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NOTES ON THE LAGENIDIACEAE IN JAPAN

BY

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(With three text-figures)

No record has ever been published in Japan on the Ancylistales, one of the smallest and most interesting groups of lower fungi. SKVORTZOW described four species of this group from Manchuria including *Myzocyttium megastomum* DE WILDEMAN and *Lagenidium enecans* ZOPF, which belong to the Lagenidiaceae. In the course of his studies on the Japanese aquatic fungi, the present writer found some members of this group parasitic on various algae. The present paper has been prepared to record three species of them. The family Lagenidiaceae consists of three genera, Achlyogeton, Myzocyttium and Lagenidium. In this paper, it is proposed to include in this family the genus Aphanomycopsis established by SCHERFFEL.

The writer wishes to express here his sincere appreciation to Prof. S. ITO for his valuable directions and cordial encouragement throughout the present investigation.

Achlyogeton entophytum SCHENK

in Bot. Zeit. XVII, p. 398, pl. XII, fig. A, 1859; SOROKIN, in Rev. Mycol. XI, p. 139, pl. LXXXI, fig. 122, 1889; v. MINDEN, in Krypt. Fl. Mark Brand. V, p. 429, 1915; MARTIN, in Mycologia, XIX, p. 188, fig. 1 (c, d), 1927.

Thallus endobiotic, consisting of an unbranched tube, at maturity divided by the septa into 2-9 cells, each of which functions as a sporangium, prominently constricted at the septum; sporangia subelliptical, 15.6-33.6 μ in length, 9.6-20.4 μ in breadth, with hyaline, thin membrane; exit-tubes single, more or less long, up to 60 μ in length, approximately 3.6 μ in breadth; zoospores at once encysting at the mouth of the exit-tube, forming a globose aggregation of tiny spheres as in Achlya, about 4 μ in diameter, later swimming away leaving their cyst behind; sexual organs unknown.

Hab. In the cells of *Cladophora* sp. Lake Akan, Prov. Kushiro (Aug. 20, 1931).

Distrib. Europe, N. America, Central Asia and Japan.

This fungus was found attacking *Cladophora* in company with *Myzocyttium entophyllum* SCHENK in the same manner as has been noted by SCHENK and MARTIN. SCHENK has illustrated the emergence of a uniciliate zoospore from each of the cystospores. Although it was not actually observed, FITZPATRICK suggested that the secondary zoospore in this fungus may be laterally biciliate as in other members of the family. With the present material, the emergence of a secondary zoospore could not be observed and accordingly it remains unsolved whether or not FITZPATRICK'S statement is actually the case. A spherical, thick-walled resting spore was observed by MARTIN, but its functions remained obscure. A peculiar, thick-walled body with a thin-walled companion cell was found in the sporangia of our fungus. It is perhaps the resting spore of a fungus of *Olpidiopsis* parasitic on *Achlyogeton*, but its zoosporangium was not observed.

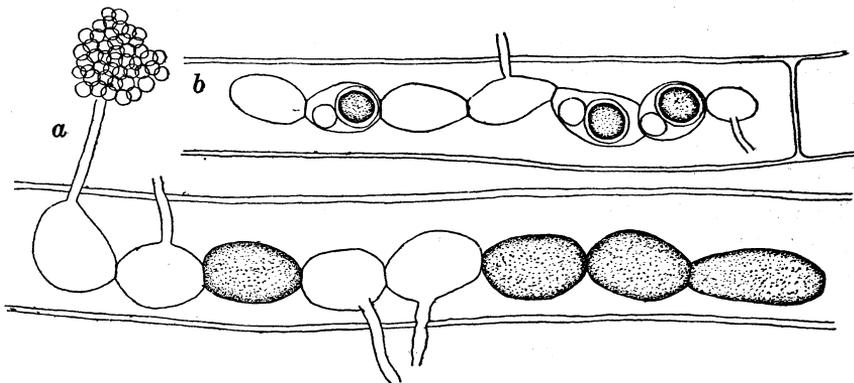


Fig. 1 *Achlyogeton entophyllum* SCHENK

- a. Sporangia in a cell of *Cladophora* sp. and spherical aggregation of zoospores. $\times 540$.
 b. Resting spores of parasite in the sporangia. $\times 540$.

Myzocyttium proliferum SCHENK

Ueber das Vorkommen kontraktile Zellen im Pflanzenreich, p. 10, 1858; ZOPF, in Nova Acta Acad. Leop. XLVII, p. 159, pl. XIV, figs. 6-34, 1884; v. MINDEN, in Krypt. Fl. Mark Brand. V, p. 430, 1915; MARTIN, in Mycologia, XIX, p. 188, fig. 1 (a, b), 1927; SKVORTZOW, in Arch. Protistenk. LVII, p. 206, fig. 10, 1927.

Syn. *Pythium proliferum* SCHENK (not DE BARY), in Verhandl. Phys. Med. Ges. Würzburg, IX, p. 20, pl. I, figs. 30-47, 1857. *Pythium globosum* WALZ, in Bot. Zeit. XXVIII, p. 554, pl. IX, figs. 13-19, 1870, pro parte. *Lagenidium*

globosum LINDSTEDT, Syn. der Saproleg. p. 54, 1872; REINSCH, in Jahrb. Wiss. Bot. XI, pl. XVII, figs. 6-12, 1878.

Thallus endobiotic, consisting of 2-12 sexual and asexual cells which connect with each other into a simple or rarely branched chain; sporangia broad elliptical to spherical, 14.4-24 μ in diameter, with a single, long exit-tube; zoospores developing in a vesicle which is formed by the discharge of the contents of sporangia at the mouth of the exit-tube as in *Pythium*, kidney-shaped, approximately 10 \times 6 μ , with two cilia near the hilum; oogonia and antheridia similar to sporangia in shape and size; oospores solitary, not filling up the oogonial cavity, spherical, 14.4-20.4 μ in diameter, with smooth, thick membrane and an excentric globule.

Hab. In the cells of *Spirogyra Jürgensii* Kütz. Bannosawa near Sapporo, Prov. Ishikari (June 21, 1931).

In the cells of *Spirogyra* sp. Sapporo, Prov. Ishikari (July 24, 1931).

In the cells of *Cladophora* sp. Lake Akan, Prov. Kushiro (Aug. 20, 1931).

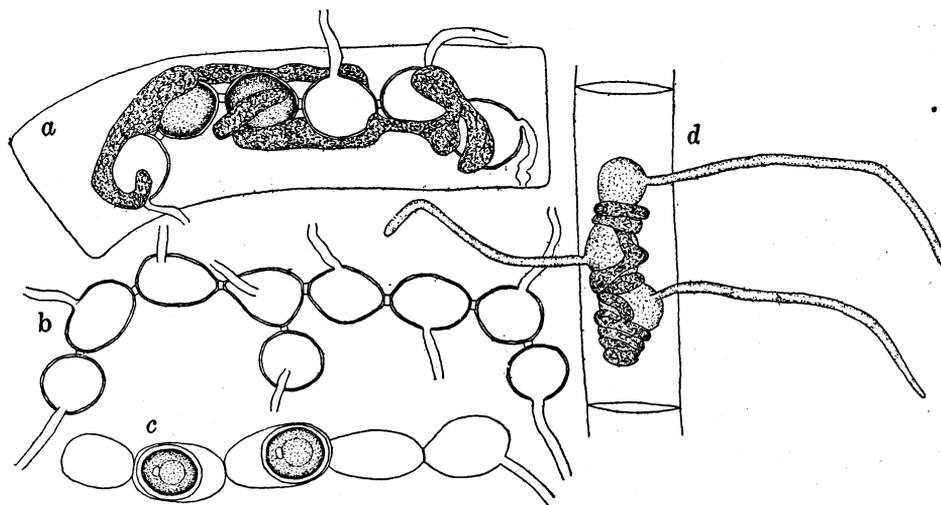


Fig. 2 *Myzocyttium proliferum* SCHENK

a. Sporangia in a cell of *Spirogyra* sp. \times 540. b. Sporangia arranged in a branching chain. \times 540. c. Fungus from *Cladophora* sp. consisting of oogonia, antheridia and sporangium. \times 540. d. Abnormal germination of sporangia in a cell of *Spirogyra Jürgensii*. \times 540.

Distrib. Europe, N. America, China and Japan.

In the fungus occurring on *Spirogyra* the septa separating each sporangium are very thick, up to 2.4μ , while in the fungus on *Cladophora* they are very thin. In ZOPF's illustration, there are various types of septa in the same host plant.

In the fungus found on *Spirogyra Jürgensii*, the thallus was two- or three-celled and smaller in size. In this fungus a peculiar phenomenon was observed concerning the germination of sporangium. When the mature sporangia were mounted in a drop on a slide-glass, covered with cover-glass and sealed with paraffin, they germinated by a germ-tube which elongated exceedingly but produced no zoospores.

Aphanomycoptis bacillariacearum SCHERFFEL

in Arch. Protistenk. LII, p. 14, pl. I, figs. 31-35, pl. II, figs. 36-48, 1925; SPARROW, in Mycologia, XXV, p. 530, pl. XLIX, fig. 14, 1933.

Thallus endobiotic, at first consisting of a cylindrical, unbranched tube, later richly branched, provided with long or short, often somewhat inflated twigs, septate at indefinite intervals into a number of cells at maturity, without prominent constriction at the septum, each component cell functioning as a sporangium or an oogonium; sporangia cylindrical or tubular, unbranched or irregularly branched, often lobed, widely variable in length, up to 150μ long, $4.8-16.8 \mu$ in diameter; exit-tubes single for a sporangium, very long, up to 150μ in length, about 4.8μ in breadth; zoospores on leaving the sporangium coming to rest at once in a hollow sphere at the mouth of the exit-tube, encysting there as in *Achlya*, later swimming away leaving their cyst behind, in encysting globular, $6-7.2 \mu$ in diameter, in swimming kidney-shaped, narrower in front, provided with two cilia near the hilum, containing an oil drop; oogonia (?) intermixed with sporangia in a thallus, terminal or intercalary, cylindrical, medially expanded, $15.6-21.6 \mu$ in breadth, provided with no periplasm; antheridia absent; oospores (?) one or two, laying loosely in an oogonium, spherical, $14.4-19.2 \mu$ in diameter, with smooth, thick membrane and a large oil globule, germination unknown.

Hab. On *Surirella* sp. Maruyama near Sapporo, Prov. Ishikari (July 31, 1931; Aug. 22, 1932).

On *Navicula* sp. Maruyama near Sapporo, Prov. Ishikari (Aug. 22, 1932).

Distrib. Europe, N. America and Japan.

This fungus has been described by SCHERFFEL from Hungary parasitizing

on *Pinnularia*, *Epithemia* and other diatoms. Our fungus seems to be almost identical with SCHERFFEL's species except in the septation of mature thallus. SPARROW has very recently reported this organism from North America. His fungus consists of a simple, unbranched tube, which is thought to be a reduced, one-celled form of the species. SCHERFFEL has described oospores which had been formed asexually in the swollen, non-septate (?) parts of the intramatrical hyphae. In our material, no sexual fusion was found among these bodies. It seems that they resemble the resting spore of *Achlyogeton* found by MARTIN. It is not definitely known whether these bodies are the sexual organ or not since their functions remain obscure.

The genus *Aphanomycopsis* was treated by SCHERFFEL as a member of the Saprolegniaceae together with the genus *Ectrogella* which is reasonably considered to belong to the Olpidiaceae in Chytridiales. FITZPATRICK has noted this genus as somewhat imperfectly known and falling near *Aphanomyces* in Saprolegniaceae. SCHERFFEL pointed out that the characters of contents of vegetative cells are also characteristics of the Saprolegniaceae. Since the genus in question possesses some similarities to *Aphanomyces* in the character of cell contents and zoospore emergence, he placed the former in the Saprolegniaceae. His description of the genus is quoted partially as follows:

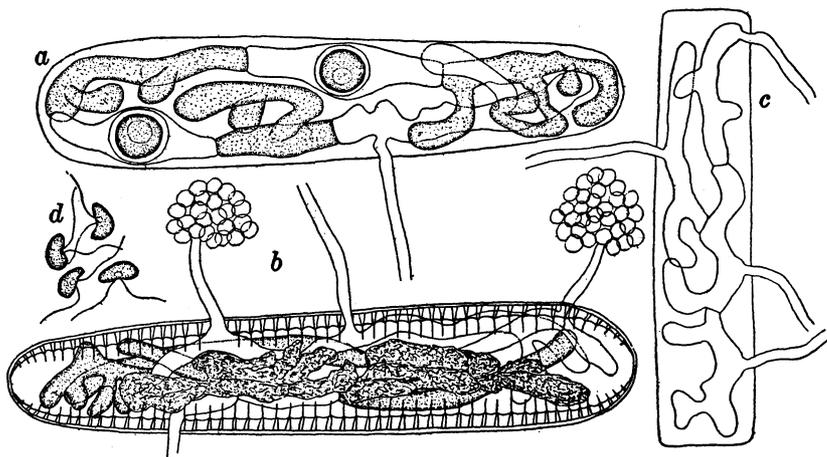


Fig. 3 *Aphanomycopsis bacillariacearum* SCHERFFEL

a. Sporangia and oogonia in *Surirella* sp. $\times 540$. b. Showing the habitat of the fungus in *Surirella* sp. $\times 320$. c. Empty thallus, whose contents have been entirely extruded, in *Navicula* sp. $\times 320$. d. Zoospores in secondary active period. $\times 540$.

“Schlauchinhalt vorerst mattglänzende Plättchen und dazwischen eingestreute, stärker lichtbrechende kleine Körnchen führend, also schollig. Später wie von wässriger Flüssigkeit erfüllt erscheinend; in dem Wandbelag wenige winzige, glänzende, runde Körnchen, die Ortsveränderungen zeigen (*Aphanomyces*-Habitus). Nachher reich an feinen, glänzenden Körnchen, einen nach innen unregelmässig konturierten, verschieden dicken Wandbelag bildend, von deutlichem Saprolegniaceen-Habitus.”

The writer proposes to transfer the genus to the Lagenidiaceae in Ancylistales, based on the following two points:

1. Absence of typically developed mycelium.
2. Thallus completely transformed into the reproductive organs at maturity.

In the Saprolegniaceae, the mycelium is well developed and consists of thread-like hyphae. The thallus functions in a relatively small part in reproduction at maturity, certain specialized cells being cut off from the hyphae to function as reproductive organs. The remainder of the thallus, however, retains its vegetative character.

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