

**A Colorless, Filamentous Chlorophyceous Alga,
Cladogonium ogishimae Gen. et Sp. Nov.,
Parasitic on Fresh-water Shrimps**

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Abstract

A new ectoparasitic, colorless alga is reported here with the taxonomic description of a new genus and a new species as a member of the Cladophorales. This alga grows on shrimps from Japan. All of the vegetative cells are colorless, but the zoosporangia and the zoospores are furnished with many green chloroplasts.

The decolorization of photosynthetic pigments of algae often occurs in parasitic or saprophytic condition. However, according to Fritsch¹⁾, Korschikoff²⁾ and Smith³⁾, most of these algae belong to unicellular members such as Chlorococcales, Gymnodinioideae, or Chloromonadineae.

In 1939, a saprophytic alga of branched filamentous form was described under the name of *Saprochaete saccharophila* by Coker and Shanor⁴⁾, who thought it to have a close relationship to *Stigeoclonium* of the Chaetophorales. Later, Round and Wills⁵⁾ made some descriptions on this alga, and Bourelly and Denizot⁶⁾ recorded the same species from Ivory Coast of Africa. Wills⁷⁾ again made some additional observations on the alga. Recently, von Stosch⁸⁾ reported the occurrence of this alga in Germany. Another colorless, filamentous, saprophytic alga that has stalked aplanosporangia was reported by Singh⁹⁾ from India. He referred it to the Trentepohliaceae, suggesting its relationship to *Trentepohlia*.

Ogishima¹⁰⁾ in 1950 reported the occurrence of a colorless, filamentous organism that was ectoparasitic on a Japanese fresh-water shrimp. He mentioned about remarkable characteristics of this organism as follows: (i) vegetative cells were colorless, (ii) four ciliated zoospores were formed in large, club-shaped terminal sporangia, (iii) each zoospore contained a green chloroplast, and he referred this organism to the Chaetophorales and suggested it to have a relationship to *Microthamnion*.

Recently the present authors had an opportunity to examine good materials of more or less similar organisms that were collected from several localities in Japan by Dr. Kamita, former Professor of Shimane University (Fig. 1, A). By a precise observation on the cell structure, the authors have concluded that the present alga is a member of a new genus belonging to the Cladophoraceae of Cladophorales.

The cells of this alga are largely vacuolated as in fungoid cells, and mostly several large vacuoles are dispersed in the cytoplasm (Fig. 1, D, Fig. 2, D). By means of staining with iron-aceto-carmin, 4-8 nuclei are evidently observed in a

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cell (Fig. 1, D, Fig. 2, D). The cell wall is composed of two layers. The inner layer shows a typical cellulose reaction when treated with chlor-zinc iodide reagent, but the outer layer does not react with it. There is neither pigmentation nor chloroplast in the vegetative cells. When treated with iodine-potassium iodide reagent, the cell contents do not give starch reaction. However, the mature zoosporangium gives a typical iodine reaction due to the presence of starch. The chloroplasts of zoospores are numerous, discoid and green (Fig. 2, C). The present alga is considered to be closely related to the Cladophoraceae by the following characters: (i) each vegetative cell contains 4-8 nuclei and (ii) the zoospore contains numerous, discoid and green chloroplasts. Because we can not find any described genus whose characters coincide with those of the present alga, we wish to establish a new taxon for it.

Cladogonium Hirose et Akiyama gen.nov.

Thallus e parte erecto et rhizoideo compositus. Pars erecta ramosa, e cellulis

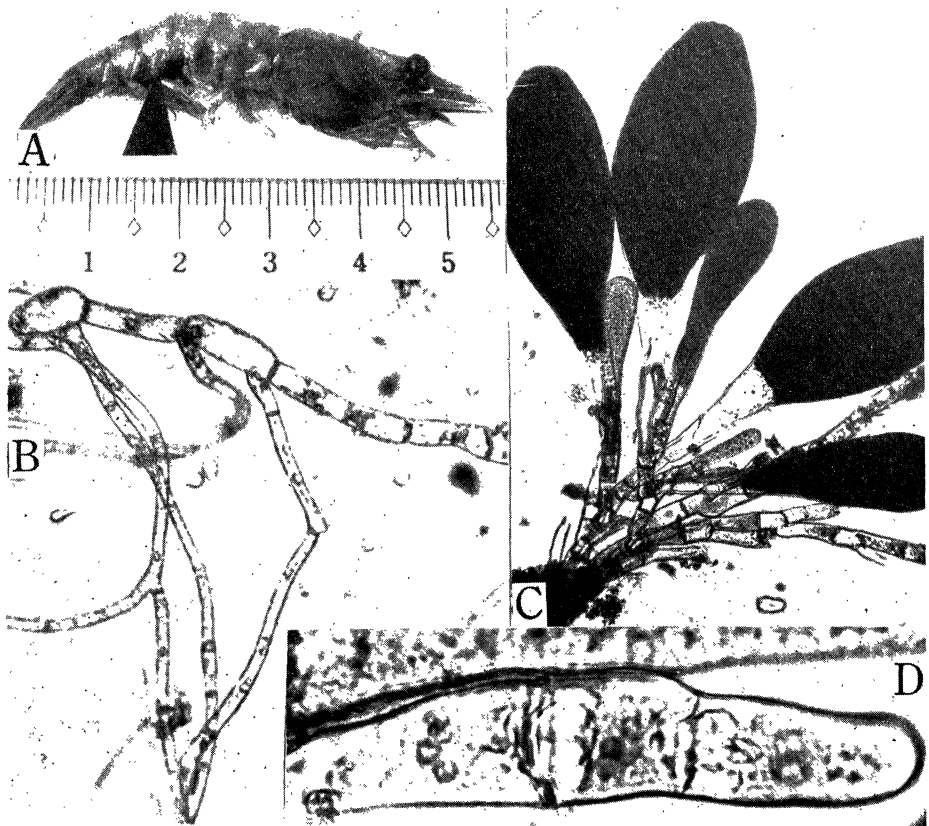


Fig. 1. *Cladogonium ogishimae* A. With a wedge is pointed a portion where ectoparasitic alga is growing on a shrimp, *Macrobranchium longipes*. $\times 1.2$. B. Portion of a thallus showing several rhizoids. $\times 130$. C. Whole view of a thallus. Large club-shaped black portions are all zoosporangia. $\times 90$. D. Young, terminal cell of an erect filament, showing many fungoid vacuoles and several nuclei. $\times 330$.

achromaticis composita. Cellula multos nucleos instructa. Omnis ramus ad zoosporangium terminatus. Zoosporae virides. Pars rhizoidea e cellulis achromaticis composita. Parietis cellulae ex stratis duobus compositus. Stratum interius ex cellulosa constatum.

Thalli composed of erect and rhizoidal systems. Erect system branched, consisted of colorless cells with many nuclei. Branches terminated at swollen zoosporangia. Rhizoidal system composed of colorless cells. Zoospores furnished with green chloroplasts.

Cladogonium ogishimae Hirose et Akiyama sp. nov.

Thallus e parte erecto et rhizoideo compositus. Omnis cellula achromatica praeter zoosporangium quod multas zoosporas virides instructum. Pars erecta ex cellulis multi-nucleatis, 20-30 longis—cylindraccis composita et opposite vel alterne ramosa. Omnis ramus ad zoosporangium longi-claviforme terminatus. Zoospora viridis, quadriciliata. Rhizoideum ex cellulis cylindraccis compositum, ex cellula basilari filamenti erecti exorientum, in contextum hypodermaticum hospitis expansum. Parietis cellulae ex stratis duobus compositus. Stratum interius ex cellulosa constatum. Cellulae filamenti erecti 16-(26.5)-35 μ crassae, 40-(99)-180 μ longae, 4-8 nucleos instructis. Zoosporangium 130-(181.5)-210 μ crassum, 440-(561.5)-790 μ longum. Zoospora viridis, 8-12 μ crassa.

Hab. Plantae in Macrura aquae-dulcis, *Paratya compressa improvisa*, *Macrobranchio longi-pede*, vel *Caridina leucosticta* epiparasiticae.

Thallus composed of an erect portion and a rhizoidal one (Fig. 1, B, C, D. Fig. 2, A, B). Cells colorless excepting of zoosporangia. Zoosporangia furnished with green colored zoospores. Erect portions composed of 20-30, long-cylindrical, multinucleate cells, branched oppositely or alternately and terminated at a large, club-shaped zoosporangium (Fig. 1, C. Fig. 2, A. Fig. 3). Zoospores green and fourciliated (Fig. 2, C). Rhizoids composed of cylindrical cells,

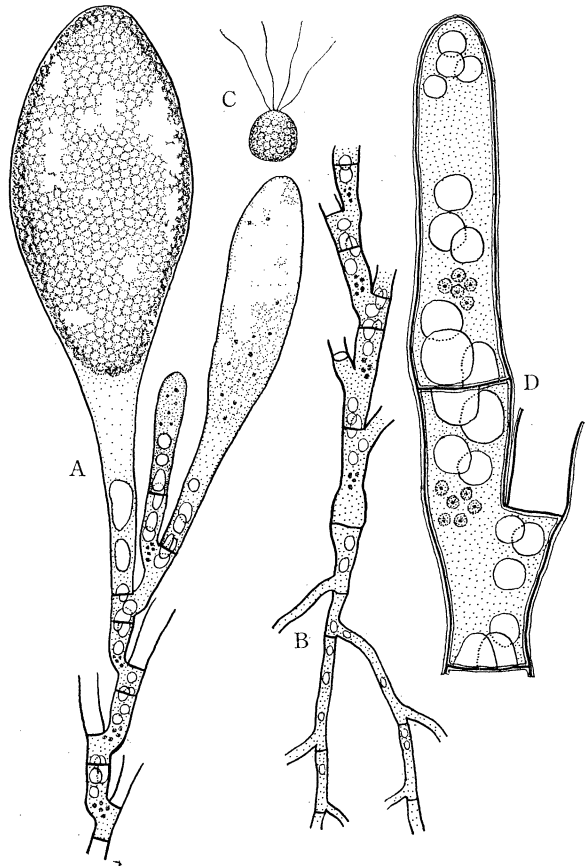


Fig. 2. *Cladogonium ogishimae* A. Apical portion of a thallus, showing young and mature zoosporangia. All component cells are multinucleate and much vacuolated. $\times 130$. B. Basal portion of an erect filament with branched rhizoids $\times 130$. C. Zoospore. $\times 400$. D. Young terminal cell, showing fungoid vacuolation and 5-6 nuclei in a cell. $\times 330$.



Fig. 3. *Cladogonium ogishimae* Zoosporangium, showing many zoospores within it. $\times 130$.

and issued from a basal cell of an erect filaments (Fig. 1, B. Fig. 2, B) and spreaded into hypodermatic tissues of a host. Cell wall composed of two layers and the inner layer consisted of cellulose. Cells of an erect filament $17-(26.5)-35\mu$ in diameter and $40-(99)-180\mu$ in length, furnished with 4-8 nuclei. Zoosporangium $130-(161.5)-210\mu$ in diameter and $440-(561.5)-790\mu$ in length. Zoospores green colored, $8-12\mu$ in diameter.

Hab. Ectoparasitic on fresh-water shrimps, *Paratya compressa improvisa* De Haan, *Macrbranchium longipes* de Haan (Fig. 1, A) and *Caridina leucosticta* Stimpson.

Loc.: Omiya, Saitama Pref. (col. Ogishima in 1950), Yanase, Okawacho, Ehime Pref. (col. Kamita in Aug. 1956), Makawa, Minami-Tanegashima, Kagoshima Pref. (col. Kamita in July 1962). Zoosporophytic type specimen, collected by Dr. T. Kamita at Yanase, Okawacho, Ehime Prefecture in August 1956, deposited in the Herbarium of Faculty of Science, Kobe University.

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