THE OCCURRENCE OF THE GREEN ALGA *PRODODERMA VIRIDE* (CHLOROPHYCEAE) IN MICHIGAN

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ABSTRACT

The epiphytic branched filamentous green alga Protoderma viride is reported from Michigan for the first time. An alga occurring worldwide, its only other report for the Great Lakes region is from Wisconsin. Using light microscopy it was observed from numerous strata from one Upper Peninsula site and several Lower Peninsula locations.

INTRODUCTION

The widely occurring green algal genus Protoderma K¸tzing has been reported from all seven continents and the Pacific Ocean islands (Burova et al. 2011, Guiry 2016). Of the nine species currently accepted taxonomically (six freshwater, three marine; Guiry 2016) only the species Protoderma viride K¸tzing has been reported from as many as six continents, though it is not known from Antarctica. Considering that it is the most widely distributed species of Protoderma (Guiry 2016), it is surprising that it has never been reported from Michigan. The only previous record of its occurrence from the Great Lakes region is from Wisconsin (Prescott 1962).

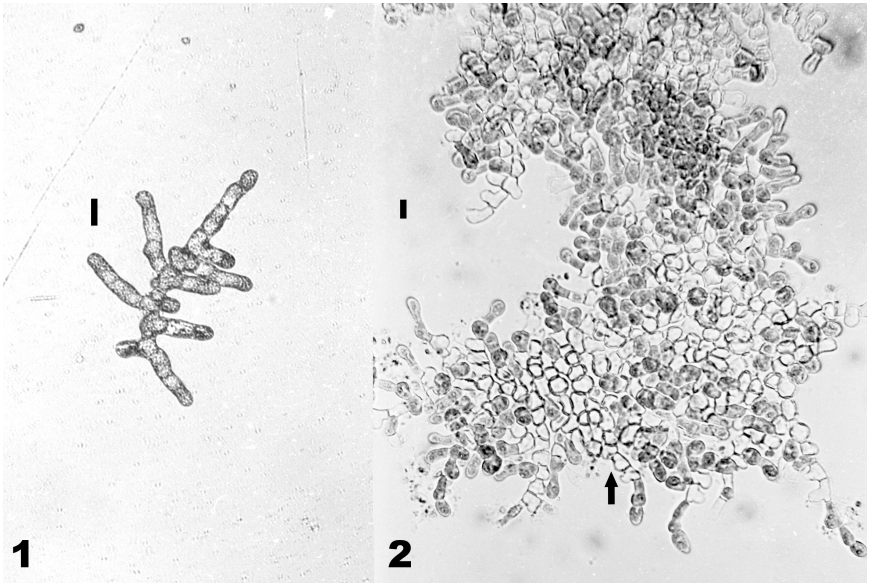
METHODS AND MATERIALS

More than 30 samples containing Protoderma viride were collected throughout Michigan over a 32-years period (summer months 1971ñ2002). The environments from which the collections were taken ranged from lotic to lentic and from shaded to bright light. Protoderma viride K¸tzing was found variously on rocks, pebbles, and macrophytes (e.g., Potamogeton spp., Sagittaria spp., Typha latifolia, and Valisneria americana) or other filamentous algae (e.g., Chaetophora spp., Cladophora glomerata, Oedogonium spp., and Rhizoclonium). For microscopy observations of samples from macrophytes, a portion of a stem or leaf epidermis containing P. viride was stripped and transferred to a Petri dish. In the Petri dish the thallus was either ìteasedî from the epidermis (using fine tipped forceps or a dissecting needle) prior to being mounted on a glass slide, or observed directly on a peeled epidermis. The alga was examined in strewn preparations by using either an A.O. Spencer light microscope (bright field) or a Zeiss Photoscope II light microscope (bright field, phase contrast, Nomarski interference contrast). Three preserved samples are deposited in the Central Michigan University herbarium (CMC).

RESULTS

Samples containing Protoderma viride were collected from: Bay County (the Saginaw River in Bay City); Charlevoix County (Iron Ore Creek, Lake Geneserath, and Font Lake on Beaver Island); Cheboygan County (Burt and Douglas Lakes); Isabella County (the Chippewa River in Mt. Pleasant and Lake Isabella); Kalamazoo County (Gull Lake); Luce County (Manistique Lake); and Midland County (Tittabawassee River in Freeland). Filaments of Protoderma viride are irregularly branched and horizontally growing, closely arranged and semi-radiate. They form a single layer of cells or a pseudoparenchymatous disk (Figures 1 and 2). Each cell possesses a parietal chloroplast and one pyrenoid. Asexual reproduction is by aplanospores or biflagellate zoospores; a palmelloid stage is formed by repeated division of central cells. The cell sizes I observed (3ñ6 µm broad and 7ñ11 µm long) all fell within the range of those previously reported by Prescott (1962), Sarma (1986), John et al. (2011), and Stancheva (2016). These researchers had cell dimensions of widths ranging from 3-8 µm and lengths of 6-18 µm. Biflagellate zoospores were observed being released from both field collected material or short-term cultures.

Protoderma is readily overlooked (as are many other minute encrusting algae) since it is difficult to remove it intact when sampling. It is difficult to distinguish Protoderma from related genera, especially those having a dominant prostrate thallus and few if any erect branches. I observed it from a number of substrata: aquatic plants, wood, stones, and other filamentous green algae (including epilithic, epiphytic, and periphytic habitats).



FIGURES 1 and 2. *Protoderma viride*. Fig 1. Young developing thallus. Scale bar = 10 µm. Fig. 2. Mature pseudoparenchymatous thallus with empty sporangia (arrow). Scale bar = 20 µm.

Protoderma viride can easily be mistaken for a number of other branched or pseudoparenchymatous green algae including Chaetophora, Cladophora, Pseudendoclonium, Pseudouvella, Stigeoclonium (especially young developing thalli) and even unbranched green algae such as Oedogonium or Rhizoclonium. Its cells are usually somewhat smaller than those of the genera listed above with which it may be confused. Frequently, identification of Protoderma is possible only if the zoospores are observed and seen to be biflagellate as they were in the majority of specimens I studied.

It is hoped this brief note will alert other Michigan phycologists, limnologists, and individuals conducting environmental studies to examine their samples a little more closely.

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