Observations and typification of *Navicula serians* var. *thermalis* Grunow and its transfer to the genus *Brachysira*

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Navicula serians var. *thermalis* Grunow (in Van Heurck 1880: pl. 12: fig. 10) was originally described from unspecified hot springs in Eastern Asia ("*in Thermen Ostindiens*") based on Grunow sample 928. Based on the notes in Grunow's accession books, the sample was collected in 1865 and given to Grunow by the Czech palaeontologist Ferdinand Stoliczka (1838–1874), who made several expeditions to Burma, the Malay Peninsula, Singapore, and the Himalayas. A more precise locality where the sample was collected is not given. The same sample also served as type material for *Achnanthes gibberula* Grunow (in Cleve & Grunow 1880: 22), which was transferred to the genus *Crenotia* as *C. gibberula* (Grunow) Wojtal in 2013, although the type of *Achnanthes gibberula* was probably not investigated closely (Van de Vijver, pers. comm.). Grunow illustrated his new *N. serians* variety by a single line drawing in Van Heurck's *Synopsis des Diatomées de Belgique* (1880). The original cut out for this drawing is kept at **W** (Vienna, Austria) and is the only original information we have for *N. serians* var. *thermalis* (Fig. 1). The taxon is extremely rare in the sample, which is also indicated by Grunow, who did not even list it for sample 928 in his accession book.

The taxonomic history of this taxon is convoluted. In 1895, Cleve transferred *N. serians* var. *thermalis* to the genus *Anomoeoneis* as *A. exilis* var. *thermalis* (Grunow) Cleve (1895: 8). Müller (1898: 66) placed it as a variety of *Navicula exilis* (Kützing) Grunow in the subgenus *Anomoeoneis* and named it *N. exilis* var. *thermalis* (Grunow) O.Müller. Hustedt (1930: 264) questioned the combination of var. *thermalis* with *A. exilis* and proposed to treat it as a form of *Anomoeoneis serians* var. *brachysira* [as *A. serians* var. *brachysira* f. *thermalis* (Grunow) Hustedt)], basing his transfer on the more bluntly rounded apices and sturdier valve outline. He commented that he saw a lot of var. *serians* and var. *brachysira* together in samples and that several valves showed the typical protracted apices of Grunow's var. *thermalis*. Later, Cleve-Euler (1953) transferred the variety *thermalis* to *Anomoeoneis brachysira*, invalidly employing the designation "*A. brachysira* β *thermalis*" (Grunow) A.Cleve. In the same year, Woodhead & Tweed (1953: 121) suggested a similar transfer, but as a form [*A. brachysira* f. *thermalis* (Grunow) Woodhead & Tweed]. Finally, when Ross (1986: 607) transferred *A. brachysira* to the genus *Brachysira*, renaming it *B. brebissonii* R.Ross, he included var. *thermalis* as a form of the latter [*B. brebissonii* f. *thermalis* (Grunow) R.Ross]. Wolfe & Kling (2001: 248, 250) stated that this taxon can only be considered a synonym of *B. brebissonii*. However, all these taxonomic treatments are solely based on the single line drawing in Van Heurck (1880) and did not involve analyses of the original Grunow type material from Eastern Asia (Ostindien).

Several hundreds of the original Grunow samples are conserved in the Van Heurck collection, part of the **BR** herbarium (Meise Botanic Garden, Belgium), and include Grunow sample 928. Although the sample only contained a few valves of *N. serians* var. *thermalis*, the observations made from the slide allowed a much better understanding of its correct taxonomic identity. Comparison of LM observations of type material of *B. brebissonii* (Van de Vijver 2014) and the valves found in Grunow sample 928 (Figs 2–7) indicated clear differences excluding a possible link between these taxa. Additional morphological details as seen through SEM show that the valve outline is clearly undulating and that the stria density is very high (Fig. 8). We therefore propose to separate *N. serians* var. *thermalis* from *B. brebissonii* and raise it to species level as *Brachysira thermalis*

(Grunow) Van de Vijver & T.M.Schuster *comb. et stat. nov*., and Grunow sample 928, conserved in **BR** (**BR**-4648), is here designated as the lectotype.

Brachysira thermalis (Grunow) Van de Vijver & T.M.Schuster, *comb. et stat. nov*. (Figs 2–8)

Basionym: *Navicula serians* var. *thermalis* Grunow in Van Heurck *Synopsis des Diatomées de Belgique, Atlas*, pl. XII [12], fig. 10, 1880

Lectotype **designated here**: **BR-4648** Grunow sample 928 (*Thermen Ostindiens*, leg. F. Stoliczka s.n., 1865), material archived at the Van Heurck collection (**BR**). The lectotype is represented by Figs 2–8.

Isolectotypes: slide W0164801 and slide W0164802, both from Grunow sample 928 (**W**).

Homotypic synonyms: *Anomoeoneis exilis* var. *thermalis* (Grunow) Cleve (1895). *Navicula exilis* var. *thermalis* (Grunow) O.Müller (1898), *Anomoeoneis serians* var. *brachysira* f. *thermalis* (Grunow) Hustedt (1930), *Anomoeoneis brachysira* var. *thermalis* (Grunow) A.Cleve (1953), *Anomoeoneis brachysira* f. *thermalis* (Grunow) Woodhead & Tweed (1953), *Brachysira brebissonii* f. *thermalis* (Grunow) R.Ross (in Hartley 1986)

Description: Valves elliptic-lanceolate with convex margins, clearly undulating in larger valves (Fig. 2). Apices clearly protracted rostrate to subcapitate. Valve dimensions (n=6): length 17–27 µm, width ca. 6 µm. Axial area narrow, linear. Central area almost non-existent, very small, elliptical, apically elongated. Raphe filiform, straight with simple central endings. Terminal raphe fissures not discernible in LM. Striae hardly visible in LM, very fine, radiate throughout, 30–35 in 10 µm.

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Cleve, P.T. & Grunow, A. (1880). Beiträge zur Kenntniss der arctischen Diatomeen. *Kongliga Svenska Vetenskaps-Akademiens Handlingar* 17(2): 1–121, 7 pls.

Cleve-Euler, A. (1953). Die Diatomeen von Schweden und Finnland. Teil III. Monoraphideae, Biraphideae 1. *Kungliga Svenska Vetenskapsakademiens Handlingar, ser. IV* 4(5): 1–255, figs 484–970.

Hartley, B. (1986). A check-list of the freshwater, brackish and marine diatoms of the British Isles and adjoining coastal waters. *Journal of the Marine Biological Association of the United Kingdom* 66(3): 531–610.

Hustedt, F. (1930). Bacillariophyta (Diatomeae) Zweite Auflage. In: Die Süsswasser-Flora Mitteleuropas. Heft 10. (Pascher, A. Ed.), pp. [i]–vii, [1]–466. Jena: Verlag von Gustav Fischer.

Müller, O. (1898). Bacillariales aus den Hochseen des Riesengebirges. *Forschungsberichte aus der Biologischen Station zu Plön* 6: 48–84, pl. III.

Van de Vijver, B. (2014). 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). *Phytotaxa* 184(3): 139–147, 52 fig.

Van Heurck, H. (1880). Synopsis des Diatomées de Belgique Atlas. pls I–XXX [pls 1–30]. Anvers: Ducaju et Cie.

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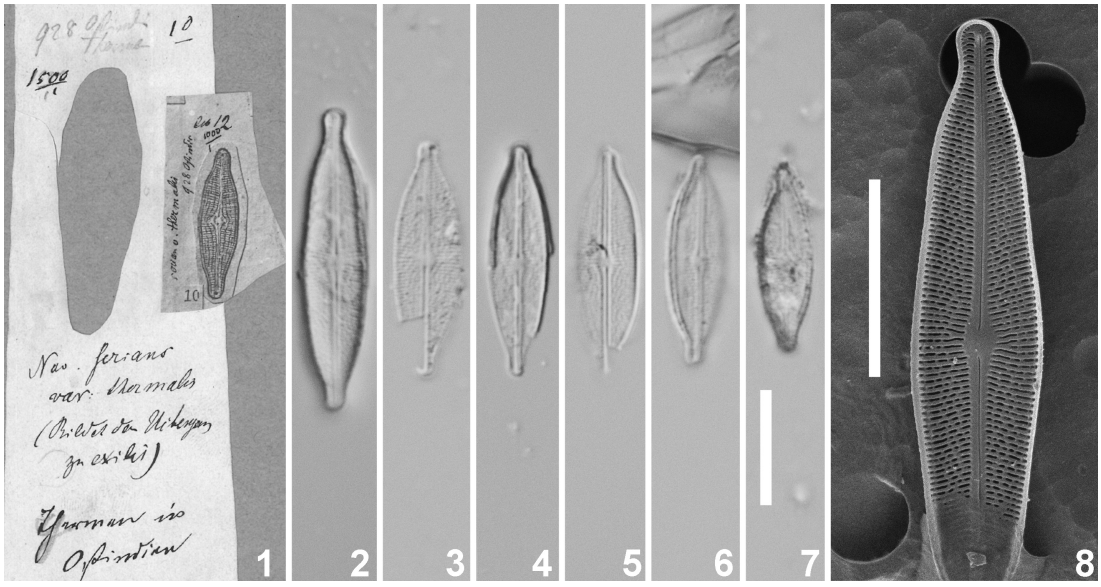
Wolfe, A.P. & Kling, H.J. (2001). A consideration of some North American soft-water *Brachysira* taxa and description of *B. arctoborealis* sp. nov. In: Lange-Bertalot-Festschrift: Studies on Diatoms. Dedicated to Prof. Dr. Dr. h.c. Horst Lange-Bertalot on the occasion of his 65th Birthday. (Jahn, R., Kociolek, J.P., Witkowski, A. & Compère, P. Eds). Berlin: A.R.G. Gantner Verlag, K.G.

Woodhead, N. & Tweed, R.D. (1953). The freshwater algae of Anglesey and Caernarvonshire. *The North Western Naturalist*, series 2, 25: 85–122, 255–296, 392–435, 564–602.



Figs 1–7. *Brachysira thermalis* (Grunow) Van de Vijver & T.M.Schuster, *comb. et stat. nov.* LM and SEM pictures taken from the lectotype population (Grunow sample 928, *Thermen Ostindien*, **BR**-4648). **Fig. 1.** Original drawing from the Grunow drawing collection (**W**) of *Navicula serians* var. *thermalis* Grunow. **Figs 2–7.** LM views. **Fig. 8**. SEM internal view. Scale bars = 10 µm.