

First record of the rare species *Phaeoschizochlamys mucosa* (*Phaeosaccionaceae*) in Bulgaria

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Abstract. Genus *Phaeoschizochlamys* Lemmerm. has been seldom recorded with its type species *P. mucosa* from few localities in Europe and North America. In July 2011, during some phycological studies in the Pirin Mts (Bulgaria), this alga was found in an alpine peat-bog pool. Owing to the world distribution of *P. mucosa* in various types of wetlands, it is assumed that this species has a broad-ranging ecological tolerance. This has contradicted with its rare records until nowadays and obviously requires further investigations.

Key words: algae, ochrophytes, peat bog, *Phaeoschizochlamys mucosa*, Pirin Mts, pool, rare species

Introduction

The capsal genus *Phaeoschizochlamys* Lemmerm. has been seldom recorded with its type species *P. mucosa* in Europe and North America. Its few localities were situated in Germany (Wangerooge region: Lemmermann 1898), Netherlands (Bosthol, Zegveld and Nederhorst den Berg: Dop & al. 1980), Romania (Cluj region: Péterfi 1970, 1974 cit. acc. to Caraus 2002), and U.S.A. (Ontario, Muscoca: Nicholls 1984). Recently, during some phycological investigations of the alpine wetlands of the Pirin Mts, a National Park and UNESCO Monument of Cultural and Natural Heritage in Bulgaria, this alga was recorded in a small peat-bog pool in the large, polystructural wetland complex of Popovi Ezera (IWB 9084 in Michev & Stoyneva 2007).

Material and methods

The peat bog, sampled on 20.07.2010, was situated at ca. 2205 m a.s.l. on the geographical left side of the in-

flow into lake Popovo Ezero 5 (IWB 0451 in Michev & Stoyneva 2007), which runs from lake Popovo Ezero 2 (IWB 0447 in Michev & Stoyneva 2007) – Fig. 1. Its coordinates are 41°42'41.30" N 23°30'36.70" E. The peat bog lacked any large open-water surface, but con-



Fig. 1. View of lake Popovo Ezero 5, with the studied peat bog on the left side of the photo.



Fig. 2. Sampling in the peat bog inhabited by *Phaeoschizochlamys mucosa*.

tained some small pools (Fig. 2). The water temperature was 24 °C, pH – 6.1 and conductivity – 8 μ S.

The algal sample was collected in a plastic tube and immediately fixed with 4 % formaline final concentration. The material was checked in the lab on non-permanent slides by light microscopy (LM), on Motic BA 400 microscope equipped with immersion and phase contrast objectives. According to the standard procedure, the algae were stained with Iodine solutions, Methylene Blue and Gentian Violet for revealing starch, mucilage and cell wall structures (e.g. Ettl & Gärtner 1995). The photos were taken by a Moticam 2000 camera and the images have been processed by a special Motic Images Plus 2.0 program.

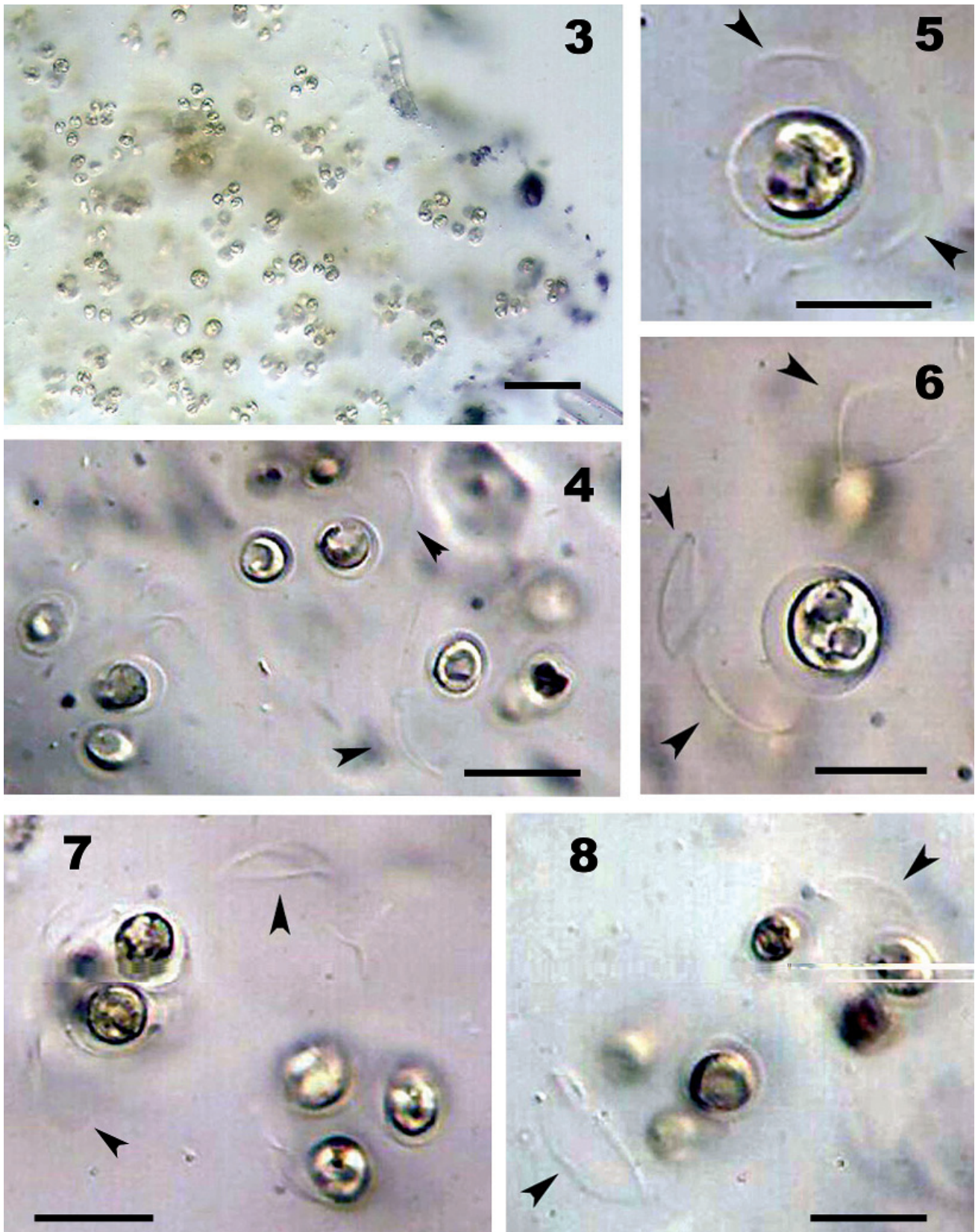
Results

The alga appeared in smaller or larger oval mucilage “colonies”, which contained ovoid or spherical cells, (5)–6–9 μ m in diameter (Figs 3, 4). The cell wall was visible as smooth, surrounded by a more or less thin spherical mucilage sheath (Figs 5, 6). Each cell contained one or two lobed golden-brown plastids, located parietally (Figs 3–8). Pyrenoids have not been seen. Some pairs of closely adpressed cells, which resembled juvenile autospores, have been observed (Fig. 7). Remnants of the mother cell wall persisted in the jelly around single cells, or above groups of 2–4–8 cells, but were better visible at higher magnification (Figs 3–8). Stomatocysts and zooids have not been seen.

Discussion

The morphology of the found alga is in conformity with the description of the rare taxon *Phaeoschizochlamys mucosa*, with its main identifying feature – cup-shaped remnants of the mother cell wall visible in the common jelly matrix. For this species, found first on the Frisian Island of Wangerooge in Germany, Lemmermann (1898) listed cell size of 4–8 μ m. Later on, studying Dutch material in cultures, Dop & al. (1980) recorded a size range of 6 μ m for newly released autospores and up to 9.5 μ m for vegetative cells, but did not consider this minor difference significant. The same size of 6–9 μ m in diameter was indicated for the North American materials by Nicholls (1984), who emended the data with measurement of the cells during autospore formation, when the diameter could reach 12 μ m. The sparse physical and chemical information on the world habitats, where *P. mucosa* was detected, prevented us from drawing a well-grounded conclusion about the species ecology. However, its finding in various types of wetlands with different type of morphometry, water movement, halinity, pH and altitude location (e.g. freshwater and brackish swamps, pools and ditches in the Wangerooge Island of Germany and in the central western part of the Netherlands – near Zegveld and Nederhorst, all at ca. -3–2 m a.s.l., a mountain creek in Ontario at ca. 450 m a.s.l. and a peat pond near Bosthol in the Netherlands at ca. -2 m a.s.l., in the Salicea meso- to eutrophic acid peat-bogs in Romania at ca. 650 m a.s.l., together with our find in slightly acid waters of a small alpine peat bog at ca. 2205 m a.s.l.), points out the broad-ranging tolerance of this species, which runs contrary to its rare finding until nowadays and obviously requires further investigation.

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Figs 3-8. *Phaeoschizochlamys mucosa* Lemmerm.: 3, General view of the capsal alga at magnification 40× after staining with Methylene Blue, which reveals the margin of the thallus, scale bar – 20 μm; 4-8, Single cell and groups of two-four cells, observed with higher magnification (100×) and immersion revealing the typical for the species cup-shaped remnants of the mother cell walls (indicated by arrows) after staining by Iodine, scale bar – 10 μm.

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