



## Analysis of the type material of *Navicula brachysira* Brébisson with the description of *Brachysira sandrae*, a new raphid diatom (Bacillariophyceae) from Iles Kerguelen (TAAF, sub-Antarctica, southern Indian Ocean)

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### Abstract

During a study of the freshwater diatom flora of some hot springs on the sub-Antarctic Kerguelen Islands, an unknown *Brachysira* species was observed. Detailed morphological analysis using both light and scanning electron microscopy observations revealed sufficient morphological differences to separate this species as *Brachysira sandrae* sp. nov. The new species belongs to the complex of taxa around *B. brebissonii*. The type material of *Navicula brachysira*, most likely the type of *B. brebissonii*, was studied to reveal its morphological ultrastructure. The new species is compared with *B. brebissonii* and with similar *Brachysira* taxa worldwide.

**Keywords:** *Brachysira*, *Navicula brachysira*, sub-Antarctica, Iles Kerguelen, morphology, new species

### Introduction

Although described in 1836 by Kützing, it was not until 1981 that the genus *Brachysira* Kütz (1836: 153) was morphologically better characterized and separated from the, at that moment, more generally used genus *Anomoeoneis* Pfitzer (1871: 77). Despite this characterization, the genus remained quite species poor with only fifteen known taxa until 1994 when a new monograph was published by Lange-Bertalot & Moser (1994) containing 67 taxa, of which 34 were described as new to science. Fourtanier & Kociolek (2011) currently list 138 records of *Brachysira*, mostly from Lange-Bertalot & Moser (1994), Moser *et al.* (1998) and Metzeltin & Lange-Bertalot (2007). Morphologically, the genus is characterized by rather linear, lanceolate or rhombic valves with an ornamented valve face (spines, ridges, warts); uniseriate striae composed of transapically elongated areolae, internally closed by hymenes, two sets of ribs, one surrounding the valve margin and one bordering the raphe; and a narrow raphe sternum with straight raphe branches and simple proximal and distal raphe endings. The genus is globally widespread and often associated with acid, oligotrophic and oligosaprobic conditions (Round & Mann 1981, Lange-Bertalot & Moser 1994).

One of the globally most widespread taxa is *Brachysira brebissonii* R.Ross (in Hartley 1986: 607). The species was originally described in 1849 by Kützing as *Navicula aponina* var. *brachysira* Kütz. (1849: 69). Wolfe & Kling mention as one of the synonyms *Navicula brachysira* Bréb. (in Rabenhorst 1853: 66). In the collection of the Botanic Garden Meise, material from Falaise of *Navicula brachysira* Brébisson, sent by de Brébisson, was found. This material has never been investigated with scanning electron microscopy techniques.

Although the environmental conditions in the sub-Antarctic region (Van de Vijver & Beyens 1996, 1999, Van de Vijver *et al.* 2001, 2004, 2008) are comparable to the (sub-)Arctic region, the genus *Brachysira* is almost absent in this region. The only taxon that is present with 100% certainty is *Brachysira minor* (Krasske 1939: 377) Lange-Bert. (in Lange-Bert. & Moser 1994: 47), described from southern Chile (Krasske 1939) but reported from various islands and archipelagos in the southern Atlantic Ocean [sub-Antarctic and Maritime Antarctic localities such as South Georgia (Van de Vijver & Beyens 1996), South Shetland Islands (Zidarova 2008, Kopalová & Van de Vijver 2013) and James Ross Island (Kopalová *et al.* 2012, 2013, 2014)]. Kellogg & Kellogg (2002) list only three *Brachysira* taxa that are found in the (sub-)Antarctic region: *B. aponina* Kütz. (1836: n° 154) (2 records), *B. microcephala* (Grunow 1867: 19) Compère (1986: 26) (1 record) and *B. serians* (Bréb. In Kütz. 1844: 92) Round & D.G.Mann (1981: 227)

limited to three, equally shaped areolae. The combination of these differences justify the separation of the Kerguelen populations from *B. brebissonii* and their description as a new species.

*Brachysira neoexilis* Lange-Bert. (in Lange-Bertalot & Moser 1994: 51) is usually smaller with narrower valves (valve width 3–5 µm) and clearly rostrate to even capitate apices giving the valves always a narrower outline. The species also shows a higher stria density (30–36 in 10 µm vs. 29–31 in *B. sandrae*). Conspecificity and confusion is hence to be excluded. *Brachysira lehmanniae* Lange-Bert. & Gert Moser (1994: 40) has a more rhombic outline with a larger valve width (8–9.5 µm) and never protracted, broadly rounded apices. *Brachysira manfredii* Lange-Bert. (in Lange-Bertalot & Moser 1994: 44) has more lanceolate valves with acutely rounded, never protracted apices and a lower stria density (24.5–26.5 in 10 µm) (Lange-Bertalot & Moser 1994). Finally, *B. guttiformis* Gert Moser, Lange-Bert. & Metzeltin (1998: 95) has a comparable, though slightly more rhombic-lanceolate valve outline but a lower stria density (22–24 in 10 µm) and has up to 5 areolae per stria (versus 2–4 in *B. sandrae*) (Moser *et al.* 1998).

## Acknowledgements

Ir. Marc Lebouvier is thanked for collecting the Val Travers samples. Sampling on Kerguelen has been made possible thanks to the logistic and financial support of the French Polar Institute-Paul-Emile Victor in the framework of the terrestrial program 136 (Marc Lebouvier & Yves Frenot). Part of the research was funded within the BELSPO project CCAMBIO. Dr. Alex Ball, the staff of the IAC laboratory and Dr. Eileen J. Cox at the Natural History Museum are thanked for their help with the scanning electron microscopy.

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