Phytotaxa 221 (3): 247–264
www.mapress.com/phytotaxa/

Article

ISSN 1179-3155 (print edition)
PHYTOTAXA
ISSN 1179-3163 (online edition)

http://dx.doi.org/10.11646/phytotaxa.221.3.3

Type analysis of *Cymbella schubartii* and two new *Encyonopsis* species (Bacillariophyceae) from southeastern Brazil

SIMONE WENGRAT[1*], GISELE C. MARQUARDT[1], DENISE C. BICUDO[1], CARLOS E. DE M. BICUDO[1], CARLOS E. WETZEL[2] & LUC ECTOR[2]

[1] *Instituto de Botânica, Department of Ecology, Av. Miguel Estéfano 3687, 04301–012 São Paulo, SP, Brazil*
[2] *Luxembourg Institute of Science and Technology (LIST), Environmental Research & Innovation (ERIN) Department, 41 rue du Brill, L-4422 Belvaux, Grand-duchy of Luxembourg*
** Corresponding author (E-mail: siwbio@gmail.com)*

Abstract

The type material of *Cymbella schubartii* was studied in order to clarify the differences and similarities within the complex of *Encyonopsis* species observed in southeastern Brazilian water bodies. Detailed examination using light and scanning electron microscopy of modern populations led us to propose two new *Encyonopsis* species, which are here described in details. Morphometric analysis of the valve shape supported the separation of four species: *Encyonopsis schubartii*, *E. difficilis*, *E. sanctipaulensis*, *sp. nov*. and *E. linensis*, *sp. nov*. Additionally, *Cymbella perpusilla* var. *moreirae* is formally transferred to the genus *Encyonopsis*. Regarding their ecological preferences, these species were found in rivers and reservoirs, especially in oligotrophic and oligo-mesotrophic environments.

Key words: Diatoms, *Encyonopsis*, geometric morphometry, new species, type material, ultrastructure

Introduction

Diatoms belonging to genus *Encyonopsis* Krammer (1997a: 156) constitute a heterogeneous group both morphologically and ecologically, mostly reported in oligotrophic systems (*e.g.* Krammer 1997b). The genus derived from *Cymbella* C. Agardh (1830: 1) and was described to accommodate a series of small to moderately large freshwater species. The main morphological characteristics that distinguish it from *Cymbella*, *Cymbopleura* Krammer (1999: 292), *Encyonema* Kützing (1833: 589) and recently, *Kurtkrammeria* Bahls (2015: 170); include: i) valves weakly dorsiventral, sometimes even naviculoid, ii) filiform raphe, slightly ventrally curved, with distal fissures turned to the ventral side and proximal endings dorsally turned, iii) absence of both apical pore fields, iv) isolated pores (stigmata and stigmoids) may be present on the dorsal side of the central area, and v) presence of small, rounded to transapically elongated areolae arranged in uniseriate striae (Krammer 1997b, Van de Vijver *et al*. 2012, Potapova 2014).

Krammer (1997b) transferred many species previously belonging to *Cymbella* and described several new taxa of *Encyonopsis*. According to the Catalogue of Diatom Names database (Fourtanier & Kociolek 2011), more than 77% of the 129 *Encyonopsis* species and varieties were described by Krammer (1997b). More recently, there has been an increase in the description of new *Encyonopsis* taxa, including studies in Europe (Van de Vijver *et al*. 2009, 2012), Siberia (Potapova *et al*. 2014), and important contributions in North America with the proposal of 20 new species of *Encyonopsis* (Bahls 2013, Graeff & Kociolek 2013). Furthermore, some new *Encyonopsis* species from Costa Rica, Panama and Réunion Island were described by Wydrzycka & Lange-Bertalot (2001), Metzeltin & Lange-Bertalot (2009) and Le Cohu *et al*. (2014).

Most species of the *Encyonopsis schubartii* (Hustedt) Krammer complex were described by studies in South America. *Encyonopsis difficilis* (Krasske) Krammer (1997b: 121) was described from Chile by Krasske (1939: 403 as *Cymbella difficilis*) and subsequently reported as common epiphytic in *Sphagnum* in Santanna, Brazil (Krasske 1948). *Encyonopsis schubartii* (Hustedt) Krammer (1997b: 125) was originally described from Lagoa de Carrinho, municipality of Pirassununga, São Paulo State, Brazil (Hustedt 1955: 59 as *Cymbella schubartii*). *Encyonopsis difficiliformis* Krammer was described from Chile (Krammer 1997b: 122) and *E. subcapitata* Krammer from Venezuela (Krammer 1997b: 127).

Accepted by Saúl Blanco Lanza: 11 Jul. 2015; published: 4 Aug. 2015