Analysis of the type material of *Achnanthidium jackii* Rabenhorst (Bacillariophyta, *Achnanthidiaceae*)

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*Achnanthidium jackii* Rabenhorst (1861: n° 1003) was described in 1861 by Rabenhorst from decaying plants and algae from “Quellwasser bei Salem” (Municipality of Baden-Württemberg State, southern Germany). This species was named for the collector, Ap[othekar] Jack. The species was transferred several years later by Grunow to *Achnanthes linearis* var. *jackii* (Rabenhorst) Grunow (in Van Heurck 1880: pl. 27: fig. 24). Lange-Bertalot & Ruppel (1980: 20) lectotypified the species, choosing the exsiccatia material 1003 (sub n° ZU 2/37), present in the Hustedt Collection (Bremerhaven, BRM) as the lectotype. The exsiccatia published by Rabenhorst under the title *Algen Europa’s* (1861-1882) was distributed to a large number of herbaria and research institutes worldwide, each having today a (relatively) complete set of this material. Material of *Achnanthidium jackii* from the Salem source was studied several times by various authors although never in full detail. Lange-Bertalot & Ruppel (1980) showed two light micrographs (LM) (Lange-Bertalot & Ruppel 1980: figs 120, 121) from the lectotype, together with several other figures representing *A. jackii* from different localities. More light micrographs of the type appeared in Lange-Bertalot & Krammer (1989, pl. 51: figs 22–26’) and Potapova & Hamilton (2007, figs 4 i, j). The latter authors also showed four scanning electron microscopy (SEM) pictures (Potapova & Hamilton 2007, figs 3a–d). Unfortunately, to date a detailed analysis of *A. jackii* had not been made.

Novais *et al.* (2015) analysed several varieties of the *Achnanthidium minutissimum* (Kützing) Czarnecki (Czarnecki 1994: 157) including *Achnanthes minutissima* var. *cryptocephala* Grunow (in Van Heurck 1880: pl. 27, figs 41–44). The latter, based on type material from Belgium (Van Heurck Type du Synopsis des diatomées de Belgique n° 238), was characterized by the presence of a fairly large fascia in the central area, protracted, rostrate to subcapitate apices and weakly radiate striae on both valves composed of 3–4, rarely two areolae. This variety was recombined as *Achnanthidium neocryptocephalum* (Grunow) Novais & Van de Vijver (in Novais *et al.* 2015: 116). The type population examined showed a large similarity with (the few) illustrations of the type *A. jackii* making a detailed analysis of the latter type necessary to examine possible conspecificity.

Here we detail, using LM and SEM observations, the original Rabenhorst material (*Alg. Europa’s* n° 1003) of *A. jackii* using the exsiccatia material present in the Van Heurck collection at Botanic Garden Meise (BR), Belgium. A comparison between both taxa is made.

*Achnanthidium jackii* Rabenhorst (Figs 1–22)

Light microscopy (Figs 1–17): Frustules in girdle view rectangular, weakly arched with slightly recurved apices. Valves linear-lanceolate to weakly lanceolate with more or less convex margins and broadly rounded, protracted, rostrate apices. Valve dimensions (n=30): length 8–17 µm, width 3.0–3.9 µm. Raphe valve concave (Figs 3–10). Axial area narrow, linear, only very weakly widening towards the central area. Central area forming a clear, often asymmetrical, fascia. Shortened striae absent in the central area. Raphe filiform, straight with indistinct proximal raphe...
endings. Terminal raphe fissures indiscernible in LM. Transapical striae weakly radiate to almost parallel throughout the entire valve, becoming more radiate towards the apices, 25–30 in 10 µm, becoming denser near the apices (up to 35 in 10 µm). Rapheless valve convex (Figs 11–17). Axial area very narrow, linear-lanceolate, widening near the central area. Central area variable ranging from absent to forming a small fascia to occasionally asymmetrical due to absence of one central stria or the spacing of two central striae (Figs 11, 12). Transapical striae weakly radiate throughout, more radiate near the apices, 28–30 in 10 µm, up to 34 near the apices.

Figs 1–22. *Achnanthidium jackii* Rabenhorst. LM and SEM material from Rabenhorst 1861, exsiccatia n° 1003. Figs 1–17. LM showing frustules in girdle view (Figs 1, 2), raphe valves (Figs 3–10) and rapheless valves (Figs 11–17). Scale bar = 10 µm. Figs 18–22. SEM pictures showing raphe valves (Figs 18, 21) and rapheless valves (Figs 19, 20, 22). Scale bars = 10 µm.

Scanning electron microscopy (Figs 18–22): Axial area of the rapheless valve clearly lanceolate, widened towards the central area (Figs 19, 20, 22), on the raphe valve, axial area very narrow near the apices, widening towards the central area (Figs 18, 21). Striae in both valves composed of 3–4 rounded areolae and one marginal slit-like areola (Figs 18, 19). Near the apices striae composed of only 2–4 rounded to square areolae lacking slit-like marginal areolae (Figs 18, 19). Proximal raphe endings straight, indistinct, internally proximal endings deflected in opposite directions (Fig. 19). Terminal raphe fissures short, very weakly expanded, terminating at the apices just beyond the last striae (Figs 18, 21).
**Achnanthidium neocryptocephalum** described from Belgium in 1880, differs little from *A. jackii*. Novais *et al.* (2015) indicate a possible separation based on valve width based on earlier results (Potapova & Hamilton 2007). Specimens of *A. jackii* measured in Potapova & Hamilton (2007) showed a valve width ranging from 2.2–3.4 µm. However, analysis of 30 valves (both raphe and rapheless) resulted in a valve width varying between 3.0 and 3.9 µm which is entirely within the valve width range of *A. neocryptocephalum*. The striae in *A. jackii* on the raphe valve have a higher number of areolae per stria (3–5) whereas in all valves of *A. neocryptocephalum*, only 3–4, rarely 2 areolae are found per stria. The striae on the rapheless valve show no differences. All other morphological features, including valve outline, valve length, stria number, shape and size of both the axial area and the central area and the raphe structure do not differ between both taxa. A similar opinion was already indicated by Potapova & Hamilton (2007). Their multivariate analysis and cluster analysis of type specimens showed that *A. jackii* and *A. neocryptocephalum* (as *A. minutissima* var. *cryptocephala*) almost did not differ from each other. The detailed analysis of the type material of both taxa (*A. neocryptocephalum* in Novais *et al.* 2015 and *A. jackii* in this study), confirmed this observation.

*Achnanthidium jackii* was described in 1861 and hence has priority over *A. neocryptocephalum*, a new name for *Achnanthes minutissima* var. *cryptocephala* Grunow 1880; priority at the species level for *Achnanthidium cryptocephalum* Nägeli ex Kützing 1849. *Achnanthidium neocryptocephalum* is thus a taxonomic synonym of *A. jackii* as a name has no priority outside its own rank (McNeill *et al.* 2012, Art. 11.2, Melbourne Code). *Achnanthes minutissima* var. *cryptocephala* is thus also a taxonomic synonym of *A. jackii*.

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