

Planophila communis sp. nov. (Chlorosarcinales, Chlorophyta)
from Japanese soils

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A new Chlorosarcinalean alga, *Planophila communis*, is described from Japanese soils. It differs from the species hitherto described in the characters that the vegetative cells are evenly surrounded with gelatinous matrix and the plant mass does not change in color in old cultures.

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Introduction

The organism to be described here was isolated from soils of several localities in Japan by the method reported previously (WATANABE 1977). It divides vegetatively to form four-celled packets, produces quadriflagellate zoospores of *Protosiphon*-type, and possesses a parietal chloroplast with a pyrenoid. After examination, it became clear that this isolate is a hitherto non-described species of the genus *Planophila*.

The alga newly described has been deposited in the Culture Collection of Algae, Institute of Applied Microbiology, University of Tokyo.

***Planophila communis* S. WATANABE sp. nov. (Figs. 1-13).**

Cellulae vegetativae sphaericae, 5-18 μm diametro; vel ellipsoideae, ad 14 \times 18 μm attingentes. Fasciculi duo-octo-cellularium per divisiones cellularum vegetativarum successivas effecti. Fasciculique cellulae solitariae tectae aequaliter matricibus gelatinosis. Chloroplastus parietalis cum una vel raro duabus pyrenoidibus; vacuolae contractiles in cellulis vegetativis interdum

observatae; cellulae per crescentiam uninnucleatae.

Reproductio per dissociationem fasciculorum aut per zoosporas quadriflagellatas aut per aplanosporas. Zoosporae elongatae, 3.5-8 \times 7-18 μm , sine membrana, stigma antium aut prope aequatorium, duas vacuolas contractiles anticas, pyrenoidem posticam, et chloroplastum parietalem que perforatum habentes.

Massa plantarum viridis per periodum culturae; ad paginam laevis sed glomerans in cultura vetere.

Origo: Plantae e solo arborum in loco Saitama-ken dicto; m. Apr., 1975 lectae; numerus culturae SAI-1.

Typus: Figs. 1-13.

The soil samples were collected from arable land in Saitama Prefecture, characterized by the Kanto Loam; at the side of a road in Mt. Eboshidake, Nagasaki Prefecture; and from a farm of bananas and papayas in Chichijima, one of the Ogasawara Islands in the Pacific Ocean about 1000 km away from Tokyo.

Young vegetative cells derived from zoospores or aplanosporas are solitary and

assume spherical forms with diameters of 5–18 μm . The thin gelatinous matrix evenly surrounds the individuals. The chloroplast of these cells is cup-shaped or mantle-shaped, containing one or rarely two prominent pyrenoids. The latter is densely covered with two to several starch grains which are closely arranged and may be loose when the cells are old. In actively growing cultures, the young spherical cells sometimes possess two contractile vacuoles in the surface of the cytoplasm and a stigma in the chloroplast. The cells are uninucleate, and vacuoles are sometimes present.

As the cells grow, they assume ellipsoidal form and undergo vegetative cell division (=desmoschisis, GROOVER & BOLD 1969). The division occurs across the center of the parent cell into two daughter cells, which remain in close association with the parent cell wall. The daughter cells may undergo desmoschisis in the direction which is usually perpendicular to the preceding division giving two-dimensional, four-celled packets (Fig. 1). Three-dimensional, cuboidal packets are sometimes produced (Fig. 5). The packets are covered with a gelatinous matrix which is evenly thickened and does not form the branching *Hormotilopsis*-like colony. The packets may dissociate either partially or entirely to form diads or solitary cells. The cells comprising packets attain to sizes of 14 \times 18 μm . The chloroplast becomes larger

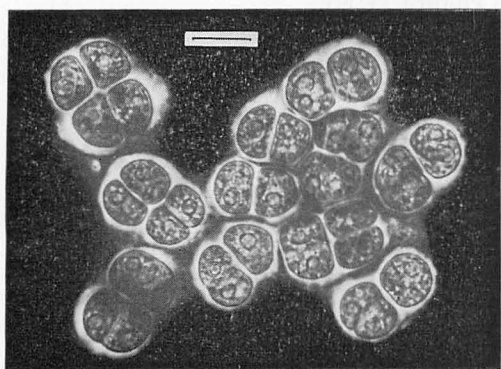


Fig. 1. *Planophila communis* sp. nov. India ink preparation to show two- or four-celled packets surrounded with evenly thickened matrix. (Scale, 20 μm).

with the cell growth, and occupies the entire cell periphery without opening. Two contractile vacuoles are sometimes present in packet cells.

Reproduction occurs by zoosporogenesis which takes place in both solitary and packet cells. The zoospores were obtained by transferring the actively growing cells into tap water or liquid medium and maintaining in dark overnight. They (Figs. 8–13) are elongate, and 3.5–8 \times 7–18 μm in size; rounded at both ends or somewhat acute at the anterior. The cell wall is lacking (*Protosiphon*-type, STARR 1955), as evidenced by their rapid assumption of a spherical form upon quiescence. The chloroplast is parietal, irregularly incised and occupies the posterior pole, containing an inconspicuous pyrenoid at the basal part. The stigma is located at the equatorial or anterior portion of the plastid. Zoospores which fail to obtain motility function as aplanospores.

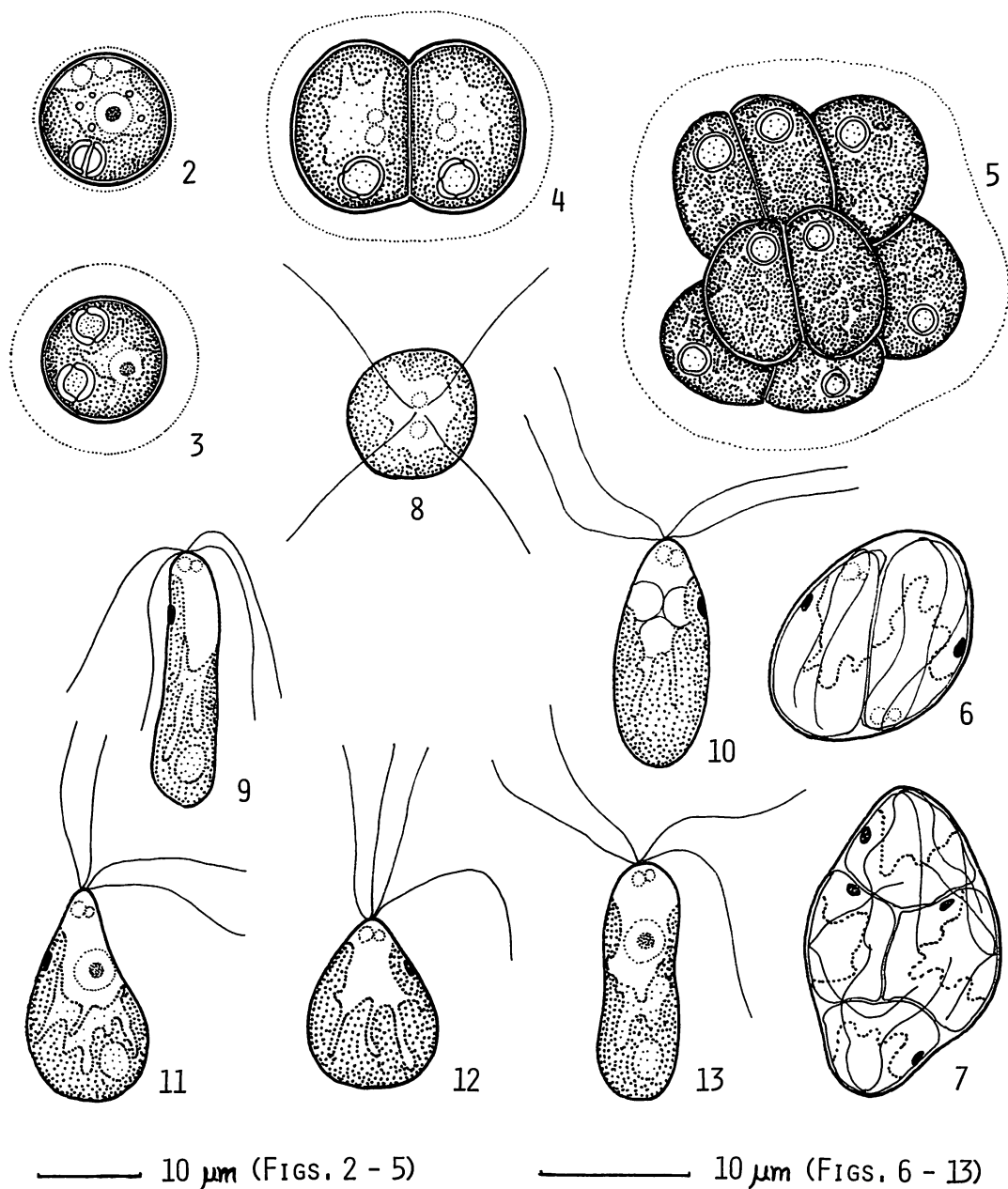
Sexual reproduction has not been observed.

Plant mass is green and smooth; in old cultures the color does not change but the surface becomes glomerulate, forming mounds on the agar medium.

Discussion

The genus *Planophila* GERNECK (1907) is characterized by the two-dimensional vegetative division to form two- to eight-celled packets and the production of quadriflagellate zoospores of *Protosiphon*-type. Cells of *P. laetevirens* GERNECK (1907), *P. asymmetrica* (GERNECK) WILLE (1911) and *P. bipyreoidosa* REISIGL (1964) are in a flat or biserial packet, but *P. terrestris* GROOVER & HOFSTETTER (1969) frequently forms cuboidal packets. On the basis of characters in the formation of daughter cells by desmoschisis, GROOVER & BOLD (1969) classified *Planophila* in the Chlorosarcinales.

The present isolate clearly differs from *P. asymmetrica* and *P. bipyreoidosa* in the characters of zoospores, such as the length of body and the existence of stigma. According to the descriptions by GERNECK (1907) and REISIGL (1964), in *P. laetevirens*



Figs. 2-13. *Planophila communis* sp. nov. Fig. 2, a solitary cell with two contractile vacuoles. Fig. 3, a solitary cell with two pyrenoids. Fig. 4, a two-celled packet, with two contractile vacuoles. Fig. 5, a three-dimensional packet. Figs. 6-7, mother cells containing two or four zoospores. Fig. 8, a zoospore of front view. Figs. 9-13, zoospores in the motile period, showing various shapes.

the plant mass remains green in old cultures and the cells attain to 5-15 (-22) μ m in diameter. Although these characteristics coincide with those of the present isolate, the

deposition of gelatinous matrix has not been observed in *P. laetevirens*. The present isolate resembles *P. terrestris* in the formation of cuboidal packets, the deposition of

gelatinous matrix and the sizes of zoospores attaining to a length of 18 μm . However, the two are distinguished from one another by the following attributes; in *P. terrestris* the plant mass changes to brownish orange in old cultures and the unilateral deposition of gelatinous matter results in the formation of branching *Hormotilopsis*-like colonies, but in the present isolate the plant mass does not change in color throughout the culture period and the gelatinous matter is evenly deposited around the cells. These different characteristics were ascertained by comparative study with a living specimen of *P. terrestris* (Culture Collection of Algae, The University of Texas, No. 1709).

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渡辺 信: クロロサルシナ目の1新種 *Planophila communis*

日本の3地点の土壌から分離された緑藻の1種は, desmoschisis (GROOVER et BOLD 1969) により2~8コの娘細胞からなる平面的或は立体的な packet を形成し, 細胞のまわりはゼラチン質につつまれる。葉緑体は側壁でピレノイドを有し, 遊走子は *Protosiphon* 型 (STARR 1955) で4本の鞭毛を持っている。この分離種は *Planophila* 属の既知の4種のうち, *P. terrestris* GROOVER and HOFSTETTER (1969) に最も近い形質を備えている。しかし, *P. terrestris* ではゼラチン質が *Hormotilopsis* 様になり, 藻塊は古くなればオレンジ色に変色するが, 分離種ではゼラチン質の厚さはほぼ一定で, 藻塊は古くなっても変色しないという特徴でこの2種はお互いに異っている。そこで分離種に *Planophila communis* S. WATANABE の名称を与え新種記載した。(606 京都市左京区北白川追分町 京都大学農学部応用植物学研究室)