



A new species of *Chrysophaerella* (Chrysophyceae: Chromulinales), *Chrysophaerella rotundata* sp. nov., from Finland

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Abstract

Chrysophaerella rotundata sp. nov. is described from a small lake in Finland. Ultrastructural morphology of *C. rotundata* scales is similar, even identical, to the morphology of *C. brevispina* scales. However, *C. rotundata* possesses three types of scales: scales characterized by a circular or almost circular outline were found in addition to the larger and smaller oval scales. Significant genetic differences were recognized in ITS rDNA sequences between *C. rotundata* and *C. brevispina*. Results of the molecular analyses and the observed morphological variation of scales have been discussed, clearly showing the existence of a hidden diversity within the genus *Chrysophaerella*.

Introduction

The genus *Chrysophaerella* Lauterborn (1896: 16) represents free-living, autotrophic organisms covered with siliceous scales and spines and bearing two flagella of unequal length. Cells may be solitary or grouped in more or less spherical colonies. Two colonial taxa, *C. longispina* Lauterborn (1896: 16) and *C. brevispina* Korshikov (1942: 31) emend. Harris & Bradley (1958: 75) are commonly found in freshwater habitats (Kristiansen & Preisig 2001). Taxonomy of the genus *Chrysophaerella* is based on ultrastructure of siliceous scales and spines, and the images of *C. longispina* and *C. brevispina* include both transmission and scanning electron micrographs (e.g. Nicholls 1980, Cronberg & Kristiansen 1980, Siver 1993). The phylogenetic position of the genus *Chrysophaerella* was reported by Andersen (2007) based on uncultured and unidentified isolates. Subsequently, SSU rDNA and *rbcL* sequences of cultured *C. brevispina* and *C. longispina* corroborated the phylogenetic position of *Chrysophaerella*, which is firmly placed into the clade comprising naked chrysophyte genera *Chrysamoeba* Klebs (1893: 407), *Chromulina* Cienkowski (1870: 435), and *Oikomonas* Kent (1880: 230, 250) (Škaloud *et al.* 2013).

The detailed ecological study of *C. brevispina* and *C. longispina* has been published by Siver (1993), who investigated their distribution along seasonal, temperature, pH, specific conductance, and total phosphorus gradients. *Chrysophaerella brevispina* and *C. longispina* have been proposed to be distributed primarily in the winter and the summer/autumn months, respectively. Both taxa were found to be primarily distributed at pH 5 to 7, and in waters having low specific conductance. However, *C. brevispina* has been proposed to tolerate higher trophic and conductance conditions, which could explain its more common occurrence (Siver 1993).

Colonial *Chrysophaerella* species are widely distributed worldwide (Siver 1993). Both species have been reported from Finland as well (e.g. Hällfors & Hällfors 1988, Ikävalko 1994). During our investigation of Finnish chrysophyte flora in the spring of 2012, we reported *Chrysophaerella* taxa in several investigated localities. Besides *C. brevispina* colonies bearing morphologically typical silica scales, some isolated colonies were partially covered by distinct, rounded scales. Therefore, we aimed to further investigate the morphology and phylogenetic position of this organism.