



Transfer of *Fragilaria atomus* Hust. to the genus *Stauroforma* (Bacillariophyta) based on observation of type and newly collected material

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Abstract

Fragilaria atomus was described from a brackish water lagoon in southern Finland and has subsequently been reported from several localities worldwide. However, due to its small size, it can be easily mistaken with other small, morphologically similar araphid diatoms. To clarify the morphological, metric and structural features of the species, lectotype material from BRM (Hustedt's diatom collection) and specimens from salt marshes in Brazil were studied using light and scanning electron microscopy. *Fragilaria atomus* is compared to seven morphologically similar taxa belonging to *Fragilaria*, *Stauroforma* and *Psammoneis*. The results revealed that some important features of *Fragilaria* (discoïd closing plates, rimoportulae and spines) are not present in *F. atomus*. The absence of these structures, together with the opposite striation pattern, round areolae, features of the apical pore field, and reduced or absent sternum, suggest that a transfer of *F. atomus* to *Stauroforma* is appropriate. The distribution and ecology of *F. atomus* is discussed.

Key words: araphids, Bacillariophyceae, Brazil, diatoms, *Fragilaria atomus*, Hustedt Collection, salt marsh, South America, *Stauroforma*, taxonomy, type material

Introduction

Araphid diatoms are well represented in planktonic and periphytic communities of freshwater lakes (Morales 2001). Studies from brackish habitats have shown that araphid diatoms are also important components of the diatom community in these environments (Witkowski & Lange-Bertalot 1993, Sabbe & Vyverman 1995, Vilbaste *et al.* 2000, Witkowski *et al.* 2000, Morales 2001, Garcia 2006, Horton *et al.* 2006, Ulanova *et al.* 2009).

Since the 1980s, ultrastructural studies have revealed high morphological diversity in *Fragilaria* Lyngb. (1819: 182). Rosen & Lowe (1981) were among the first to observe specimens from *Fragilaria sensu lato* using the scanning electron microscope. Thereafter, Round (1984), Poulin *et al.* (1986) and Williams & Round (1987) followed with observations and revisions of *Fragilaria sensu lato*. Williams & Round (1987, 1988) described four new genera of fragilarioids: *Fragilariforma* D.M. Williams & Round (1988: 265), *Pseudostaurosira* D.M. Williams & Round (1987: 276), *Punctastriata* D.M. Williams & Round (1988: 278), *Staurosirella* D.M. Williams & Round (1987: 274) and revised the circumscription of both *Fragilaria* and *Staurosira* Ehrenb. (1843: 45) (Williams & Round 1987: 276). Subsequently, Flower *et al.* (1996) described *Stauroforma* Flower, V.J. Jones & Round (1996: 53) and Morales (2001, 2002) described *Pseudostaurosiroopsis* E. Morales (2001: 116) and *Sarcophagodes* E. Morales (2002: 111). Thus, eight genera have been resurrected or newly derived from *Fragilaria sensu lato*, and revision on type material continues (Morales 2001, Morales & Edlund 2003, Morales & Manoylov 2006, Tuji & Williams 2006, 2008, Ács *et al.* 2009, Morales *et al.* 2012).

Cleve & Grunow (1880: 98), *Planothidium delicatulum* (Kütz.) Round & Bukht. (1996: 353) and *Pseudostaurosira brevistriata* (Grunow) D.M. Williams & Round (1987: 276). In this investigation and in the other studies from the Americas, the species was present together with the following species: *Anaulus balticus* Simonsen (1959: 74), *Catenula adhaerens*, *Cyclotella choctawhatcheeana* A.K.S. Prasad in Prasad *et al.* (1990: 419), *Desikaneis gessneri* (Hust.) A.K.S. Prasad in Prasad & Livingston (1993: 435), *Fallacia florinae* (M. Møller) Witkowski (1993b: 215), *N. frustulum*, *N. minutula* Grunow in Van Heurck (1881: pl. 69, fig. 5), *Placoneis sovereignae* (Hust.) Torgan & Donadel in Torgan *et al.* (2010: 113), *P. delicatulum*, *Tryblionella apiculata* W. Greg. (1857: 79) and diverse araphid diatoms.

This is the first time *S. atomus* has been recorded from South America including illustrations. It is possible that the species is widely distributed in salt marshes and coastal regions of the world. More studies carried out in these regions should corroborate this hypothesis.

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