

## Typification of *Synedra filiformis* Grunow and its transfer to the genus *Fragilaria* (Fragilariaceae, Bacillariophyta)

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*Synedra filiformis* Grunow in Cleve & Grunow (1880: 106, pl. VI: fig. 116) was originally described from “Finnmark, Kaafjord” (currently Kåfjord, province of Troms og Finnmark, Norway). It was illustrated with two line drawings, one showing a frustule in girdle view, and one a valve in valve face view (Cleve & Grunow 1880, pl. IV, fig. 116 and our Fig. 1 showing the annotated drawing in the Grunow drawing collection). In his description, Grunow mentioned a narrow range in length (82–87 µm) and a width of 2 µm. Grunow was able to detect striae that, according to him, were only present at the margin (“*nur am Rande sichtbar*”) and he even reported a stria density of 24 in 10 µm. In his description, Grunow compared this new taxon with *Synedra tenera* W.Smith but diagnosed it as smaller and more densely striated.

The drawings in Cleve & Grunow (1880) are the only drawings Grunow published for this taxon as the species is not illustrated in Van Heurck (1881). Almost all drawings Grunow published during his career were clippings from his personal collection, which is currently kept at the herbarium of the Naturhistorisches Museum in Vienna, Austria (W). The drawings were annotated with handwritten notes indicating information (e.g. Grunow sample number, occasionally locality, collector, and collection number) necessary to retrieve the type material that is also kept in the Grunow collection at W (Schuster & al. 2022). Based on the information provided with the drawing, *Synedra filiformis* was observed in a single gathering, Grunow sample 2036, collected from Kaafjord (Finmark). Unfortunately, unmounted material no longer exists at W, but the slide mounted in Canada Balsam is still present in the Grunow slide collection at W. Analysis of the slide revealed a fairly large population of a finely striated, relatively long, thin species, identical to the drawing in Cleve & Grunow (1880, pl. 6: fig. 116).

Williams & Karthick (2021) recently defined the correct identity of the genus *Synedra*, concluding that its species are strictly marine and have a distinct morphology, which is completely different from that observed in the type of *Synedra filiformis*. However, as no unmounted material is available, it is impossible to observe the morphological details of the species using scanning electron microscopy (SEM).

Later authors, such as Van Heurck (1881), Hustedt (1932), and Krammer & Lange-Bertalot (1991) did not mention this species. Cleve-Euler (1953) listed and illustrated it in her overview of the diatoms of Sweden and Finland. Several varieties and forms were also described, such as *Synedra filiformis* var. *capitata* A.Cleve (1953: 69, fig. 390f, g, as ‘*S. filiformis* ε ? *capitata* n. v.’) but their taxonomic status needs to be clarified following analysis of the original material. The taxon was, however, frequently reported from the Laurentian Great Lakes, but recent analysis of material from these lakes revealed that in fact several of these populations belonged to newly described (though similar) species (Alexson & al. 2022).

During an analysis of some diatom samples collected from Swedish rivers, a small population of a taxon showing some similarity with the drawings in Cleve & Grunow (1880) was observed in the Semlan, a small river on the border of the Åre and Krokoms Kommuns in Central Sweden. Although the Semlan population could only be compared with the type population based on light microscopy (LM) observations, it is clear that they are conspecific, given the fine striation pattern,

typical fusiform valve outline and elongated apices. Since unmounted material of the Semlan population was available, morphological details could be studied using SEM.

Therefore, we detail the morphology of the population in Grunow sample 2036 using LM and designate the sample as lectotype for *Synedra filiformis* Grunow. We also illustrate specimens from the Semlan population using LM and SEM observations. This sample was collected by A. Jarlman in the Semlan river on 21 September 2004. The river was characterized by an almost circumneutral pH (7.4), low conductivity (69  $\mu\text{S}/\text{cm}$ ), low Total-P (6  $\mu\text{g}/\text{L}$ ) and Total-N (331  $\mu\text{g}/\text{L}$ ) values (Van de Vijver & al. 2011). Based on the additional characters provided by SEM, we designate the Semlan sample as epitype for the lectotype in accordance with ICN Art. 9.8 (Turland & al. 2018), as the observations of the epitype unambiguously define the morphology and taxonomic identity of *Synedra filiformis*. Based on these observations, it is formally transferred to the genus *Fragilaria* as follows.

***Fragilaria filiformis*** (Grunow) Van de Vijver & T.M.Schuster, *comb. nov.* (Figs 1–41)

Basionym: *Synedra filiformis* Grunow (in Cleve & Grunow), *Kongl. Svenska Vetenskaps-akademiens Handlingar*, 17(2): p. 106, pl. 6: fig. 116, 1880.

**Lectotype (here designated)**: slide W0164879, Grunow sample 2036, Kaafjord, Finnmark (W, Naturhistorisches Museum, Vienna). Fig. 5 represents the lectotype.

Registration for the new combination: <http://phycobank.org/103277>

Registration for the typifications: <http://phycobank.org/103278>

**Epitype (here designated for the above lectotype of *Synedra filiformis* Grunow)**: slide BR-4735 (BR, Meise Botanic Garden); sample CA37 (Semlan River, Central Sweden, coll. date 21.IX.2004, leg. Amelie Jarlman); the epitype is here represented by Fig. 29.

Description: Frustules in girdle view rectangular, solitary or in pairs. Colonies of more than 2 cells joined together not observed. Valves narrow, spindle-shaped with lanceolate central part and long protracted, very thin apices. Valve dimensions ( $n=30$ ): length 65–100  $\mu\text{m}$ , width (central part) 1.5–2.0  $\mu\text{m}$ . Apices less than 1  $\mu\text{m}$  wide. Valve face flat, virgae not raised. Sternum rather broad, clearly widening towards the central area. Central area very large, hyaline, with occasional areolae on the margin. Marginal spines not observed. Apical pore field small, composed of only a few short rows of rounded to squarish pores. Single rimoportula located at the apex, rounded, rimmed, surrounded by weakly depressed hyaline circle. Striae uniseriate, composed of up to 5 very small, rounded areolae, in the elongated apices striae composed of only 1 small areola. Striae parallel throughout, 24–26 in 10  $\mu\text{m}$ .

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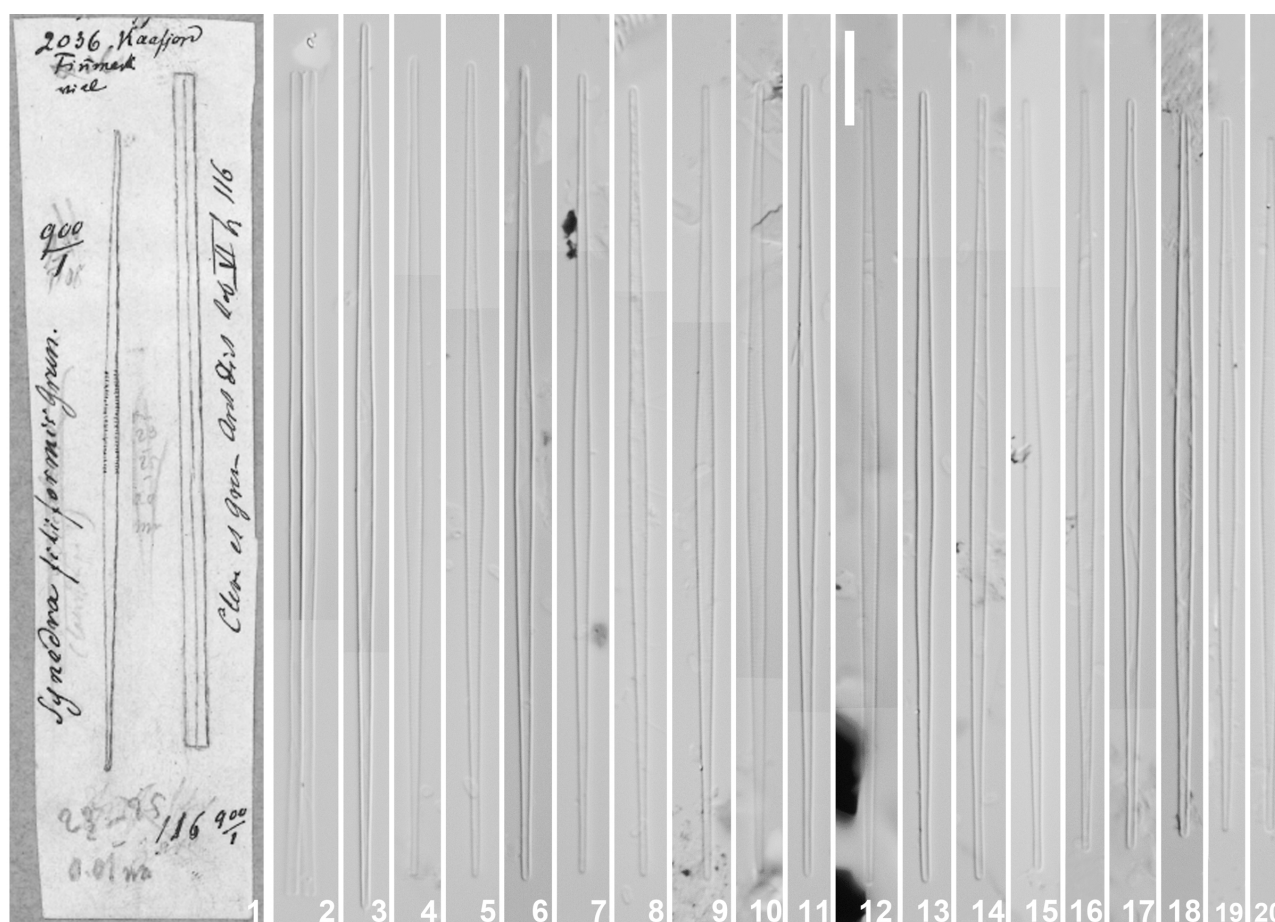
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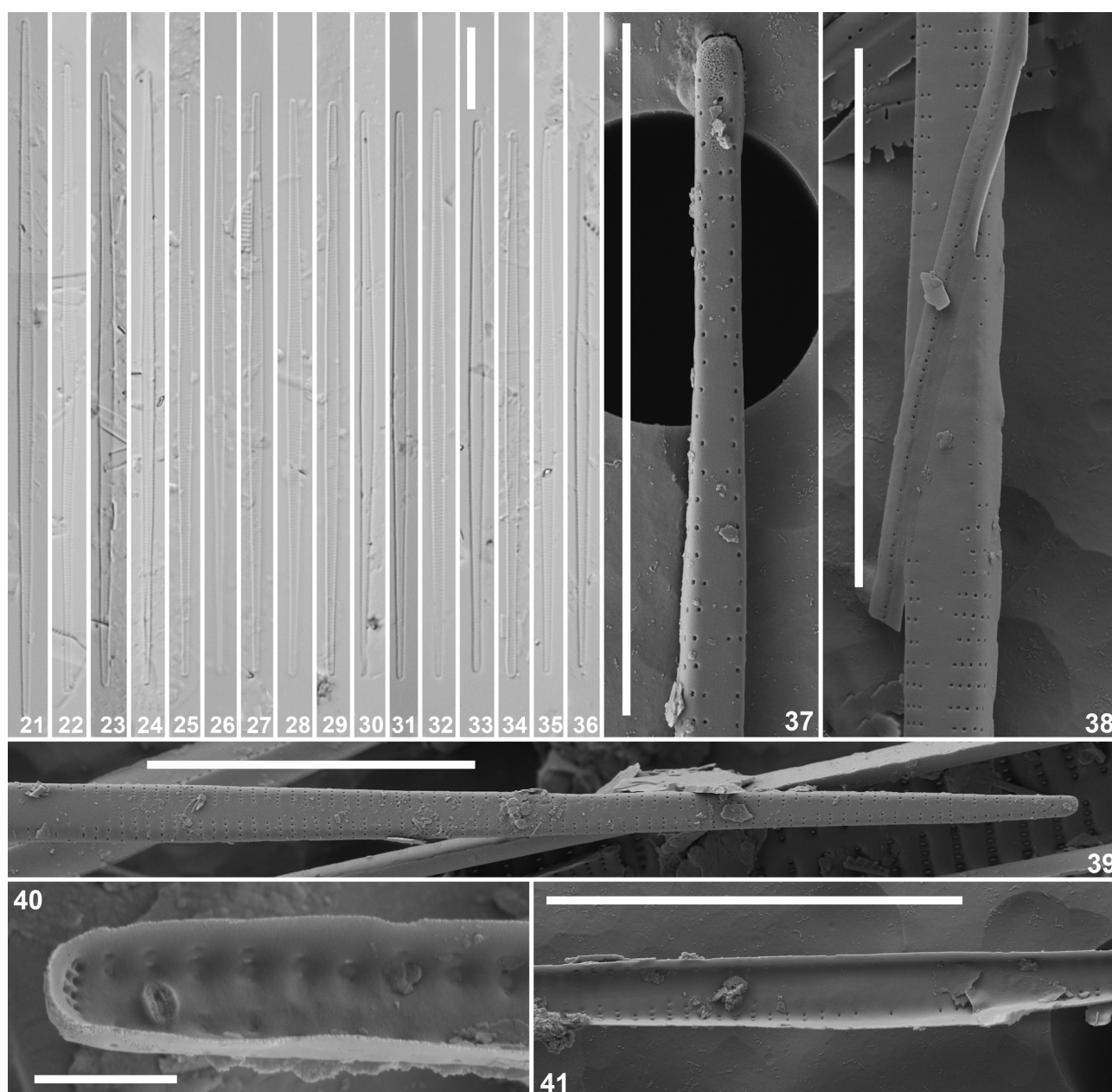
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**Figs 1–20.** Light microscopy observations and original drawing of *Fragilaria filiformis* (Grunow) Van de Vijver & T.M.Schuster, *comb. nov.* Light microscopy images taken from the lectotype (Grunow sample 2036, Kaafjord, Finnmark, W0164879). **Fig. 1.** Original drawing of *Synedra filiformis* in Cleve & Grunow (1880, pl. 6: fig. 116). **Fig. 2.** Two frustules in girdle view. **Figs 3–20.** LM pictures of valves in a decreasing length series. Scale bar = 10  $\mu$ m.





**Figs 21–41.** Light and scanning electron microscopy observations of *Fragilaria filiformis* (Grunow) Van de Vijver & T.M.Schuster, *comb. nov.* taken from the epitype (**BR-4735**, Semlan River, Sweden). **Figs 21–36.** LM pictures of valves in a decreasing length series. **Fig. 37.** SEM external view of a valve apex with rimoportula and apical porefield. Note the striae composed of a single areola and the flat valve face. **Fig. 38.** SEM external view of the central area. **Fig. 39.** SEM external view of half a valve from central area to valve apex. **Fig. 40.** SEM internal view of the rimoportula. **Fig. 41.** SEM internal view of the central area. Scale bar = 10  $\mu\text{m}$ , except for Fig. 40 where scale bar = 1  $\mu\text{m}$ .