

# Observations on the type material of *Achnantheidium affine* (*Achnanthidiaceae*, *Bacillariophyta*)

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The complex of species around *Achnantheidium minutissimum* (Kützinger 1833: 578) Czarnecki (1994: 157) is one of the most diverse in the world but also difficult to identify and comprises at present more than 50 taxa worldwide. Although most of these taxa were only described in the past 10–15 years, several had already been described in the nineteenth century by famous diatomists such as Friedrich T. Kützinger, William Smith and Albert Grunow.

The latter described in 1880 a species named *Achnanthes affinis* Grunow (in Cleve & Grunow 1880: 20) based on material he received from Henri Van Heurck, collected in Belgium. The description of the species was only very brief “*Grösse und Gestalt der A. minutissima, Structur ähnlich wie bei A. hungarica. Querstreifen 27–30 in 0,01 mm* [Size and shape as in *A. minutissima*. Structure similar to the one in *A. hungarica*. Striae 27–30 in 10 µm]”. More precise information was not provided in the original description. In 1885, Van Heurck added the species to his *Synopsis des Diatomées de Belgique* (Van Heurck 1885, p. 130) grouping it together with *A. hungarica* (Grunow) Grunow (in Cleve & Grunow 1880: 20) in the category: “*Valve inférieure munie d’un stauros - Valve supérieure à raphé excentrique droit* [Inferior valve with a stauros – superior valve with a straight eccentric raphe]” and mentions a sample from Brussels collected by Charles-Henri Delogne as its locality. Van Heurck also expanded the description: “*Valves linéaires-lancéolées étroites, à extrémités obtuses-arrondies, ayant 27–30 stries en 1 c.d.m. Valve supérieure à stries presque parallèles; valve inférieure à stries radiantes, à pseudo-stauros large. Longueur: 1,5–2,3 c.d.m.* [Valves linear-lanceolate, straight with bluntly rounded apices, having 27–30 striae in 10 µm. Superior valve (= rapheless valve) with almost parallel striae; inferior valve (=valve with raphe) with radiate striae and a large pseudo-stauros. Length: 15–23 µm] and added a reference to two drawings in his Atlas (Van Heurck 1880, pl. XXVII [27], figs 39 & 40).

In 1989, Lange-Bertalot (in Lange-Bertalot & Krammer 1989: 104) combined the taxon as a variety of *A. minutissima* and designated sample Grunow 2505 as lectotype. Additionally, the taxon was illustrated (Lange-Bertalot & Krammer 1989, pl. 53: figs 22–31, 35–37 and pl. 56: figs 5–7) although only three of the depicted valves originated from original Grunow material: “*Fig. 35–37: Lectotypus, Coll. Grunow 2505 (= Coll. Delogne 16, aus Belgien)*”. In the figure caption on page 272, Lange-Bertalot added “*Lectotypus, Coll. Grunow 2505 (= Coll. Delogne 16 from Belgium)*”. The other pictures, including the SEM images were taken from different populations (for instance from the Weißensee, Bavaria, Germany) and do not correspond entirely to the three type specimens and the description. A thorough analysis of the type population was lacking, most likely as the original material was not available at that time.

Another explanation for this lack of type analysis is perhaps the fact that Grunow’s sample 2505 does not correspond with Delogne sample 16 but with sample 166 and this may have hindered

further analysis. The Naturhistorisches Museum (**W**) in Vienna, Austria conserves Grunow's accession books, cataloguing his entire sample collection. Based on the information in these books, Grunow sample 2505 was based on Delogne sample 166 (and not 16). Meise Botanic Garden (**BR**) houses almost all samples Delogne collected during his life. Some of them were used to make a set of 100 exsiccatae for his series "*Diatomées de Belgique*". Unfortunately, only a hand-written, incomplete list of samples accompanies the set. In the Van Heurck collection held at Meise Botanic Garden (**BR**), Belgium, a slide containing *Achnanthes affinis* (VII-20-B10), was found, made from sample 166 collected by Delogne. The sample, labelled "*Achnanthes affinis* Grun.", was collected *on conferven* [on filamentous algae] in the former Brussels Botanic Garden (*Jardin Botanique de Bruxelles*) in May 1877. The dried material in a tube labelled 166 was prepared and an analysis of the diatom flora showed that it corresponds to the historic Delogne slide (VII-20-B10) in the Van Heurck collection. The slide is almost entirely dominated by *A. affinis* with several other taxa present in only small amounts: *Cocconeis pediculus* Ehrenberg, *Denticula tenuis* Kützing, *Encyonopsis microcephala* (Grunow) Krammer, *Gomphonema* cf. *elegantissimum* E.Reichardt & Lange-Bertalot, *Ulnaria* cf. *acus* (Kützing) Aboal and *U. ulna* (Nitzsch) Compère. This composition indicates a more alkaline environment (Lange-Bertalot & al. 2017).

In 1994, *Achnanthes affinis* was transferred to the genus *Achnanthidium* by Czarnecki (1994: 156, no fig.), as *Achnanthidium affine* (Grunow) Czarnecki.

*Achnanthidium affine* (Grunow) Czarnecki, 1994 (Figs 1–50)

Basionym: *Achnanthes affine* Grunow (in Cleve & Grunow), 1880: 20

Synonym: *Achnanthes minutissima* var. *affine* (Grunow) Lange-Bertalot (in Lange-Bertalot & Krammer 1989: 104, pl. 53: figs 22–31, 35–37, and pl. 56: figs 5–7).

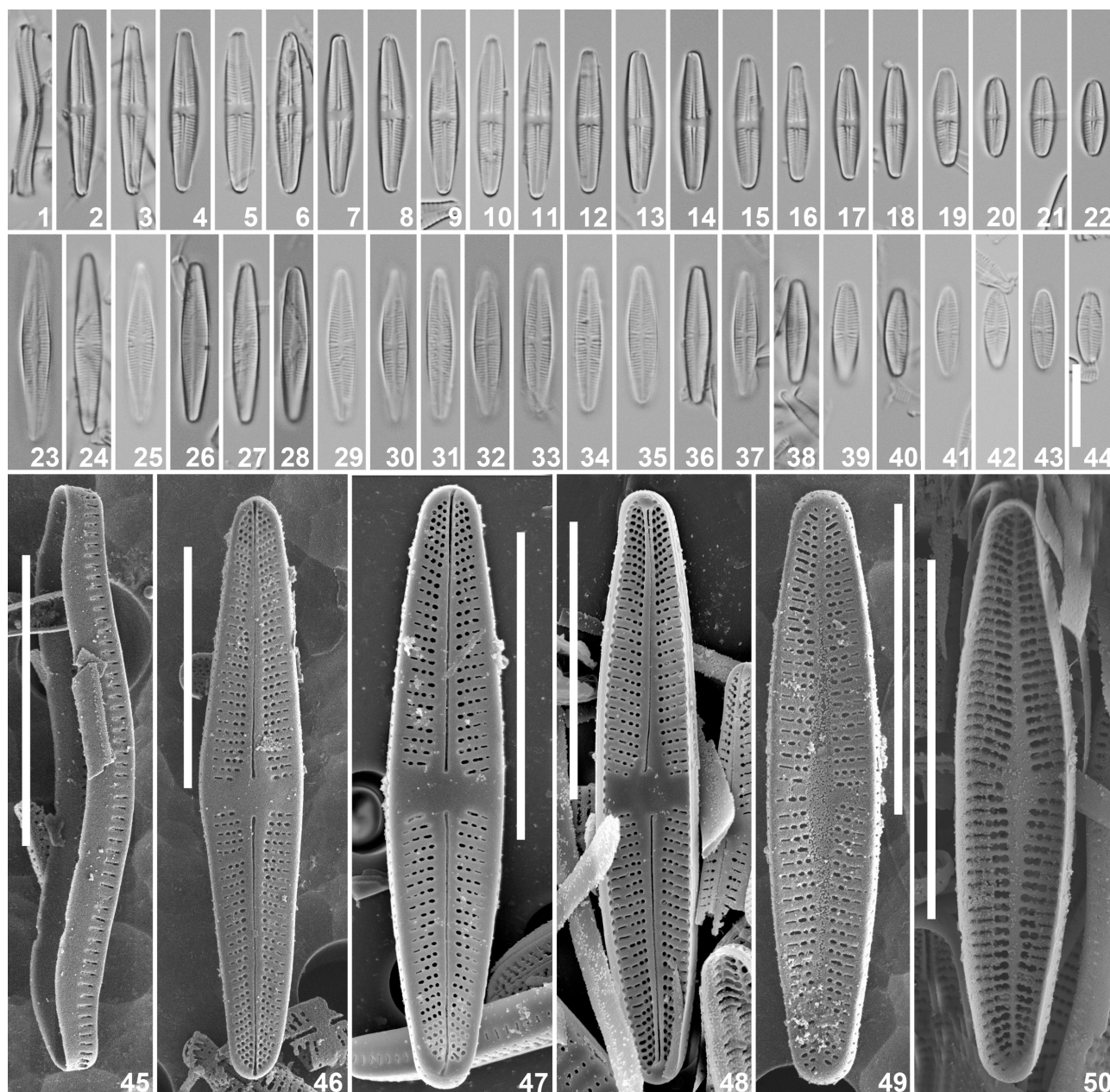
Lectotype: Coll. Grunow 2505 (designated by Lange-Bertalot in Lange-Bertalot & Krammer 1989: 104).

Description: Frustules in girdle view arched, with recurved apices (Figs 1, 45). Valves narrowly lanceolate, some raphe-bearing valves linear-lanceolate, smaller valves becoming more elliptic. Rhombic-lanceolate valves not observed. Apices not or only weakly protracted, bluntly rounded. Valve dimensions (n=50): 8–25 µm, width 3.0–3.5 µm. Raphe valve concave (Figs 2–22). Axial area narrow, slightly widening towards the central area (Figs 46–48). Central area forming a very large, often asymmetrical, bow tie-shaped to rectangular fascia. Shortened striae bordering the central area not observed. Raphe branches straight, with indistinct central raphe ending (Figs 46–47). Internally central endings deflected in opposite directions (Fig. 48). Terminal raphe fissures short, indistinct, terminating beyond the last striae (Figs 46–47). Internally small helictoglossae present (Fig. 48). Striae uniseriate, composed of 2–4 rounded and one, marginally placed, slit-like areola (Figs 46–47), 28–30 in 10 µm. At the apices, striation much denser, apical striae composed of 1–4 rounded areolae, lacking slit-like areolae (Figs 46–47). Rapheless valve convex (Fig. 45). Mantle areolae slit-like (Fig. 45). Axial area clearly widened in the centre, lanceolate. Central area irregular, sometimes forming a small fascia, on one or both sides, or with more widely spaced, sometimes shortened, central striae. Striae radiate, uniseriate, composed of 2–3 rounded and 1 slit-like areola (Figs 49–50), 27–29 in 10 µm throughout the entire valve.

Comments: *Achnanthidium affine* is only rarely illustrated in the literature and in most cases the depicted valves do not belong to *A. affine*. For instance, Patrick & Reimer (1966, pl. 16: figs 11–12, as *Achnanthes affine*) presented two drawings but it is unclear whether these valves truly represent *A. affine* as the rapheless valve is lacking a wider axial area and the fascia on the raphe bearing valve is strictly rectangular and not wedge-shaped. In Compère (1981: figs 94, 95), describing diatoms from the deserts in Iran, four valves are shown that bear some resemblance to *A. affine* but the presence of the protracted apices makes conspecificity doubtful. Likewise, in Podzorski (1985, pl. 34: figs 1, 2) both depicted valves lack the presence of a fascia and possess well-protracted apices, unlike the type of *A. affine*.

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**Figs 1–50. *Achnantheidium affine* (Grunow) Czarnecki.** LM and SEM pictures taken from Delogne sample 166 (Jardin botanique de Bruxelles, Belgium). Figs 1–44. LM showing frustule in girdle view (Fig. 1), raphe valves (Figs 2–22) and rapheless valves (Figs 23–44). Scale bar = 10 µm. Figs 45–50. SEM pictures showing rapheless valve in girdle view (Fig. 45), external view of raphe valves (Figs 46, 47), internal view of raphe valve (Fig. 48), external view of rapheless valve (Fig. 49), internal view of rapheless valve (Fig. 50). Scale bars = 10 µm.