

THE ALGAE OF INDIANA¹

B. H. SMITH, Indiana State Teachers College

This paper presents a list of algae, with the exception of the diatoms, which have been found in Indiana.

The collections, from which this systematic list was prepared, were made largely by the writer during the past three years, 1928-29, 1929-30, and 1930-31, and represent more than 1,200 collections from 29 counties. The writer is well aware of the fact that this list is perhaps far from complete for the state and that an approximate list must take years of collecting and determining, a task which he hopes to continue. Little or no attempt was made to make determinations in the field as this greatly retarded collecting and under such conditions facilities are not so good for accurate determinations. The material as a rule, that is unless it could be examined in the laboratory shortly, was placed directly in Transeau's Solution which consists of water, 95 per cent alcohol and formaldehyde, in the ratio of 6:3:1.

The writer made approximately 1,000 permanent slides. The material was removed first from the preservative and placed in 10 per cent glycerine and water, using a watch glass. The glycerine was allowed to concentrate by evaporation of the water for two or three days, when pure glycerine was added. The material was now placed on a slide and a small drop of melted glycerine jelly was added (this jelly must not be too warm) and allowed to solidify over night. The slides were then sealed by ringing with balsam. For the desmids this seems to be a very satisfactory method but is very unsatisfactory for the Zygnemales.

Historical. The literature dealing with the algae of Indiana consists of approximately forty papers, many of which do little more than mention one or two genera. The first written account of the algae of the state seems to have been made by Cox (1876) who lists the genera *Oscillatoria* and *Closterium*, and *Pediastrum angulosum* (Ehrenb.) Menegh., *Euastrum ansatum* Ralfs. and twelve genera of diatoms without species names. These were all from Wayne County. The second report on the algae was by Curtis (1882) who reported approximately seventy-eight diatoms from Marion County. Johnson (1891) lists several species mostly from Lake County, in the northwestern corner of the state. Mottier (1894) adds Bloomington as a new station for *Pleodorina*. Eigenmann (1895) mentions *Ceratium hirundinella* O. F. M. diatoms or other minute organisms along with various forms of *Palmella* in the first report of the biological station which is located on Winona Lake, in Kosciusko County. Arthur (1896) lists *Cladophora glomerata genuina*

¹This paper is part of a thesis presented in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Graduate School of the Ohio State University.

Kirch. and Chamaesiphon. Bigney (1896) in his survey of Milan Pond, says the pond is very rich in algae and then proceeds to name such genera as Spirogyra, Zygnema, Vaucheria, Oscillatoria Euglena, diatoms, desmids and kindred forms. Thomas (1898) lists fifteen desmids from Crawfordsville in Montgomery and remarked he was surprised that no more has been done on the algae and made a plea for further work in the field. Burrage (1901) found 14 genera of diatoms and five genera of other algae in the Lafayette Reservoir. By far the largest list of algae was made by Andrews (1909) when he reported about 175 species mostly from Monroe County. Again Andrews (1926) reported an additional list of species of about 88 in number. Palmer (1928) added five new species for the state. Palmer (1931) again reports 13 new species and 3 new genera of algae from Indiana.

Andrews (1929) in a third article lists 52 species including some diatoms, all from Monroe County. Palmer (1930) adds some 22 genera and seven species of algae to his check list for 1875-1928. In the same year he also adds Lemanea as having never been listed for the state. White (1930) lists 22 species of algae as not previously reported for Indiana.

This review of literature shows very clearly the meager amount of work which has been done on the algae in the state since the beginning fifty-five years ago. It is no doubt true that much of the earlier work and perhaps some of the latter work on the algae in this state was done under unfavorable conditions, especially with reference to access to dependable literature. This is perhaps particularly true with reference to the species of Spirogyra, Zygnema, Mougeotia, Debarya and the family Oedogoniaceae. Up to the present time there is no satisfactory published key or monograph of the Zygnemaceae and it was only by the use of the unpublished keys of these genera by Transeau that the writer was able to make satisfactory determinations. In 1925, Transeau published a key with descriptions and drawing of the species of the genus Debarya and in 1926 appeared his key to the genus Mougeotia.

In 1929 Tiffany published his key to the Oedogoniaceae and followed in 1930 with the publication of his monograph of the same, the only complete work in English on this family. Up to this time the work of Hirn (1900) published in Latin and German was the model for all algologists. This work was not only difficult to secure but was becoming obsolete.

In brief this shows the scattered condition of the literature dealing with some of the very common genera of algae, which made accurate determinations difficult.

Summarizing the literature up to the time this paper was presented before the Indiana Academy of Science we find that out of 92 counties in the state, algae have been recorded from but 19 counties and for 8 of these counties there have been less than 10 species reported. Nine counties have more than 10 species reported, they are Marion, Marshall, Montgomery, Lake, Lawrence, Kosciusko, Wayne, Monroe, and Tippecanoe. Summarizing the number of genera and species previously reported in the state we find: Blue-greens—28 genera and 100 species and vari-

eties, one genus had no species named; Desmids—16 genera and 164 species; all others, 63 genera and 217 species and varieties, 9 of these genera have no species named. Omitting the genera with no species named there are 106 genera and 479 species recorded for the state. This does not include the diatoms of which there are 30 genera and 120 species reported, 5 genera having no species named. Curtis (1882) reported 78 species, which shows there has been essentially nothing added to his efforts.

Geographical. Indiana may be divided into three rather general regions: (I) The Northern Lake and Moraine Region, the southern limit of which may be indicated by a line beginning at Ft. Wayne, in Allen County, and passing through Huntington, Peru, Logansport, Monticello and proceeding westward through the lower edge of Jasper and Newton counties, into Illinois. This region might be further subdivided into sections as follows: (1) Calumet Lacustrine, (2) Valparaiso Moraine, (3) Kankakee Lacustrine, (4) Steuben Morainal Lake and (5) Maumee Lacustrine section. This region as a whole is a rather rough plain. Scattered over it are belts of low, hummocky hills, many lakes, and patches of sand hills intermingled with marshes. These belts of sand and gravel were laid down at the margin of ice while the margin was stationary and are frequently called terminal moraines. In Allen County only, on the east, do we find silt and clay in the beds of old extinct lakes, drained thousands of years ago. In north central Indiana are found belts of gravelly clay, mixed by the glacier, which are from 100 to 200 feet thick and also belts of sand, gravel and gravelly clay, mixed in confusion by the glacier, and the surface strewn with hard boulders. In the northwestern section, Newton, Jasper, Pulaski, Stark, and Laporte are found belts of sand, silt and gravel laid down by the rivers and lakes. Here are found the sand dunes, hillocks and hollows of sand blown by the wind, gravelly clay mixed by the glacier and boulders again strewn over the surface. (II) The Central Drift Plain, sometimes called the Tipton Till Plain, a region truly a plain, being level and smooth, extending southward from the Northern Lake and Moraine Region to Posey County in the extreme southwestern part of the state and to Clark County on the southeast. The latter county is opposite Louisville, Kentucky. This region extends over the middle and southern two-thirds of the state, except for fifteen counties. Its southern limit corresponds with the southern limit of glaciation. This central drift plain has three distinct divisions or sections. The north central region which covers about one-third of the state is a gravelly clay of 100 to 200 feet in thickness and was mixed by the glacier. The region is sometimes called a ground moraine. The southwestern region and the southeastern region correspond to the limits of glaciation. Here the soil is gravelly clay, as in the north central region, except it averages from 0 to 50 feet thick and is somewhat enriched by loess loam and imperfectly mantles the bed rock. (III) The Southern Hills and Rolling Land, a region found in central southern Indiana, of about 6,250 square miles. This is an exceedingly rough region as compared with either of the other two regions of the state. There are about fifteen counties in the section,

beginning with Brown and Monroe counties on the north and extending southward to the Ohio River. Here are the unglaciated hills of valleys and it constitutes the most rugged region of Indiana. The soil is made up largely of bed rock made by the weathering of shale and limestone and some sandstone.

The writer wishes to thank Dr. E. N. Transeau, under whose guidance this work was made possible and accomplished, for his helpful criticisms, the checking of many determinations, especially of the Zygnemaceae, and also for the use of his unpublished keys of the species of Spirogyra and of Zygnema, without which their determination would have been nearly impossible. To Dr. L. H. Tiffany the writer is greatly indebted and many thanks are due for his assistance with the Oedogoniaceae, and to Dr. Helen J. Brown thanks are likewise due for her assistance with the Desmidiaceae. For assistance in the determination of the Peridineae the writer wishes to express his appreciation and thanks to Mr. G. H. Wailes, of the Pacific Biological Station, Nanaimo, British Columbia. He also expressed appreciation to those of his students who helped in making some of the collections: Max Britton, Francis Post, Ben Frandzel, Mary Frances Caress, and Claude French.

SUMMARY

Of the 540 forms in the list there are 101 varieties, 272 species and 30 genera which have not been recorded in published reports from the state.

There are 22 species and varieties not recorded in published literature from the United States. These are as follows:

1. *Oedogonium armigerum* Hirn. Previously reported from Brazil.
2. *Oedogonium biforme* Nordst. Previously reported from Brazil, Paraguay and Ecuador.
3. *Oedogonium crassiusculum* Wittr. var. *arachavaletae* (Wittr.) Hirn. Previously reported from Uruguay.
4. *Oedogonium inconspicuum* Hirn. Previously reported from Colombia; Finland, Austria and Sweden.
5. *Oedogonium paulense* Nordst and Hirn. Previously reported from Brazil and Australia.
6. *Scenedesmus quadricauda* var. *africana* Fritsch and Rich. Previously reported from South Africa.
7. *Spirogyra bucheti* Petit. Previously reported from Morocco.
8. *Spirogyra nawaschini* Kasanowsky. Previously reported from Europe.
9. *Spirogyra schmidtii* W. & G. S. West. Koh Chang, Siam.
10. *Spirogyra subreticulata* Fritsch. Previously reported from South Africa.
11. *Spirogyra tolosana* Comere. Previously reported from France.
12. *Spirogyra velata* Nordst. Previously reported in Europe; South Africa.
13. *Cosmarium lundellii* var. *ellipticum* West. Previously reported from Wales and Scotland.

14. *Cosmarium obtusatum* Schmidle. Previously reported from Scotland, Germany, Austria (2) and East Africa.
15. *Ceratium hirundinella* var. *carenthianum* Zederb.
16. *Ceratium hirundinella* var. *pilburgense* Zederb.
17. *Glenodinium oculatum* Stein. Reported from Europe and Australia.
18. *Peridinium elpatiewsky* (Ostenf.) Lemm. Reported from Europe and Asia.
19. *Peridinium lomnicki* Wolsz. Reported from European waters.
20. *Peridinium penardi* Lemm. Reported from plankton of ponds and streams in Europe.
21. *Closterium diana* Ehrenb. var. *arcuatum* (Breb.) Rabenh.
22. *Vaucheria uncinata* Kuetz. Reported from Norway and Europe.

Eddy (1930) says that 16 of the known species of the fresh water dinoflagellates have been found in the United States. Of these 16 known species the writer has found four in Indiana. In addition to this, six species not reported for the United States and two new species were found, making a total of 12 species and varieties for the state.

The new forms and names are as follows:

1. *Oedogonium borisianum* var. *minus* var. nov. L. H. Tiffany and B. H. Smith.
2. *Oedogonium succium* var. *australe* (G. S. West) L. H. Tiffany and B. H. Smith.
3. *Vaucheria orthocarpa* (Reinsch) var. *major* var. nov.
4. *Closterium lineatum* Ehrenb. var. *maximum* var. nov.
5. *Cosmarium portianum* Arch. var. *major* var. nov.
6. *Peridinium laeve* (Ruitf.) Hass. var. *wailesii* var. nov.
7. *Peridinium* sp. According to Wailes, closely related to *P. tabulatum*.

Zygosporos not previously reported—*Cosmarium ovale* Ralfs. Zygosporos with semi-cells.

SYSTEMATIC ARRANGEMENT OF ALGAL GROUPS AND SPECIES FOUND IN INDIANA

Class I—Myxophyceae

Aphanothece stagnina (Sprengel) A. Braun. Sullivan Co., July 24, 1930. Vigo Co., April, 1929.

¹*Chroococcus minutus* (Kuetz) Näg. Vigo Co., 1928.

Chroococcus turgidus (Kuetz) Näg. Vigo Co., July 3 and July 18, 1929. Kosciusko Co., Aug. 31, 1929.

¹*Chroococcus limneticus* Lemm. Kosciusko Co., Sept. 14, 1929. Vigo Co., Aug. 15, 1930.

¹*Coelosphaerium nägelianum* Unger. Vigo Co., July 30, 1929. Kosciusko Co., Sept. 15, 1929.

¹ Species—not previously reported from State.

² Variety—not previously reported from State.

³ Genus—not previously reported from State.

⁴ Varieties or species—not previously reported from United States.

⁵ New Varieties.

- ¹*Gloeocapsa arenaria* (hass.) Rabh. Vigo Co., July 9, 1929.
¹*Gloeocapsa gelatinosa* Kuetz. Vigo Co., July 9, 1929.
¹*Gloeocapsa muralis* Kuetz. Vigo Co., April, 1928.
Gloeocapsa polydermatica Kuetz. Vigo Co., April, 1928.
Gomphosphaeria aponina Kuetz. Montgomery Co., Aug. 14, 1929.
Elkhart Co., Sept. 15, 1929.
¹*Merismopedia elegans* A. Braun. Vigo Co., Spring, 1929, July 3, 1929, Aug. 14, 1930.
Merismopedia glauca (Ehrenb) Näg. Vigo Co., July 3, 1929, Aug. 15, 1930.
¹*Merismopedia minima* Beck. Vigo Co., Aug. 31, 1931.
¹*Merismopedia punctata* Meyen. Vigo Co., June 10, 1931, July 3, 1929, Aug. 4, 1930.
Microcystis aeruginosa Kuetz. Vigo Co., Aug. 4, 1930.
²*Microcystis aeruginosa* var. *major* (Wittr.) G. M. Smith. Vigo Co., Aug. 4, 1930.
¹*Microcystis flos-aquae* (Wittr.) Kirch. Vigo Co., Aug. 13, 1930.
Kosciusko Co., Sept. 15, 1929.
¹*Microcystis parasitica* Kuetz. Wabash Co., Aug. 31, 1929.
¹*Microcystis pseudofilamentosa* Craw. Kosciusko Co., Sept. 15, 1929.
Lyngbya aerugineo-caerulea (Kuetz) Com. Vigo Co., July 18, 1929.
¹*Lyngbya arachnoidea* Kuetz. Vigo Co., July 3, 1929.
¹*Lyngbya contorta* Lemm. Vigo Co., Aug. 23, 1930.
¹*Lyngbya major* Menegh. Vigo Co., July 3, 1929, July 18, 1930.
¹*Lyngbya martensiana* Menegh. Vigo Co., July 9, 1929.
¹*Lyngbya putealis* Montague. Knox Co., Summer, 1929.
¹*Oscillatoria anguina* Bory. Vigo Co., April 18, 1931. Tippecanoe Co., Sept. 23, 1929.
¹*Oscillatoria angustissima* W. and G. S. West. Vigo Co., July 1, 1930.
Oscillatoria chalybea Mertens. Warren Co., Aug. 28, 1930.
¹*Oscillatoria chlorina* Kuetz. Vigo Co., July 18, 1929.
Oscillatoria limosa Agardh. Benton Co., May 17, 1931. Vigo Co., April 11, 1931.
¹*Oscillatoria okeni* Agardh. Vigo Co., July 23, 1930.
¹*Oscillatoria ornata* Kuetz. Clay Co., July 4, 1929.
Oscillatoria princeps Vaucher. Vigo Co., July 23, 1930. Parke Co., July 13, 1929, February, 1928. Benton Co., May 17, 1931. Clay Co., May 23, 1931.
¹*Oscillatoria proboscidea* Gom. Warren Co., Aug. 28, 1930.
¹*Oscillatoria sancta* Kuetz. Montgomery Co., Aug. 4, 1929.
Oscillatoria splendida Brev. Vigo Co., July 23, 1930. Wabash Co., Aug. 31, 1929. Clay Co., July 4, 1929.
¹*Oscillatoria subtilissima* Kuetz. Vigo Co., July 18, 1929.
Oscillatoria tenuis Agardh. Wabash Co., Aug. 31, 1929. Vigo Co., July 30, 1929.

¹ Species—not previously reported from State.

² Variety—not previously reported from State.

³ Genus—not previously reported from State.

⁴ Varieties or species—not previously reported from United States.

⁵ New Varieties.

¹*Oscillatoria terebriformis* (Agardh.) Gomont. Vigo Co., April 20, 1929.

Phormidium tenue (Menegh) Gom. Sullivan Co., May 2, 1931.

¹*Phormidium retzii* (Ag.) Gom. Wabash Co., Aug. 31, 1929.

Borzia trilocularis Cohn. Montgomery Co., Aug. 4, 1929.

¹*Spirulina gomontiana* (Setchell) Geitler. Vigo Co., July 23, 1930.

¹*Spirulina major* Kuetz. Vigo Co., July 23, 1930.

¹*Spirulina princeps* (W. & G. S. West) G. S. West. Vigo Co., July 3, 1929, Aug. 13, 1930. Clay Co., May 23, 1931.

³*Trichodesmium thibautii* Gom. Vigo Co., July 24, 1930.

¹*Anabaena affinis* Lemm. Vigo Co., July 18, 1929.

¹*Anabaena californica* Borge. Sullivan Co., May 24, 1931. Vigo Co., July 12, 1929.

¹*Anabaena catenula* (Kuetz) Born and Flah. Greene Co., May 2, 1931. Vigo Co., July 18, 1929.

Anabaena flos-aquae (Lyngh.) Breb. Vigo Co., July 30, 1929.

¹*Anabaena inaequalis* (Kuetz) Born and Flah. Montgomery Co., July 14, 1929.

¹*Anabaena laxa* A. Braun. Vigo Co., June 18, 1929.

¹*Anabaena limnetica* G. M. Smith. Kosciusko Co., Sept. 15, 1929.

¹*Anabaena macrospora* var. *crassa*. Klebahn. Vigo Co., Aug. 15, 1930.

²*Anabaena macrospora* Klebahn var. *robusta* Lemm. Vigo. Co., July 3, 1929.

¹*Anabaena plantonica* Brunthaler. Wabash River, August, 1930.

¹*Anabaena poulseniana* Boye P. Vigo Co., June 27, 1930.

¹*Anabaena scheremetievi* Flenkin. Montgomery Co., July 14, 1929.

¹*Anabaena spiroides* Klebahn var. *crassa* Lemm. Vigo Co., July 3, 1930.

¹*Anabaena sphaerica* Born and Flah. Vigo Co., July 3, 1930.

Anabaena variabilis Kuetz. Vigo Co., June 6, 1931.

³*Anabaenopsis raciborskii* Wolosz. Vigo Co., Aug. 31, 1930.

¹*Anabaenopsis circularis* (G. S. West) Wolosz. Vigo Co., Aug. 23, 1930.

Aphanizomenon flos-aquae (1) Ralfs. Vigo Co., Aug. 13, 1930, Vigo Co., July 17, 1930.

¹*Cylindrospermum musciola* Kuetz. Sullivan Co., June 8, 1931.

¹*Cylindrospermum majus* Kuetz. Vigo Co., during Summer, 1913.

¹*Cylindrospermum minutissimum* Collins. Vigo Co., July 24, 1930.

¹*Cylindrospermum minutum* Wood. Vigo Co., June 27, 1930.

¹*Cylindrospermum stagnale* (Kuetz) Born and Flah. Vigo Co., July 30, 1929.

Nostoc coeruleum Lyngbya. Vigo Co., summer, 1928.

Nostoc commune Vaucher. North Terre Haute, Summer, 1928. Montgomery Co., Summer, 1925.

¹*Nostoc linkia* (Roth) Bornet. Vigo Co., Summer, 1928.

¹ Species—not previously reported from State.

² Variety—not previously reported from State.

³ Genus—not previously reported from State.

⁴ Varieties or species—not previously reported from United States.

⁵ New Varieties.

¹*Nostoc punctiforme* (Kuetz) Hariot. Montgomery Co., July 6, 1930. Vigo Co., April 24, 1930.

Nostoc pruniforme Ag. Fish hatcheries, Lake Wawasee. These colonies were very large, up to 2.5 centimeters in diameter and the bottom of the fish pond was literally covered with them.

¹*Calothrix stagnalis* Gcm. Vigo Co., 1928.

¹*Calothrix sandwicensis* (Nordst.) Schmidle. Vigo Co., Aug. 1, 1929.

³*Dichothrix gypsophila* (Kuetz) Born and Flah. Kosciusko Co., Sept. 15, 1929.

¹*Gloeotrichia echinulata* (J. E. Smith) Richt. Vigo Co., July 7, 1930 and July 9, 1930.

Gloeotrichia natans (Hedw.) Rabenh. Vigo Co., July 9, 1930.

³*Hammatoida normanii* W. and G. S. West. Vigo Co., June 26, 1929.

¹*Rivularia minutula* (Kuetz) Born and Flah. Wabash Co., Aug. 31, 1929.

Rivularia echinulata (Smith) Born and Flah. Monroe Co., June 27, 1929.

Rivularia natans (Hedwig) Welwitach. Grant Co., Sept. 2, 1929.

¹*Rivularia borealis* Richt. Wabash Co., Aug. 31, 1929.

¹*Scytonema mirabile* (Dillwyn) Born. Vigo Co., Aug. 1, 1929, and July 17, 1930.

Tolypothrix lanata (Desv.) Wartmann. Kosciusko Co., Sept. 15, 1929. Vigo Co., April, 1929.

Tolypothrix tenuis Kuetz. Vigo Co., 1928.

Tolypothrix distorta (Desv.) Wartm. Vigo Co., July 17, 1930.

³*Desmonema wrangelii* (Ag.) Born and Flah. Vigo Co., Aug. 31, 1931.

³*Plectonema tenue* Thuret. Vigo Co., 1929.

Class III—Rhodophyceae

Batrachospermum moniliforme Roth. Montgomery Co., Spring, 1917.

Lemanea torulosa (Roth.) Ag. Owen Co., May, 1923. Collected by Glenn W. Bladyes of Ohio State University.

Class IV—Heterokontae

Botryococcus braunii Kuetz. Creek, one mile north of Brazil, State Road 49, May 31, 1931.

¹*Botryococcus protuberans* W. and G. S. West var. *minor* G. M. Smith. Vigo Co., July 18, 1929.

¹*Botryococcus sudeticus* Lemm. Vigo Co., July 9, 1930.

¹*Ophiocytium capitatum* Wolle. Vermillion Co., June 6, 1931.

Ophiocytium cochleare A. Braun. Tippecanoe Co., Sept. 23, 1929. Sullivan Co., May 24, 1931.

¹*Ophiocytium mains* Nägeli. Elkhart Co., Sept. 15, 1929.

¹ Species—not previously reported from State.

² Variety—not previously reported from State.

³ Genus—not previously reported from State.

⁴ Varieties or species—not previously reported from United States.

⁵ New Varieties.

Tribonema bombycinum (Ag.) Derb. and Sol. Vigo Co., May 17, 1931.

Botrydium granulatum (L) Grev. Tippecanoe Co., Summer, 1929. Vigo Co., Summer, 1930.

Class V—Chlorophyceae

¹*Eudorina elegans* Ehrenb. Vigo Co., June 26, 1929. Sullivan Co., Aug. 21, 1930.

Gonium pectorale Müll. Vigo Co., June 26, 1929.

Pandorina morum (Müll.) Bury. Parke Co., July 20, 1929. Vigo Co., Aug. 14, 1930.

Pleodorina californica Shaw. Vigo Co., Aug. 13, 1930.

Pleodorina illinoiensis Kofoid. Howard Co., Sept. 2, 1929.

Volvox globator (L.) Ehrenb. Vigo Co., 1923. Kosciusko Co., Sept. 14, 1929.

¹*Volvox mononac* G. M. Smith. Vigo Co., March 28, 1929.

Volvox aureus Ehrenb. Vigo Co., March 28, 1929.

¹*Chlamydomonas angulosa* Dill. Vigo Co., May 2, 1931.

³*Carteria klebsii* (Dangeard) Dill. Vigo Co., Summer, 1929.

³*Asterococcus limneticus* G. M. Smith. Putnam Co., May 23, 1931.

Asterococcus superbus (Cienk) Scherffel. Montgomery Co., May 13, 1930.

Sphaerocystis schroeteri Chod. Vigo Co., Aug. 8, 1930. Kosciusko Co., Sept. 15, 1929.

Tetraspora gelatinosa (Vauch) Desv.

¹*Tetraspora limnetica* W. and G. S. West. Vigo Co., June 30, 1930.

¹*Tetraspora lacustris* Lemm. Marion Co., June 4, 1930.

Hydrodictyon reticulatum (1) Lagerh. Vigo Co., June 30, 1929. Very abundant and in all stages of development from zoospores to very large coenobia.

Pediastrum boryanum (Turpin) Menegh. Vermillion Co., June 6, 1931. Vigo Co., July 18, 1929. Kosciusko Co., Sept. 15, 1929.

²*Pediastrum boryanum* var. *longicorne* Raciborski. Vigo Co., July 18, 1929. Kosciusko Co., Sept. 14, 1929.

Pediastrum duplex Mayen. Vigo Co., Fall, 1927.

²*Pediastrum duplex* var. *clathratum* (A. Braun.) Lagerheim. Vigo Co., Aug. 4, 1930.

²*Pediastrum duplex* var. *gracillimum* W. and G. S. West. Vigo Co., Aug. 23, 1930.

²*Pediastrum duplex* var. *rotundatum* Lucks. Vigo Co., July 18, 1929.

¹*Pediastrum integrum* Naeg. Tippecanoe Co., Sept. 23, 1929. Vigo Co., June 10, 1931. Sullivan Co., July 24, 1930.

¹*Pediastrum ovatum* (Ehr.) A. Br. Vigo Co., Aug. 23, 1930.

¹*Pediastrum sculptatum* G. M. Smith. Kosciusko Co., Sept. 14, 1929.

¹ Species—not previously reported from State.

² Variety—not previously reported from State.

³ Genus—not previously reported from State.

⁴ Varieties or species—not previously reported from United States.

⁵ New Varieties.

- ²*Pediastrum simplex* var. *duodenarium* (Bailey) Robenhorst. Vermillion Co., June 6, 1931. Vigo Co., Aug. 4, 1930.
- ²*Pediastrum simplex* Meyen. var. *granulatum* Lemm. Kosciusko Co., Sept. 14, 1929.
- Pediastrum tetras* (Ehr.) Ralfs. Vermillion Co., June 6, 1931. Kosciusko Co., Sept. 14, 1929.
- ³*Characium naegellii* var. *majus* Hanagirg. Montgomery Co., May 13, 1930.
- Characium pringsheimii* A. Br. Kosciusko Co., Sept. 14, 1929.
- ³*Chlorococcum humicolum* (Naeg.) Rabenh. Sullivan Co., May 23, 1931.
- ³*Phyllobium sphagnicola* G. S. West. Vigo Co., May 17, 1931.
- Dictyosphaerium ehrenbergianum* Naeg. Montgomery Co., May 13, 1930.
- ¹*Dictyosphaerium pulchellum* Wood. Vigo Co., Aug. 31, 1930.
- ³*Actinastrum hantzschii* Lagerh. Vigo Co., Aug. 4, 1930.
- ²*Actinastrum hantzschii* var. *fluvitale* Lemm. Vigo Co., Aug. 23, 1930.
- ¹*Ankistrodesmus chodati* (Tanner-Fullemann) Brunth. Vigo Co., Aug. 20, 1930.
- ²*Ankistrodesmus falcatus* var. *mirabilis* G. S. West. Sullivan Co., June 8, 1931. Kosciusko Co., Sept. 14, 1929. Vermillion Co., June 6, 1931.
- ²*Ankistrodesmus falcatus* var. *spirilliformis* G. S. West. Sullivan Co., July 24, 1930. Vigo Co., June 30, 1930.
- ¹*Ankistrodesmus nitzschoides* G. S. West. Vigo Co., Aug. 4, 1930.
- ¹*Ankistrodesmus setigerus* (Schröd) G. S. West. Parke Co., May 5, 1931. Sullivan Co., June 8, 1931.
- ¹*Ankistrodesmus spiralis* (Turner) Lemm. Parke Co., June 18, 1929.
- Chlorella vulgaris* Beijer. Vigo Co., Aug. 17, 1930.
- ³*Closteriopsis longissimum* var. *aciculare* (Chod.). Vigo Co., Aug. 17, 1930.
- Coelastrum microporum* Nägeli. Parke Co., May 5, 1931. Montgomery Co., Sept. 8, 1929. Vigo Co., July 17, 1929. Noble Co., Sept. 15, 1929.
- ¹*Coelastrum reticulum* (Dangeard) Senn. Vigo Co., Aug. 23, 1930.
- Coelastrum sphaericum* Naeg. Vermillion Co., June 6, 1931. Parke Co., May 5, 1931.
- ¹*Crucigenia cruciata* (Wolle) Schmidle. Vigo Co., Aug. 23, 1930.
- ¹*Crucigenia apiculata* Lemm. Kosciusko Co., Sept. 14, 1929.
- ¹*Crucigenia quadrata* Morren. Vermillion Co., June 6, 1931.
- ¹*Crucigenia rectangularis* (Naeg) Gay. Vigo Co., July 18, 1929. Kosciusko Co., Sept. 15, 1929.
- Crucigenia tetrapedia* (Kirchner) W. and G. S. West. Vigo Co., Aug. 4, 1930.

¹ Species—not previously reported from State.

² Variety—not previously reported from State.

³ Genus—not previously reported from State.

⁴ Varieties or species—not previously reported from United States.

⁵ New Varieties.

- ¹*Crucigenia truncata* G. M. Smith. Vigo Co., Aug. 23, 1930.
- ³*Elaktothrix viridis* (Snow) Printz. Vigo Co., July 17, 1930.
- ³*Gloeoetaenium loitlesbergerianum* Hansgirg. Sullivan Co., July 24, 1930. Howard Co., Sept. 2, 1929. Vigo Co., July 17, 1930.
- ³*Kirchneriella humaris* (Kirchner) Möbius. Kosciusko Co., Sept. 14, 1929. Vigo Co., Aug. 15, 1930.
- ¹*Kirchneriella obesa* (W. West) Schmidle. Montgomery Co., May 13, 1930.
- ²*Kirchneriella obesa* var. *major* (Bunard) G. M. Smith. Sullivan Co., June 8, 1931.
- ²*Kirchneriella obesa* var. *aptera* (Teiling) Brunthaler. Vigo Co., Aug. 31, 1930.
- ³*Micractinium pusillum* Fresen. var. *elegans* G. M. Smith. Vigo Co., Aug. 23, 1930.
- ³*Oocystis borgei* Snow. Vigo Co., Aug. 15, 1930, July 9, 1929.
- ¹*Oocystis crassa* Wittr. Vigo Co., June 8, 1931.
- ¹*Oocystis elliptica* W. West. Parke Co., June 18, 1929.
- ¹*Oocystis natans* (Lemm.) Wille. Grant Co., Sept. 2, 1929.
- ²*Oocystis natans* var. *major* G. M. Smith. Vigo Co., June 10, 1931.
- ¹*Oocystis parva* W. & G. S. West. Vigo Co., July 26, 1930.
- ¹*Oocystis pusilla* Hansgirg. Sullivan Co., May 24, 1931.
- ¹*Oocystis solitaria* Wittr. Montgomery Co., Sept. 8, 1929.
- Scenedesmus abundans* (Kirchner) Chodat. Sullivan Co., June 8, 1931.
- ²*Scenedesmus acuminata* (Lag.) Chod. var. *elongatus* G. M. Smith. Vigo Co., Aug. 31, 1931.
- ²*Scenedesmus arcuatus* var. *capitatus* G. M. Smith. Vigo Co., May, 1930.
- ¹*Scenedesmus arcuatus* var. *platydisca* G. M. Smith. Vigo Co., Aug. 23, 1930, July 18, 1929. Parke Co., May 5, 1931.
- ¹*Scenedesmus bernardi* G. M. Smith. Parke Co., May 5, 1931.
- ²*Scenedesmus bijuga* (Turp.) Lagerh. var. *flexosus* Lemm. Vigo Co., Aug. 4, 1930. Many of these colonies had 32 cells instead of the usual 16 cells.
- ²*Scenedesmus bijuga* var. *irregularis* (Wille) G. M. Smith. Vigo Co., May, 1930.
- ¹*Scenedesmus bijuga* var. *alternans* (Reinsch) Borge. Kosciusko Co., Sept. 15, 1929.
- ²*Scenedesmus bijuga* var. *alternans* forma *irregularis* G. M. Smith. Vigo Co., May, 1930.
- ¹*Scenedesmus denticulatus* Lagerheim. Howard Co., Aug. 30, 1929.
- ²*Scenedesmus denticularis* var. *linearis* Hanag. Vigo Co., May, 1930.
- Scenedesmus dimorphus* (Turp.) Kuetz. Vigo Co., Aug. 23, 1930.
- ¹*Scenedesmus longus* Mayen. Howard Co., Aug. 30, 1930.
- ²*Scenedesmus longus* var. *brevispina* G. M. Smith. Vigo Co., June 3, 1930.

¹ Species—not previously reported from State.

² Variety—not previously reported from State.

³ Genus—not previously reported from State.

⁴ Varieties or species—not previously reported from United States.

⁵ New Varieties.

¹*Scenedesmus opoliensis* P. Richter. Parke Co., May 5, 1931. Vigo Co., Aug. 15, 1930.

Scenedesmus quadricauda (Turp.) de Breb. Vigo Co., June 30, 1929.

²*Scenedesmus quadricauda* var. *parvus* G. M. Smith. Vigo Co., no date.

²*Scenedesmus quadricauda* var. *quadrispina* (Chod.) G. M. Smith. Parke Co., May 5, 1931.

²*Scenedesmus quadricauda* var. *westii* G. M. Smith. Parke Co., May 5, 1931.

²*Scenedesmus quadricauda* var. *longispina* (Chod.) G. M. Smith. Vigo Co., Aug. 4, 1930.

³*Scenedesmus quadricauda* var. *africana* Fritsch and Rich. Vigo Co., Aug. 31, 1930.

³*Selenastrum westii* G. M. Smith. Vigo Co., Aug. 23, 1930.

³*Sorastrum americanum* (Bohlin) Schmidle var. *undulatum* G. M. Smith. Vigo Co., July 17, 1930.

Sorastrum spinulosum Nägeli. Montgomery Co., Sept. 8, 1929. Vigo Co., July 12, 1929. Sullivan Co., May 24, 1931. Kosciusko Co., Sept. 14, 1929.

¹*Tetraedron caudatum* (Corda) Hanag. Sullivan Co., June 8, 1931.

²*Tetraedron gracile* (Reinsch) Hanag. var. *excavatum* G. M. Smith. Vigo Co., June 30, 1930.

Tetraedron minimum (A. Braun) Hanag. Parke Co., June 18, 1929. Vermillion Co., June 6, 1931.

²*Tetraedron regulare* Kuetz. forma *major* Reinsch. Martin Co., Nov. 17, 1929.

²*Tetraedron trigonum* (Nägeli) Hanag. var. *gracile* (Reinsch) de Toni. Vigo Co., Aug. 23, 1930, Aug. 11, 1930.

¹*Tetraedron tumidulum* (Reinsch) Hanag. Vigo Co., July 17, 1930. Differs from the drawings of this species in that it has wart-like thickenings, (not spines) at the apices.

¹*Tetrastrum elegans* Playf. Vigo Co., Aug. 23, 1930.

¹*Tetrastrum heterocanthum* (Nordet) Chod. Vigo Co., Aug. 4, 1930.

¹*Tetrastrum staurogeniaeforme* (Schröd) Lemm. Vigo Co., Aug. 23, 1930.

¹*Treubaria triappendiculata* Bern. Vigo Co., Aug. 23, 1930, Aug. 11, 1930.

³*Geminella ordinata* (W. & G. S. West) Heering. Vigo Co., May 13, 1931.

³*Geminella interrupta* Turpin. Kosciusko Co., Sept. 15, 1929.

Olothrix aequalis Kuetz. Vigo Co., July 3, 1930.

Olothrix tenuissima Kuetz. Vigo Co., July 3, 1930.

⁴*Olothrix variabilis* Kuetz. Knox Co., April 23, 1930. Vigo Co., May 22, 1931, June 24, 1930.

Olothrix zonata Kuetz. Montgomery Co., June 6, 1930.

Schizomeris leibleinii Kuetz. Knox Co., June 23, 1929.

¹ Species—not previously reported from State.

² Variety—not previously reported from State.

³ Genus—not previously reported from State.

⁴ Varieties or species—not previously reported from United States.

⁵ New Varieties.

- Microspira stagnorum* (Kuetz.) Lagerh. Parke Co., February, 1928.
¹*Microspira tumidula* Hazen. Vigo Co., April 23, 1930.
³*Prasiola crispa* (Lightf.) Menegh. forma *muradis* (Kuetz) G. S. West. Vigo Co., July 3, 1930.
³*Cylindrocapsa geminella* Wolle. Clay Co., July 7, 1930.
Pleurococcus naegeli Chod. Common everywhere on north side of trees.
Chaetophora elegans (Roth) Ag. Vigo Co., April 23, 1930. Marion Co., June 4, 1930.
Chaetophora incrassata (Hudson) Hazen. Vigo Co., April 24, 1930.
Chaetophora pisiformis (Roth) Ag. Sullivan Co., June 8, 1931. Vigo Co., June 18, 1929.
Draparnaldia glomerata (Vauch.) Ag. Vermillion Co., June 6, 1931.
Draparnaldia plumosa (Vauch.) Agardh. Vigo Co., Spring, 1929.
¹*Draparnaldia ravenelii* Wolle. Vigo Co., April 24, 1930.
¹*Microthamnion kutzinghamum* Naeg. Vigo Co., May 9, 1931.
¹*Microthamnion strictissimum* Rabenh. Vigo Co., May 9, 1931.
¹*Stigeoclonium lubricum* (Dillw.) Kuetz. Kosciusko Co., September 15, 1929.
Stigeoclonium tenue (Ag.) Kuetz. Vigo Co., June 20, 1929.
²*Stigeoclonium tenue* var. *bulbiferum* Wolle. Vigo Co., April 24, 1930.
¹*Aphanochaete repens* A. Br. Clay Co., May 23, 1931.
³*Coleochaete scutata* Breb. Vigo Co., spring of 1929.
¹*Coleochaete soluta* (Breb.) Pringh. Vigo Co., spring of 1929.
³*Basilcladia chelonum* (Collins.) Hoffman and Tilden. Vigo Co., June, 1929.
Cladophora crispata (Roth) Kuetz. Parke Co., spring, 1930.
Cladophora glomerata (L) Kuetz. Vigo Co., spring, 1930.
²*Cladophora glomerata* var. *clavata*. Wolle. Vigo Co., June, 1931.
¹*Cladophora sauteri* (Nees) Kuetz. Kosciusko Co., June 12, 1931. Sometimes listed as *Aegagropila sauteri* (Nees) Kuetz.
¹*Pithophora varia* Wille. Noble Co., September 15, 1929. Vigo Co., May, 1931. Clay Co., June 12, 1930. Tippecanoe Co., September 23, 1929. Monroe Co., June 27, 1929. Montgomery Co., September 7, 1929.
¹*Pithophora oedogonia* Wittr. var. *polyspora* Rendle and West. This species developed in the laboratory culture and seemed to differ from *P. varia* in that many of the *aplanospores* were *globose*.
¹*Rhizoclonium hieroglyphicum* Kuetz. Vigo Co., spring, 1929.
³*Dichotomosiphon tuberosus* (A. Br.) Ernst. Lagrange Co., Sept. 15, 1929.
Vaucheria geminata (Vauch.) de Candolle. Vigo Co., June 10, 1931. Montgomery Co., April 23, 1930. Marion Co., April 22, 1930. Greene Co., May 2, 1931.
Vaucheria geminata forma *racemosa* (Vauch.) Walz. Vigo Co., April 4, 1931.

¹ Species—not previously reported from State.

² Variety—not previously reported from State.

³ Genus—not previously reported from State.

⁴ Varieties or species—not previously reported from United States.

⁵ New Varieties.

¹*Vaucheria hamata* (Vauch.) de Candolle. Vigo Co., April 11, 1931.

¹*Vaucheria longipes* Collins. Vigo Co., Oct. 30, 1929.

⁵*Vaucheria orthocarpa* (Reinsch) var. *major* var. nov. Vigo Co., 1929. Much larger than the species, otherwise in agreement with figure and description. Oogonia 97-98u x 147-175u; oospore 85-96u x 107-125. Very few oospores were as short as 107u.

¹*Vaucheria pachyderma* Walz. Marion Co., April 22, 1930. Warren Co., May 17, 1931. Henry Co., April 22, 1930.

¹*Vaucheria polysperma* Hassell. Vigo Co., April 24, 1930.

¹*Vaucheria repens* Hassell. Vermillion Co., June 6, 1931.

Vaucheria sessilis (Vauch.) de Candolle. Vigo Co., May 17, 1931. Vermillion Co., June 1, 1931. Marion Co., April 28, 1931. Sullivan Co., May 2, 1931.

²*Vaucheria sessilis* forma *genuina* Hansgirg. Vigo Co., May 13, 1931.

Vaucheria terrestris de Candolle. Montgomery Co., August 26, 1929. Putnam Co., May 23, 1931. Sullivan Co., June 8, 1931. Vigo Co., spring, 1929.

⁴*Vaucheria uncinata* Kuetz. Vigo Co., May 14, 1931. Previously reported from Norway and Europe.

¹*Bulbochaete basispora* Wittr. and Lund. Vigo Co., April 23, 1930. Previously reported from Ohio and Sweden.

¹*Bulbochaete crenulata* Pringh. Vigo Co., Aug. 12, 1929.

Bulbochaete intermedia De Bary. Montgomery Co., April 23, 1930. Knox Co., May 26, 1926.

²*Bulbochaete intermedia* var. *depressa* Wittr. Montgomery Co., April 23, 1930.

¹*Bulbochaete rectangularis* Wittr. Vigo Co., May 13, 1931. Greene Co., May 12, 1931. Knox Co., May 26, 1926.

¹*Bulbochaete repanda* Wittr. Greene Co., May 10, 1931.

¹*Bulbochaete varians* Wittr. Montgomery Co., Sept. 8, 1929. Greene Co., May 12, 1931.

⁴*Oedogonium armigerum* Hirn. Montgomery Co., June 6, 1930. Previously reported from Brazil.

⁴*Oedogonium biforme* Nordst. Knox Co., May 17, 1931.

¹*Oedogonium borisianum* (Le Clerc) Witter. Montgomery Co., June 6, 1930. Vigo Co., July 12, 1929. Clay Co., July 7, 1930.

²*Oedogonium borisianum* var. *westii* Tiffany and Brown. Vigo Co., May 9, 1931.

⁵*Oedogonium borisianum* var. *minus* L. H. Tiffany and B. H. Smith var. nov. Vigo Co., June 26, 1929. Oogonium 33-55u x 33-55u. Oospore 30-33u x 37-42u. Pore—superior. Suffultory cell—30u x 52u. Vegetative cells—14-15u x 37-48u. Dwarf males present.

¹*Oedogonium boscii* (Le Clerc) Wittr. var. *occidentale* Hirn. Greene Co., May 2, 1931.

¹*Oedogonium capilliforme* Kuetz. Wittr. Vermillion Co., June 1, 1931. Montgomery Co., June 6, 1930.

¹ Species—not previously reported from State.

² Variety—not previously reported from State.

³ Genus—not previously reported from State.

⁴ Varieties or species—not previously reported from United States.

⁵ New Varieties.

- ²*Oedogonium capilliforme* var. *diversum* (Hirn) Tiffany. Clay Co., May 22, 1931.
- ¹*Oedogonium capilliforme* var. *australe* Wittr. Montgomery Co., Aug. 26, 1929. Vigo Co., May 14, 1931.
- ¹*Oedogonium ciliatum* (Hass.) Pringsheim. Knox Co., May 26, 1926.
- ¹*Oedogonium capillare* (Linnaeus) Kuetz. Parke Co., June 17, 1929. Vigo Co., June 18, 1929.
- ²*Oedogonium capillare* forma *stagnale* (Kuetz: Wittr.) Hirn. Parke Co., June 17, 1929.
- ¹*Oedogonium cardiacum* (Hess.) Wittr. Montgomery Co., June 6, 1930.
- ²*Oedogonium cardiacum* var. *carbonicum* Wittr. Vigo Co., May 14, 1931.
- ²*Oedogonium cardiacum* (Hass.) Wittr. var. *minus* Lemm. Putnam Co., May 23, 1931. Vigo Co., June 10, 1931.
- ¹*Oedogonium concatenatum* (Hass.) Wittr. Vigo Co., April 23, 1930.
- ²*Oedogonium crassiusculum* Wittr. var. *idioandrosporum* Nordst. and Wittr. Sullivan Co., June 28, 1929. Vigo Co., June 19, 1929. Knox Co., May 26, 1926.
- ²*Oedogonium crassiusculum* var. *cataractum* (Wolle) Tiffany. Vigo Co., May 28, 1931.
- ¹*Oedogonium crassiusculum* var. *arecharvaletae* (Wittr.) Hirn. Sullivan Co., May 2, 1931. Clay Co., May 31, 1931.
- ¹*Oedogonium crenulatocostatum* Wittr. Vigo Co., July 12, 1929.
- ²*Oedogonium crenulatum* Wittr. var. *gracillus* Nordst. and Hirn. Sullivan Co., June 28, 1929.
- ¹*Oedogonium crispum* (Hass.) Wittr. Knox Co., May 26, 1926.
- ¹*Oedogonium curvum* Pringh. Knox Co., May 26, 1926.
- ¹*Oedogonium cyathigerum* Wittr. Vigo Co., June, 1926.
- ²*Oedogonium cyathigerum* forma *perfectum* Hirn. Vigo Co., 1928.
- ²*Oedogonium cryptoporum* Wittr. var. *vulgare* Wittr. Montgomery Co., Sept. 8, 1929. Vigo Co., spring, 1929.
- ²*Oedogonium decipiens* Wittr. forma *dissimile* Hirn. Knox Co., May 26, 1926.
- ¹*Oedogonium exocostatum* Tiffany. Vigo Co., July 12, 1927.
- ¹*Oedogonium fragile* Wittr. Knox Co., May 26, 1926.
- ¹*Oedogonium globosum* Nordst. Montgomery Co., May 13, 1930.
- Oedogonium grande* Kuetz. Wittr. Vigo Co., June 18, 1929.
- ²*Oedogonium grande* var. *aequatoriale* Wittr. Knox Co., May 26, 1926.
- ²*Oedogonium grande* var. *majus* Hansgirg. Vigo Co., June 26, 1929. Much larger than recorded variety measurements. Oogonium 59-63u x 81-96u. Oospore 52-59u x 74-88u. Veg. cell 33-37u x 122-130u. Pore—superior. Male filament—33-37u wide.
- ¹*Oedogonium gracilimum* Wittr. and Lund. Knox Co., May 26, 1926. Vigo Co., June 26, 1929. Montgomery Co., April 23, 1930.

¹ Species—not previously reported from State.

² Variety—not previously reported from State.

³ Genus—not previously reported from State.

⁴ Varieties or species—not previously reported from United States.

⁵ New Varieties.

- ¹*Oedogonium inconspicuum* Hirn. Montgomery Co., June 6, 1930.
- ¹*Oedogonium intermedium* Wittr. Vigo Co., June 18, 1929; April 23, 1929.
- ¹*Oedogonium iowense* Tiffany. Knox Co., May 26, 1926.
- Oedogonium irregulare* Wittr. Vigo Co., May 17, 1931.
- Oedogonium landsboroughi* (Hass.) Wittr. Monroe Co., June 29, 1929.
- ²*Oedogonium landsboroughi* var. *norvegicum* Wittr. Vigo Co., June 26, 1929.
- ¹*Oedogonium latiusculum* Tiffany. Vigo Co., summer, 1929.
- ¹*Oedogonium mexicanum* Wittr. Vigo Co., July 4, 1929.
- ¹*Oedogonium monile* Berkley and Harvey. Putnam Co., May 23, 1931.
- ¹*Oedogonium moniliforme* Wittr. Vigo Co., July 12, 1929.
- ¹*Oedogonium multisporum* Wood. Vigo Co., May 13, 1931. Davis Co., May 23, 1931.
- ¹*Oedogonium oblongum* Wittr. Knox Co., May 26, 1926. Vigo Co., June 26, 1929.
- ¹*Oedogonium paludosum* (Hass.) Wittr. Knox Co., May 26, 1926.
- ²*Oedogonium paludosum* var. *parvisporum* Hirn. Knox Co., May 26, 1926. Clay Co., May 23, 1931.
- ¹*Oedogonium paucocostatum* Transeau. Vigo Co., Aug. 13, 1930.
- ¹*Oedogonium paulense* Nordst. and Hirn. Greene Co., May 2, 1931. Clay Co., May 23, 1931. Measurements differ enough from the species that a new variety might well be made. Vegetative cells 14-20u x 85u; oogonium 37-44u x 55-78u; oospore 34-41u x 41-54u. Antheridia present. No antheridia were found in the Greene County collections, the determination being based on the oogonia, oospores and vegetative cells which were quite characteristic for the species. Reported previously from Brazil and Australia.
- ¹*Oedogonium pisanum* Wittr. Parke Co., May 5, 1931.
- ²*Oedogonium pisanum* var. *gracilis* Transeau and Tiffany. Knox Co., May 17, 1931.
- ¹*Oedogonium plagiostomum* Wittr. Sullivan Co., June 21, 1929. Clay Co., May 31, 1931.
- ²*Oedogonium plagiostomum* var. *gracilius* Wittr. Vigo Co., June 28, 1929. Knox Co., June 23, 1930.
- ¹*Oedogonium plusiosporum* Wittr. Sullivan Co., June 21, 1929.
- ¹*Oedogonium porrectum* Nordst. and Hirn. Knox Co., May 26, 1926.
- ¹*Oedogonium pratense* Transeau. Knox Co., May 26, 1926. Vigo Co., June 26, 1929.
- ¹*Oedogonium princeps* (Hass.) Wittr. Vigo Co., May 17, 1931.
- Oedogonium pringsheimii* Cramer; Wittr. Knox Co., June 23, 1929.
- ²*Oedogonium pringsheimii* var. *nordstedtii*. Knox Co., June 23, 1929.
- ²*Oedogonium pringsheimii* (Cramer; Wittr.) var. *abbreviatum* Hirn. Vigo Co., April 23, 1930.

¹ Species—not previously reported from State.

² Variety—not previously reported from State.

³ Genus—not previously reported from State.

⁴ Varieties or species—not previously reported from United States.

⁵ New Varieties.

- ¹*Oedogonium pseudacrosporium* Wittr. Vigo Co., June 26, 1929.
- ¹*Oedogonium richterianum* Lemm. Knox Co., May 26, 1926.
- ¹*Oedogonium rivulare* (Le Clerc) A. Braun. Vigo Co., June 25, 1930.
- ¹*Oedogonium richterianum* Lemm. Knox Co., May 26, 1926.
- ²*Oedogonium rufescens* var. *exiguum* (Elfving) Tiffany. Montgomery Co., Aug. 4, 1929.
- ²*Oedogonium rufescens* var. *lundellii* (Wittr.) Tiffany. Sullivan Co., May 26, 1931.
- ²*Oedogonium rugulosum* (Nordst.) forma *minutum* (Hanag.) Hirn. Montgomery Co., June 6, 1930.
- ¹*Oedogonium suecicum* Wittr. Knox Co., May 2, 1931. Vigo Co., spring, 1929.
- ³*Oedogonium suecicum* var. *australe* (G. S. West) B. H. Smith nov. comb. Knox Co., May 2, 1931. There is enough difference between the species and the form *australe* G. S. West as exhibited by this material to raise the varietal rank. Oogonium 37-41u x 47u. Oospore 37u x 34-37u without spines. Oospore 30-34u x 34-37u without spines. Vegetative cells 17-20u x 53-58u.
- ¹*Oedogonium sexangulare* Cleve. Montgomery Co., June 6, 1930. Vigo Co., June 26, 1929. Specimens smaller than the type species. Oogonium 33u x 30-32u. Oospore 26u x 26-28u. Pore—median. Vegetative cells 15u x 37-63u. Dwarf males present.
- ¹*Oedogonium varians* Wittr. and Lund. Knox Co., June 23, 1929. Dioscious form.
- ¹*Oedogonium vaucherii* (Le Clerc) A. Br. Wittr. Vigo Co., July 3, 1929.
- ¹*Oedogonium verrucosum* Hallas. Montgomery Co., Sept. 8, 1929.
- Oedogonium wabashense* Tiffany. Knox Co., 1927.
- ¹*Oedogonium wyliei* Tiffany. Montgomery Co., Aug. 27, 1929.
- ³*Debarya decussata* Transeau. Vigo Co., April 26, 1929.
- Mougeotia genuflexa* (Dillwyn) Agardh. Vigo Co., April 23, 1930.
- ¹*Mougeotia lactevirens* (Braun) Wittr. Montgomery Co., Sept. 8, 1929.
- ¹*Mougeotia pulchella* Wittr. Vigo Co., April 23, 1929.
- ¹*Mougeotia robusta* (De Bary) Wittr. Vermillion Co., June 1, 1931. Sullivan Co., April 26, 1930. Vigo Co., April 23, 1930; June 10, 1930.
- ²*Mougeotia robusta* var. *biornata* Wittr. Sullivan Co., April 25, 1930. Vigo Co., April 23, 1930.
- Mougeotia scalaris* Hassall. Vigo Co., June 10, 1931.
- ¹*Mougeotia sphaerocarpa* Wolle. Vermillion Co., June 1, 1931. Aplanospores abundant but no zygospores.
- ¹*Spirogyra affinis* (Hass.) Petit. Vigo Co., May 14, 1931.
- ¹*Spirogyra borgeana* Transeau. Montgomery Co., April 23, 1930. Putnam Co., May 23, 1931.
- ¹*Spirogyra bucheti* Petit. Sullivan Co., July 11, 1930. Previously reported from Morocco.

¹ Species—not previously reported from State.

² Variety—not previously reported from State.

³ Genus—not previously reported from State.

⁴ Varieties or species—not previously reported from United States.

⁵ New Varieties.

¹*Spirogyra catenaeformis* (Hass.) Kuetz. Vigo Co., April 24, 1931. Decatur Co., April 22, 1930. Sullivan Co., July 11, 1930. Aplanospores present.

²*Spirogyra catenaeformis* var. *parvula* Transeau. Vigo Co., April 23, 1930; April 24, 1931.

Spirogyra communis (Hass.) Kuetz. Vigo Co., April 24, 1931; April 23, 1930.

Spirogyra condensata (Vauch) Kuetz. Putnam Co., May 23, 1931. Vigo Co., April 11, 1931. Sterile cells inflated, a not previously reported characteristic of American specimens, although apparently common for European specimens.

Spirogyra crassa Kuetz. Knox Co., May 26, 1926.

Spirogyra decimina (Mueller) Kuetz. Vigo Co., April 24, 1931.

³*Spirogyra decimina* (Mueller) Kuetz var. *plena* W. and G. S. West. Sullivan Co., May 24, 1931. Vigo Co., April 24, 1930.

Spirogyra ellipsospora Transeau. Knox Co., May 27, 1931. Warren Co., May 17, 1931.

⁴*Spirogyra farlowii* Transeau. Vigo Co., April 23, 1930; April 24, 1931. Greene Co., May 2, 1931.

⁵*Spirogyra grevilleana* (Hass.) Kuetz. Vigo Co., April 24, 1931; April 18, 1931.

Spirogyra inconstans Collins. 1912. *S. fallax* (Hansgirg) Wille 1900. Not. *S. insignis* var. *fallax*. Hansgirg Hedwigia 27, 1860; *S. wille* Skuja 1928. Sullivan Co., May 2, 1931.

Spirogyra inflata (Vauch.) Rab. Includes *S. frigida* Gay. Knox Co., May 26, 1926. Greene Co., May 4, 1931. Vigo Co., April 23, 1930; April 24, 1931. Material collected from Hulman Pond was reproducing by aplanospores.

¹*Spirogyra juergensii* Kuetz. Benton Co., May 17, 1931. Greene Co., May 10, 1931. Vigo Co., April 23, 1930. Sullivan Co., April 25, 1930.

¹*Spirogyra laxa* Kuetz. Clay Co., May 9, 1931.

Spirogyra longata (Vauch) Kuetz. Warren Co., May 17, 1931. Vigo Co., April 24, 1931; April 24, 1930. Knox Co., April 25, 1931.

Spirogyra majuscula Kuetz. Vigo Co., April 23, 1930; May 17, 1931; April 23, 1930. Sullivan Co., May 2, 1931. Clay Co., April 13, 1929. Putnam Co., May 23, 1931. That found on April 23, 1930—conjugation was both lateral and sclariform. Lateral conjugation rare. A very abundant and variable form.

¹*Spirogyra maxima* (Hass.) Wittr. Vigo Co., no date given.

⁴*Spirogyra nawaschini* Kasanowsky. Montgomery Co., April 23, 1930. Conjugation was both lateral and sclariform. Immature aplanospores were also present. Previously reported from Europe.

Spirogyra neglecta Hass. Sullivan Co., June 7, 1931; July 11, 1930.

Spirogyra nitida (Dillw.) Link. Montgomery Co., July 14, 1929.

¹ Species—not previously reported from State.

² Variety—not previously reported from State.

³ Genus—not previously reported from State.

⁴ Varieties or species—not previously reported from United States.

⁵ New Varieties.

Spirogyra porticalis (Mueller) Cleve. Vigo Co., May 14, 1931. Fertile cells short, spores greatly crowded, ovoid to globose ovoid. Vigo Co., April 24, 1931. Knox Co., April 25, 1930.

¹*Spirogyra protecta* Wood. Clay Co., May 23, 1931. Sullivan Co., May 23, 1931. Vigo Co., April 24, 1930.

¹*Spirogyra reflexa* Transeau. Vigo Co., June 30, 1929.

¹*Spirogyra reticulata* Nordst. Vigo Co., April 23, 1930.

¹*Spirogyra setiformis* (Roth) Kuetz. Montgomery Co., July 14, 1929.

¹*Spirogyra singularis* Nordst. Vigo Co., April 23, 1930.

¹*Spirogyra spreeciana* Rabenh. Vigo Co., April 23, 1930; April 24, 1930. Aplanospores lateral conjugation common in Hulman pond collection.

¹*Spirogyra stictica* (E gl. Bot.) Wille. Vigo Co., June 8, 1929; June 26, 1929.

¹*Spirogyra subreticulata* Fritsch. Sullivan Co., June 21, 1929. Montgomery Co., July 14, 1929.

¹*Spirogyra schmidtii* W. & G. S. West. Clay Co., July 7, 1930. Zygosporangium 48-51u x 78-102u. Vegetative cell 31-34u x 221-357u. End wall—plain. Chromatophores 3, sometimes 4. Spores about 2 times as long as broad, usual type is 3 times as long as broad. Reticulate walls pronounced. Previously reported from Koh Chang, Siam.

¹*Spirogyra tenuissima* (Hass.) Kuetz. Vigo Co., April 24, 1931. Montgomery Co., April 15, 1931.

¹*Spirogyra tolosana* Comere. Clay Co., May 9, 1931. Vigo Co., May 24, 1931. Occasional cells have but one chromatophore. Measurements agree perfectly for the species. The fertile cells are longer, however, than the type. Comere describes the spores as filling the fertile cells. In this material the spores fill two-thirds of the fertile cell usually, sometimes only one-third or one-fourth of the cell. Previously reported from France.

Spirogyra varians (Hass.) Kuetz. Knox Co., April 25, 1930. Henry Co., April 22, 1930. Warren Co., May 17, 1931. Clinton Co., May 23, 1931. Vigo Co., April 23, 1930. A very common species. In this collection splanospores were forming. There was one instance of a perfectly mature zygosporangium formed in the male filament. Conjugation tube was still connected with the female filament.

²*Spirogyra varians* var. *minor* Teodoresco. Sullivan Co., June 28, 1929; May 23, 1930. Greene Co., May 2, 1931. Vigo Co., May 14, 1931; May 13, 1931. Henry Co., April 22, 1930.

⁴*Spirogyra velata* Nordstedt. Vigo Co., April 23, 1930.

²*Spirogyra velata* var. *occidentalis* Transeau. Knox Co., April 25, 1930; May 26, 1926. Benton Co., May 17, 1931. Montgomery Co., April 23, 1930.

Spirogyra weberi Kuetz. Benton Co., May 17, 1931. Warren Co., May 17, 1931. Clay Co., May 31, 1931. Vigo Co., May 13, 1931.

¹ Species—not previously reported from State.

² Variety—not previously reported from State.

³ Genus—not previously reported from State.

⁴ Varieties or species—not previously reported from United States.

⁵ New Varieties.

¹*Zygnema collinsianum* Transeau. Knox Co., May 26, 1926.

Zygnema cruciatum (Vaucher) Agardh. Sullivan Co., May 2, 1931. Greene Co., May 4, 1931. Vigo Co., June 26, 1929.

Zygnema insigne (Hassall) Kuetz. Vigo Co., April 23, 1930, June 10, 1931.

¹*Zygnema cylindricum* Transeau. Knox Co., May 2, 1931. Greene Co., May 4, 1931. Aplanospores abundant in Knox Co. collection, but very few in Green Co. collection.

¹*Zygnema laetevirens* Klebs. Greene Co., May 10, 1931. Parthenospores common.

²*Zygnema pectinatum* (Vauch.) Agardh. var. *crassum* Transeau. Vigo Co., May 30, 1930.

¹*Zygnema peliosporum* Wittr. Collected by Dr. Donaghy in Vigo Co., no date given.

¹*Zygnema stellinum* (Vaucher) Agardh. Vigo Co., April 23, 1930. Clay Co., May 23, 1931.

¹*Zygnema vaucherii* Agardh. Vigo Co., April 23, 1926.

²*Gonatozygon monotaenium* De Bary. Montgomery Co., July 14, 1929.

³*Netrium digitus* (Ehrenb.) Itzigsh and Rothe. Sullivan Co., June 21, 1929. Monroe Co., summer, 1929. Vigo Co., May, 1930.

Arthrodesmus convergens Ehrenb. Montgomery Co., Sept. 8, 1929.

¹*Closterium abruptum* West. Vigo Co., summer, 1930.

²*Closterium acerosum* (Schrank) Ehrenb. var. *elongatum* Breb. Clay Co., May 23, 1931.

¹*Closterium archerianum* Cleve. Vigo Co., May, 1930.

¹*Closterium cynthia* De Not. Knox Co., May 23, 1931.

¹*Closterium decorum* Breb. Montgomery Co., Aug. 28, 1929. Figure shows formation of zygospore.

Closterium diana Ehrenb. Montgomery Co., Sept. 20, 1929.

⁴*Closterium diana* var. *arcuatum* (Breb.) Rabenh. Kosciusko Co., Sept. 15, 1929.

¹*Closterium didymotocum* Corda. Montgomery Co., Sept. 8, 1929. Clay Co., May 23, 1931.

Closterium ehrenbergii Menegh. Vigo Co., Aug. 14, 1930. Sullivan Co., June 21, 1929. Kosciusko Co., Sept. 14, 1929.

¹*Closterium gracile* Breb. Vigo Co., Aug. 20, 1930.

¹*Closterium keutzingii* De Brebisson. Vigo Co., July 18, 1929. Montgomery Co., June 6, 1930.

¹*Closterium leibleinii* Kuetz. Sullivan Co., June 8, 1931. Noble Co., Sept. 15, 1929.

Closterium lineatum Ehrenb. Tippecanoe Co., Sept. 23, 1929.

⁵*Closterium lineatum* Ehrenb. var. *maximum* var. nov. Montgomery Co., Sept. 20, 1929.

¹*Closterium macilentum* Breb. Sullivan Co., April 25, 1930.

¹ Species—not previously reported from State.

² Variety—not previously reported from State.

³ Genus—not previously reported from State.

⁴ Varieties or species—not previously reported from United States.

⁵ New Varieties.

Closterium moniliferum (Bory) Ehrenb. Sullivan Co., June 8, 1931. Vermillion Co., June 6, 1931. Vigo Co., June 10, 1931. Wabash Co., Aug. 31, 1929.

¹*Closterium pritchardianum* Arch. Vigo Co., April 23, 1930, July 9, 1930. Showing abundant zygospore formation. Plates show variations in conjugation. In second collection the material was proportionately larger, being 34-58u wide x 323-680u long. Apex 7-8u wide. Previously reported from United States in Connecticut.

Closterium setaceum Ehrenb. Vigo Co., July 12, 1929.

¹*Closterium subulatum* (Kuetz) Breb. Vigo Co., May 20, 1929.

Closterium venus Kuetz. Noble Co., Sept. 15, 1929.

²*Cosmarium abbreviatum* Racib. var. *planctonicum* W. & G. S. West. Putnam Co., May 23, 1931.

²*Cosmarium abscissum* var. *subetchachanense*. Montgomery Co., Sept. 8, 1929.

¹*Cosmarium binum* Nordst. Vigo Co., July 9, 1930.

¹*Cosmarium bioculatum* Breb. Kosciusko Co., Sept. 14, 1929.

Cosmarium botrytis (Bory) Menegh. Vigo Co., Aug. 13, 1930. Parke Co., June 18, 1929.

²*Cosmarium botrytis* var. *subtumidum* Wittr. Sullivan Co., May 24, 1931.

²*Cosmarium biretum* Breb. var. *trigibbernum* Nordst. Vermillion Co., June 6, 1931.

¹*Cosmarium bireme* Nordst. Vigo Co., July 26, 1930.

¹*Cosmarium blytii* Wille. Sullivan Co., June 7, 1931. Clay Co., July 24, 1930, June 21, 1930.

¹*Cosmarium circulare* Reinsch. Elkhart Co., Sept. 15, 1929.

¹*Cosmarium calcareum* Wittr. Montgomery Co., Sept. 8, 1929.

Cosmarium dentatum Wolle. Sullivan Co., July 24, 1930. Vigo Co., June 3, 1930.

¹*Cosmarium eloisianum* Wolle. Vigo Co., June 20, 1929.

¹*Cosmarium formosulum* Hoff. Vermillion Co., June 6, 1931.

Cosmarium granatum Breb. Vermillion Co., June 1, 1931. Vigo Co., May, 1930.

Cosmarium granatum var. *subgranatum* Nordst. Sullivan Co., June 7, 1931.

²*Cosmarium granatum* var. *ocellatum* W. West and G. S. West. Sullivan Co., July 24, 1930. 41-48u wide x 75-82u long. A much larger form than West describes.

¹*Cosmarium impressulum* Elfv. Sullivan Co., May 24, 1931. Monroe Co., June 28, 1929. July 20, 1929.

Cosmarium laeve Rabenh. Vigo Co., June 3, 1930.

⁴*Cosmarium lundellii* Delp. var. *ellipticum* West. Parke Co., June 19, 1929. Grant Co., Sept. 2, 1929. Previously reported from Wales and Scotland.

¹ Species—not previously reported from State.

² Variety—not previously reported from State.

³ Genus—not previously reported from State.

⁴ Varieties or species—not previously reported from United States.

⁵ New Varieties.

²*Cosmarium lundellii* var. *corruptum* (Turn.) West and G. S. West. Putnam Co., May 23, 1931.

Cosmarium meneghinii Breb. Vigo Co., May, 1930.

¹*Cosmarium obtusatum* Schmidle. Montgomery Co., Sept. 8, 1929. Vermillion Co., June 6, 1931. Clay Co., June 21, 1930.

²*Cosmarium obtusatum* var. *beanlandii* W. and G. S. West. Parke Co., July 5, 1930. Clay Co., June 21, 1930.

Cosmarium ovale Ralfs. Montgomery Co., Sept. 8, 1929. This species was very abundant in this pond from early spring until late fall. Zygospores which according to West are "unknown" were very common throughout the summer.

¹*Cosmarium ochthodes* Nordst. Montgomery Co., Sept. 8, 1929.

¹*Cosmarium pachydermum* Lund. Noble Co., Sept. 15, 1929.

¹*Cosmarium pokornyanum* (Green) W. & G. S. West. Noble Co., Sept. 15, 1929.

¹*Cosmarium portianum* Archer. Sullivan Co., June 6, 1929, May 24, 1931. Parke Co., June 19, 1929. Montgomery Co., Sept. 8, 1929. Vigo Co., June 3, 1930.

²*Cosmarium portianum* var. *major* nov. var. Vigo Co., May, 1930. Greene Co., May 2, 1931. Identical with the species except much larger 38u x 51u, isthmus 17u.

²*Cosmarium portianum* var. *nephroidum* Wittr. Vigo Co., Aug. 13, 1930.

¹*Cosmarium protractum* (Naeg.) De Bary. Montgomery Co., July 14, 1929; Sept. 14, 1929.

¹*Cosmarium pseudoprotuberans* Kirchn. Vigo Co., June 30, 1930.

¹*Cosmarium pseudoconnatum* Nordst. Vigo Co., June 6, 1930.

¹*Cosmarium pseudatlanthoideum* West. Montgomery Co., Sept. 8, 1929.

¹*Cosmarium pseudopyramidatum* Lund. Vermillion Co., June 6, 1931. Parke Co., July 4, 1930.

¹*Cosmarium punctulatum* Breb. Montgomery Co., July 3, 1929.

²*Cosmarium punctulatum* var. *subpunctulatum* (Nordst.) Borg. Parke Co., June 18, 1929.

¹*Cosmarium quadratum* Ralfs. Montgomery Co., Sept. 8, 1929.

¹*Cosmarium quadratum* (Gay) De Toni. Grant Co., Sept. 2, 1929.

Cosmarium quasillus Lund. Vigo Co., July 7, 1929.

¹*Cosmarium rectangulare* Grum. Grant Co., Sept. 2, 1929.

²*Cosmarium rectangulare* Grum var. *hexagonum* (Elfr.) West & G. S. West. Sullivan Co., June 7, 1930. Kosciusko Co., Sept. 14, 1929.

¹*Cosmarium reniforme* (Ralfs) Archer. Montgomery Co., Sept. 8, 1929. Vermillion Co., June 6, 1931. Parke Co., June 18, 1931. Grant Co., Sept. 2, 1929.

²*Cosmarium reniforme* var. *elevatum* West and G. S. West. Clay Co., May 23, 1931. Noble Co., Sept. 15, 1929.

¹ Species—not previously reported from State.

² Variety—not previously reported from State.

³ Genus—not previously reported from State.

⁴ Varieties or species—not previously reported from United States.

⁵ New Varieties.

- ²*Cosmarium reniforme* var. *compressum* Nordst. Putnam Co., May 23, 1931.
- ²*Cosmarium sexangulare* Lund. forma *minima* Nordst. Vermillion Co., June 6, 1931. Vigo Co., Aug. 13, 1930.
- ¹*Cosmarium speciosum* Lund. Clay Co., May 23, 1931.
- ²*Cosmarium speciosum* Lund. var. *simplex* Nordst. Clay Co., May 23, 1931.
- ²*Cosmarium speciosum* var. *rostafinskii* (Gutw.) W. and G. S. West. Parke Co., July 20, 1929.
- ¹*Cosmarium subcostatum* Nordst. Parke Co., July 20, 1929.
- ²*Cosmarium subcostatum* var. *minor* West and G. S. West. Vigo Co., May, 1930; June 3, 1930.
- Cosmarium suberenatum* Hantz. Grant Co., Sept. 2, 1929. Vigo Co., July 4, 1929.
- ¹*Cosmarium supraspeciosum* Wolle. Montgomery Co., Sept. 8, 1929.
- ¹*Cosmarium subspeciosum* Nordst. var. *validus* Nordst. Vigo Co., July 30, 1929.
- ¹*Cosmarium subcucumis* Schmidle. Putnam Co., May 23, 1931.
- ¹*Cosmarium subretusiforme* W. and G. S. West. Vigo Co., July 18, 1930.
- ¹*Cosmarium letraophthalmum* Breb. Montgomery Co., Aug. 4, 1929.
- ¹*Cosmarium triplicatum* Wolle. Montgomery Co., Sept. 8, 1929.
- ²*Cosmarium turpinii* Breb. var. *eximum* G. S. West. Knox Co., May 23, 1931. Clay Co., May 23, 1931.
- ²*Cosmarium turpinii* Breb. var. *podolicum* Gutw. Sullivan Co., June 8, 1931. Vigo Co., May, 1930; June 26, 1929.
- ²*Cosmarium undulatum* Corda var. *crenulatum* (Naeg) Wittr. Clay Co., June 21, 1930. Length 14-19u x 13-15u width. Much smaller than West's measurements. Cell wall sparsely punctate.
- ²*Cosmarium ungerianum* (Naeg) Be Bary var. *bohemicum* Lutkem. Desm. Bohn. Sullivan Co., May 23, 1931.
- ¹*Cosmarium vexatum* West. Vigo Co., June 10, 1931; July 3, 1929.
- Desmidiium swartzii* Agardh. Montgomery Co., Sept. 8, 1929. Sullivan Co., Aug. 24, 1930. Vigo Co., July 12, 1929. Elkhart Co., Sept. 15, 1929.
- ²*Euastrum ansatum* Ralfs. var. *attenuatum* Schmidle. Sullivan Co., Aug. 24, 1930. Schmidle describes this variety as 52u x 120u. The specimens here observed were 54u x 126-130u, otherwise identical with the variety.
- ¹*Euastrum bidentatum* Naeg. Parke Co., June 19, 1929. Vigo Co., July 17, 1930.
- ¹*Euastrum denticulatum* (Kirchn) Gay. Sullivan Co., July 24, 1930.
- ¹*Euastrum dubium* Naeg. Hulman Pond, Vigo Co., July 26, 1930.
- ¹*Euastrum insulare* (Wittr.) Roy. Kosciusko Co., Sept. 14, 1929.
- ¹*Euastrum oblongum* (Grev.) Ralfs. Putnam Co., May 23, 1931.

¹ Species—not previously reported from State.

² Variety—not previously reported from State.

³ Genus—not previously reported from State.

⁴ Varieties or species—not previously reported from United States.

⁵ New Varieties.

- ¹*Euastrum pulchellum* Breb. Sullivan Co., July 24, 1930.
Euastrum verrucosum Ehrenb. Vigo Co., July 12, 1929.
- ²*Euastrum verrucosum* var. *alatum* Wolle. Vigo Co., July 12, 1929. Kosciusko Co., Sept. 14, 1929. Montgomery Co., Sept. 8, 1929. Knox Co., May 2, 1931. Sullivan Co., July 24, 1930.
- Hyalotheca dissiliens* (Sm.) Breb. Montgomery Co., Sept. 8, 1929. Vigo Co., July 12, 1931. Elkhart Co., Sept. 15, 1929. Sullivan Co., June 21, 1929.
- ²*Hyalotheca dissiliens* forma *tridentula* Nordst. Greene Co., May 4, 1931.
- ¹*Micrasterias americana* (Ehrenb.) Ralfs. Knox Co., May 2, 1931. Greene Co., May 4, 1931. Vigo Co., July 12, 1929. Montgomery Co., Sept. 8, 1929.
- Micrasterias radiata* Hassall. Sullivan Co., June 21, 1929. Vigo Co., June 20, 1929.
- Micrasterias truncata* (Corda) Breb. Parke Co., June 18, 1929. Vigo Co., May, 1930.
- ¹*Penium cucurbitinum* Biss. Parke Co., July 20, 1929.
- ¹*Penium libellula* (Focke) Nordst. Vigo Co., July 3, 1929.
- Penium margaritaceum* (Ehrenb) Breb. Vigo Co., July 24, 1930. Monroe Co., June 28, 1929. Montgomery Co., June 6, 1930.
- ¹*Penium minutum* (Ralfs) Cleve. Vigo Co., July 12, 1929.
- Penium spirostriolatum* Barker. Montgomery Co., June 6, 1930.
- ²*Pleurotaenium ehrenbergii* (Breb) De Bary. Vigo Co., spring, 1929. Elkhart Co., Sept. 15, 1929.
- ¹*Pleurotaenium maximum* (Reisch) Lund. Montgomery Co., Sept. 8, 1929. Sullivan Co., Aug. 21, 1930.
- ²*Pleurotaenium maximum* var. *tumidum* Brown. Montgomery Co., Sept. 8, 1929.
- ¹*Pleurotaenium trabecula* (Ehrenb) Naeg. Putnam Co., May 23, 1931. Montgomery Co., Aug. 28, 1929. Vigo Co., Aug. 13, 1930.
- ²*Pleurotaenium trabecula* forma *clavata* (Kuetz) West & G. S. West. Vigo Co., Aug. 13, 1930. Kosciusko Co., Sept. 15, 1929.
- ²*Staurastrum anatinum* Cooke and Wills var. *curtum* G. M. Smith. Vigo Co., July 18, 1929.
- ²*Staurastrum anatinum* var. *denticulatum* G. M. Smith. Vigo Co., July 18, 1929.
- Staurastrum avicula* Breb. Elkhart Co., Sept. 15, 1929.
- Staurastrum dilatatum* Ehrenb. Vigo Co., May, 1930. Kosciusko Co., Sept. 14, 1929.
- Staurastrum fucigerum* De Brebisson. Montgomery Co., Sept. 8, 1929.
- ²*Staurastrum gracile* Ralfs. var. *coronulatum* Boldt. Vigo Co., July 18, 1929.
- Staurastrum margaritaceum* (Ehrenb) Menegh. Vigo Co., June 8, 1930.

¹ Species—not previously reported from State.

² Variety—not previously reported from State.

³ Genus—not previously reported from State.

⁴ Varieties or species—not previously reported from United States.

⁵ New Varieties.

Staurastrum muticum De Breb. Vigo Co., May, 1930.

Staurastrum obiculare Ralfs. Montgomery Co., Sept. 8, 1929. Vigo Co., June 30, 1930. June 18, 1929, Parke Co.

²*Staurastrum obiculare* var. *ralfsii* West and G. S. West. Vigo Co., May 20, 1930.

¹*Staurastrum polymorphum* Breb. Vigo Co., June 30, 1930.

²*Staurastrum paradoxum* Meyen var. *biradiatum* Griffiths. Knox Co., April 25, 1930. Vigo Co., Aug. 4, 1930.

²*Staurastrum quadrangulare* De Breb. var. *breviaculeatum* G. M. Smith. Vigo Co., July 17, 1930.

¹*Staurastrum setigerum* Cleve. Montgomery Co., Sept. 8, 1929.

²*Staurastrum setigerum* var. *brevispinum* G. M. Smith. Montgomery Co., Sept. 8, 1929.

²*Staurastrum striolatum* (Naeg) Arch. Clay Co., June 21, 1930.

¹*Staurastrum subgemmulatum* West and G. S. West. Kosciusko Co., Sept. 19, 1929.

¹*Staurastrum turgescens* De Not. Vigo Co., July 9, 1929.

¹*Xanthidium antilopaeum* (Breb.) Kuetz. Vigo Co., July 12, 1929.

²*Xanthidium antilopaeum* var. *hibridarium* W. and G. S. West. Montgomery Co., July 12, 1929.

¹*Euglena spirogyra* Ehrenb. Vigo Co., June 8, 1930.

Euglena viridis Ehrenb. Vigo Co., summer, 1930; May 2, 1931.

¹*Ceratium hirudinella* O. Fr. M. Schrank. Vigo Co., Aug. 14, 1930; Aug. 4, 1930.

⁴*Ceratium hirudinella* var. *carenthianum* Zederb. Vigo Co., Aug. 4, 1930.

⁴*Ceratium hirudinella* var. *piburgense* Zederb. Vigo Co., Aug. 4, 1930.

⁴*Glenodinium oculatum* Stein.

³*Codonella cratera* (Leidy) Vorce. Montgomery Co., March 20, 1930.

¹*Peridinium cinctum* Ehrb. Vigo Co., Aug. 19, 1930.

⁴*Peridinium elpatiewsky* (Ostenf) Lemm. Sullivan Co., July 13, 1930.

²*Peridinium laeve* Huitf-Hass var. *wailesii* var. nov. Montgomery Co., March 20, 1930.

⁴*Peridinium lomnicki* Wolosz. Vigo Co., June 13, 1930.

⁴*Peridinium penardi* Lemm. Vigo Co., June 5, 1930; June 13, 1930.

Peridinium quadridens Stein. Vigo Co., Aug. 4, 1930.

³*Peridinium* sp. Montgomery Co., March 20, 1930.

¹*Peridinium willei* Huitf-Haas. Vigo Co., Aug. 19, 1930; June 5, 1930.

Chara fragilis. Clay Co., May 23, 1931.

Chara contraria A. Br. Vigo Co., June 8, 1931.

Nitella species. Vigo Co., May 1, 1931.

¹ Species—not previously reported from State.

² Variety—not previously reported from State.

³ Genus—not previously reported from State.

⁴ Varieties or species—not previously reported from United States.

⁵ New Varieties.

BIBLIOGRAPHY

- Ackley, Alma B. 1929.—New Species and Varieties of Michigan Algae. *Trans. Amer. Micros. Soc.* 48 (3): 302-309. Pls. 35-37.
- Allen, W. R. 1921.—Studies of the Biology of Freshwater Mussels. III. Distribution and Movements of Winona Lake Mussels. *Proc. Acad. Sci.* pp. 227-238.
- Andrews, F. M. 1909.—A List of Algae Chiefly from Monroe County, Indiana. *Proc. Ind. Acad. Sci.* pp. 375-380.
- 1926.—A List of Algae of Monroe County, Indiana. II. *Proc. Ind. Acad. Sci.* 36.
- 1926.—*Vaucheria aversa*. *Proc. Ind. Acad. Sci.* 36: 221-223.
- Bailey, F. M. 1895.—Contributions to the Queensland Flora. Dept. of Agr., Brisbane. *Bot. Bull.* No. 17.
- Bailey, F. M. 1895.—Contributions to the Queensland Flora. Dept. of Agr., Brisbane. *Bot. Bull.* No. XI.
- Bigney, A. J. 1896.—Notes on the Biological Survey of Milan Pond. *Proc. Ind. Acad. Sci.* pp. 274-275.
- Biswas, K. P. 1930.—Contributions to our Knowledge of the Fresh Water Algae of Manipar, Assam. *Jour. of the Bombay Natural Hist. Soc.* 189-192.
- Borge, O. 1923.—Beiträge zur Algenflora von Schweden. *Arkiv. Bot.* 18 (10): 1-34.
- 1925.—Die von Dr. F. C. Hoehne während der Expedition Roosevelt-Rondon gesammelten Süßwasser-algen. *Arkiv. Bot.*, Bd. 19. No. 17.
- 1921.—Die Algenflora des Takernsees. *K. Sverska Vetensk. Akad.* 4. Stockholm, 1921.
- Brown, H. B. 1908.—Algal Periodicity in Certain Ponds and Streams. *Bull. For. Bot. Club* 35: 223-248.
- Brown, Helen J. 1929.—The Algae Family Vaucheriaceae. *Transactions of the American Microscopical Society.* Vol. XLVIII, No. 1.
- 1930.—The Desmids of the Southeastern Coastal Plain Region of the United States. *Transactions of the American Microscopical Society.* Vol. XLIX, No. 2.
- Burrage, S. 1895.—A New Station for *Pleodorina californica* Shaw. *Proc. Ind. Acad. Sci.* pp. 99-100.
- 1896.—The Occurrence of *Uroglena* in the Lafayette (Ind.) City Water. *Proc. Ind. Acad. Sci.* pp. 56-59.
- 1901.—Microscopical Organisms found in the Lafayette (Ind.) Reservoir. *Proc. Ind. Acad. Sci.* pp. 63-65.
- Carter, Nellie 1926.—Freshwater Algae of India. *Records Bot. Survey India* 9: 263-302.
- 1919.—Studies on the Chloroplasts of Desmids. I-IV. *Ann. Bot.* Vol. 33-34. 1919-1920.
- 1922.—Algae from New Caledonia. *Jour. Linn. Soc. London.* Bot. 46: 47-69.
- Clark, H. W. 1901.—Flora of Eagle Lake and Vicinity. *Proc. Ind. Acad. Sci.* pp. 145-146.
- Collins, F. S. 1909.—The Green Algae of North America. *Tufts College Studies* 2: 79-480.

——— 1918.—A Working Key to the Genera of North American Algae. Tufts College Studies 4: 1-50.

Drouet, F. 1930.—A List of Algae from Columbia, Mo. Univ. of Mo. Stud. 5 (1): 1-30.

Eddy, S. 1930.—The Fresh-water Armored or Thecate Dinoflagellates. Trans. Amer. Micros. Soc. XLIX 49 (4): 277-321. Figs. 1-58.

Everman, B. W. and Clark, H. W. 1920.—Lake Maxinkuckee, Indiana, a Physical and Biological Survey. Dept. of Conservation Publication. Vol. II, No. 7.

Fritsch, F. E. 1914.—Contributions to our Knowledge of the Fresh-water Algae of Africa. I. Some Freshwater Algae from Madagascar. Ann. Biol. Locust. 7: 40-59. Pl. 1.

——— 1916.—The Morphology and Ecology of an extreme terrestrial form of *Zygnema* (*Aygonium*) *ericetorum* (Kurtz). Hansg. Ann. Bot. 30 (117): 135-149.

——— 1923.—Contributions to our Knowledge of Freshwater Algae of Africa. 4. Freshwater and Subaerial Algae from Natal. Trans. Roy. Soc. South Africa 11: 297-298.

——— 1907.—Studies on the Occurrence and Reproduction of British Freshwater Algae in Nature. Ann. Bot. 21 (83): 423-436.

Ghase, S. L. 1923.—A systematic and Ecological Account of a Collection of Blue-Green Algae from Lahore and Sumla. Linn. Soc. Jour. Bot. 46: 333-346.

——— 1922.—The Heleoplankton of Three Berkshire Pools. Linn. Soc. Jour. Bot. 46: 1-11.

——— 1922.—The August Heleoplankton of some North Worcester-shire Pools. Linn. Soc. Jour. Bot. 43: 423-432. Pls. 34-35.

Grarblad, Rolf. 1919.—Observations critical quas ad cognoscenda *Closterium didymotocum* et *Closterium Baillyanum*. Acta Soc. pro Fauna et Flora Fennica 49 (5): 1-20. Pl. 1.

——— 1925.—Einige Desmidisceen aus Sibirien. Soc. Sci. Fennica. Commentations Biological I, (8): 1-9.

——— 1924.—Observations on some Desmids. Acta Societatis pro Fauna et Flora Fennica. 55 (3): 1-18. Pls. 1-2.

——— 1926.—Beitrag zur Kenntnis der Desmidisceen Schlesiens. Soc. Sci. Fennica. Commentationes Biologicae II, 5.

——— 1921.—New Desmids from Finland and Northern Russia. Acta Soc. Fauna et Flora Fennica 49 (7): 1-78. Pls. 1-7.

——— 1920.—Finnländische Desmidisceen aus Keuru. Acta Soc. Fauna et Flora Fennica. 47 (4): 1-98. Pls. 1-6.

Hazen, F. E. 1902.—Ulotricaceae and Chaetophoraceae of the United States. Memoirs Torrey Bot. Club. 11: 135-250: Pl. 20-42, 131 figs.

Henry, G. 1913.—On the Vertical Distribution of the Plankton in Winona Lake. Proc. Ind. Acad. Sci. pp. 77-92.

Hodgetts, W. J. 1918.—The Conjugation of *Zygonium ericetorum* Kuetz. The New Phytologist 17 (10): 238-251.

Hylander, C. J. 1928.—The Algae of Connecticut. State Geol. and Nat. History Survey. Bull. 42.

Iyengar, Parthasarathy M. O. 1923.—Note on Some Attached Form of *Zygnemaceae*. Jour. of the Indian Botanical Society.

July, C. 1902.—The Plankton of Winona Lake. Proc. Ind. Acad. Sci. p. 123.

Klugh, A. B. 1921.—A New Genus and Three New Species of Algae from Miramichi River, New Brunswick. Dept. of Naval Service Contributions to Canadian Biology. Ottawa.

Markle, M. S. 1918.—Some Abnormalities in Plant Structure. Proc. Ind. Acad. Sci. pp. 117-124

Moore, G. T. and Carter, Nellie. 1923.—Algae from Lakes in the Northern Part of North Dakota. Ann. of the Mo. Bot. Garden 10: 393-422.

Mottier, D. M. 1894.—Pleodorina in Indiana. Bot. Gaz. 19: 383.

Nordstedt, O. 1911.—Algologische Notizen Separat ur Botaniska Notiser for ar 1911.

Palmer, C. Marvin. 1929.—Algae of Indiana—a classified check list of those published between 1875 and 1928. Proc. Ind. Acad. Sci. 38: 109-121. 1928 (1929).

Palmer, C. M. 1931.—Algae of Indiana—Additions to the 1875-1928 check list. Proc. Ind. Acad. Sci. 40: 107-109.

——— 1931.—Algae of Marion County, Indiana. Butler Univ. Bot. Studies. Vol. II, No. 1.

Palmer, C. M. 1931.—The algae Schizomeris and Lemanea in Indiana. Proc. Ind. Acad. Sci. 40: 111-113.

Pascher, A. 1913.—Die Süßwasser-flora Deutschlands, Oesterreichs und der Schweiz. Heft 1, 2, 3, 4, 5, 6, 7, 9, 11, 12. Jena, G. Fischer, 1913-1927.

Petit, Paul. 1880.—Spirogyra des Environs de Paris. Jacques Lechevalier. Paris.

Picket, F. L. 1912.—A Case of Changed Polarity in *Spirogyra elongata*. Bul. For. Bot. Cl. 39: 509-510.

Printz, H. 1915.—Contributions ad Floram Asiae Interioris Pertinentes. I. Die Chlorophyceen des Südlichen Sibiriens und des Uriankarlandes. Skrifter Norske. Videnskabera Seleskab. 1915. Nr. 4.

——— 1915.—Beiträge zur Kenntnis der Chlorophyceen und ihrer Verbreitung in Norwegen. Skrifter Norske Videnskabers Selskab. 1915. Nr. 2.

Saunders, De. Alton 1910.—Papers from the Harriman Alaska Expedition. XXV. The Algae. Proc. Wash. Acad. Sci. 3: 391-486.

Scott, W. 1917.—An Epidemic among the Fishes of Huffman's Lake. Proc. Acad. Sci. pp. 67-71.

Scott, W. 1909.—The Fauna of a Solution Pond. Proc. Ind. Acad. Sci. pp. 375-442.

Scott, W. 1916.—Report on the Lake of the Tippecanoe Basin. (Indiana) Ind. Univ. Stud. 3: 1-39.

Scovell, J. T. 1900.—The flora of Lake Maxinkuckee. Proc. Ind. Acad. Sci. p. 127.

Smith, G. M. 1926.—The Plankton Algae of the Okoboji Region. Transactions of the American Microscopical Society. Vol. XLV. No. 3.

——— 1920.—Phytoplankton of the Inland Lakes of Wisconsin. Part I and II, Wisconsin Geol. and Nat. His. Survey, No. 57, 1920 and 1924.

——— 1924.—Plankton Algae of Palisades Park. Roosevelt Wild Life Bull. 2: 93-195.

Snow, Julia W. 1902.—The Plankton Algae of Lake Erie. Bull. U. S. Fish Com. 1902: 369-394.

Strom, K. M.—The Alga-Flora of the Sarek Mountains. In Naturwissenschaftliche Untersuchungen des Sarekbirges in Schwedisch-Lappland, Geleitet von A. Hamberg. Bd. III, Botanik, Lief. 5: 437-524.

——— 1921.—The Phytoplankton of some Norwegian Lakes. Skrifter Videnskabs-selskab, Also. I. Mathem-Hatur. Klasse. 1921. No. 4.

——— 1919.—Freshwater Algae from Caucasus and Turkestan. Nyt. Mag. Natur. 57: 129-143.

——— 1926.—Norwegian Mountain Algae. Skrifter Norske Videnskaps-Akademi i Oslo. I. Mathem-Natur. Klasse, 1926. No. 6.

Taylor, W. R. and Colton, H. S. 1928.—The Phytoplankton of some Arizona pools and lakes. Amer. Jour. Bot. 15 (10): 596-614. Pls. 46-47.

Thomas, M. B. 1898.—Some Desmids of Crawfordsville. Proc. Ind. Acad. Sci. 163-164.

Tiffany, L. H. 1930.—The Oedogonisceae, a monograph including all known species of the genera Bulbochaete, Oedocladium and Oedogonium. Columbus, Ohio.

——— 1927.—New Species and Varieties of Chlorophyceae. Bot. Gaz. 83: 202-206.

——— 1926.—The Filamentous Algae of northwestern Iowa with special reference to the Oedogoniaceae. Trans. Amer. Micros. Soc. 55: 60-132.

——— 1924.—Some new forms of Spirogyra and Oedogonium. Ohio Jour. of Sci. 24: 180-187: Pls. I-III, 20 figs.

Tiffany, L. H. and Transeau, E. N. 1927.—Oedogonium periodicity in the North Central States. Trans. Amer. Micros. Soc. 46 (3) 166-174.

Tilden, Josephine. 1910.—Minnesota Algae. Vol. I, Minneapolis.

Transeau, E. N. 1926.—The Genus Mougeotia. The Ohio Journal of Science, 1926. 311-338.

——— 1925.—The Genus Debarya. The Ohio Journal of Sci. 25: 193-201.

——— 1913.—The periodicity of the algae of Illinois. Trans. Amer. Micros. Soc. 32 (1): 31-40.

——— 1916.—The periodicity of freshwater algae. American Journal of Botany, 3: 121-133.

——— 1913.—The life history of Gloeotaenium. The Bot. Gaz. 55 (1): 66-73.

——— 1917.—The Algae of Michigan. The Ohio Jour. of Sci. 17 (7): 217-232.

——— Key to the Species of Spirogyra—unpublished.

Wailles, G. H. and Tiffany, L. H. 1929.—Some Algae from British Columbia. Vancouver "Museum and Art Notes" 4: 1-10.

Wolle, F. 1887.—Fresh-water Algae of the United States. Vol. 2. The Cannenius Press, Bethlehem, Pa.

Weatherwax, P. 1913.—Ecological Notes on Certain White River Algae. Proc. Ind. Acad. Sci. pp. 107-108.

——— 1914.—Some Peculiarities in *Spirogyra dubia*. Proc. Ind. Acad. Sci. pp. 203-206.

West, G. S. and Fritsch, F. E. 1927.—A Treatise on the British Freshwater Algae. Cambridge University Press.

West, G. S. 1916.—Algae. Cambridge University Press. Vol. I.

——— 1909.—The Algae of the Birket Garum, Egypt. Phytoplankton from the Albert Nyanza. Jour. of Bot.

——— 1909.—A Biological Investigation of the Peridinieae of Sutton Park, Warwickshire. The New Phytologist. 8 (506): 181-196.

West, W. and G. S. 1896.—On some North American Desmidiaceae. Trans. Linn. Soc. London. Botany 2 d. ser. 5: 229-275.

——— 1898.—On some Desmids of United States. Jour. Linn. Soc. London. Bot. 33: 279-322.

West, W. and G. S. and (Vol. 5) Carter, Nellie 1904.—A Monograph of British Desmidiaceae. The Ray Society, London. Vol. I-X. 1904-1923.

White, Helen L. 1931.—The phytoplankton of a solution pond with special reference to the periodicity of certain algae. Proc. Ind. Acad. Sci. 40: 123-140.

Wille, N. 1925.—Vorarbeiten zu einer Monographie der Chroococceen. Nyt Magazin for Naturvidenskaberne. Bd. H 2: 169-209. Pls. 1-14.