

The transfer of *Fragilaria oldenburgioides* Lange-Bertalot to the genus *Pseudostaurosira* (Staurosiraceae, Bacillariophyceae)

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Lange-Bertalot & Metzeltin (1996) published their ground-breaking monograph on the diatom flora of the Finnish dystrophic Julma Ölkky lake including 128 taxonomic acts (among them 62 new species and infraspecies, and two new genera). Today, this monograph is still one of the principal identification books used by many diatomists in Europe but also worldwide, despite its, nowadays, often out-of-date taxonomy for a lot of species. In the years that followed, several taxonomic updates improved the information in Lange-Bertalot & Metzeltin (1996) but for some of the illustrated and described taxa, the taxonomy was not, or occasionally incorrectly, updated.

One of these is *Fragilaria oldenburgioides* Lange-Bertalot (in Lange-Bertalot & Metzeltin 1996: 55, pl. 7: figs 42–47 a, b; pl. 111: figs 8, 9), a rare small-celled araphid. The original Latin description was as follows “*Valvae ad instar F. oldenburgiana etiam F. capensis similes sed satis differentes. Valvae ellipticae apicibus abrupte attenuatis et acute rotundatis sic rostratiformibus apparentibus, 9–20 µm longae, 3.3–4.2 µm latae. Area axialis variabilis, angustissima linearis vel plusminusve lanceolata sine area centralis intermissa. Striae transapicales alternantes utrimque, 15–17 in 10 µm, non punctatae apparentes.*” [Valves similar to those of *F. oldenburgiana* and even from those of *F. capensis*, but also quite different. Valves elliptical with apices abruptly tapering and sharply rounded thus appearing rostrate, 9–20 µm long, 3.3–4.2 µm wide. Axial area variable, very narrow, linear or more or less lanceolate, lacking a central area. Transapical striae alternating on both sides, 15–17 in 10 µm, not appearing punctate.] The species was illustrated with six LM and 2 SEM pictures.

The species was first transferred to *Staurosira* Ehrenberg as *Staurosira oldenburgioides* (Lange-Bertalot) Kulikovskiy, Lange-Bertalot & Witkowski (in Kulikovskiy & al. 2010: 38) and later to the genus *Staurosirella* D.M. Williams & Round as *Staurosirella oldenburgioides* (Lange-Bertalot) E. Morales, M.L. García & Maidana (in García & al. 2017: 113). Both transfers were made based on an interpretation of the original illustrations as stated in García & al. (2017: 112): “...we consider that there is sufficient published information that warrants their taxonomic transfer”. Unfortunately, the information available for *F. oldenburgioides* is not entirely unambiguous. The valves illustrated in LM in Lange-Bertalot & Metzeltin (1996, pl. 7: figs 42–47) clearly represent several different taxa. Figures 42–44 are put more closely together and most likely belong to the same species whereas figs 45, 46, 47a and 47b, show distinct morphological differences and hence most likely represent different species. Moreover, the two SEM illustrations show a totally different structure and do not belong to any of the three taxa illustrated in LM. It is even more likely that these two SEM pictures represent “*Fragilaria* (?nov.) spec. Nr. 2 Julma Ölkky – cf. *F. construens* var. *venter* auct.” illustrated on the same plate under figs 22–26.

The original description fits best with figs 42–44 and therefore we consider these three LM pictures to represent *F. oldenburgioides*. Analysis of the original type slide (Praep. Eu-SF 151 in Coll. Lange-Bertalot, Julma Ölkky bei Kuusamo, Finlandia, leg. A. & R. Dorn, 13. 6. 1992) resulted in the observation of five additional valves, congruent with figs 42–44 (see our Figs 1–5). According to Horst Lange-Bertalot, who kindly had provided us with the original slide, there is unfortunately

no unmounted material available. A new sampling of the Julma Ölkky Lake in 2020 did not yield any additional valves (Van de Vijver, pers. obs.).

During a revision of the genus *Pseudostaurosira*, a relatively large population of a taxon showing a high morphological similarity to *F. oldenburgioides* was observed in the Swedish river Sverkestaån, located in central-Sweden, not far from the city of Örebro. Analysis of both the type population and the Swedish population revealed no morphological differences which led us to the conclusion that both represent the same species. The Sverkestaån population allowed us to perform detailed scanning electron microscopy observations indicating that this taxon is referable to the genus *Pseudostaurosira* (based on the structure of the striae, the small apical pore field, presence of mantle plaques, structure of the girdle bands and the presence of spines located on the striae), despite a few morphological aberrant features so far not observed in the genus *Pseudostaurosira* (Williams & Round 1988, Morales & al. 2019, 2021). All valves are covered by a dense pattern of very small, siliceous granules. The spines are small and conical, and not of the linking-type. *Pseudostaurosira* species usually form long, ribbon-like colonies with frustules strongly connected with well-developed linking spines. Nevertheless, we believe that *F. oldenburgioides* should be transferred to the genus *Pseudostaurosira* (see for example *Pseudostaurosira aedes* E. Morales & al. (2021: 32) and *Pseudostaurosira frankeniae* E. Morales, C.E. Wetzel & Ector (2021: 38, ‘*frankenae*’) for similar characters).

Here, the original Julma Ölkky slide (Eu-SF 151) and the Sverkestaån sample are described using light and scanning electron microscopy observations. The new combination *Pseudostaurosira oldenburgioides* (Lange-Bertalot) Van de Vijver & C.E. Wetzel is proposed. The Sverkestaån sample is here designated as epitype for the holotype of the species in accordance with ICN Art. 9.9 (Turland & al. 2018) stating that “an epitype is a specimen or illustration selected to serve as an interpretative type when the holotype, lectotype, or previously designated neotype, or all original material associated with a validly published name, is demonstrably ambiguous and cannot be critically identified for purposes of the precise application of the name to a taxon” which is the case with *F. oldenburgioides* as discussed earlier here.

Pseudostaurosira oldenburgioides (Lange-Bertalot) Van de Vijver & C.E. Wetzel, *comb. nov.* (Figs 1–30).

Basionym: *Fragilaria oldenburgioides* Lange-Bertalot *pro parte*, in Lange-Bertalot & Metzeltin 1996, *Iconographia Diatomologica* 2: p. 55, pl. 7, figs 42–44 (excluding figs 45–47 and excluding pl. 111, figs 8–9).

Holotype: Praep. Eu-SF 151 in Coll. Lange-Bertalot, Julma Ölkky bei Kuusamo, Finlandia, leg. A. & R. Dorn, 13.vi.1992 (**FR**).

Epitype (here designated for the above holotype): slide **BR-4849** (Meise Botanic Garden, Belgium), slide made from the Sverkestaån material.

Epitype locality: Sverkestaån river, Örebro County, Svealand, Sweden, coll. date 2.ix.2002, leg. A. Jarlman.

Registration: <http://phycobank.org/104757> (name), <http://phycobank.org/104758> (epitype)

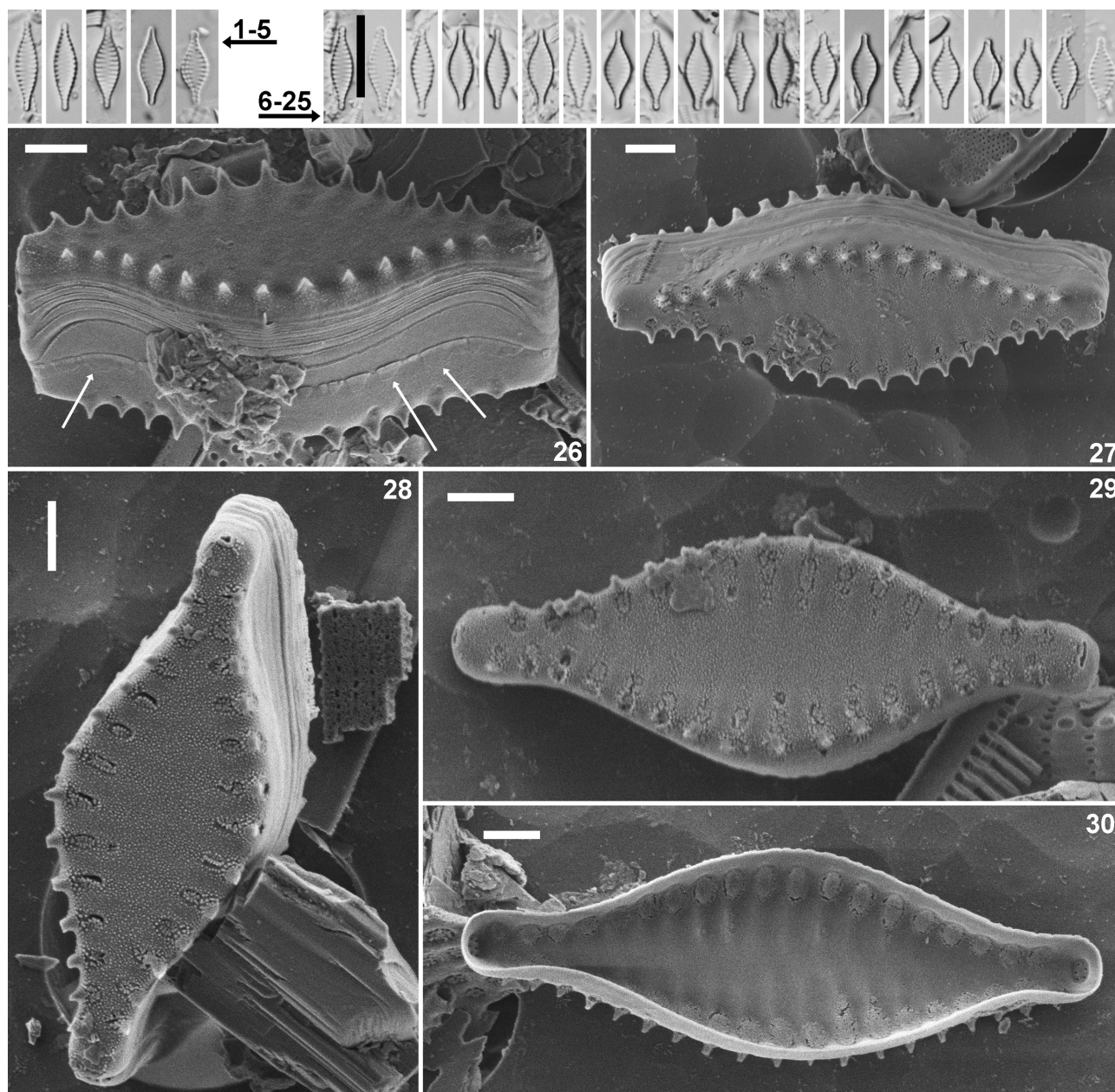
Homotypic synonyms: *Staurosira oldenburgioides* Kulikovskiy, Lange-Bertalot & Witkowski (in Kulikovskiy & al. 2010: 38), *Staurosirella oldenburgioides* E. Morales, M.L. García & Maidana (in García & al. 2017: 113).

Description: Valves elliptical to lanceolate-elliptical, gradually narrowing from valve middle to the apices, then abruptly protracted, rostrate (Figs 1–25). Frustules solitary. Girdle composed of several open, plain, ligulate copulae, each with a very thin, siliceous ridge at the edge (Figs 26, 27). Valvocopula broad, lacking perforations. Valve dimensions (n=30): length 8–10 µm, width 3.0–3.5 µm. Sternum broad, lanceolate. Central area lacking. Striae marginal, 15–17 in 10 µm, composed of one large, transapically elongated areolae on the valve face (Figs 28 & 29), and one smaller areola on the mantle, close to the valve face/mantle junction (Fig. 27). Areolae covered

externally with volae (Fig. 28). Valve face and advalvar mantle partly covered by dense pattern of very small, siliceous granules (Figs 26–29). Distinct mantle plaques present on the mantle edge (Fig. 26, white arrows). Spines small but robust, conical, located between valve face and mantle areolae (Figs 26–29). Apical pore fields reduced to a small, rimmed depression on both apices (Figs 26 & 27). Internally, areolae closed by depositions on volae forming round to elliptic structures (Fig. 30).

Mrs Amelie Jarlman (Lund, Sweden) is thanked for providing us the Sverkestaån sample. Prof. dr dr (h.c.) Horst Lange-Bertalot (Frankfurt, Germany) kindly sent us the original Julma Ölkky slide Eu-SF 151.

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Figs 1–30. *Pseudostaurosira oldenburgioides* (Lange-Bertalot) Van de Vijver & C.E. Wetzel comb. nov. LM and SEM pictures taken from the holotype (Eu-SF 151, Julma Ölkky, Figs 1–5) and epitype (BR-4849, material (Sverkestaån river, Örebro County, Svealand, Sweden, Figs 6–30). **Figs 1–5.** LM views of 5 valves observed in the Julma Ölkky holotype slide. **Figs 6–25.** LM views of a size diminution series. **Fig. 26.** SEM view of a frustule is girdle view. The white arrows indicate the mantle plaques. **Fig. 27.** SEM external view of a frustule in oblique view. **Figs 28–29.** SEM external view of two valves showing the valve face surface granules, spine structure and areolae with the closing volae arising from the areolar inner periphery and projecting inwards. A single irregular disk-like one covering each areola in external view. Spines originating from vimines at the valve face/mantle junction. **Fig. 30.** SEM internal view of an entire valve. Scale bar = 10 μ m (Figs 1–25), = 1 μ m (Figs 26–30).