, ". . . can be used for comparison in future

investigations of Park Lake or other aquatic habitats . . ." along with a list of the invertebrates found during his investigation. Some of his data have been utilized in this work.

Since 1938 the Michigan Department of Conservation, Department of Fisheries has maintained those records of the lake concerned mostly with the recreational use of the lake with specific reference to fishing. A winter fish-kill was recorded for the year 1939. An interesting letter dated September 10, 1943 from M. J. DeBoer to R. S. Kocher dealt with the possibility of using the lake for testing chemical controls on the aquatic plants and possible algicide testing. Apparently no further consideration was given to the proposal.

Since the first records on Park Lake were kept by the Institute for Fisheries starting in 1938, reports of pollution from chemical toilets have been entered periodically. Ball in 1938 was the first to record information concerning this pollution and Bratt (1957) was the most recent. During the author's collecting trips physical evidence of pollution was evident. The shorelines were used as a dumping ground for all types of refuse. Residential units had direct drains into the lake as were observed during the summer of 1967. Waste water from a household sink was observed flowing into the lake proper. Outdoor sanitary units were observed to be located within twenty feet of the lake edge

where the shore line was composed mainly of sand. The garbage dump for the community is located near the edge of the lake at the south end.

MATERIALS AND METHODS

Biological Sampling

Permanent Stations

Station I was established at the onset of the investigation at the northeast end of the lake (see map p. 8) about 20 feet to the north of the public boat landing in water free from vascular aquatic plants. This location was chosen because of wind action on the lake which is southwest-northeast most of the time.

Station II, established 9 June 1967, was chosen for its close proximity to Station I. It too, was at the northeast end of the lake (see map p. 8) yet was not subjected to wave and wind action that occurred at Station I. It was in a vegetational opening about six feet in diameter and in about two feet of water over approximately a foot of silty bottom deposits.

Station III, established 3 April 1967, was near the northwest end of the lake just to the south of a boat slip dug into the lake from the road on the north side. The bottom here was virtually free from vascular aquatic plants with water about ten feet deep ten feet from the shore. About 25-30 feet to the south from the station area was the

edge of the Decodon mat. This station was chosen for the purpose of comparing its flora with that of Station I. Station I receives the most wind and wave action while Station III is on the windward side of the lake being sheltered by the zone of trees along the shore and by the Decodon mat. (It was thought that there might be some biota differences between the two stations.)

Incidental Stations

Samples were collected at random along the shore line and as far out into the lake as the investigator could wade. When a boat was available samples were collected from the lake area inaccessible from the shore.

No permanent station was established at the southern end of the lake during the time when there was no ice cover because of the inaccessibility of the shore area. When a boat was available samples were taken in the southern area and during the time an ice cover was on the lake samples were collected from the same general area.

Duration of Sampling

The collecting period began on 13 April 1966 and was terminated on 22 November 1967 with occasional collections made up to 5 June 1968. The occasional collections were made for the purpose of augmenting the qualitative samples. The collections were made weekly during June through October; biweekly during November, December, March through May; and monthly January and February.

Methods and Equipment

During the period of study 197 samples were collected. These were placed in 4-dram (16 cc.) lip vials and stoppered with corks. The samples were taken from floating masses, both filamentous and non-filamentous; scrapings of any non-living object in the water having a film or growth appearing on its surface; scrapings of submerged parts of vascular aquatic plants; squeezings of bottom debris and vascular aquatic plants; from the first centimeter of bottom substrate; collection of growths on animal life of the lake, and masses chopped out of the ice cover. Plankton samples were collected with the aid of a plankton net of No. 2 silk bolting cloth during the months of the year when there was no ice cover. A 1200 cc. Kemmerer water sampler was used when there was an ice cover on the lake.

The plankton samples were taken from the same areas (Stations I and III) throughout the collecting period with a few incidental plankton hauls taken from other parts of the lake (see map p. 8). When there was an ice cover thick enough to walk on, a hole was chopped in the ice and a Kemmerer water bottle was used to take the sample. The water from the bottle was released into the plankton net at the surface. This procedure was repeated until the vial attached to the plankton net showed an accumulation of plankton. The winter plankton samples were taken from various

parts of the lake in addition to those from the regular stations (see map p. 8).

Examination Procedure

All of the samples were taken to the laboratory and given a cursory microscopical examination. After the first examination the samples were preserved with either 6 - 3 - 1 (Transeau's solution, six parts water: three parts 95% ethyl alcohol: one part commercial formalin) or with F.A.A. plus cupric acetate (6 cc. commercial formalin: 2.5 cc. glacial acetic acid: 100 cc. 95% ethyl alcohol: 2 gm. cupric acetate). An equal volume of preservative was added to an equal volume of sample. Both living and preserved samples were analyzed and a camera lucida drawing was made of each taxon. Every sample was examined until no additional forms were observed.

Specimens were mounted in a 5% glycerine solution and were made into semi-permanent mounts which are in the author's personal collection. Slides bearing new species or new records for North America and Michigan will be made into more permanent mounts for subsequent study and accession to the author's collection.

Collection Notes

Each collection was given a code number. It appears on each vial and slide made from the collection. The code also appears in the taxonomic section of this thesis and is explained as follows:

MI = Michigan (state; geographical location) omitted in the taxonomic list

66 = year of collection

08 = month

04 = day

.7 = individual collection

thus the collection number would read: MI 660804.7.

Chemical Sampling

Stations

Three stations were established from which water chemistry samples were taken. They are described in the Biological section above as Stations I, II, and III.

Factors Measured

For several reasons the measurement of pH and alkalinity were the only chemical factors checked. The main reasons were the lack of funds required for the purchase of necessary test reagents and the failure of the Hach DR meter to function properly for the Nitrate and Phosphate tests.

Alkalinity and pH were chosen because they are general indicators of the chemical environment.

Duration of Sampling

Water chemistry analyses were made at the stations mentioned above. The sampling was terminated on 18 October 1967.

Methods and Equipment

For all the chemical tests of the water samples the author used the methods described in the Hach Chemical Company Catalog Number Nine: Water and Sewage Analysis Procedures, Hach Chemical Company, Ames, Iowa.

For the measurement of pH, a Beckman Model 180 pocket pH meter was employed, standardized with Beckman standard solution at pH 7.0. The alkalinity indicator used was methyl red-bromcresol green as methyl orange was not available. According to Standard Methods (12th edition) either of the two are acceptable for use as the alkalinity indicator.

SUMMARY OF BIOLOGICAL SAMPLING

A total of 335 taxa have been recorded for Park Lake from the 197 samples collected. The algae reported herein belong to the following divisions:

DIVISION	GENERA	NUMBER OF TAXA	% OF TOTAL
Cyanophyta	26	74	22.1
Chlorophyta	71	200	59.7
Euglenophyta	4	21	6.3
Pyrrhophyta	4	9	2.7
Chrysophyta	27	31	9.2

Of the 335 taxa recorded there are 12 species and varieties newly recorded for North America or 3.6% of the total, 27 are newly recorded for Michigan or 8.4% of the total and two species are new to science. The taxa newly recorded are listed in Table 1.

The limnetic community composed 31.3% of the total algal flora in the lake. The community was composed of 43% Chlorophyta, 26% Chrysophyta, 24% Cyanophyta, 4% Pyrrhophyta and 3% Euglenophyta.

The littoral community composed 69.7% of the algal flora in the lake. The composition of the littoral flora

TABLE 1. Newly Recorded Taxa

TAXA	SPECIES NEW TO MICHIGAN	N. AMERICA	SCIENCE
Borzia trilocularis Cohn	x		
Scytonema Bohneri Schmidle	x	x	
Gongrosira sp.	x	x	x
Oedogonium capitellatum Witt.	x		
Pectodictyon cubicum Taft	x		
Scenedesmus acutus			
f. *alternans* Hortob.	x	x	
S. acutus f. *tetradesmisformis*			
(Wolosz.) Uherkov.	x	x	
S. armatus var. *boglariensis*			
f. *semicostatus* Hortob.	x		
S. bicaudatus (Hansg.) Chodat	x	x	
S. tibiscensis Uherkov.	x		
Cosmarium conspersum			
f. *minor* Borge	x		
C. depressum (Naeg.) Lund.	x		
C. garrolense var. *dimido-minor*			
(Grönblad) Krieger	x	x	
C. humile var. *danicum*			
(Borge) Schmidle	x		
C. humile var. *glabrum* Gutw.	x		

TABLE 1--Continued

TAXA	SPECIES NEW TO MICHIGAN	N. AMERICA	SCIENCE
Cosmarium minutissimum Archer	x		
C. Sportella Brébisson	x		
Euastrum Turneri var. strictum (Boerges.) Scott & Prescott	x		
Staurastrum Cosmarioides Nordst.	x		
S. cyclacanthum var. subacanthum Grönblad	x	x	
S. disputatum f. minor West & West	x	x	
S. pinnatum var. subpinnatum (Schm.) West	x		
S. punctulatum var. minor West and West	x	x	
Euglena fusca (Klebs) Lemm.	x		
Phacus obolus Pochm.	x	x	
P. pseudonordstedtii Pochm.	x	x	
Phacus sp.	x	x	x

was 60.2% Chlorophyta, 21.6% Cyanophyta, 8.5% Chrysophyta, 7.6% Euglenophyta and 2.1% Pyrrhophyta.

The true role of the Chrysophyta in the lake is not depicted by the above data because diatoms were not identified to species.

The results showed no noticeable difference between the plankton floras at Stations I and III in number and in composition of the floras.

A water bloom occurred in the lake for a period of approximately ten weeks during the summer of 1967. The major components of the bloom were: Microcystis aeruginosa, M. flos-aquae, Anabaena flos-aquae, Coelosphaerium Naegelianum, and C. Kuetzingianum.

Jackson (1963) reported that on several occasions during his investigation of Lake Lansing, water blooms were observed. The blooms in the fall of 1959 and 1962 in Lake Lansing turned the surface waters of the shallow littoral region a pea soup color and was composed primarily of Microcystis aeruginosa, M. flos-aquae, Coelosphaerium Naegelianum, and Anabaena sp.

Jackson reported other blooms occurring with the major components being Ceratium hirundinella on one occasion and Tolypothrix tenuis on another. Park Lake had an abundance of C. hirundinella in the spring of 1967 but it was never in bloom proportions. Tolypothrix tenuis was recorded for Park Lake but it was never in abundance.

Wade (1949) conducted a study on Jordan Lake in southern Michigan that supported a water bloom during the summer months. The major components of that bloom flora were: Anabaena limnetica, A. spiroides var. crassa, A. circinalis var. macrospora. Aphanizomenon flos-aquae, Microcystis aeruginosa, and Coelosphaerium Naegelianum.

Edelstein (1966) in her paper on the phytoplankton of Spring Lake, Michigan mentioned that this lake in 1957 also supported a water bloom. The major components of that bloom were: Aphanizomenon flos-aquae, Anabaena spiroides var. crassa, A. circinalis, Microcystis aeruginosa, and Aphanocapsa pulchra. It should be noted from the above data that water blooms can occur in most highly productive lakes when the physical and chemical elements are in the proper balance and proportions. Also the Cyanophyta are the major elements of the blooms that are the producers of obnoxious conditions while the Chrysophyta and the Pyrrhophyta though noted for their bloom ability are not the most obnoxious water bloomers.

Water blooms are of interest, among other aspects, because of their economic importance. Blooms cause economic loss to a recreational area by their objectional odors and by ruining the water for fishing and swimming. Further there are many accounts relating blooms to fish-kill through suffocation or by poisonous agents such as hydroxylamine (Prescott, 1939, 1959). Other undesirable effects are

produced by water blooms (toxic effects are on other animals, wild and domestic) which will not be discussed here. There is a wealth of information published on blooms and reference should be made to Prescott (1939, 1959), Wade (1949), and Ingram and Prescott (1954) and especially the bibliographies of these papers for discussions on this topic.

As has been noted previously a relatively highly productive lake is the only type of lake where blooms have been reported to occur. Odum (1959) states that blooms are characteristic of eutrophic lakes. With the above statements one can conclude that Park Lake is an aging, eutrophic lake.

SUMMARY OF CHEMICAL SAMPLING

The history of Park Lake reveals that a limited study of the water chemistry has been made. Ball's 1938 report to the Fisheries Institute, Department of Fisheries, Michigan Department of Conservation reveals that on the 15th of August, 1938 a series of water samples taken from varying depths (two, five, ten and fifteen feet) were tested for the following: temperature, oxygen, CO_2, alkalinity and pH. The data for pH, alkalinity and temperature near the surface have been included in Table 2 (p. 25).

Bratt (1957) presented a series of water chemistry data tables derived from the limited period of his investigation. His readings were taken from varying depths of the lake (surface, four and twelve feet). In the present study only surface samples were taken and only the data for the surface readings of Bratt's are presented. Because of the limited data no valid conclusions can be drawn from them but they are presented only to give an up-to-date summary of what has been done on Park Lake. In the present study limited funds necessitated that only the temperature, alkalinity and pH tests be performed.

TABLE 2. Summarization of Park Lake Water Chemistry

Determination	Ball 1938		Bratt 1957	Andresen 1967		
Date	August		July-Nov.	Jan.-Oct.	June-Oct.	Apr.-Oct.
Station	I	II		I	II	III
Depth	5'	2'	surface	surface		
Temperature C	25.6	26.0	8-28	0-30	22-31.5	12-30
pH	8.5	8.4	6.9-9.0	7.4-9.4	8.4-9.6	8.0-9.4
Alkalinity ppm.						
Phenolphthelein	6.0	5.0	0.0	0-20	0-28	0-20
Methyl red-						
Bromcresol green				116-216	108-168	134-160
Methyl orange	115	125	70-137			

The author's values for pH and alkalinity are higher than either of the previously reported for Park Lake. Reasons for this cannot be satisfactorily explained if they represent the true situation in the lake at the time of the readings, but they could be different because of a difference in collection and examination times of the three investigators involved. As is well-known to students of limnology the chemical composition of natural waters varies throughout a 24-hour period. If the collections had been taken at the same time this variable could have been eliminated (Ball gave the times of collection while Bratt did not).

SUMMARY AND CONCLUSION

Park Lake is a shallow, eutrophic lake of glacial origin, located in the southeast corner of Clinton County, six miles from the campus of Michigan State University. In recent years, the eutrophication process has been enhanced by increased pollution. It is a rapidly aging lake with a high density of vascular aquatic plants and an abundant algal flora.

The algae can be assigned to the following divisions from the collections made:

DIVISION	GENERA	TOTAL TAXA	% OF TOTAL
Cyanophyta	26	74	22.1
Chlorophyta	71	200	59.7
Euglenophyta	4	21	6.3
Pyrrhophyta	4	9	2.7
Chrysophyta	27	31	9.2

Of the 335 taxa recorded from the 197 samples collected 12 are newly recorded for North America, 27 are newly recorded for Michigan and two are new to science.

The flora is co-dominated in number of species by the Chlorophyta and the Cyanophyta. The Euglenophyta,

Pyrrhophyta and Chrysophyta comprise only 18.2% of the total algal flora of the lake. The importance of the Chrysophyta must not be disregarded or minimized by the above percentage as they were not all identified to species, the Bacillariophyceae (diatoms) being identified to the generic level only.

The littoral community includes more than twice the number of taxa as the limnetic community.

The lake supported a continuous water bloom for a period of approximately ten weeks during the summer of 1967. The major components of the bloom were Microcystis aeruginosa, M. flos-aquae, Coelosphaerium Kuetzingianum, C. Naegelianum and Anabaena flos-aquae.

The bloom flora of Park Lake was similar to that of Lake Lansing, but differed from the bloom flora in Jordan Lake in respect to their dominants.

SYSTEMATIC LIST OF THE ALGAE IN PARK LAKE

The following systematic list is adapted from Prescott 1964. The following symbols are used in the notes on the respective species.

Diam. = diameter of the cell
L. = length of the cell
W. = width of the cell
T. = thickness of the cell
Is. = isthmus
u. = microns

All of the taxa newly recorded are noted so following the habitat and collection number.

Division Cyanophyta
Class Myxophyceae
Order Chroococcales
Family Chroococcaceae
Aphanocapsa Naegeli 1849

Aphanocapsa elachista West and West 1895, p. 276
Prescott 1962, p. 453
Diam. 2 u
Squeezings. 660707.2

Aphanocapsa pulchra (Kuetz.) Rabenhorst 1865, p. 49

Prescott 1962, p. 454, Pl. 101, Fig. 14

Diam. 3.5 u

Tychoplankton. 660707.5

Aphanothece Naegeli 1849

Aphanothece gelatinosa (Henn.) Lemmermann 1910, p. 69

Prescott 1962, p. 467, Pl. 104, Fig. 8

Diam. 7-8 u slightly larger than typical

Plankton. 660804.14

Aphanothece stagnina (Spreng.) A. Braun 1865 (Anacystis rupestris Lyngb.) Drouet and Daily in Daily 1942, p. 650

Prescott 1962, p. 469, Pl. 103, Figs. 14-16

Diam. 3 u

Free-floating mass. 670609.9

Chroococcus Naegeli 1849

Chroococcus dispersus (Keissl.) Lemmermann 1904, p. 102

Prescott 1962, p. 447, Pl. 100, Fig. 7

Diam. 4.3 u

Squeezings. 660707.1

Chroococcus giganteus W. West 1892, p. 741

Prescott 1962, p. 447, Pl. 100, Fig. 16

Diam. 60 u

Plankton. 660804.19

Chroococcus limneticus Lemmermann 1898, p. 153

Prescott 1962, p. 448, Pl. 100, Figs. 4,5

Diam. 7 u

Plankton. 660804.19

Chroococcus minimus (Keissl.) Lemmermann 1904, p. 102

Prescott 1962, p. 449

Diam. 2-3 u

Squeezings. 660707.1

Chroococcus minor (Kuetz.) Naegeli 1849, p. 47

Prescott 1962, p. 449, Pl. 100, Fig. 12

Diam. 3 u

Squeezings. 660707.1

Chroococcus minutus (Kuetz.) Naegeli 1849, p. 46

Prescott 1962, p. 449, Pl. 100, Fig. 9

Diam. 7 u

Tychoplankton. 670712.8

Chroococcus Prescottii Drouet and Dailey in Drouet 1942, p. 127

Prescott 1962, p. 450, Pl. 100, Fig. 13

Diam. 6 u; colony Diam. 39 u

Squeezings. 660707.1

Chroococcus turgidus (Kuetz.) Naegeli 1849, p. 46

Prescott 1962, p. 450, Pl. 100, Fig. 19

Diam. 14 u

Squeezings. 660707.1

Chroococcus varius A. Braun in Rabenhorst 1861-1878, Nos. 245

Prescott 1962, p. 451, Pl. 100, Fig. 15

Diam. 4 u

Squeezings from bottom material. 660707.4

Coelosphaerium Naegeli 1849

Coelosphaerium dubium Grunow in Rabenhorst 1865, p. 55

Prescott 1962, p. 470, Pl. 106, Fig. 1

Diam. 5-6 u

Euplankton. 670712.1

Coelosphaerium Kuetzingianum Naegeli 1849, p. 54

Prescott 1962, p. 470, Pl. 106, Fig. 2

Diam. 3 u

Tychoplankton. 660707.1

Coelosphaerium Naegelianum Unger 1854, p. 196

Prescott 1962, p. 470, Pl. 106, Fig. 4

Diam. 3 u; L. 7 u

Tychoplankton. 670712.8

Dactylococcopsis (Reinsch.) Hansgirg 1883

Dactylococcopsis fascicularis Lemmermann 1898, p. 153

Prescott 1962, p. 464, Pl. 105, Figs. 10-12

Diam. 1-2 u; L. 15-19 u

Euplankton. 670609.3

Gloeothece Naegeli 1849

Gloeothece rupestris (Lyngb.) Bornet in Wittrock and Nordstedt 1880, No. 2456

Prescott 1962, p. 462, Pl. 103, Figs. 2,3

Diam. 7-8 u; L. 10 u

Tychoplankton. 660804.19

Gomphosphaeria Kuetzing 1836, Dec. XVI, No. 151

Gomphosphaeria aponina Kuetzing 1836, Dec. XVI, No. 151

Prescott 1962, p. 472, Pl. 106, Fig. 5

Diam. 4 u; L. 8 u

Squeezings. 660707.2

Gomphosphaeria aponina var. delicatula Virieux 1916, p. 69

Prescott 1962, p. 472, Pl. 106, Fig. 7

Diam. 4 u; L. 5 u

Squeezings from bottom material. 660707.4

Gomphosphaeria aponina var. multiplex Nygaard 1926, p. 204

Geitler 1932, p. 246

Diam. 6 u

Squeezings from bottom material, plankton. 660707.4

Gomphosphaeria lacustris var. compacta Lemmermann 1900, p. 339

Prescott 1962, p. 473, Pl. 106, Fig. 8; Geitler 1932, p. 244

Diam. 2 u; L. 3 u

Squeezings from bottom material. 660707.4

Merismopedia Meyen 1839

Merismopedia convoluta de Brébisson in Kuetzing 1849, p. 472

Prescott 1962, p. 458, Pl. 103, Fig. 13

Diam. 5 u

Euplankton. 660707.3

Merismopedia glauca (Ehrenb.) Naegeli 1849, p. 55

Prescott 1962, p. 101, Pl. 101, Figs. 2-4

Diam. 4 u

Squeezings. 660707.1

Merismopedia punctata Meyen 1839, p. 67

Prescott 1962, p. 459, Pl. 102, Fig. 10

Diam. 3.5 u

Squeezings. 660707.1

Merismopedia tenuissima Lemmermann 1898, p. 154

Prescott 1962, p. 459, Pl. 100, Fig. 17

Diam. 2 u

Plankton. 660804.19

Microcystis Kuetzing 1833

Microcystis aeruginosa Kuetz.; emend. Elenkin 1924, p. 14

Prescott 1962, p. 456, Pl. 102, Figs. 1-4

Diam. 5.2-7 u

Squeezings, plankton. 660707.1

Microcystis flos-aquae (Wittrock) Kirchner 1900

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

Diam. 3-6 u

Plankton. 660707.3

Microcystis incerta Lemmerman 1899, p. 132

Prescott 1962, p. 457, Pl. 102, Fig. 5

Diam. 4 u

My specimen is larger than the typical but it is placed here because of the compactness of the colony.

Plankton. 661012.1

Order Chamaesiphonales

Family Chamaesiphonaceae

Chamaesiphon Braun and Grunow in Rabenhorst 1865

Chamaesiphon incrustans Grunow in Rabenhorst 1865, p. 149

Prescott 1962, p. 477, Pl. 108, Figs. 7,8

Diam. 3 u; L. 12 u

Epiphyte on Gongrosira Debaryana. 670712.4

Family Pleurocapsaceae

Pleurocapsa Thuret 1855

Pleurocapsa minor Hansg. emend. Geitler 1925

Geitler 1932, pp. 348-352, Figs. 182-185

Diam. 4-6 u

Epiphyte. 660804.15

Order Hormogonales

Suborder Homocystineae

Family Oscillatoriaceae

Arthrospira Stizenberger 1852

Arthrospira Jenneri (Kuetz.) Stizenberger 1852, p. 32

Prescott 1962, p. 481, Pl. 108, Figs. 22,23

Spiral W. 14 u; spiral L. 20 u; trichome Diam. 7 u

Euplankton. 660804.10

Borzia Cohn 1883

Borzia triocularis Cohn 1883. (Pl. 1, Fig. 1)

Smith, 1950, p. 575, Fig. 488; Gomont 1893, p. 218, Pl. 6, Fig. 5

Trichome Diam. 14 u; L. 9 u

Trichome of three to five (eight) barrel-shaped cells. Terminal cells hemisphaerical. Previously known only from Indiana.

Squeezings from bottom material. 660707.4. New record for Michigan.

Lyngbya Agardh 1824

Lyngbya aestuarii (Mert.) Liebermann 1841, p. 492

Prescott 1962, p. 499, Pl. 111, Fig. 8

Trichome Diam. 18 u, cell L. 5 u, filament Diam. 23 u

Attached. 660804.7

Lyngbya Birgei G. M. Smith 1916, p. 482

Prescott 1962, p. 499, Pl. 111, Fig. 9

Filament Diam. 15 u, cell L. 2 u

Squeezings. 660707.1

Lyngbya Diquetii Gomont in Hariot 1895, p. 169

Prescott 1962, p. 500, Pl. 112, Fig. 8

Filament Diam. 3 u

Epiphytic on epizoic filament of Gongrosira sp.

670717.1

Lyngbya epiphytica Hieronymus in Engler and Prantl 1900, p. 67

Prescott 1962, p. 500, Pl. 112, Figs. 2,3

Filament Diam. 2 u

Epiphytic on entangled mass of algae among Typha latifolia. 670808.2

Lyngbya Hieronymusii Lemmermann 1905, p. 146

Prescott 1962, p. 501, Pl. 112, Fig. 4

Filament Diam. 20 u, trichome Diam. 17 u

Plankton. 670527.2

Lyngbya major Meneghini 1837, p. 12

Prescott 1962, p. 502, Pl. 112, Fig. 10

Filament Diam. 12 u, cell L. 2-4 u

Attached to artificial substrate (old rubber tire).

661115.2

Lyngbya spirulinoides Gomont 1890, p. 355; 1892, p. 146

Prescott 1962, p. 503, Pl. 131, Fig. 1

Filament Diam. 16 u

The specimens were straight as can be the condition in rare instances according to Prescott, 1962.

Plankton. 670218.3

Lyngbya Taylorii Drouet and Strickland 1940, p. 631 in Strickland 1940, p. 631

Prescott 1962, p. 503, Pl. 113, Fig. 3

Trichome Diam. 5 u

In floating mass of algae and on bottom mud. 670822.1

Lyngbya versicolor (Wartmann) Gomont 1892, p. 147

Prescott 1962, p. 504, Pl. 113, Fig. 4

Filament Diam. 3 u, trichome Diam. 3.5 u

Epizoic on snail shell. 670527.10

Oscillatoria Vaucher 1803

Oscillatoria Agardhii Gomont 1892, p. 205

Prescott 1962, p. 484, Pl. 108, Figs. 15, 16

Trichome Diam. 5 u, cell L. 5-7 u

Squeezings. 660707.1

Oscillatoria articulata Gardner 1927, p. 35

Prescott 1962, p. 486, Pl. 107, Fig. 22

Trichome Diam. 5 u, cell L. 2-4 u

Plankton. 660707.3

Oscillatoria Bornetii Zukal 1849, p. 260

Prescott 1962, p. 486, Pl. 108, Figs. 19,20

Trichome Diam. 10 u, cell L. 5-6 u

Attached to artificial substrate (old rubber tire).

661115.2

Oscillatoria chalybea Mertens in Jurgens 1822, Dec. 18, No. 41

Prescott 1962, p. 486, Pl. 109, Figs. 8,9

Trichome Diam. 10-15 u, cell L. 4-7 u

Among floating mass of algae and on bottom mud. 671004.1

Oscillatoria curviceps C. A. Agardh 1824, p. 68

Prescott 1962, p. 487, Pl. 108, Figs. 17,18

Trichome Diam. 15 u, cell L. 4-6 u

Slime mass at shore line. 660804.22

Oscillatoria limnetica Lemmermann 1900, Ber. d. Deutsch. Ges., 18, p. 310

Prescott 1962, p. 488, Pl. 109, Fig. 16

Trichome Diam. 2 u (type Diam. 1.6-1.8 u)

Plankton. 670121.1

Oscillatoria limosa (Roth) C. A. Agardh 1812, p. 35

Prescott 1962, p. 489, Pl. 109, Fig. 17

Trichome Diam. 16, cell L. 4-6 u

Attached to artificial substrate. 660804.22

Oscillatoria nigra Vaucher 1803, p. 192

Prescott 1962, p. 489, Pl. 109, Fig. 18

Trichome Diam. 7 u, L. 3.5-4.5 u

Floating mass entangled among higher aquatics. 670921.5

Oscillatoria ornata Kuetzing 1845-1849, p. 30

Prescott 1962, p. 489; Geitler 1932, p. 944

Trichome Diam. 15 u, cell L. 4-6 u

Mass at shore line. 660804.17

Oscillatoria princeps Vaucher 1803, p. 190

Prescott 1962, p. 489, Pl. 110, Fig. 1

Trichome Diam. 40 u, cell L. 5-8 u

Entangled in floating mass. 660804.22

Oscillatoria rubescens DeCandolle 1825, Mem. Soc. Phys. Nat. Genèva, 2, p. 29

Prescott 1962, p. 490, Pl. 107, Fig. 21

Trichome Diam. 3 u, cell L. 5 u

Plankton. 660804.15

Oscillatoria subbrevis Schmidle 1901, p. 243

Prescott 1962, p. 491, Pl. 107, Fig. 23

Trichome Diam. 5.2 u, cell L. 3 u

Squeezings. 660707.1

Oscillatoria tenuis C. A. Agardh 1813, Algarum Decades, p. 25

Prescott 1962, p. 491, Pl. 110, Figs. 8,9,14

Trichome Diam. 6.5 u, cell L. 6.5 u

Squeezings. 660707.1

Phormidium Kuetzing 1843

Phormidium tenue (Menegh.) Gomont 1892, p. 169

Prescott 1962, p. 496, Pl. 111, Fig. 7

Trichome Diam. 2 u, cell L. 3.5 u

In greenish film on bottom. 670403.1

Schizothrix Kuetzing 1843

Schizothrix tinctoria Gomont 1890, p. 351

Prescott 1962, p. 508, Pl. 131, Figs. 7,8

Trichome Diam. 1.8 u

Epizoic on snail shell. 670527.10

Spirulina Turpin 1827

Spirulina princeps (West and West) G. S. West 1907, p. 179

Prescott 1962, p. 480, Pl. 108, Fig. 13

Sprial W. 8-9 u, spiral L. 14-17 u, trichome Diam. 4-5 u

Squeezings. 660707.1

Spirulina subsalsa Oersted 1842, p. 17

Prescott 1962, p. 480, Pl. 108, Fig. 14

Trichome Diam. 2 u, spiral W. 4 u

Squeezings. 660707.1

Trichodesmium Ehrenberg 1830

Trichodesmium lacustre Klebahn 1895, p. 13

Prescott 1962, p. 488, Pl. 109, Fig. 15; Smith 1920, p. 54, Pl. 8, Fig. 1

Trichome Diam. 6 u, cell L. 4 u

Plankton. 660804.9

Suborder Heterocystineae

Family Nostocaceae

Anabaena Bory 1822

Anabaena flos-aquae (Lyngb.) deBrébisson 1836, p. 36

Prescott 1962, p. 515, Pl. 116, Fig. 7

Veg. cell Diam. 6 u; heterocyst Diam. 7 u, L. 8 u; akinete Diam. 7 u, L. 20 u

Plankton. 661012.1

Anabaena oscillarioides Bory 1822, p. 308

Prescott 1962, p. 517, Pl. 117, Figs. 8-10

Veg. cell Diam. 6 u, L. 8 u; heterocyst Diam. 8 u, L. 10 u; akinete Diam. 8 u, L. 11-14 u

Plankton. 670627.6

Anabaena sp.

Veg. cell Diam. 4 u, L. 7-8 u

No heterocyst or akinete seen

Epiphyte on Nuphar sp. leaf. 670905.4

Nostoc Vaucher 1903

Nostoc comminutum Kuetzing 1849-1869, Tab. Phyc., 2, p. 3

Prescott 1962, p. 522, Pl. 119, Fig. 12

Veg. cell Diam. 4 u, L. 4-6 u; heterocyst Diam. 7 u; no akinete observed

Attached to a floating piece of wood. 670921.4

Family Scytonemataceae

Microchaete Thuret 1875

Microchaete Goeppertiana Kirchner in Engler and Prantl 1900

Prescott 1962, p. 542, Pl. 127, Figs. 3,4

Veg. cell Diam. 6 u; heterocyst Diam. 10 u (longer than typical)

Attached to artificial substrate (an old plastic bag). 670905.7

Scytonema C. A. Agardh 1824

Scytonema Bohneri Schmidle 1901, p. 60. (Pl. 1, Figs. 2-4)

Frémy 1930, p. 302

Veg. cell Diam. 8-10 u

Plant occurring in small tufts on substrate. Trichome branches frequently exhibiting both Scytonema-type branches and Tolypothrix-type branches. Sheath thin and not lamellated. Cells appearing quadrate. This plant is distinguished by its thin trichomes, thin non-lamellated sheath and the quadrate cells. Intermingled with algae and on bottom mud. 671004.2

New record for North America.

Tolypothrix Kuetzing 1843

Tolypothrix lanata Wartmann in Rabenhorst 1858, No. 768

Prescott 1962, p. 537, Pl. 125, Fig. 7

Veg. cell Diam. 10 u; heterocyst Diam. 8 u, L. 11 u

Plankton. 671004.3

Tolypothrix tenuis Kuetzing; emend. J. Schmidt 1889, p. 383

Prescott 1962, p. 583

Veg. cell Diam. 8 u; filament Diam. 10 u; heterocyst Diam. 7 u

Epilithic. 670829.8

Family Rivulariaceae

Calothrix C. A. Agardh 1824

Calothrix atricha Frémy 1930, p. 261

Prescott 1962, p. 552, Pl. 129, Fig. 6

Veg. cell Diam. 8 u; heterocyst Diam. 10 u

Epiphyte. 670712.9

Calothrix breviarticulata West and West 1897, p. 240

Prescott 1962, p. 552, Pl. 132, Fig. 1

Veg. cell Diam. 7 u; filament Diam. 13 u; sheath lamellate

Attached to floating wood (2 X 4). 670609.11

Calothrix epiphytica West and West 1897, p. 240

Prescott 1962, p. 553, Pl. 132, Figs. 2,3

Veg. cell Diam. 3 u; filament Diam. 7 u; heterocyst Diam. 5 u

Epiphyte. 670609.11

Calothrix stellaris Bornet and Flahault 1886, p. 365

Prescott 1962, p. 554

Veg. cell Diam. 7 u

Attached to floating wood (2 x 4). 670627.3

Gloeotrichia J. G. Agardh 1842

Gloeotrichia echinulata (J. E. Smith) P. Richter 1894, p. 31

Prescott 1962, p. 557, Pl. 134, Figs. 1,2

Diam. (at base of trichome) 5 u, cell L. 7 u

Plankton. 660804.14

Gloeotrichia pisum (C. A. Ag.) Thuret 1875, p. 382

Prescott 1962, p. 559, Pl. 134, Figs. 8-10

Veg. cell Diam. 5-6 u, L. 8 u; heterocyst Diam. 7 u

There were no akinetes on this specimen but it is assigned to Gloeotrichia rather than Rivularia because it is not incrusted with lime and the mucilage is not tough and hard as in Rivularia.

Epiphyte. 670712.8

Division Chlorophyta

Class Chlorophyceae

Order Volvocales

Family Chlamydomonadaceae

Chlamydomonas Ehrenberg 1835

Chlamydomonas globosa Snow 1903, p. 389

Prescott 1962, p. 71, Pl. 1, Figs. 8,9

Diam. 8 u, L. 12-13 u

Plankton. 670801.4

Chlamydomonas polypyrenoideum Prescott 1944, p. 348

Prescott 1962, p. 71, Pl. 1, Figs. 10,11

Diam. 7 u, L. 10 u

Euplankton. 670829.5

Chlamydomonas pseudopertyi Pascher 1927, p. 214

Prescott 1962, p. 72, Pl. 1, Fig. 12

Diam. 17 u

Squeezings of Utricularia sp. 670627.4

Family Volvocaceae

Eudorina Ehrenberg 1832

Eudorina elegans Ehrenberg 1832, p. 78

Prescott 1962, p. 72, Pl. 1, Figs. 24-26

Diam. 15 u

Squeezings, plankton. 660707.4

Gonium Mueller 1773, emend. Prescott in Prescott, Silva and Wade 1949

Gonium pectorale Mueller 1773, p. 60

Prescott 1962, p. 75, Pl. 1, Fig. 21

Diam. 7 u

Squeezings, plankton. 660707.1

Pandorina Bory 1824

Pandorina morum (Muell.) Bory 1824, p. 600

Prescott 1962, p. 75, Pl. 1, Fig. 23

Diam. 12-15 u, L. 12 u

Squeezings, plankton. 660707.2

Pleodorina Shaw 1894

Pleodorina californica Shaw 1894, p. 282

Prescott 1962, p. 77, Pl. 2, Fig. 1

Veg. Diam. 12 u; reproductive cell Diam. 22 u

Plankton. 670712.1

Volvox Linnaeus 1758

Volvox aureus Ehrenberg 1838, p. 71

Prescott 1962, p. 78, Pl. 2, Fig. 4

Diam. 7 u (thpe 4-6 u), no cell sheath visible

colony Diam. 425 u

Plankton. 680513.1

Volvox tertius A. Meyer 1896, p. 188

Prescott 1962, p. 79, Pl. 3, Fig. 12

Diam. 5 u; Distinguished from V. aureus on the basis of the presence of individual cell sheaths.

Plankton. 680513.1

Order Tetrasporales

Family Palmellaceae

Asterococcus Scherffel 1908

Asterococcus superbus (Cienk.) Scherffel 1908, p. 762

Prescott 1962, p. 86, Pl. 4, Fig. 10

Diam. 25 u

In mass by shoreline, plankton. 660804.17

Gloeocystis Naegeli 1849

Gloeocystis ampla (Kuetz.) Lagerheim 1883, p. 63

Prescott 1962, p. 84, Pl. 3, Fig. 17

Diam. 10-13 u

Squeezings, plankton. 660707.1

Gloeocystis gigas (Kuetz.) Lagerheim 1883, p. 63

Prescott 1962, p. 84, Pl. 3, Fig. 16

Diam. 10 u

Squeezings, plankton. 660707.1

Gloeocystis planctonica (West and West) Lemmermann 1915, p. 34

Prescott 1962, p. 85, Pl. 3, Figs. 10,11

Diam. 7-13 u

Squeezings. 660707.1

Palmella Lyngbye 1819

Palmella mucosa Kuetzing 1843, p. 172

Prescott 1962, p. 83, Pl. 3, Figs. 8,9

Diam. 6-10 u

Squeezings. 660707.4

Sphaerocystis Chodat 1897

Sphaerocystis Schroeteri Chodat 1897, p. 119

Prescott 1962, p. 83, Pl. 3, Figs. 6,7

Diam. 6 u, colony Diam. 44 u

Plankton. 660804.10

Family Tetrasporaceae

Apiocystis Naegeli in Kuetzing 1849

Apiocystis Brauniana Naegeli 1849, p. 67

Prescott 1962, p. 89, Pl. 5, Figs. 7,8,10

Diam. 7 u, epiphyte on Cladophora sp.

In floating algal mass at shoreline. 670609.10

Tetraspora Link 1809

Tetraspora gelatinosa (Vauch.) Desvaux 1818, p. 18

Prescott 1962, p. 88, Pl. 5, Figs. 3,4

Diam. 7 u

Epiphyte. 670403.10

Family Coccomyxaceae

Dispora Printz 1914

Dispora crucigenioides Printz 1914, p. 32

Prescott 1962, p. 93, Pl. 46, Figs. 5,6

Diam. 3-5 u, L. 7 u, colony 32 u

Entangled among epiphytes. 670403.11

Elakatothrix Wille 1898

Elakatothrix viridis (Snow) Printz 1914, p. 31

Prescott 1962, p. 93, Pl. 4, Figs. 1,2

Diam. 5-7.5 u, L. 27-29 u

Squeezings. 660804.2

Order Ulotrichales

Family Ulotrichaceae

Binuclearia Wittrock 1886

Binuclearia tatrana Wittrock 1886, p. 9

Prescott 1962, p. 102, Pl. 7, Figs. 7-9

Diam. 9 u

Entangled among epiphytes. 670712.8

Geminella Turpin 1828

Geminella interrupta (Turp.) Lagerheim 1883, p. 68

Prescott 1962, p. 100, Pl. 6, Fig. 15

Diam. 5 u, L. 10 u

Plankton. 660804.14

Geminella minor (Naeg.) Heering 1914, p. 41

Prescott 1962, p. 100, Pl. 6, Fig. 17

Diam. 7 u, filament Diam. 15 u

Entangled among epiphytes. 661115.6

Hormidium Kuetzing 1843, emend.
Klebs 1896

Hormidium Klebsii G. M. Smith 1933, p. 385

Prescott 1962, p. 98, Pl. 6, Fig. 4

Diam. 5 u, L. 23 u

Scrapings from Typha latifolia leaves. 670403.5

Radiofilum Schmidle 1894

Radiofilum flavescens G. S. West 1899, p. 57

Prescott 1962, p. 103, Pl. 7, Fig. 10

Diam. 6 u

Entangled in floating mass of algae. 670829.4

Ulothrix Kuetzing 1833

Ulothrix tenerrima Kuetzing 1843, p. 253

Prescott 1962, p. 96, Pl. 6, Fig. 12

Diam. 8 u, L. 5-8 u

Entangled among epiphytes. 661115.5

Uronema Lagerheim 1887

Uronema elongatum Hodgetts 1918, p. 160

Prescott 1962, p. 98, Pl. 5, Fig. 5

Diam. 6 u, L. 13-24 u

Epiphyte on Oedogonium sp. in ice. 661217.1

Family Microsporaceae

Microspora Thuret 1850

Microspora elegans Hansgirg 1891, p. 311

Prescott 1962, p. 107

Diam. 13 u, L. 28-36 u

Squeezings. 680605.1

Microspora Loefgrenii (Nordst.) Lagerheim 1887, p. 417

Prescott 1962, p. 107, Pl. 8, Fig. 2

Diam. 17 u

Scrapings from Typha sp. leaves. 670403.5

Microspora pachyderma (Wille) Lagerheim 1887, p. 415

Prescott 1962, p. 108, Pl. 8, Fig. 3

Diam. 12 u, L. 12 u

Scrapings from Typha sp. leaves. 670403.5

Microspora stagnorum (Kuetz.) Lagerheim 1887, p. 417

Prescott 1962, p. 108, Pl. 8, Figs. 6,7; Heering 1914, p. 151

Diam. 5 u, L. 15-30 u

Scrapings from Typha sp. leaves. 670403.5

Family Cylindrocapsaceae

Cylindropcapsa Reinsch 1867

Cylindrocapsa conferta W. West 1892, p. 735

Prescott 1962, p. 110, Pl. 9, Figs. 5,6

Diam. 20 u (with sheath), L. 11-15 u

Squeezings. 660707.1

Family Chaetophoraceae

Aphanochaete A. Braun 1851

Aphanochaete polychaete (Hansg.) Fritsch 1902, p. 410

Prescott 1962, p. 125, Pl. 17, Fig. 1

Cell L. 18 u

3-4 setae per cell

Epiphyte on epilithic Cladophora insignis. 670829.8

Aphanochaete repens A. Braun 1851, p. 196

Prescott 1962, p. 125, Pl. 17, Fig. 2,3

Diam. 10 u

Epiphyte on Oedogonium sp. in ice. 661217.1

Chaetophora Schrank 1783

Chaetophora attenuata Hazen 1902, p. 213

Prescott 1962, p. 118, Pl. 13, Figs. 4,5

Diam. 7 u, L. 20 u

Scrapings from floating board (2 X 4). 670627.3

Chaetophora incrassata (Huds.) Hazen 1902, p. 214

Prescott 1962, p. 118, Pl. 14, Figs. 1,2,11

Diam. 10 u

Scrapings from log breakwater. 670712.10

Pseudulvella Wille 1911

Pseudulvella americana (Snow) Wille 1911, p. 90

Prescott 1962, p. 124, Pl. 15, Fig. 6

Diam. 8-11 u

Epiphyte. 670712.6

Stigeoclonium Kuetzing 1843

Stigeoclonium lubricum (Dillw.) Kuetz. 1845, p. 198

Prescott 1962, p. 115, Pl. 10, Figs. 1,2; Islam 1963, p. 118, Pl. 8, Fig. 4; Pl. 17, Figs. 1-4; Pl. 18, Figs. 1-4; Pl. 19, Fig. 3

Diam. 15 u

Epiphyte. 670403.11

Stigeoclonium subsecundum Kuetz. 1843, p. 253

Prescott 1962, p. 117, Pl. 10, Figs. 3,4

Main axis Diam. 8 u, L. 11-19 u

Epiphyte. 670725.4

Stigeoclonium tenue (C. A. Ag.) Kuetzing 1843, p. 253

Prescott 1962, p. 117; Islam 1963, p. 90, Pl. 19, Fig. 1

Diam. 9 u

Epiphyte. 670403.10

Stigeoclonium sp.

Diam. 8 u, L. 18 u

Immature, not enough development for positive identification.

Epiphyte. 661115.5

Family Protococcaceae

Protococcus C. A. Agardh 1824

[= Pleurococcus Meneghini 1837]

Protococcus viridis C. A. Agardh 1824, p. 13

Prescott 1962, p. 127, Pl. 10, Figs. 5-7

Diam. 12 u

Squeezings. 660707.1

Family Coleochaetaceae

Chaetosphaeridium Klebahn 1892

Chaetosphaeridium ovalis G. M. Smith 1916, p. 471

Prescott 1962, p. 131, Pl. 14, Fig. 8

Diam. 13 u, L. 20 u

Epiphyte on Cladophora sp. 670712.3

Coleochaete de Brébisson 1844

Coleochaete irregularis Pringsheim 1860, p. 11

Prescott 1962, p. 129, Pl. 17, Figs. 8,9

Diam. 10-14 u

Epiphyte. 670403.12

Coleochaete scutata de Brébisson 1844, p. 29

Prescott 1962, p. 130, Pl. 18, Fig. 9

Diam. 15-24 u, L. 14-25 u

Epiphyte.

Family Trentopohilaceae

Gongrosira Kuetzing 1843

Gongrosira Debaryana Rabenhorst 1863, p. 223

Prescott 1962, p. 132, Pl. 19, Fig. 3

Diam. 19-22 u, L. 25-34 u (shorter than typical)

Epizoic on snail shells. 670712.4

Gongrosira sp. (Pl. 3, Figs. 1-5)

Veg. cell Diam. 11-15 u, L. 19-36 u; basal cell Diam. 40 u, L. 87 u; sporangia Diam. 20 u, L. 23-38 u

This plant is thought to be new to science on the basis of the swollen basal cell of the upright branches. The prostrate filament appears to consist totally of the swollen cells.

Epizoic on snail shells; attached to artificial substrate. 670717.1, 680521.2

Order Cladophorales

Family Cladophoraceae

Basicladia Hoffmann and Tilden 1930

Basicladia chelonum (Collins) Hoffmann and Tilden 1930, p. 382

Prescott 1962, p. 143, Pl. 23, Figs. 8-12

Diam. 19 u, basal

Epizoic on snapping turtle. 670403.9

Basicladia crassa Hoffmann and Tilden 1930, p. 382

Prescott 1962, p. 144, Pl. 77, Figs. 11-13

Diam. 30 u basal, Diam. 50 u diatal

Epizoic on snapping turtle. 670403.9

Cladophora Kuetzing 1843

Cladophora crispata (Roth) Kuetzing 1843, p. 264

Prescott 1962, p. 137, Pl. 19, Figs. 9-11

Main axis Diam. 40 u, branch Diam. 30 u, L. 280 u

Attached to artificial substrate (an old rubber tire).

661115.2

Cladophora insignis (C. A. Ag.) Kuetzing 1845, p. 217

Prescott 1962, p. 139, Pl. 21, Figs. 4,5

Diam. 95 u, L. 420 u

Attached to wooden post. 670829.7

Pithophora Wittrock 1877

The genus Pithophora was not found by the investigator during the extent of the survey, but a jar of preserved algae in the teaching collection at Michigan State University bearing the label "Park Lake 10-12-55 Rhizoclonium, Cladophora, Pithophora" was found by the investigator. It is assumed that Pithophora was in the lake at one time. It tentatively can be placed, therefore, on a species list of the algae of Park Lake.

Rhizoclonium Kuetzing 1843, emend.
Brand 1908

Rhizoclonium crassipellitum West and West 1897, p. 35, fa.

Prescott 1962, p. 141, Pl. 23, Fig. 1

Diam. 35 u, L. 55 u, wall thickness 7 u

Entangled among vascular aquatic plants. 670808.2

Rhizoclonium hieroglyphicum (C. A. Ag.) Kuetzing 1845, p. 206

Prescott 1962, p. 142, Pl. 23, Fig. 3

Diam. 30 u, L. 260 u

Entangled among vascular aquatic plants. 660804.7

Oedogoniales

Family Oedogoniaceae

Bulbochaete C. A. Agardh 1817

Bulbochaete sp. 1

Diam. 30 u; L. 100 u

Sterile plant

Epiphyte. 660707.5

Bulbochaete sp. 2

Diam. 22-35 u; L. 45-48 u

Sterile plant

Epiphyte. 670609.7

Oedogonium Link 1820

Oedogonium capitellatum Wittrock 1875, p. 7. (Pl. 1, Fig. 5)

Tiffany 1930, p. 104, Pl. 34, Fig. 315

Veg. cell Diam. 7 u; L. 31 u; Oogonia Diam. 24 u, L. 22 u; Oospore Diam. 15 u, L. 20 u

This species is distinguished by its smooth oospore wall, median operculation and size. It is macrandrous and monoecoius.

Free-floating mass. 660804.14. New record for Michigan

Oedogonium Howardii G. S. West 1904, p. 281

Prescott 1962, p. 183; Tiffany 1937, p. 49, Pl. 20, Fig. 292

Veg. cell Diam. 9-10 u, L. 35 u; Oogonia Diam. 23 u, L. 26 u; oospore Diam. 21 u, L. 16 u.

Oogonia solitary or up to three in a series in my specimins although other authors refer to them as in series of two.

Plankton. 670712.1

Oedogonium poecilosporum Nordstedt and Hirn in Hirn 1900, p. 298

Tiffany 1937, p. 84, Pl. 19, Fig. 286; Prescott 1962, p. 186

Veg. cell Diam. 8 u, L. 37 u; Oogonia Diam. 22 u, L. 24 u; oospore Diam. 20 u, L. 20 u

Entangled among higher aquatics. 670808.3

Oedogonium pratense Transeau 1914, p. 297

Prescott 1962, p. 186, Pl. 36, Figs. 4,5; Tiffany 1937, p. 49, Pl. 21, Figs. 325, 326

Veg. cell Diam. 13 u, L. 100 u; Oogonia Diam. 43 u, L. 72 u; oospore Diam. 38 u, L. 50 u

Plankton. 670712.1

Oedogonium spirostriatum Tiffany 1936, p. 2

Prescott 1962, p. 194, Pl. 44, Figs. 1,2; Tiffany 1937, p. 75, Pl. 23, Figs. 366,367

Veg. cell Diam. 14-17 u, L. 80 u;

This plant was identified from the vegetative characters only.

Plankton. 670712.1

Oedogonium sp. 1

Veg. cell Diam. 16 u, L. 45 u; Oogonia Diam. 40 u, L. 40 u; oospore - not mature

Oedogonium sp 2

Veg. cell Diam. 24 u, L. 63 u; Oogonia Diam. 50 u, L. 80 u; oospore - not mature; Anthiridium Diam. 24 u, L. 10 u

Oedogonium sp. 3

Veg. cell Diam. 20 u, L. 57 u

This specimen could be a vegetative representation of species 2.

Oedogonium sp. 4

Veg. cell Diam. 13 u, L. 37 u

Oedogonium sp. 5

Veg. cell Diam. 16 u, L. 80 u

This specimen could be a vegetative representative of species 1

Oedogonium sp. 6

Veg. cell Diam. 35 u, L. 110 u

Order Chlorococcales

Family Botryococcaceae

Botryococcus Kuetzing 1849

Bourrelly (1966) assigns this genus to the family Dictyosphaeriaceae on the basis of its reproduction and the retention of the cells by fragments of the maternal membrane resulting in amorphous or structured colonies. I have followed Prescott (1964) in assigning it to the Botryococcaceae in order to be consistent.

Botryococcus Braunii Kuetzing 1849, p. 892

Prescott 1962, p. 232, Pl. 52, Figs. 1,2,11

Diam. 3-4 u, L. 6 u

Plankton. 660804.15

Botryococcus sudeticus Lemmermann 1896, p. 111

Prescott 1962, p. 232, Pl. 52, Fig. 3

Diam. 9 u

Plankton. 680513.1

Family Characiaceae

Characium A. Braun in Kuetzing 1849

Characium ambiguum Hermann 1863, p. 26

Prescott 1962, p. 216, Pl. 45, Fig. 11

Diam 7 u, L. 21 u

Epiphyte on Oedogonium sp. in ice. 661217.1

Characium Dabaryanum (Reinsch) DeToni 1889

Pascher 1915, p. 84, Fig. 40

Diam. 14 u, L. 32 u

Epizoic--this specimen was found with Oedogonium sp. in the ice. 661217.1

Characium falcatum Schroeder 1898, p. 23

Prescott 1962, p. 216, Pl. 45, Fig. 14

Diam. 9 u, L. 38 u

Epiphyte on Oedogonium sp. in ice. 661217.1

Family Hydrodictyaceae

Pediastrum Meyen 1829

Pediastrum araneosum (Racib.) G. M. Smith 1916, p. 476

Prescott 1962, p. 221, Pl. 47, Fig. 4

Diam. 25 u

Plankton. 660707.6

Pediastrum Boryanum (Turp.) Meneghini 1840, p. 210

Prescott 1962, p. 222, Pl. 47, Fig. 9; Pl. 48, Figs. 1,3

Diam. 14-20 u, L. 18 u

Squeezings, plankton. 660707.1

Pediastrum Boryanum var. longicorne Raciborski 1889, p. 13

Prescott 1962, p. 222, Pl. 47, Fig. 10

Diam. 25 u

Squeezings. 660707.1

Pediastrum duplex var. clathratum (A. Braun) Lagerheim 1882, p. 56

Prescott 1962, p. 223, Pl. 48, Fig. 6

Diam. 13 u, colony Diam. 75 u

Plankton. 660804.13

Pediastrum duplex var. rugulosum Raciborski 1889, p. 24

Prescott 1962, p. 224, Pl. 49, Fig. 3

Diam. 15-22 u

Among an entangled floating mass of algae and bottom mud. 670808.1

Pediastrum integrum Naegeli 1849, p. 97

Prescott 1962, p. 225, Pl. 48, Figs. 9,10

Diam. 15-18 u

Squeezings. 660707.1

Pediastrum obtusum Lucke 1907 (= P. quadricornutum Prescott 1944)

Prescott 1962, p. 226, Pl. 49, Figs. 6,7

Diam. 16 u

Squeezings. 660707.1

Pediastrum tetras (Ehrenb.) Ralfs 1844, p. 469

Prescott 1962, p. 227, Pl. 50, Figs. 3,6

Diam. 7 u

Squeezings. 660707.1

Pediastrum tetras var. tetraodon (Corda) Rabenhorst 1868, p. 78

Prescott 1962, p. 227, Pl. 50, Fig. 7

Diam. 12 u, L. 10 u

Plankton. 660707.3

Sorastrum Kuetzing 1845

Sorastrum spinulosum Naegeli 1849, p. 99

Prescott 1962, p. 228, Pl. 50, Fig. 9; Pl. 53, Fig. 1

Diam. 13 u, T. 10 u, spine L. 4 u

Squeezings. 660707.1

Family Coelastraceae

Coelastrum Naegeli in Kuetzing 1849

Coelastrum microporum Naegeli in A. Braun 1844, p. 70

Prescott 1962, p. 230, Pl. 53, Fig. 3

Diam. 8-10.5 u

Squeezings, plankton. 660707.1

Family Oocystaceae

Ankistrodesmus Corda 1839

Ankistrodesmus falcatus (Corda) Ralfs 1848, p. 180

Prescott 1962, p. 253, Pl. 46, Figs. 5,6

Diam. 1.5 u, L. 30 u

Squeezings. 660804.13

Ankistrodesmus falcatus var. tumidus (West and West) G. S. West

Prescott 1962, p. 254, Pl. 56, Figs. 14,15

Diam. 3 u, L. 18 u

Squeezings. 660707.4

Chlorella Beyerinck 1890

Chlorella vulgaris Beyerinck 1890, p. 758

Prescott 1962, p. 237, Pl. 53, Fig. 13

Diam. 7 u

Plankton. 680521.1

Closteriopsis Lemmermann 1899

Closteriopsis longissima var. tropica West and West 1905

Prescott 1962, p. 255, Pl. 57, Figs. 2,3

Diam. 6 u, L. 315 u

Entangled among epiphytes. 661115.5

Gloeotaenium Hansgirg 1890

Gloeotaenium Loitelsbergerianum Hansgirg 1890, p. 10

Prescott 1962, p. 248, Pl. 54, Figs. 13,14

Diam. 25 u

Squeezings. 660707.1

Nephrocytium Naegeli 1849

Nephrocytium Agardhianum Naegeli 1849, p. 79

Prescott 1962, p. 249, Pl. 54, Fig. 16

Diam. 3 u, L. 11 u

Squeezings. 660804.13

Nephrocytium limneticum (G. M. Smith) G. M. Smith 1933, p. 503

Prescott 1962, p. 249, Pl. 54, Fig. 18

Diam. 5-7 u, L. 20 u

Squeezings. 660804.3

Oocystis Naegeli in A. Braun 1855

Oocystis Borgei Snow 1903, p. 379

Prescott 1962, p. 243, Pl. 51, Fig. 10

Diam. 10 u, L. 19 u

Plankton. 660707.6

Oocystis elliptica W. West 1892, p. 739

Prescott 1962, p. 244, Pl. 51, Fig. 11

Diam. 13-17 u, L. 21.3-27 u

Squeezings. 660707.1

Oocystis gigas Archer 1877, p. 105

Prescott 1962, p. 244, Pl. 51, Fig. 14

Diam. 21 u, L. 31.3 u

Squeezings. 660707.4

Oocystis parva West and West 1898, Jour. Bot., 36, p. 335

Prescott 1962, p. 246, Pl. 54, Fig. 3

Diam. 8-11 u, L. 15-18 u

Tychoplankton. 660707.5

Oocystis solitaria Wittrock in Wittrock and Nordstedt 1879

Prescott 1962, p. 247, Pl. 54, Fig. 10

Diam. 6 u, L. 13 u

Squeezings. 660704.3

Planktosphaeria G. M. Smith 1918

Planktosphaeria gelatinosa G. M. Smith 1918, p. 267

Prescott 1962, p. 240, Pl. 53, Fig. 23

Diam. 13 u

Plankton, squeezings. 660707.1

Quadrigula Printz 1915

Quadrigula lacustris (Chod.) G. M. Smith 1920, p. 139

Smith 1920, p. 138-139, Pl. 33, Figs. 4-6; Prescott 1962, p. 260, Pl. 59, Figs. 4,5

Diam. 6 u, L. 42 u

Squeezings. 660804.2

Rayssiella Edelstein and Prescott

Rayssiella hemisphaerica Edelstein and Prescott 1964, p. 121

Edelstein and Prescott 1964, p. 122, Figs. 1-9

Diam. 8 u, L. 18 u

Plankton. 660804.6

Tetraedron Kuetzing 1845

Tetraedron minimum (A. Braun) Hansgirg 1888, p. 131

Prescott 1962, p. 267, Pl. 60, Figs. 12-15

Diam. 10-14 u

Plankton, squeezings. 660707.3

Tetraedron muticum (A. Braun) Hansgirg 1888, p. 131

Prescott 1962, p. 267, Pl. 60, Figs. 16,17

Diam. 10-15 u

Squeezings, plankton. 660707.1

Trochiscia Kuetzing 1833

Trochiscia reticularis (Reinsch) Hansgirg 1888, p. 129

Prescott 1962, p. 230, Pl. 53, Figs. 19,20

Diam. 20 u

Squeezings. 680605.1

Zoochlorella Brandt 1882

Zoochlorella parasitica Brandt 1882

Prescott 1962, p. 235, Pl. 53, Fig. 9

Diam. 1 u

Endozoic in Ophridium sp. 671004.4

Family Scenedesmaceae

Crucigenia Morren 1830

Crucigenia rectangularis (A. Braun) Gay 1891, p. 100

Prescott, 1962, p. 285, Pl. 65, Figs. 7,8

Diam. 5 u, L. 7-9 u

Plankton. 660707.5

Pectodictyon Taft 1945

Pectodictyon cubicum Taft 1945, pp. 25-28. (Pl. 4, Fig. 1)

Smith 1950, p. 277, Fig. 199; Taft 1945, pp. 25-28

Diam.7 u

Plankton. 660804.7

New Record for Michigan.

Scenedesmus Meyen 1829

Scenedesmus acutus Meyen 1829

Uherkovich 1966, p. 36, Pl. 1, Figs. 1-8 (= S. obliquus (Turp.) Kuetzing 1833 in Prescott 1962, p. 279, Pl. 63, Fig. 17)

Diam. 5-7 u, L. 17.5-22 u

Squeezings. 660707.1

Scenedesmus acutus f. alternans Hortob. 1941. (Pl. 1, Fig. 6)

Uherkovich 1966, p. 39, Pl. 1, Figs. 31,32,34-36

Diam. 5 u, L. 17.5 u

This form is distinguished by its alternating arrangement of cells of the coenobium, the inner ones being angular clavate, and the end cells being lunate with a swelling on the inner curve.

Squeezings. 660707.1. New record for North America

Scenedesmus acutus f. tetradesmiformis (Wolosz.) Uherkovich 1966, p. 39. (Pl. 1, Fig. 7)

Uherkovich, 1966, p. 39, Pl. 1, Figs. 37-39

Diam. 7 u, L. 25 u

This form is distinguished by the fusiform cells composing the coenobium.

Squeezings. 660707.4. New record for North America.

Scenedesmus arcuatus Lemmermann 1899

Uherkovich, 1966, p. 48, Pl. 5, Figs. 138-145

Diam. 4-7 u, L. 10-15 u

Plankton, squeezings. 660804.3

Scenedesmus arcuatus var. playdisca G. M. Smith 1916

Smith 1916, p. 451, Pl. 30, Figs. 101-105

Diam. 3-4 u, L. 8 u

Squeezings. 660707.1

Scenedesmus armatus var. boglariensis f. semicostatus Hortb. 1949. (Pl. 1, Fig. 8)

Uherkovich 1966, p. 68, Pl. 8, Figs. 342-347

Diam. 4-4.5 u, L. 16 u

This form is distinguished by the end cells of the coenobium bearing a long spine at each pole and by the central cells having a prominent longitudinal median rib.

Squeezings. 660707.1. New record for Michigan

Scenedesmus bicaudatus (Hansg.) Chodat 1926. (Pl. 1, Fig. 9)

Uherkovich 1966, p. 88, Pl. 13, Figs. 524-534

Diam. 5-6 u, L. 13-15 u; spine L. 10 u

This species is distinguished by its oval cells which are tightly appressed and the terminal cells of the coenobium each bearing one spine. The spines are situated on the opposite poles of the terminal cells.

Tychoplankton, adhering to a substrate. 660707.5.

New record for North America

Scenedesmus brevispina (G. M. Smith) Chodat 1926 (= S. longus var. brevispina G. M. Smith 1916)

Uherkovich 1966, p. 51, Pl. 6, Figs. 171-177

Diam. 4 u, L. 12 u

Tychoplankton. 660707.5

Scenedesmus ecornis (Ralfs) Chodat. 1926, p. 170

Uherkovich 1966, p. 45, Pl. 4, Figs. 84-109

Diam. 5 u, L. 15 u

Squeezings. 660707.1

Scenedesmus ecornis var. disciformis Chod. 1902

Uherkovich 1966, p. 46, Pl. 4, Figs. 110-121

Diam. 4-5 u, L. 11-13 u

Squeezings. 660707.1

Scenedesmus longus var. Naegelii (deBréb.) G. M. Smith 1920, p. 156

Prescott 1962, p. 279, Pl. 63, Fig. 24, Pl. 64, Fig. 1; Smith 1920, p. 156, Pl. 40, Figs. 1,2

Diam. 6.5 u, L. 22-25 u

Plankton. 660804.7

Scenedesmus ovalternus Chod. 1926, pp. 164-1965 (= S. bijuga var. alternans (Reinsch) Borge 1907)

Uherkovich 1966, p. 47, Pl. 5, Figs. 130,131

Diam. 5 u, L. 10 u

Squeezings. 660707.1

Scenedesmus quadricauda (Turp.) de Brébisson in de Brébisson and Godey 1835, p. 66

Prescott 1962, p. 280, Pl. 64, Fig. 2

Diam. 5 u, L. 15 u

Squeezings. 660707.1

Scenedesmus quadricauda var. longispina (Chod.) G. M. Smith 1916, p. 480

Prescott 1962, p. 280, Pl. 63, Fig. 22; Smith 1916, p. 480, Pl. 31, Figs. 159-161

Diam. 7 u, L. 19-23 u; spine L. 10-15 u

Tychoplankton. 660707.5

Scenedesmus quadricauda var. maximus West and West 1895, p. 83

Prescott 1962, p. 280, Pl. 64, Figs. 3,4

Diam. 11 u, L. 36 u, spine L. 20 u

Squeezings. 670627.4

Scenedesmus quadricauda var. quadrispina (Chod.) G. M. Smith 1916, p. 480

Prescott 1962, p. 280, Pl. 63, Fig. 21

Cell Diam. 6.5-9 u, L. 15-19 u

Squeezings. 660707.1

Scenedesmus spinosus Chod. 1913, p. 74

Uherkovich 1966, p. 107, Pl. 18, Figs. 709-747

Diam. 2.5-4 u, L. 10-12 u

Euplankton, tychoplankton, squeezings. 660707.3

Scenedesmus tibiscensis Uherkov. 1960. (Pl. 1, Fig. 3)

Uherkovich 1966, p. 50, Pl. 5, Figs. 156-159

Diam. 3 u, L. 12-14 u

The alternating cells of the coenobium and their angular shape are the distinguishing characters of this species.

Squeezings. 660707.1. New record for Michigan.

Tetradesmus G. M. Smith 1913

Tetradesmus wisconsinense G. M. Smith 1913, p. 76

Prescott 1962, p. 283, Pl. 64, Figs. 12-14

Diam. 3 u, L. 14 u

Squeezings. 660707.1

Order Zygnematales

Family Zygnemataceae

Mougeotia (C. A. Agardh) Wittrock 1872

Mougeotia sp.

Diam. 28 u, L. 150 u

Tychoplankton. 660707.5

Sirogonium Kuetzing 1843

Sirogonium stricticum (Engl. Bot.) Kuetzing 1843, p. 278

Transeau 1951, p. 233, Pl. 40, Figs. 1-4; Prescott 1962, p. 321, Pl. 76, Figs. 5-7 (= Spirogyra strictica (Engl. Bot.) Wille 1884, p. 34)

Diam. 34 u, L. 245 u; chloroplasts three 1/2 turn each

Grab sample of submersed algal mass. 670627.1

Spirogyra Link 1820

Spirogyra crassa Kuetzing 1843, p. 280

Prescott 1962, p. 312, Pl. 72, Figs. 7,8

Diam. 150 u, L. 125 u

Floating mass at shore line. 670627.2

Spirogyra longata (Vauch.) Kuetzing 1843, p. 279

Prescott 1962, p. 316

Veg. cell Diam. 37 u, L. 110 u; Zygospore Diam. 32 u, L. 62 u; brownish with longitudinal suture

Submersed floating mass. 670527.5

Spirogyra sp. 1

Veg. cell Diam. 17-20 u, L. 85-95 u

Chloroplast-1

Plain end wall

Spirogyra sp. 2

Veg. cell Diam. 25 u, L. 200 u

Chloroplasts-3

Plain end wall

Spirogyra sp. 3

Veg. cell Diam. 27 u, L. 63 u

Chloroplast-1

Plain end wall

Spirogyra sp. 4

Veg. cell Diam. 33 u, L. 270 u

Chloroplasts-4

Plain end wall

Spirogyra sp. 5

Veg. cell Diam. 45 u, L. 275 u

Chloroplast-1

Plain end wall

Spirogyra sp. 6

Veg. cell Diam. 45 u, L. 185-270

Chloroplasts-4

Plain end wall

Spirogyra sp. 7

Veg. cell Diam. 105 u, L. 140-200 u

Chloroplast-4

Plain end wall

Spirogyra sp. 8

Veg. cell Diam. 15 u, L. 130 u

Chloroplast-1 (2 1/2 - 3 loose turns)

Replicate end walls

Spirogyra sp. 9

Veg. cell Diam. 28 u, L. 170 u

Chloroplast-1 (7 tight turns)

Replicate end walls

Zygnema C. A. Agardh 1824

Zygnema sterile Transeau in Transeau, Tiffany, Taft, and Li 1934, p. 212

Prescott 1962, p. 326; Transeau 1951, p. 41, Pl. 7, Fig. 11

Diam. 53 u, L. 40 u; pectic layer 7 u

Floating mass by shoreline. 670609.11

Zygnema sp. 1

Veg. cell Diam. 18-19 u, L. 52-58 u

Zygnema sp. 2

Veg. cell Diam. 18-20 u, L. 30-43 u

Family Desmidiaceae

Closterium Nitzsch 1817

Closterium Dianae Ehrenberg 1838, p. 92

Irénée-Marie 1939, p. 66, Pl. 5, Figs. 13-15

Diam. 20 u, L. 232 u

Squeezings. 660804.2

Closterium Ehrenbergii Menegh. 1840, p. 232

West and West 1904, p. 143, Pl. 17, Figs. 1-4

Diam. 105 u, L. 435 u

Among epiphytes. 671004.9

Closterium Jenneri Ralfs 1848, p. 167

Irénée-Marie 1939, Pl. 7, Figs. 16-18

Diam. 11 u, L. 75 u

Tychoplankton. 660707.5

Closterium Leibleinii Kuetz. 1834, p. 596

Irénée-Marie 1939, p. 65, Pl. 5, Figs. 6-9,16

Diam. 20-22 u, L. 192-203 u

Squeezings. 660707.1

Closterium libellula Focke 1847, p. 58

Krieger 1937, p. 254, Pl. 12, Figs. 1,2

Diam. 44-65 u, L. 374-410

Squeezings. 660707.2

Closterium moniliferum (Bory) Ehrenb. 1838, p. 91

Irénée-Marie, p. 66, Pl. 5, Figs. 1,2

Diam. 40-50 u, L. 197-230 u

In small pocket in ice. 661217.2

Closterium parvulum Naegeli 1849, p. 106

Irénée-Marie 1939, p. 67, Pl. 5, Figs. 10-12

Diam. 15 u, L. 143 u

Among epiphytes. 661115.5

Closterium venus var. Westii (West) Krieger 1937, p. 274

Krieger 1937, p. 274, Pl. 16, Fig. 9

Diam. 10 u, L. 75 u; arc 125 degrees

Squeezings. 660707.2

Cosmarium Corda 1834

Cosmarium angulare Johnson 1894, p. 290

Irénée-Marie 1939, p. 179, Pl. 23, Fig. 3

Diam. 25 u, L. 29 u, Is. 7 u

Squeezings. 670626.4

Cosmarium angulosum Brébisson 1856, p. 127

Irénée-Marie 1939, p. 177, Pl. 24, Fig. 5; Wade 1952

Diam. 15 u, L. 17 u, Is. 4-5 u, T. 8 u

Squeezings. 660707.1

Cosmarium Botrytis Meneghini 1840, p. 220

Irénée-Marie 1939, p. 210, Pl. 26, Fig. 4

Diam. 52 u, L. 76 u, Is. 18 u

Among epiphytes. 670627.5

Cosmarium conspersum f. minor Borge 1892, p. 9. (Pl. 1, Fig. 11)

Croasdale 1965, p. 317

Diam. 42 u, L. 54, Is. 18 u

This form is distinguished from the typical on the basis of its smaller size.

Intermingled with vascular aquatic plants. Found in the squeezings of vascular aquatic plants. 660707.1. New record for Michigan.

Cosmarium denticulatum var. Borgei Irénée-Marie 1939, p. 209

Irénée-Marie 1939, p. 209, Pl. 28, Figs. 1,3-6; Pl. 68, Fig. 4

Diam. 90 u, L. 164 u, Is. 26 u

Plankton. 680513.1

Cosmarium depressum (Naeg.) Lund. 1871, p. 38. (Pl. 2, Fig. 2)

Wade 1952; Irénée-Marie 1939, p. 165, Pl. 25, Fig. 10; West and West 1905, p. 176, Pl. 62, Figs. 2-5

Diam. 52 u, L. 54 u, Is. 14 u

Forms of this species previously have been reported in Michigan but not the typical. Dimensions of my specimen agree with the largest given by Irénée-Marie, 1939. The wall is punctate but free of any other markings with the apical view oval.

Plankton. 670712.1. New record for Michigan.

Cosmarium depressum var. Schroederi Krieger and Gerloff 1962, p. 25

Krieger and Gerloff 1962, p. 25, Pl. 8, Fig. 11

Diam. 33 u, L. 38 u, Is. 17 u

Squeezings. 660707.1

Cosmarium garrolense var. dimido-minor (Gronblad) Krieger and Gerloff 1962, p. 44. (Pl. 1, Fig. 10)

Krieger and Gerloff 1962, p. 44, Pl. 12, Fig. 2

Diam. 14 u, L. 23 u, Is. 3 u

This variety is distinguished from the typical by its smaller size.

Squeezings. 660707.4. New Record for North America.

Cosmarium humile (Gay) Nordst. in De Toni 1899, p. 965

West and West 1908, p. 221, Pl. 85, Figs. 16-18; Wade 1952

Diam. 18 u, L. 19 u, Is. 5 u

Slightly larger than the typical Diam. 15 u, L. 15.4 u, Is. 5 u

Squeezings. 660707.1

Cosmarium humile var. danicum (Borge) Schmidle 1895, p. 389. (Pl. 2, Fig. 8)

West and West 1908, p. 224, Pl. 85, Fig. 19

Diam. 15 u, L. 17 u, Is. 6 u

This variety is distinguished from the typical by the apical granules and by its smaller size.

Among epiphytes. 670609.3. New record for Michigan.

Cosmarium humile var. glabrum Gutw. 1892, p. 21. (Pl. 2, Fig. 9)

West and West 1908, p. 225, Pl. 85, Figs. 23,24

Diam. 13.5 u, L. 15 u, Is. 4 u

This variety is approximately the same size as C. humile var. danicum but is completely devoid of wall decorations.

Squeezings. 660804.3. New record for Michigan

Cosmarium minutissimum Archer 1877, pp. 194 and 301. (Pl. 2, Fig. 2)

West and West 1908, p. 126; Irénée-Marie 1939, p. 165, Pl. 21, Fig. 8

Diam. 13 u, L. 15 u, Is. 2 u

The diminutive size of this species is distinguishing.

Squeezings. 660707.1. New record for Michigan

Cosmarium obtusatum Schmidle 1898, p. 38

Croasdale 1956, p. 43, Pl. 7, Fig. 13

Diam. 35 u, L. 40 u, Is. 11-12 u

Squeezings. 660707.4

Cosmarium Portianum Archer 1860, p. 49

Irénée-Marie 1939, p. 185, Pl. 23, Fig. 4

Diam. 26 u, L. 39 u, Is. 11 u

Among epiphytes. 670712.8

Cosmarium psuedopyramidatum Lundell 1871, p. 41

Irénée-Marie 1939, p. 170, Pl. 29, Fig. 6

Diam. 26 u, L. 38 u, Is. 9 u

Squeezings. 660804.2

Cosmarium Regnelli Wille 1884, p. 16. (Pl. 2, Fig. 6)

Irénée-Marie 1939, p. 181, Pl. 24, Figs. 2,12

Diam. 41 u, L. 45 u, Is. 15 u

The concave apex, the open notch at the side of the apex and the lateral depression compose the undulating margin that is characteristic of this species.

Squeezings. 660707.2

Cosmarium reniforme (Ralfs) Arch. 1874, p. 92

West and West 1908, p. 157, Pl. 79, Figs. 1,2; Pl. 82, Fig. 15

Diam. 41 u, L. 45 u, Is. 15 u

Squeezings. 660707.1

Cosmarium sexangulare fa. minima Nordst. 1887, p. 162

West and West 1908, p. 82, Pl. 72, Figs. 4,5

Diam. 11 u, L. 10 u, Is. 4 u

Squeezings. 660707.1

Cosmarium Sportella Brébisson 1849, p. 176. (Pl. 4, Fig 3)

Irénée-Marie 1939, p. 200, Pl. 24, Fig. 9

Diam. 50 u, L. 58 u, Is. 17 u

The granular surface and the central roset of granules on each semi-cell distinguish the species. In apical view the cell is oval.

Squeezings. 660707.2. New record for Michigan

Cosmarium subcostatum Nordst. 1876, p. 37

West and West 1908, p. 236, Pl. 87, Figs. 3-5

Diam. 25 u, L. 30 u, Is. 6 u

Squeezings. 660707.1

Cosmarium subtumidum Nordst. 1878, no. 172

West and West 1905, p. 192, Pl. 63, Figs. 18-20

Diam. 33 u, L. 48 u, Is. 10 u

Squeezings. 660804.2

Cosmarium trilebulatum Reinsch 1867, p. 118

Krieger and Gerloff 1962, p. 98, Pl. 20, Fig. 21

Diam. 21 u, L. 23 u, Is. 6 u

Squeezings. 660707.1

Cosmarium tumidum Lund 1871, p. 45

Insam and Krieger 1936, p. 110, Pl. 2, Fig. 5

Diam. 23 u, L. 25 u, W. 14 u, Is. 5 u

Squeezings. 660707.1

Cosmarium Turpinii Brébisson 1856, p. 127

Irénée-Marie 1939, p. 199, Pl. 26, Fig. 1

Diam. 56-58, L. 67-80, Is. 13-19

Squeezings. 660707.1

Cosmarium undulatum var. minutum Wittrock 1869, p. 11

Krieger and Gerloff 1962, p. 40, Pl. 11, Fig. 11

Diam. 20 u, L. 32 u, Is. 6 u

Squeezings. 660804.4

Desmidium Agardh 1824

Desmidium Aptogonum Bréb. 1835, p. 65

West, West and Carter 1923, p. 242, Pl. 164, Figs. 1-3;

Wade 1952, p. 518

Diam. 31 u, L. 14-18 u, Is. 25 u, Diam apices 28 u

Squeezings. 670912.3

Desmidium Baileyi (Ralfs) Nordst. 1880, p. 24

Irénée-Marie 1939, p. 363, Pl. 63, Figs. 15,16; Wade 1952, p. 519

Diam. 24 u, L. 25 u

Plankton. 670829.6

Euastrum Ehrenberg 1832 emend. Ralfs 1844

Euastrum hypochondrum f. decoratum Scott and Presc., 1952, p. 386, Scott and Prescott 1952, Pl. 3, Fig. 10; Jackson 1963

Diam. 60 u, L. 64 u, Is. 15 u

Entangled in mass of algae by shore-line. 660804.17

Euastrum turneri var. strictum (Boerges.) Scott and Prescott 1952, p. 392. (Pl. 2, Fig. 3)

Diam. 27 u, L. 41 u, Is. 6 u

The deep apical notch and the smoothly undulating margin with projecting granules (barely visible) are characteristic of this variety. The granules at the apices of the undulations are also characteristic.

Squeezings. 670912.3. New record for Michigan.

Euastrum verrucosum Ehrenb. 1834, p. 247

Prescott and Scott 1945, p. 247, Pl. 6, Fig. 1

Diam. 87 u, L. 98 u, Is. 25 u

Among epiphytes. 670627.5

Hyalotheca Ehrenberg 1841

Hyalotheca dissiliens (Smith) Bréb. 1848, p. 51

Irénée-Marie 1939, p. 355, Pl. 62, Figs. 1-4; Wade 1952, p. 512; West, West and Carter 1923, p. 229, Pl. 161, Figs. 16-27

Diam. 26 u, L. 15 u

Plankton. 670712.2

Hyalotheca mucosa (Dillw.) Ehrenberg. 1840, p. 212

Irénée-Marie 1939, p. 355, Pl. 62, Figs. 9,10; Wade 1952, p. 511; West, West and Carter 1923, p. 235, Pl. 162, Figs. 1-4

Diam. 20 u, L. 20 u

Entangled in floating mass of algae. 661115.1

Micrasterias Agardh 1827

Micrasterias truncata var. semiradiata (Nag.) Cleve 1864, p. 487

Irénée-Marie 1939, p. 222, Pl. 33, Figs. 10,12

L. 88 u, W. 100 u, apex 64 u, Is. 17 u

Plankton. 670712.1

Pleurotaenium Naegeli 1849

Pleurotaenium Ehrenbergii (Bréb.) DeBary 1858, p. 75

West and West 1904, p. 205, Pl. 29, Figs. 9-11; Pl. 30, Fig. 1

Apical Diam. 20 u, Basal Diam. 31 u, L. 380 u

Squeezings. 660804.4

Pleurotaenium Trabecula (Ehrenb.) Naeg. 1849

West and West 1904, p. 209, Pl. 30, Figs. 11-13

Apical Diam. 17-18 u, basal Diam. 27 u, L. 465 u, Is. 20 u

Plankton. 670609.1

Staurastrum Meyen 1829

Staurastrum cornutum Archer 1881, p. 232

Irénée-Marie 1939, p. 289, Pl. 50, Fig. 3; West, West and Carter 1923, p. 31, Pl. 133, Fig. 16

Diam. 30 u, L. 30 u, Is. 10 u

Squeezings. 670627.4

Staurastrum Cosmarioides Nordst. 1870, p. 223. (Pl. 2, Fig. 1)

Irénée-Marie 1939, p. 274, Pl. 46, Fig. 3; West and West 1911, Pl. 125, Figs. 11,12

Diam. 60 u, L. 95 u, Is. 30 u

The large size, punctate cell wall and triradiate arrangement of the cell are characteristic of this species. The arms are weakly developed and in lateral view the cell resembles a large Cosmarium.

Squeezings. 660707.1. New record for Michigan.

Staurastrum crenulatum (Naeg.) Delp. 1877, p. 164

West, West and Carter 1923, p. 110, Pl. 143, Figs. 9-13

Diam. 40 u, L. 24 u, Is. 8 u

Among floating mass of algae. 670627.6

Staurastrum cyclacanthum var. subacanthum Grönblad 1962, p. 10. (Pl. 4, Fig. 2)

Grönblad 1962, p. 10, Pl. 3, Fig. 30

Diam. 45 u, L. 40 u, Is. 10 u

This form is placed here as var. subacanthum on the basis of size and the thickness of the central portion of the cell when viewed apically.

Plankton. 661115.3. New record for North America

Staurastrum disputatum forma minor West and West 1911, p. 179. (Pl. 2, Fig. 4)

West and West 1911, p. 176, Pl. 126, Fig. 16; Pl. 2, Fig. 1

Diam. 13 u, L. 20 u, Is. 9 u

This form is distinguished by its small size.

In entangled mass of algae. 660804.17. New record for North America

Staurastrum furcigerum Bréb. 1840, p. 226

West, West and Carter 1923, p. 188, Pl. 156, Figs. 7,8

Diam. 55 u, L. 48 u, Is. 25 u

Plankton. 670609.1

Staurastrum gracile var. nannum Wille 1880, p. 46

West, West and Carter, 1923, p. 900, Pl. 144, Figs. 8,9

Diam. 40 u, L. 30 u, Is. 5 u

Squeezings. 660707.1

Staurastrum hexacerum (Ehrenb.) Wittrock 1872, p. 51

Irénée-Marie 1939, p. 305, Pl. 48, Fig. 3

Diam. 30 u, L. 26-27 u, Is. ? (7-8 u)

Squeezings. 660707.1

Staurastrum Johnsonii West and G. S. West 1896, p. 266

Irénée-Marie 1939, p. 302, Pl. 53, Fig. 1

Diam. 95 u, L. 64 u, Is. 14 u

Squeezings. 660804.3

Staurastrum longiradiatum West and G. S. West 1896

Smith, 1924, p. 90, Pl. 74, Figs. 5-11

Diam. 36 u, L. 25 u, Is. 5-6 u

Plankton. 670627.11

Staurastrum Manfeldtii Delp. 1877, p. 160

West, West and Carter 1923, p. 114, Pl. 148, Fig. 2

Diam. 58 u, L. 55 u, Is. 14 u

Squeezings. 670627.4

Staurastrum pinnatum var. subpinnatum (Schm.) West and West 1902. (Pl. 2, Fig. 10)

Hinode 1955, p. 23, Pl. VI, Figs. 37,38

Diam. 44 u, L. 30 u, Is. 9 u

My variety is sex-radiate although it occurs most often as penta-radiate varieties.

Plankton. 670712.1. New record for Michigan

Staurastrum punctulatum var. minor West and West 1911.

(Pl. 2, Fig. 5)

West and West 1911, p. 181, Pl. 126, Fig. 12

Diam. 18 u, L. 20 u, Is. 8 u

This variety is distinguished from the typical by its smaller size.

Squeezings. 660707.1. New record for North America

Staurastrum Sebaldi var. ornatum 1873

West, West and Carter 1923, p. 67, Pl. 148, Fig. 7

Diam. 58 u, L. 80 u, Is. 15 u

Plankton. 670609.1

Staurastrum turgescens De Not. 1867, p. 51

West and West 1911, p. 167, Pl. 126, Figs. 5-6

Diam.28 u, L. 35 u, Is. 10 u

In entangled floating mass of algae. 670609.9

Staurastrum vestitum Ralfs 1848, p. 142

West, West and Carter 1923, p. 158, Pl. 151, Figs. 9-11

Diam. 40 u, L. 30 u, Is. 8 u

Squeezings. 660707.2

Xanthidium Ehrenberg 1837

Xanthidium antilopaeum (Bréb.) Kutz.

Croasdale 1947, p. 120, Pl. 1, Fig. 1

Diam. 60 u, L. 62 u, Is. 18 u, spine L. 10 u

Plankton. 670829.5

Penium de Brébisson 1844

Penium margaritaceum (Enrenb.) Bréb. in Ralfs 1848

West and West 1904, p. 83, Pl. 8, Figs. 32-35

Basal Diam. 22 u, apical Diam. 12 u, L. 202 u

Squeezings. 660707.1

Class Charophyceae

Order Charales

Family Characeae

Chara Valliant 1719

Chara globularis Thill.

Wood, R. D. 1967, p. 16

670609.5

Chara vulgaris Linnaeus 1753

Wood, R. D. 1967, p. 12

660804.1

Division Euglenophyta

Class Euglenophyceae

Order Euglenales

Family Euglenaceae

Euglena Ehrenberg 1838

Euglena elastica Prescott 1944, p. 365

Prescott 1962, p. 392, Pl. 86, Figs. 10-12

Diam. 10 u

Plankton. 680401.1

Euglena fusca (Klebs) Lemmermann 1910. (Pl. 4, Fig. 6)

Gojdics 1953, p. 112, Pl. 15, Figs. 1a-1f

Diam. 20 u, L. 155 u

The subcylindrical form with nearly parallel sides, the size and characteristics of the pellicle, are diagnostic of this species. Gojdics mentions that her material lacked constancy in pellicular structure, and ascribed this phenomenon to physiological conditions. In my specimen the pellicle was smooth.

Among epiphytic algae. 670403.11. New record for Michigan

Euglena gracilis Klebs 1883, p. 303

Prescott 1962, p. 393, Pl. 85, Fig. 17

Diam. 16 u, L. 40 u

Among epiphytic algae. 670403.5

Euglena proxima Dangeard 1902, p. 154

Prescott 1962, p. 394, Pl. 85, Fig. 26

Diam. 19 u, L. 66 u

Among epiphytic algae. 670403.10

Euglena sp. A.

L. 73 u

Paramylum in the shape of curved rods; undulate margin may be an artifact of preservation

Squeezings. 660707.2

Euglena sp. B.

L. 57 u; round in cross section

Paramylum bodies not present; not known if organism is metabolic

Entangled in a slime mass. 660804.20

Lepocinclis Perty 1849

Lepocinclis acuta Prescott in Prescott, Silva, and Wade 1949

Prescott 1962, p. 405, Pl. 89, Figs. 8,9

Diam. 15 u, L. 32 u

Squeezings. 660707.2

Phacus Dujardin 1841

Phacus caudatus Huebner 1886, p. 5

Pochmann 1942, p. 146, Fig. 35; Prescott 1962, p. 398, Pl. 81, Fig. 13; Huber-Pestalozzi 1955, p. 196, Pl. 39, Fig. 236

L. 32 u, W. 17 u

There is considerable variation of body form within this genus.

Squeezings. 660707.1

Phacus contortus var. complicata Bourrelly 1952

Huber-Pestalozzi 1955, p. 205, Fig. 260B

Diam. 30 u, L. 42 u

Squeezings. 660707.2

Phacus curvicauda Swirenko 1915, p. 333

Prescott 1962, p. 399, Pl. 87, Fig. 14; Pl. 88, Fig. 21

Diam. 25 u, L. 40 u

Squeezings, tychoplankton. 660804.20

Phacus longicauda (Ehrenb.) Dujardin, M. F. 1841, p. 337

Prescott 1962, p. 400, Pl. 87, Fig. 1

Diam. 40 u, L. 123 u, (cell body L. 70 u, caudus L. 53 u)

Squeezings, tychoplankton. 660804.20

Phacus longicauda var. insecta Kozw. 1915

Hueber Pestalozzi 1955, p. 223, Pl. 50, Fig. 303;

Pochmann 1942, p. 204, Fig. 115 (as a sub species)

Diam. 62 u, L. 150 u; typical Diam. 44 u, L. 130 u

This specimen extends the size range of this variety.

Plankton. 670403.8

Phacus obolus Pochman 1942, p. 153. (Pl. 4, Fig. 5)

Pochmann 1942, p. 153, Fig. 43

Diam. 15 u, L. 30 u

This species is distinguished by its size, the large central paramylon body and the straight to slightly bent caudus.

Squeezings. 660707.4. New record for North America

Phacus orbicularis Hubner 1886, p. 5, Fig. 1

Pochmann 1942, p. 178, Fig. 78

Diam. 35 u, L. 54 u

Squeezings. 660707.2

Phacus pseudonordstedtii Pochm. 1942, p. 219. (Pl. 4, Fig. 4)

Huber-Pestalozzi 1955, p. 229, Pl. 53, Fig. 318

Diam. 15 u, L. 33 u

This species is distinguished by the two large paramylum bodies at the lateral margins, the straight caudus and the left to right spiral striations in the pellicle.

Squeezings. 660707.1. New record for Michigan.

Phacus pseudoswirenkoi Prescott 1944, p. 368

Prescott 1962, p. 402, Pl. 85, Fig. 26; Pl. 87, Fig. 2; Pl. 88, Fig. 14

Diam. 35 u, L. 50 u

Plankton. 660804.18

Phacus suecicus Lemmermann in Pascher and Lemmermann 1913, p. 139

Prescott 1962, p. 403, Pl. 88, Figs. 2,3

Diam. 27 u, L. 45 u

Squeezings. 660804.20

Phacus undulatus (Skv.) Pochm. 1942, p. 191

Huber-Pestalozzi 1955, p. 214, Pl. 47, Fig. 287

Diam. 22 u, L. 32 u

Slightly smaller than typical. This specimen could be a new variety of the species on the basis of its smaller size (typical Diam. 38-40 u, L. 50-80 u).

Squeezings. 660707.1

Phacus sp. (Pl. 5, Fig. 1)

This taxon is thought to be a new species on the basis of the following characteristics:

(1) the arrangement of the paramylum with one large basal grain and many small grains scattered in the cytoplasm;

(2) the size and shape of the cell; the shape agrees with P. circulatus but the size is too great while the size is correct for P. gigas but the shape is not;

(3) the notches in the membrane; the definite notch on the right side of the cell and the slight depression on the left of the cell membrane; and

(4) the length of the caudus and its angle to the left.

Very rare in the lake, found only once.

Diam. 83 u, total L. 127 u, body L. 95 u, caudus L. 32 u

Entangled in floating mass of algae. 660804.17

Trachelomonas Ehrenberg 1835

Trachelomonas hispida (Perty) Stein 1883, Pl. 22, Fig. 21

Prescott 1962, p. 414, Pl. 83, Fig. 35

Diam. 17-20 u

Slightly smaller than the typical

Squeezings. 670609.4

Trachelomonas volvocina Ehrenberg 1833, pp. 315,331; 1838, p. 48

Prescott 1962, p. 419, Pl. 83, Figs. 1,7,8

Diam. 18 u, L. 20 u

Squeezings. 660707.2

Division Pyrrhophyta

Class Dinophyceae

Order Peridiniales

Family Glenodiniaceae

Glenodinium (Ehrenb.) Stein 1883

Glenodinium pulvisculus (Ehrenb.) Stein, III. part 2

Huber-Pestalozzi 1950, p. 172, Fig. 160; Prescott 1962, p. 430, Pl. 90, Figs. 17,18

Diam. 30 u

Larger than reported by Huber-Pestalozii, 1955, but Prescott gives the max. Diam. at 29 u

Squeezings. 660804.3

Family Peridiniaceae

Peridinium Ehrenberg 1832

Peridinium gatunense Nygaard in Ostenfeld and Nyggaard 1925, p. 10

Huber-Pestalozzi 1950, p. 202, Fig. 188; Prescott 1962, p. 433, Pl. 90, Figs. 25,26

Diam. 60-75 u, L. 56 u

Squeezings. 660707.3

Peridinium inconspicuum Lemm. 1900, p. 350

Huber-Pestalozzi 1950, p. 223, Fig. 227a; Prescott 1962, p. 433, Pl. 90, Figs. 22-24

Diam. 35 u

Plankton. 670218.3

Peridinium pusillum (Penard) Lemm. 1901, p. 65

Huber-Pestalozzi 1950, Fig. 234; Prescott 1962, p. 434, Pl. 107, Figs. 7-9

Diam. 21 u, L. 30 u

My specimen is slightly larger than the typical Squeezings. 660804.4

Peridinium umbonatum Stein 1883

Huber-Pestalozzi 1950, p. 220, Fig. 218

Diam. 30 u, L. 35 u

Among attached algae. 670403.1

Peridinium Volzii Lemmermann 1905

Huber-Pestalozzi 1950, p. 195, Fig. 177d

Diam. 55 u

Plankton. 670403.7

Peridinium Willei Huitfeld-Kaas 1900, p. 5

Prescott 1962, p. 434, Pl. 91, Figs. 22-25

Diam. 55 u, L. 65 u

Plankton. 661115.3

Family Ceratiaceae

Ceratium Schrank 1793

Ceratium hirundinella (O. F. Muell.) Dujardin 1841, p. 377

Prescott 1962, p. 437, Pl. 92, Figs. 4,5

L. 175 u

Squeezings, plankton. 660707.2

Order Dinococcales

Family Dinococcaceae

Cystodinium Klebs 1912

Cystodinium cornifax (Schill.) Klebs 1912, pp. 384,442

Prescott 1962, p. 438, Pl. 91, Figs. 5,6

Diam. 30 u, L. 80 u

Squeezings. 660804.2

Division Chrysophyta

Class Xanthophyceae

Order Heterococcales

Family Chlorotheciaceae

Ophiocytium Naegeli 1849

Ophiocytium cochleare (Eichw.) A. Braun 1855, p. 54

Prescott 1962, p. 363, Pl. 94, Figs. 10,11,15

Diam. 7 u

Squeezings. 660804.3

Ophiocytium parvulum (Perty) A. Braun 1855, p. 55

Prescott 1962, p. 365, Pl. 94, Fig. 20; Pl. 96, Figs. 4,5

Diam. 6 u

In my specimen the cell was weakly s-curved rather than strongly so

Among epiphytic algae. 670609.7

Order Heterosiphonales

Family Vaucheriaceae

Vaucheria De Candolle 1805

Vaucheria sp.

Diam. 85 u

This specimen was not in reproductive condition when it was collected.

In floating mass of algae. 670403.12

Class Chrysophyceae

Order Chrysomonadales

Family Synuraceae

Synura Ehrenberg 1838

Synura uvella Ehrenberg 1838, p. 61

Prescott 1962, p. 376, Pl. 92, Figs. 6,7

Diam. 10 u, L. 20 u

Plankton. 670403.7

Family Ochromonadaecae

Dinobryon Ehrenberg 1835

Dibobryon cylindricum Imhof 1883 ex. Ahlstrom 1937, p. 148

Prescott 1962, p. 378, Pl. 107, Fig. 1

Lorica Diam. 10 u, lorica L. 40 u

Plankton. 670627.10

Dinobryon sertularia Ehrenberg 1835, p. 280

Prescott 1962, p. 378, Pl. 98, Fig. 10

Lorica Diam. 12 u, lorica L. 35 u

Plankton, squeezings. 660804.2

Dinobryon Tabellariae (Lemm.) Pascher in Pascher and Lemmerman 1913, p. 66

Prescott 1962, p. 379, Pl. 98, Figs. 3-5

Lorica Diam. 8 u, lorica L. 23 u

Plankton. 670609.2

Uroglenopsis Lemmermann 1899

Uroglenopsis americana (Calkins) Lemmermann 1899, p. 107

Prescott 1962, p. 380, Pl. 99, Figs. 1-5

Diam. 4 u, colony Diam. 135 u

Plankton. 680513.1

Class Bacillariophyceae

Order Centrales

Family Coscinodiscaceae

Cyclotella Kuetzing 1834

Cyclotella sp. Kuetzing 1834

Smith 1950, p. 462, Fig. 371

Plankton. 660804.18; 670318.1

Melosira C. Agardh 1824

Melosira sp. C. Agarh 1824

Smith 1950, p. 462, Fig. 370

Among floating algae. 670527.9

Order Pennales

Suborder Fragilarineae

Family Tabellariaceae

Tabellaria Ehrenberg 1840

Tabellaria sp. Ehrenberg 1840

Smith 1950, p. 474, Fig. 380

Plankton, epiphyte. 660804.18; 661115.6; 670218.3; 670403.8

Family Fragilariaceae

Asterionella Hassal 1850

Asterionella sp. Hassal 1850

Smith 1950, p. 480, Fig. 388

Plankton. 680513.1

Fragilaria Lyngbye 1819, emend. Rabenhorst 1864

Fragilaria spp. Lyngbye

Smith 1950, p. 479, Fig. 386

Plankton, epiphyte. 660804.18; 661115.6; 670218.2; 670218.3

Synedra Ehrenberg 1830

Synedra spp. Ehrenberg 1830

Smith 1950, p. 479, Fig. 387

Plankton, epiphyte. 660804.18; 661115.6; 670218.2; 670218.3

Synedra delicatissima W. Smith

Det. by: F. M. Begres

Plankton. 660804.18

Family Eunotiaceae

Eunotia Ehrenberg 1837

Eunotia sp. Ehrenberg 1837

Smith 1950, p. 482, Fig. 389

Plankton, epiphyte. 661115.6; 670218.3

Suborder Achnanthineae

Family Achnanthaceae

Cocconeis Ehrenberg 1838

Cocconeis sp. Ehrenberg 1838

Smith 1950, p. 486, Fig. 395

Plankton, epiphyte. 660804.18; 661115.6; 670218.2; 670218.3

Suborder Naviculineae

Family Naviculaceae

Amphipleura Kuetzing 1844

Amphipleura sp. Kuetzing 1844

Smith 1950, p. 492, Fig. 403

Epiphyte, plankton. 661115.6; 670218.2; 670218.3

Gyrosigma Hassal 1845 emend. Cleve 1894

Gyrosigma sp. Hassal 1845 emend. Cleve 1894

Smith 1950, p. 494, Fig. 406

Plankton. 660804.18

Navicula Bory 1822

Navicula spp. Bory 1822

Smith 1950, p. 488, Fig. 396

Plankton, epiphyte. 660804.18; 661115.6; 670218.2; 670218.3

Neidium Pfitzer 1871

Neidium sp. Pfitzer 1871

Smith 1950, p. 490, Fig. 399

Plankton, epiphyte. 660804.18; 661115.6; 670218.2

Pinnularia Ehrenberg 1840

Pinnularia spp. Ehrenberg 1840

Smith 1950, p. 489, Fig. 397

Epiphyte, plankton. 660804.18; 661115.6; 670218.2; 670218.3

Stauroneis Ehrenberg 1843

Stauroneis sp. Ehrenberg 1843

Smith 1950, p. 492, Fig. 402

Plankton, epiphyte. 660804.18; 661115.6; 670218.2; 670218.3

Gomphonema Agardh 1824

Gomphonema spp. Agardh 1824

Smith 1950, p. 498, Fig. 411

Plankton, epiphyte. 660804.18; 661115.6; 670218.2; 670627.5

Family Cymbellaceae

Amphora Ehrenberg 1840

Amphora spp. Ehrenberg 1840

Smith 1950, p. 501, Fig. 414

Plankton, epiphyte. 661115.6; 670218.2

Cymbella Agardh 1830

Cymbella spp. Agardh 1830

Smith 1950, p. 500, Fig. 413

Epiphyte, plankton. 660804.18; 661115.6; 670218.2; 670218.3

Epithemia de Brébisson 1838

Epithemia sp. de Brébisson 1838

Smith 1950, p. 502, Fig. 415

Plankton. 660804.18; 670218.2

Rhopalodia O. Müller 1895

Rhopalodia sp. O. Müller 1895

Smith 1950, p. 503, Fig. 416

Epiphyte, plankton. 660804.18; 661115.6; 670218.3

Suborder Surirellineae

Family Nitzschiaceae

Nitzschia Hassal 1843

Nitzschia spp. Hassal 1845

Smith 1950, p. 505, Fig. 417

Epiphyte, plankton. 660804.18; 661115.6; 670218.3

Family Surirellaceae

Cymatopleura W. Smith 1851

Cymatopleura sp. W. Smith 1851

Smith 1950, p. 507, Fig. 420

Plankton, epiphyte. 661115.6; 670218.2

Surirella Turpin 1828

Surirella sp. Turpin 1828

Smith 1950, p. 508, Fig. 421

Plankton. 660804.8; 670403.3

PLATE 1

Figure	Organism
1	*Borzia triocularis*
2,4	*Scytonema Bohneri*
3	*Scenedesmus tibiscensis*
5	*Oedogonium capitellatum*
6	*Scenedesmus acutus* f. *alternans*
7	*S. acutus* f. *tetradesmiformis*
8	*S. armatus* var. *boglariensis* f. *semicostatus*
9	*S. bicaudatus*
10	*Cosmarium garrolense* var. *dimido-minor*
11	*C. conspersum* f. *minor*

Figures 1-11 (660x)

PLATE 1

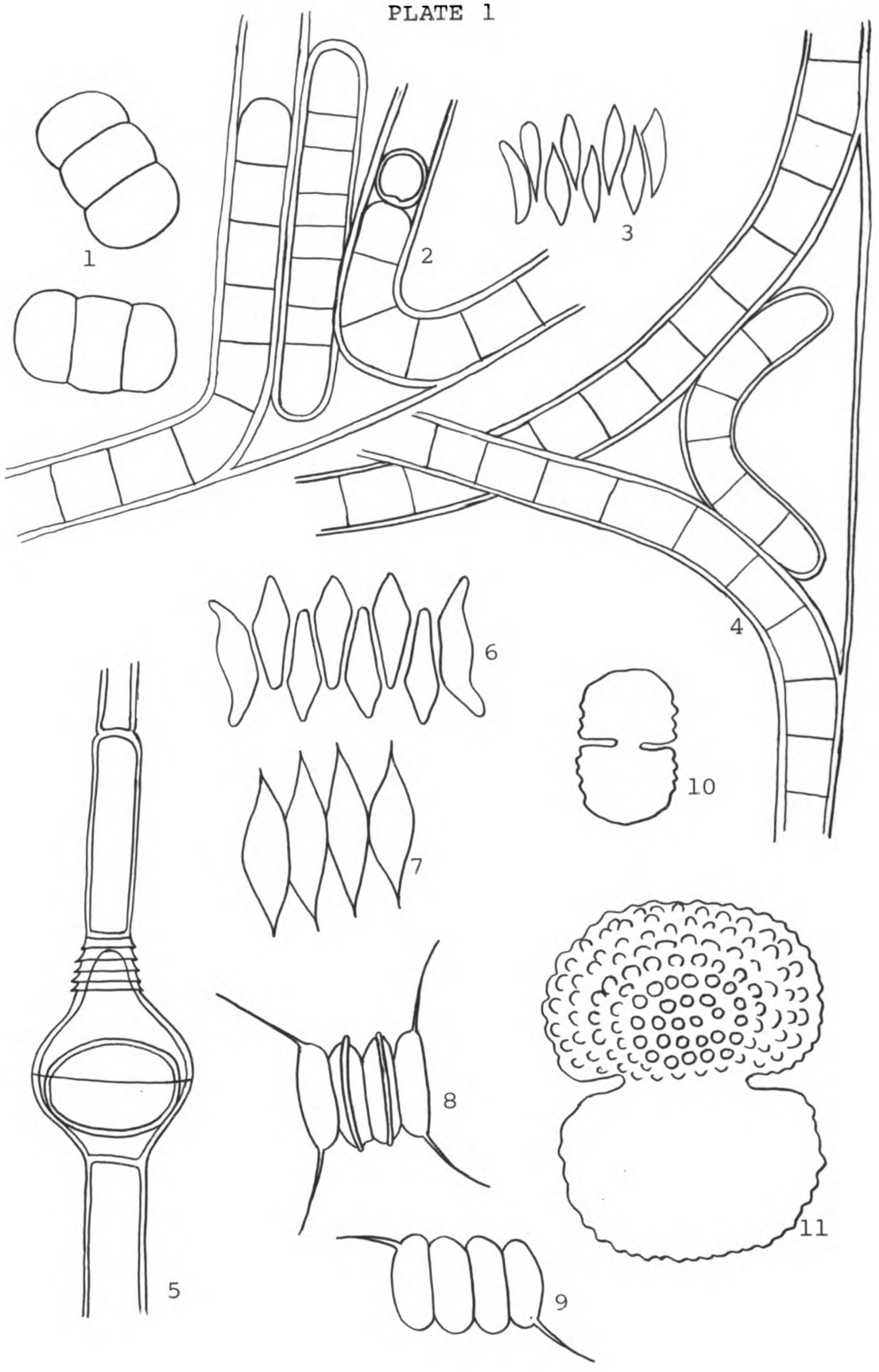


PLATE 2

Figure	Organism
1	Staurastrum Cosmarioides
2	Cosmarium depressum
3	Euastrum turneri var. strictum
4	Staurastrum disputatum f. minor
5	S. punctulatum var. minor
6	Cosmarium Regnellii
7	C. minutissimum
8	C. humile var. danicum
9	C. humile var. glabrum
10	Staurastrum pinnatum var. subpinnatum

Figures 1-10 (660x)

PLATE 2

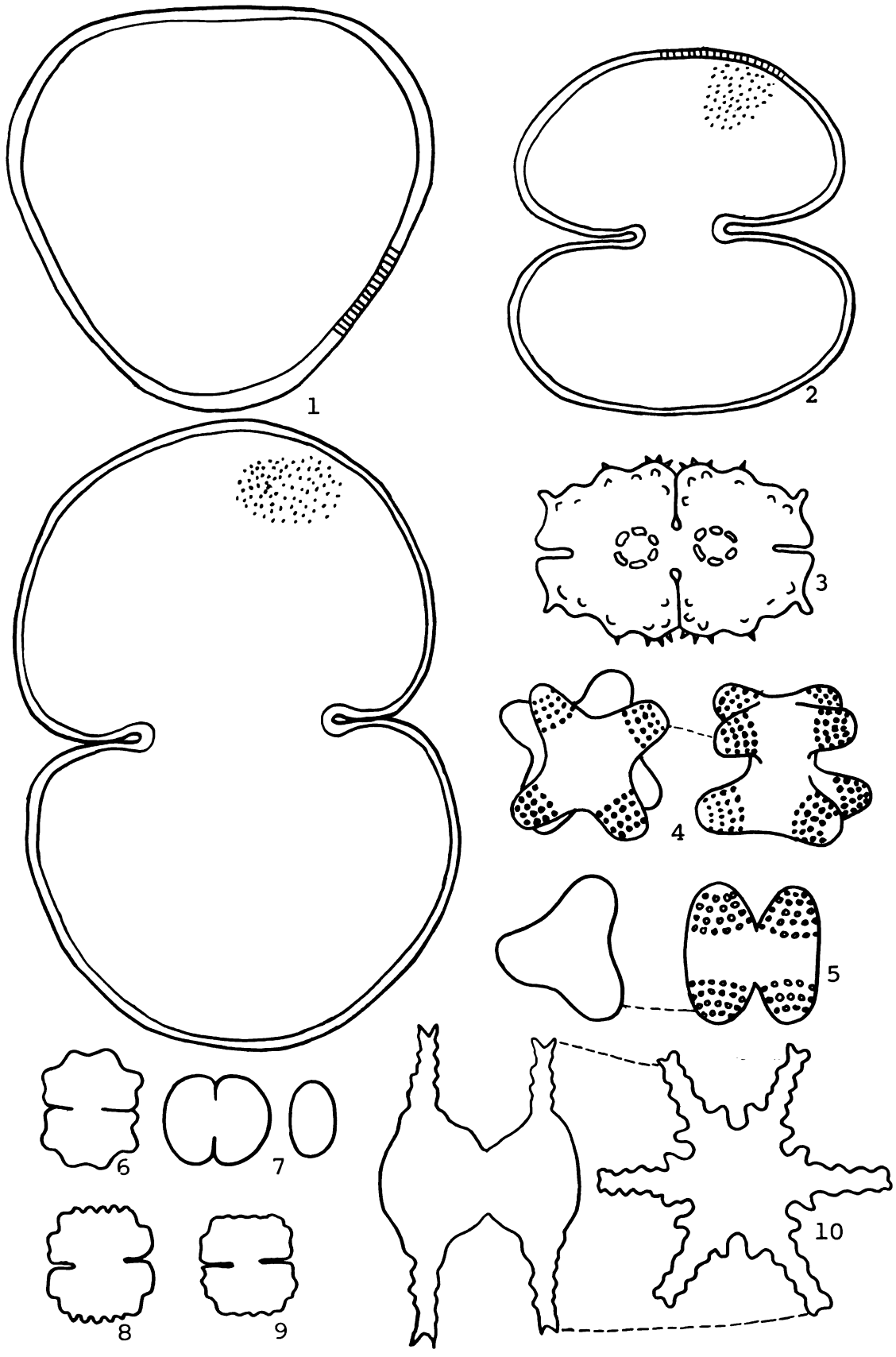


PLATE 3

Figure	Organism
1-5	Gongrosira sp. (1) one filament, (2) mature sporangia, (3) discharged sporangia, (4) basal cell detail, (5) aggregation of basal cells.

Figures 1,5 (150x); 2-4 (660x)

PLATE 4

Figure	Organism
1	*Pectodictyon cubicum*
2	*Staurastrum cyclacanthum* var. *subacanthum*
3	*Cosmarium Sportella*
4	*Phacus pseudonordstedtii*
5	*P. obolus*
6	*Euglena fusca*

Figures 2-6 (660x); 1 after Taft 1945

PLATE 4

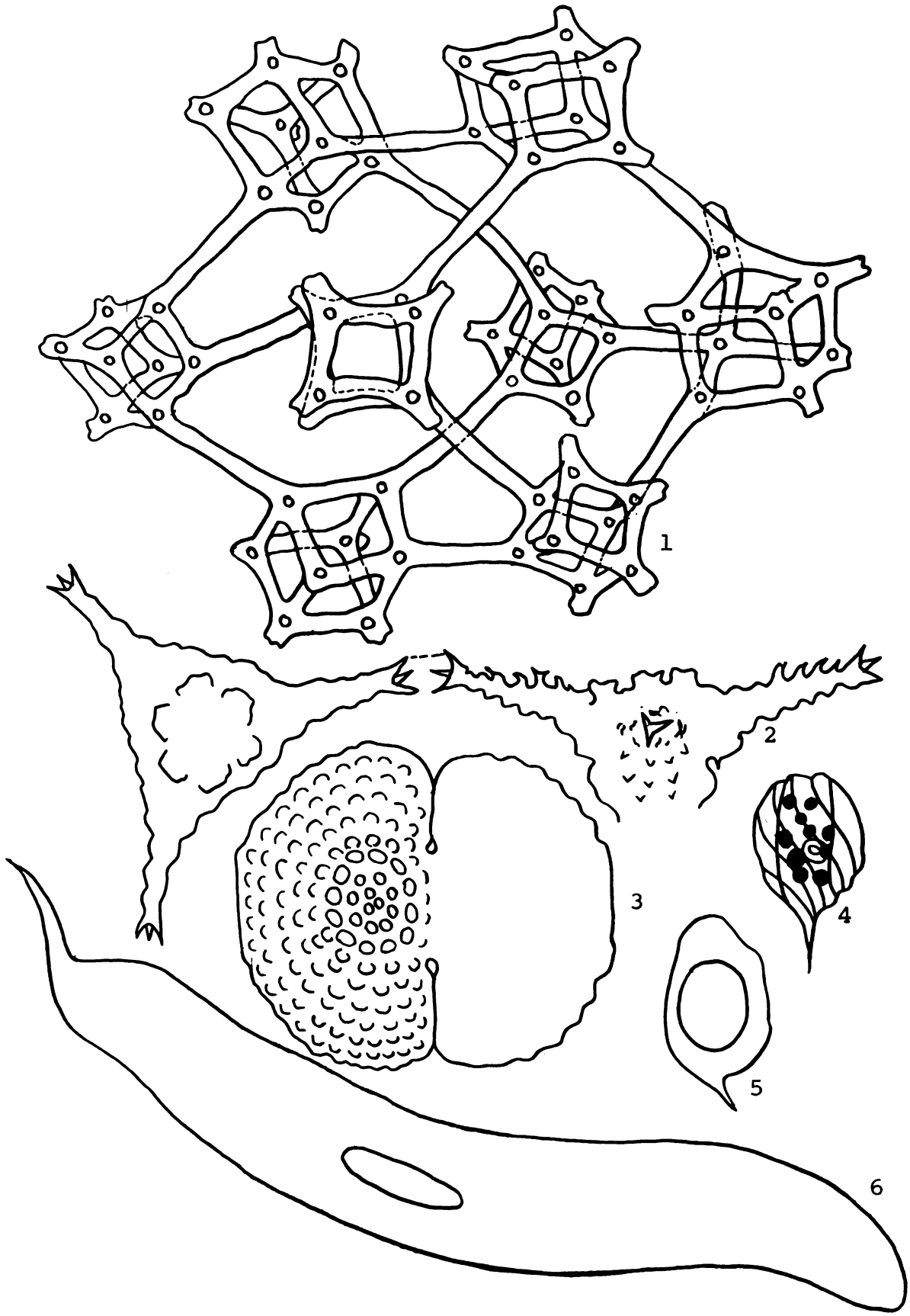
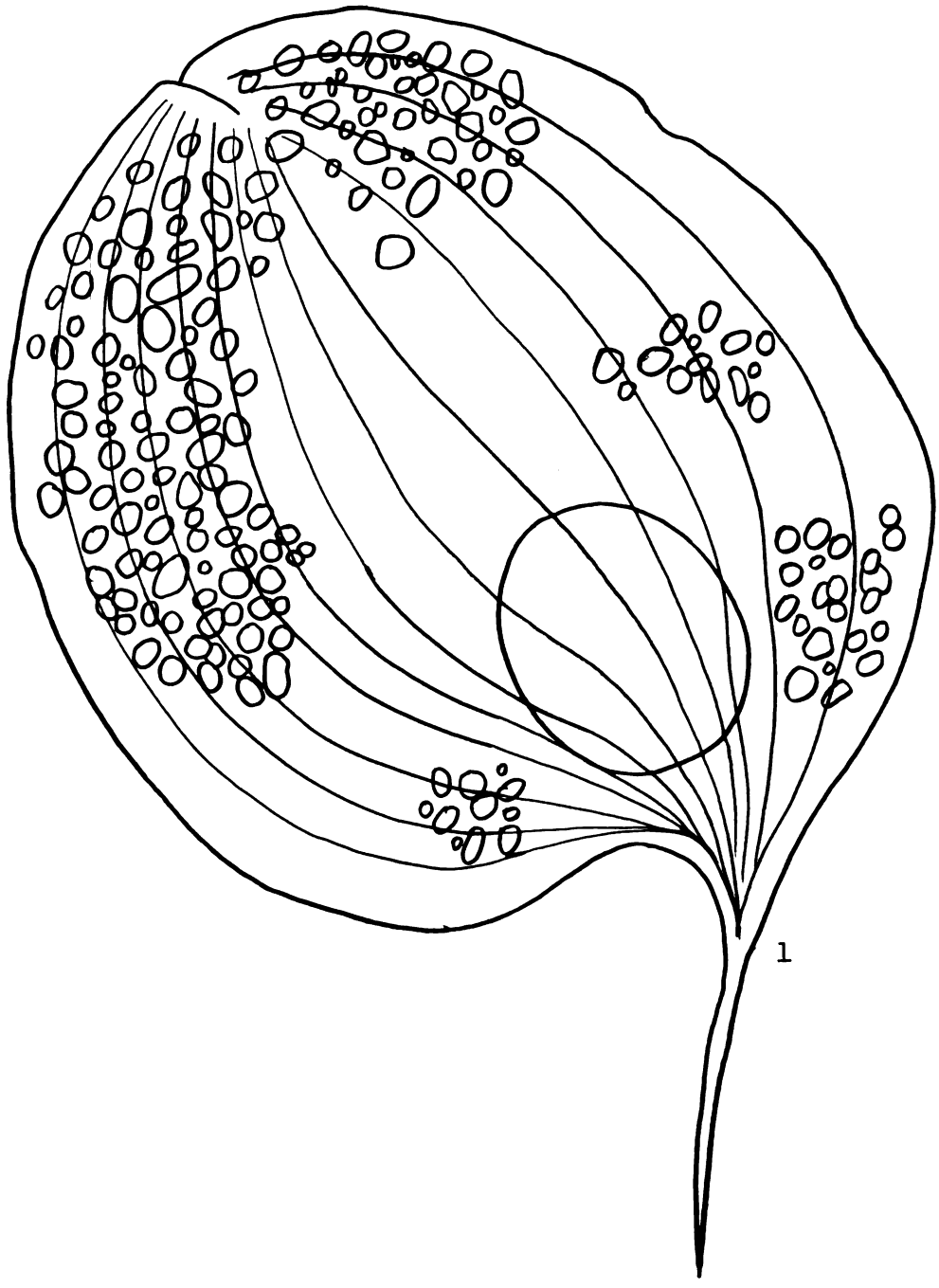


PLATE 5

Figure	Organism
1	*Phacus* sp.

Figure 1 (660x)

PLATE 5



APPENDIX I

APPENDIX I

Annotated list of vascular aquatic plants in Park Lake from the Institute for Fisheries research, Department of Fisheries, Michigan Department of Conservation, 1938.

Alisma plantago-aquatica L.

Asclepias incarnata L.

Brasenia Schreberi Gmel.

Ceratophyllum demersum L.

**Cyperus esculentis* L.

Decodon verticillatus (L.) Ell.

Eleocharis acicularis (L.) R. & S.

Eleocharis sp.

**Elodea canadensis* Michx.

Equisetum fluviatile L.

**Lemna minor* L.

**L. valdiviana* Phil.

Najas flexilis (Willd.) Rostk. & Schmidt

N. olivacea Rosend. & Butt.

Myriophyllum sp.

Nuphar variegatum Engelm.

Nymphaea odorata Ait.

Pontederia cordata L.

Potamogeton amplifolius Tuckerm.

P. angustifolius Berchtold & Presl

P. gramineus L.

P. illinoensis Morong

P. natans L.

P. pectinatus L.

P. praelongus Wulfen

P. pusillus L.

P. Robbinsii Oakes

P. strictifolius Ar. Benn.

P. zosteriformis Fern.

Sagittaria latifolia Willd.

Sagittaria sp.

Scirpus acutus Muhl.

S. americanus Pers.

*Sium suave Walt.

Sparganium chlorocarpum Rydb.

Sparganium sp.

Spirodela polyrhiza (L.) Schleid.

*Typha angustifolia L.

T. latifolia L.

Utricularia vulgaris var. americanus Gray

(* = author's additions to the list)

APPENDIX II

APPENDIX II

QUALITATIVE ANALYSIS OF THE ALGAE IN PARK LAKE

x = present	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Cyanophyta												
Aphanocapsa elachista							x					
A. pulchra							x					
Aphanothece gelatinosa								x				
A. stagnina						x			x	x	x	
Chroococcus dispursus						x	x	x	x	x	x	
C. giganteus								x				
C. limneticus					x	x		x	x	x		
C. minimus							x	x				
C. minor							x	x				
C. minutus							x					
C. Prescottii						x	x	x	x			
C. turgidus			x			x	x		x	x		
C. varius							x	x				
Coelosphaerium dubium							x					

APPENDIX II--Continued

x = present	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Coelosphaerium Kuetzingianum						x	x	x	x	x	x	
C. Naegelianum						x	x	x	x	x	x	
Dactylococcopsis fasicularis					x	x						
Gloeothece ruprestris								x		x		
Gomphosphaeria aponina				x		x	x	x	x	x		
G. aponina var. delicatula							x		x			
G. aponina var. multiplex						x	x	x	x	x		
G. lacustris var. compacta							x	x				
Merismopedia convoluta							x	x				
M. glauca					x	x	x	x		x		
M. punctata				x			x	x				
M. tenuissima						x		x	x			
Microcystia aeruginosa				x	x	x	x	x	x	x	x	
M. flos-aquae						x	x	x	x	x	x	
M. incerta						x	x	x	x	x		
Chamaesiphon incrustans							x					

APPENDIX II--Continued

x = present	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Pleurocapsa minor								x				
Arthrospira Jenneri						x	x	x				
Borzia triocularis							x					
Lyngbya aestuarii				x			x	x				
L. Birgei							x		x	x		
L. Diguetii							x					
L. epiphytica								x		x		
L. Hieronymusii					x			x				
L. major				x	x						x	
L. spirulinoides		x										
L. Taylorii								x				
L. versicolor					x							
Oscillatoria Agardhii							x	x				
O. articularia							x					
O. bornedtii				x							x	
O. chalybae								x		x		

APPENDIX II--Continued

x = present	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Oscillatoria curviceps				x			x	x			x	x
O. limnetica	x											
O. limosa			x	x			x	x				x
O. nigra									x			
O. ornata								x				
O. princeps							x	x				
O. rubescens							x	x				
O. subbrevis	x		x	x			x	x	x	x		
O. tenuis				x			x		x			x
Phormidium tenue				x								
Schizothrix tinctoria					x							
Spirulina princeps							x	x	x			
S. subsalsa							x					
Trichodesmium lacustre							x	x				
Anabaena flos-aquae						x	x	x	x	x		
A. oscillarioides							x	x	x	x		

APPENDIX II--Continued

x = present	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Anabaena sp.									x			
Nostoc comminutum									x			
Microchaete Goeppertiana									x			
Scytonema Bohneri										x		
Tolypothrix lanata										x		
T. tenuis								x				
Calothrix atricha							x					
C. breviarticulata						x						
C. epiphytica						x						
C. stellaris						x						
Gloeotrichia echinulata		x						x			x	
G. pisum							x		x			
Chlorophyta												
Chlamydomonas globosa								x				
C. polypyrenoideum								x				

APPENDIX II--Continued

x = present	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Chlamydomonas pseudopertyi						x		x				
Eudorina elegans						x	x	x				
Gonium pectorale				x			x					
Pandorina morum							x	x	x			
Pleodorina californica							x	x				
Volvox aureus					x							
V. tertius					x							
Asterococcus superbus							x	x				
Gloeocystis ampla				x			x	x	x			
G. gigas				x			x	x		x		
G. planktonica						x	x					
Palmella mucosa							x					
Sphaeriocystis Schroeteri				x	x			x				
Apiocystis Brauniana						x						
Tetraspora gelatinosa				x				x				
Dispora crucigenioides				x								

APPENDIX II--Continued

x = present	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Elakatothrix viridus							x	x				
Binuclearia tatrana							x					
Geminella interupta								x	x	x		
G. minor					x					x	x	
Hormidium Klebsii				x				x				
Radiofilum flavescens								x	x	x		
Ulothrix tenerrima				x	x						x	
Uronema elongatum												x
Microspora elegans						x						
M. Loefgrenii				x								
M. pachyderma				x								
M. stagnorum				x								
Cylindrocapsa conferta						x	x	x	x			
Aphanochaete polychaete								x				
A. repans					x	x				x	x	x
Chaetophora attenuata						x						

APPENDIX II--Continued

x = present	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Chaetophora incrassata							x					
Pseudulvella americana							x		x	x		
Stigeoclonium lubricum				x								
S. subsecundum							x					
S. tenue				x								
Protococcus viridis							x					
Chaetosphaeridium ovalis							x					
Coleochaete irregularis				x								
Gongrosira Debaryana							x					
Gongrosira sp.					x		x					
Basicladia chelonum				x								
B. crassa				x								
Cladophora crispata				x	x	x	x	x	x	x	x	x
C. insignis								x		x		
Rhizoclonium crassipellitum								x				
R. hieroglyphicum								x				

APPENDIX II--Continued

x = present	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Oedogonium capitellatum								x				
O. Howardii							x					
O. poecilosporum								x				
O. pratense								x				
O. spirostriatum								x				
Botryococcus Braunii				x	x	x	x	x	x	x	x	
B. sudeticus					x							
Characium ambiguum						x						x
C. Debaryanum												x
C. falcatum												x
Pediastrum araneosum							x	x		x		
P. Boryanum			x			x	x	x	x	x	x	
P. Boryanum var. longicorn			x			x	x		x	x	x	
P. duplex var. clathratum								x	x	x	x	
P. duplex var. rugulosum			x					x				
P. integrum					x		x		x	x		

APPENDIX II--Continued

x = present	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Pediastrum obtusum							x					
P. tetras							x					
P. tetras var. tetraodon							x					
Sorastrum spinulosum							x					
Coelastrun microporum							x	x				
Ankistrodesmus falcatus					x			x				
A. falcatus var. tumidus							x					
Chlorella vulgaris					x							
Closteriopsis longissima var. tropica								x			x	
Gloeotaenium Loitelsbergianum						x	x					
Nephrocytium Agardhianum								x				
N. limneticum								x				
Oocystis Borgei							x	x				
O. elliptica							x	x				
O. gigas							x		x			
O. parva							x	x				

APPENDIX II--Continued

x = present	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Oocystis solitaria							x					
Planktosphaeria gelatinosa							x					
Quadrigula lacustris								x				
Rayssiella hemisphaerica							x	x				
Tetraedron minimum							x	x				
T. muticum							x	x				
Trochiscia reticularis						x						
Zoochlorella parasitica										x		
Crucigenia rectangularis						x	x	x	x	x		
Pectodictyon cubicum								x				
Scenedesmus acutus						x	x	x				
S. acutus f. alternans							x	x				
S. acutus f. tetradesmiformis							x					
S. arcuatus								x				
S. arcuatus var. platydisca						x	x	x		x		
S. arcuatus var. boglariensis f. semicostatus							x					

APPENDIX II--Continued

x = present	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Scenedesmus bicaudatus							x					
S. brevispina							x					
S. ecornis					x	x	x	x		x	x	
S. ecornis var. disciformis							x					
S. longus var. Naegelii							x	x				
S. ovalternus						x	x					
S. quadricauda							x	x	x	x		
S. quadricauda var. longispina							x					
S. quadricauda var. maximus						x						
S. quadricauda var. quadrispina				x	x		x	x	x			
S. spinosus							x					
S. tibiscensis							x					
Tetradesmus wisconsinense							x					
Sirogonium stricticum						x						
Spirogyra crassa						x			x	x		
S. longata					x							

APPENDIX II--Continued

x = present	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Zygnema sterile					x	x						
Closterium Dianae								x				
C. Ehrenbergii								x		x	x	x
C. Jenneri							x					
C. Libleinii			x			x	x	x	x		x	
C. libellula						x	x	x	x			
C. moniliferum				x	x	x	x	x				x
C. parvulum							x				x	
C. venus var. westii							x					
C. pseudodianae												x
Cosmarium angulare						x			x			
C. Botrytis					x	x	x	x		x		
C. conspersum f. minor						x	x	x				
C. denticulatum var. Borgei							x					
C. depressum					x	x	x	x	x	x		
C. depressum var. schroederi							x					

APPENDIX II--Continued

x = present	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Cosmarium garrolense var. dimido-minor							x					
C. humile							x					
C. humile var. danicum							x					
C. humile var. glabrum						x						
C. minutissmum								x				
C. obtusatum						x	x		x		x	
C. portianum						x	x	x				
C. pseudopyramidatum						x	x	x				
C. Regnelli								x				
C. reniforme					x		x	x	x			
C. sexangulare f. minima						x	x					
C. Sportella						x	x					
C. subcostatum						x	x	x	x		x	
C. subtumidum						x	x	x				
C. trilobulatum							x	x				
C. tumidum							x					

APPENDIX II--Continued

x = present	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Cosmarium Turpinii		x				x	x					
C. undulatum var. minutum						x		x				
Desmidium Aptiginum								x	x			
D. Baileyi								x	x			
Euastrum hypochondrum f. decoratum			x						x	x		
E. Turnerii var. strictum								x	x			
E. verrucosum						x						
Hyalotheca dissiliens			x	x		x	x					
H. mucosa								x	x		x	
Micrasterias truncata							x	x	x			
Pleurotaenium Ehrenbergii					x			x			x	
P. trabecula						x	x		x	x	x	
Staurastrum cornatum						x		x				
S. Cosmariodes							x					
S. crenulatum						x						
S. cyclacanthum var. subacanthum			x				x				x	

APPENDIX II--Continued

x = present	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Staurastrum disputatum f. minor							x	x				
S. furcigerum					x	x	x					
S. gracile var. nannum							x					
S. hexacerum						x	x					
S. Johnsonii					x	x		x	x			
S. longiradiatum						x						
S. manfeldtii						x				x		
S. pinnatum var. subpinnatum							x	x				
S. punctulatum var. minor			x				x					
S. Sebaldi var. ornatum						x	x		x			
S. turgescens						x	x					
S. vestitum							x					
Xanthidium antilopaeum								x	x			
Penium margritaceum		x					x					
Chara globularis						x						
C. vulgaris						x	x	x	x			

APPENDIX II--Continued

x = present	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Euglenophyta												
Euglena elastica				x								
E. fusca				x								
E. gracilis				x			x					
E. proxima				x								
Lepocinclis acuta				x			x					
Phacus caudatus				x			x					
P. contortus var. complicata							x					
P. curvicauda								x				
P. longicauda								x				
P. longicauda var. insecta				x						x		
P. obolus							x					
P. orbicularis							x	x				
P. pseudonordstedtii							x					
P. pseudoswirenkoi								x				

APPENDIX II--Continued

x = present	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Phacus suecicus								x				
P. undulatus							x					
Phacus sp.								x				
Trachelomonas hispida						x	x					
T. volvocina							x					
Pyrrhophyta												
Glenodinium pulvisculus								x				
Peridinium gatunense							x	x				
P. pusillum			x					x				
P. umbonatum				x								
P. inconspicuum		x									x	
P. volzii			x	x		x	x		x			
P. Willei	x		x		x	x				x	x	
Ceratium hirundinella				x	x	x	x	x	x			
Cystidinium cornifax								x	x			

APPENDIX II--Continued

x = present	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Chrysophyta												
Ophiocytium cochleare							x	x				
O. parvulum						x						
Vaucheria sp.				x								
Synura uvella				x								
Dinobryon cylindricum						x						
D. sertularia				x			x	x				
D. tabellariae						x						
Uroglenopsis americana					x							
Cyclotella sp.			x					x				
Melosira sp.					x							
Tabellaria sp.		x		x				x		x	x	
Asterionella sp.					x							
Fragilaria spp.		x		x		x		x	x		x	
Synedra spp.		x						x			x	
S. delicatissima								x				

APPENDIX II--Continued

x = present	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Eunotia sp.		x									x	
Cocconeis sp.		x						x			x	
Amphipleura sp.		x									x	
Gyrosigma sp.								x				
Navicula sp	x	x	x	x				x			x	
Neidium sp.		x						x			x	
Pinnularia spp.		x						x			x	
Stauroneis sp.		x						x			x	
Gomphonema spp.		x				x		x			x	
Amphora spp.		x									x	
Cymbella spp.		x						x			x	
Epithemia sp.								x			x	
Rhoplodia sp.		x						x			x	
Nitzschia spp.		x						x			x	
Cymatopleura sp.		x						x			x	
Sirirella sp.				x		x						

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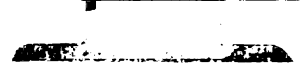

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