

(*Fasciculochloris*,
a New Chlorosphaeracean Alga from
a Connecticut Soil)

ROBERT J. MCLEAN and FRANCIS R. TRAINOR

Department of Botany, University of Connecticut,
Storrs, Connecticut, U.S.A. 06268

Abstract

Fasciculochloris boldii gen. et sp. nov. is described from a Connecticut cornfield soil. It is placed in the Chlorosphaeraceae (Chlorosphaerales) and distinguished from *Chlorosarcinopsis* by its zoospores, which have a wall, a pyrenoid, and flagella of unequal length.

Description

Fasciculochloris gen. novum – Cellulae vegetativae iuvenes oblongae ovatae, senescentes, autem, gradatim sphaericae factae. Fasciculi quattuor vel plurium cellularum post cellulae divisionem effecti. In cellulis iuvenibus chromatophorus poculiformis atque pyrenoideum apparentia. Reproductio asexualis per formationem zoosporarum flagella longitudine inaequali, membranam atque chromatophorum parietalem pyrenoideum continentem, habentium.

Fasciculochloris boldii sp. nova (Figurae 1–8) – Cellulae vegetativae iuvenes singulae magnitudine cellulae media $7.5\ \mu$, raro ante divisionem maiore quam $14\ \mu$. Divisio cellularum aut zoosporas aut, si vegetativa, fasciculos plerumque quattuor, usque ad 32, autem, cellularum in duobus¹ tribusve planis, efferens. Fasciculi $15 \times 18\ \mu$ magnitudine media, $26 \times 28\ \mu$ maxima. Plura quam unum pyrenoideum fortasse unaquaque in cellula.

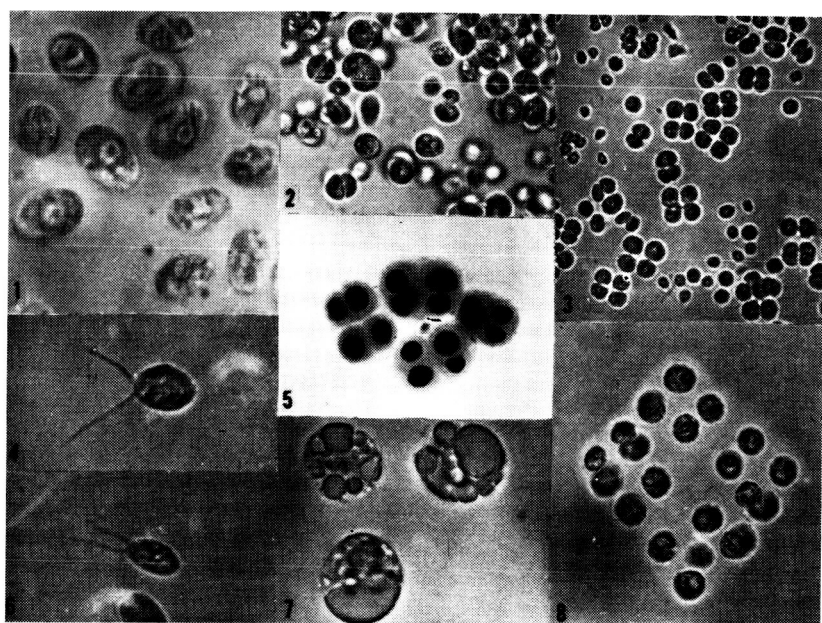
¹ This work was supported by a NASA predoctoral fellowship and NSF grant GB 1856.

10*
HCB 1.00
MK 150

FACILITY FORM 602

N67 141 76
(ACCESSION NUMBER)
4
(PAGES)
CR 80818
(NASA CR OR TMX OR AD NUMBER)

(THRU)
1
(CODE)
04
(CATEGORY)



Figs. 1-8. *Fasciculochloris boldii* gen. et sp. nov. Fig. 1. Young vegetative cells from a 2-day old liquid culture. $\times 2025$. Fig. 2. Spherical vegetative cells, some dividing. $\times 450$. Fig. 3. Packets in a week old liquid culture. $\times 225$. Fig. 4. Zoospore with flagella of unequal length. $\times 900$. Fig. 5. Packets observed in a 2-week old liquid culture. Gelatinized walls stained with methylene blue. $\times 450$. Fig. 6. Zoospore with flagella of unequal length. $\times 675$. Fig. 7. Oil droplets in solitary cells from a month old liquid culture. $\times 1080$. Fig. 8. Large packet from a month old agar culture, showing gelatinized walls and separation of cells. In Indian ink. $\times 450$.

praecipue admodum ante cellulae divisionem. Crassitudo membranae in cellulis aetate raro crassior quam $1\ \mu$. Cellulae adultae in "agar" cultae mucilaginem facientes. Omnis cellula uninucleata, oleum praecipue coacervans; cellulae vel iuvenes granulosae visae. Quattuor ad 16 zoosporae plerumque omni in cellula; diametros zoosporangiorum maxima $20\ \mu$. Zoosporae duo flagella longitudine inaequalia, chromatophorum parietalem unum pyrenoideum continentem, duas vacuolas pulsantes, stigma medium ad posterius, et membranam tenuem habentes. Zoosporae magnitudine media $4 \times 7\ \mu$, quiescentes non sphaericae factae. Reproductio sexualis non observata.

Origo: Ex agro frumentario (*Zea mays*) in loco Storrs, Connecticut dicto, m. Oct. 1958 collectae. Cellulae in cultura pura.

Fasciculochloris has young vegetative cells which are oblong or ovoid (Fig. 1), but gradually become spherical upon aging (Fig. 2). They average $7.5\ \mu$ in diameter, rarely exceeding $14\ \mu$ before division. Cell division may result in production of zoospores, or, if vegetative, in the formation of packets of mostly 4, but up to 32 cells in two or three planes (Fig. 3). Packets average $15 \times 18\ \mu$, but may attain a maximum size of $26 \times 28\ \mu$. In young cells the cup-like chromatophore and pyrenoid are apparent. More than one pyrenoid may be present in each cell, especially just before cell division. In liquid and agar cultures in the stationary phase, walls become mucilaginous (Figs. 5, 8) and cells of the packets separate. All cells were uninucleate. Young cells appear granular because of the accumulation of numerous starch grains, but in old cells oil appears to be the main storage product (Fig. 7). In each sporangium 4 to 16 zoospores may be produced. Zoosporangia may reach a maximum diameter of $20\ \mu$. Zoospores have two flagella of unequal length (Figs. 4, 6), a parietal chromatophore containing a pyrenoid, two contractile vacuoles, a median to posterior stigma, and a thin wall. Zoospores have an average size of $4 \times 7\ \mu$ and do not round up upon quiescence. Sexual reproduction was not observed.

Smooth and glossy colonies are produced on agar. A second strain of *Fasciculochloris boldii* is in culture; it produces rough colonies on agar, shows less gelatinization of the wall, and forms fewer packets in liquid culture.

This was the 24th organism isolated from a cornfield soil sample (HILTON & TRAINOR, 1963). The alga was studied in axenic culture in complete medium and in modified Bristol's medium (TRAINOR, 1964).

Taxonomic Position

A test for starch (a blue-black color when stained with I_2KI) was not positive; the granules appeared red-brown and thus might be amylopectin. The presence of chlorophyll *b*, demonstrated by the chromatographic method of COLMAN & VISHNIAC (1964), indicated that the organism was in the Chlorophyta. Because of formation of packets by vegetative cell division and the presence of zoospores, *Fasciculochloris* is placed in the Chlorosphaeraceae, Chlorosphaerales (HERNDON, 1958).

According to HERNDON (1958), the genus *Chlorosarcinopsis* includes certain packet-forming Chlorophyceae with a *Protosiphon* type of zoospore. In the vegetative state *Fasciculochloris* resembles *Chlorosarcinopsis*,

but zoospores of the former have a wall, a pyrenoid, and flagella of unequal length. Clearly this zoospore is unlike that of *Protosiphon*, or the *Chlamydomonas* and *Bracteacoccus* types described by STARR (1955).

Literature Cited

- COLMAN, B., and W. VISHNIAC, 1964. Separation of chloroplast pigments on thin layers of sucrose. *Biochim. et Biophys. Acta* 82: 616-618.
- HERNDON, W., 1958. Studies on chlorosphaeracean algae from soil. *Amer. J. Bot.* 45: 298-308.
- HILTON, R. L., and F. R. TRAINOR, 1963. Algae from a Connecticut soil. *Plant & Soil* 19: 396-399.
- STARR, R. C., 1955. A comparative study of *Chlorococcum* Meneghini and other spherical, zoospore-producing genera of the Chlorococcales. *Indiana Univ. Publ. Sc. Ser.* no. 20.
- TRAINOR, F. R., 1964. The effect of composition of the medium on morphology in *Scenedesmus obliquus*. *Can. J. Bot.* 42: 515-518.

Manuscript received October 10, 1964.