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Typification and type examination of *Synedra familiaris* Kütz. and related taxa

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Abstract

In this paper we designate a lectotype and an epitype for the diatom species *Synedra familiaris* Kütz., an important species in ecological studies of freshwater attached algal communities. For this purpose, we have used a slide in Kützing's collection housed in the Natural History Museum, London (BM). The original slide from the type locality, was not found in the museum collection, and only one slide (BM18307) was present from another locality. No individual specimen could be identified as *S. familiaris* given its current concept. Three other possible taxa were described before *S. familiaris*. So the name *S. familiaris* should not be used with the current concept. We have also designated a lectotype for *S. familiaris* f. *parva* Grunow using an individual specimen from the holotype slide in the Natural History Museum, Vienna (W). This taxon no longer conforms to the current usage of the taxon *S. familiaris*, and so we propose a new combination *Fragilaria parva* (Grunow) Tuji et D.M.Williams comb. et stat. nov.

Key index words : *Fragilaria parva* (Grunow) Tuji et D.M.Williams comb. et stat nov., lectotype, *Synedra familiaris*, *Synedra familiaris* f. *parva*, *Synedra familiaris* f. *major*

Introduction

Synedra familiaris Kütz. is an important taxon in ecological studies of freshwater attached algal communities, because it appears to be widespread, reported from many, varied localities (Hustedt 1930, Patrick & Reimer 1966, Watanabe *et al.* 2005). *Synedra familiaris* was originally described by Kützing (1844 : 68) from Falaise, France ("An *Cladophora fracta* bei Falaise : Lenormand (Als *Exilaria fasciculata*)"). Kützing's original figures are too simple to be certain of its identification (Kützing 1844 : Taf. 15, Fig. XII). Somewhat later, Grunow (in Van Heurck 1881) added two new forms, ambiguously retaining *familiaris* as the species name as well suggesting the new forms as questionable varieties of *S. rumpens* : "*S.* (*rumpens* var.?) *familiaris* forma *parva* Grun." and "*S.* (*rumpens* var.?) *familiaris* forma *major* Grun." Grunow presented only the number of striae as a description of both forms, dimensions that have subsequently been used for the identification of *S. familiaris*. Hustedt (1930) named this taxon *S. rumpens* var. *familiaris* (Kütz.) Grunow in Die Süβwasser Flora Mitteleuropas, a combination and identification that has subsequently been followed by many diatomists (e.g. Patrick & Reimer 1966) in spite of the fact that Gemeinhardt (1926 : 18) was the first to make this combination.

Although Lange-Bertalot (1980) made a thorough examination of Kützing's type material for *S. familiaris*, he could find no suitable specimens that corresponded to its current usage and presented an illustration of a specimen of *Synedra pulchella* (Ralfs ex Kütz.) Kütz. (=*Ctenophora pulchella* (Kütz.) D.M.Williams & Round). He

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also designated two lectotypes for *S. rumpens* var. *familiaris*; one, slide 970 in Grunow collection, corresponding to current usage, excluding the basionym; the other, for the taxon represented by the basionym using Kützing's type slide (Kützing no. 1370 in BM). The first designation is clearly invalid, because lectotypification of a combination must be applied to the taxon's basionym. The second is more of a problem. Lange-Bertalot presented an illustration of *S. pulchella* (Ralfs ex Kütz.) Kütz. from the designated slide. Slide 1370 is a strewn slide and it is possible that another individual is more suitable. Furthermore, slide 1370 does not come from the type locality stated in the protologue and conflicts in characters with protologue description. The figures presented by Kützing (1844: Plate 15 figure XII) are of original material and hence have priority over slide 1370, as this material is not from the type locality.

Materials and Methods

Nevertheless, it remains impossible to fix the identity of *Synedra familiaris* without typification and thus re-examination of type material is required. However, there are no specimens of *S. familiaris* from the type locality in the original collections in the Natuurhistorisch Museum, Koninklijke Maatschappij voor Dierkunde van Antwerpen (AWH) or National History Museum, London (BM). The only material identified in Kützing's collection by the name *S. familiaris* is the packet material no. 1370 (from the catalogue to Kützing's collection of diatoms, written by Eulenstein in 1868 housed in BM, see Cox 1995), portions of which are held in AWH and BM (the BM material was derived from that in AWH), the latter herbarium having a slide (BM 18307) made from this packet. While this material did not come from the type locality, and consequently specimens are neither holotypes nor isotypes, it is the most appropriate material to use for an alternative source of the type of *S. familiaris*; hence BM18307 was examined with that view in mind (this slide was examined by Lange-Bertalot 1980).

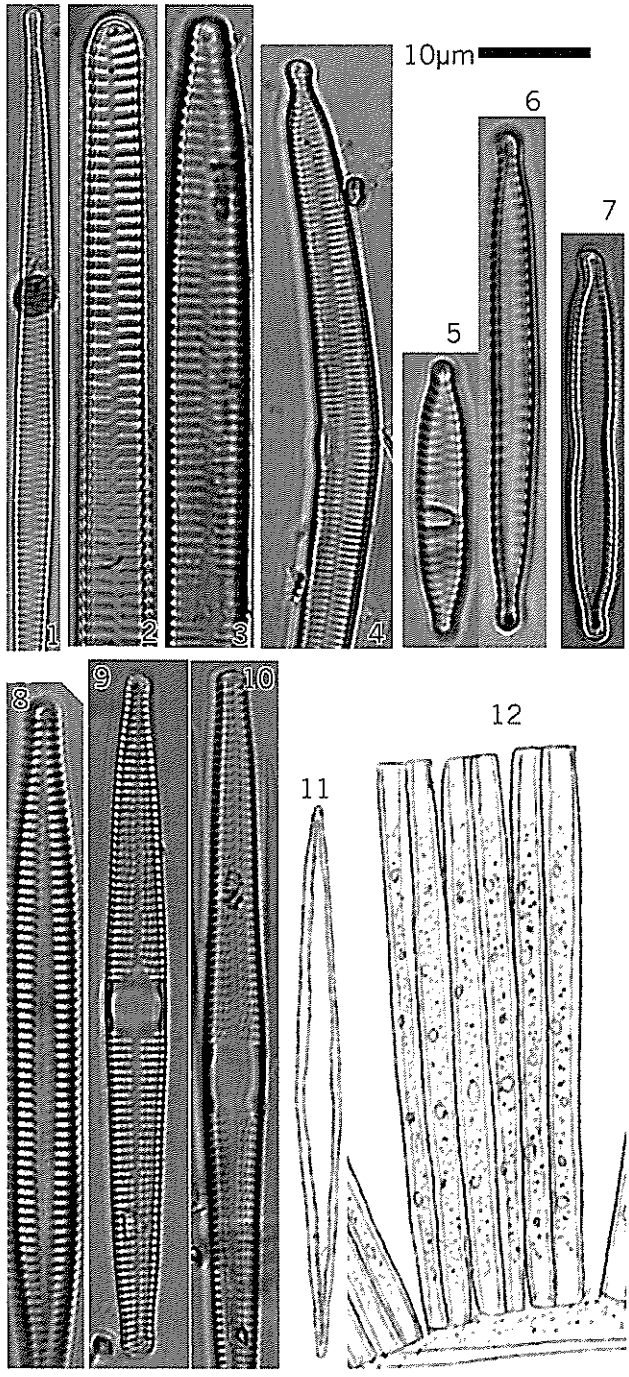
Results and Discussion

A number of specimens belonging to species from both *Synedra* and *Fragilaria* were observed on this slide (BM18307, figs 1-10); the original figures from Kützing (1844) are presented in Figures 11 and 12. Kützing (1844) described the size of this taxon as 1/27‴ (about 80 μm). None of these specimens conform to the current definition and usage of *Synedra familiaris*. However, typification must be undertaken from the original figures and description. Thus, the individual illustrated in Figure 1, because it has narrow width from Kützing's original figures, is not suitable. The individuals illustrated in Figures 2-4, 7, because these have different outline from Kützing's original figure, is not also suitable.

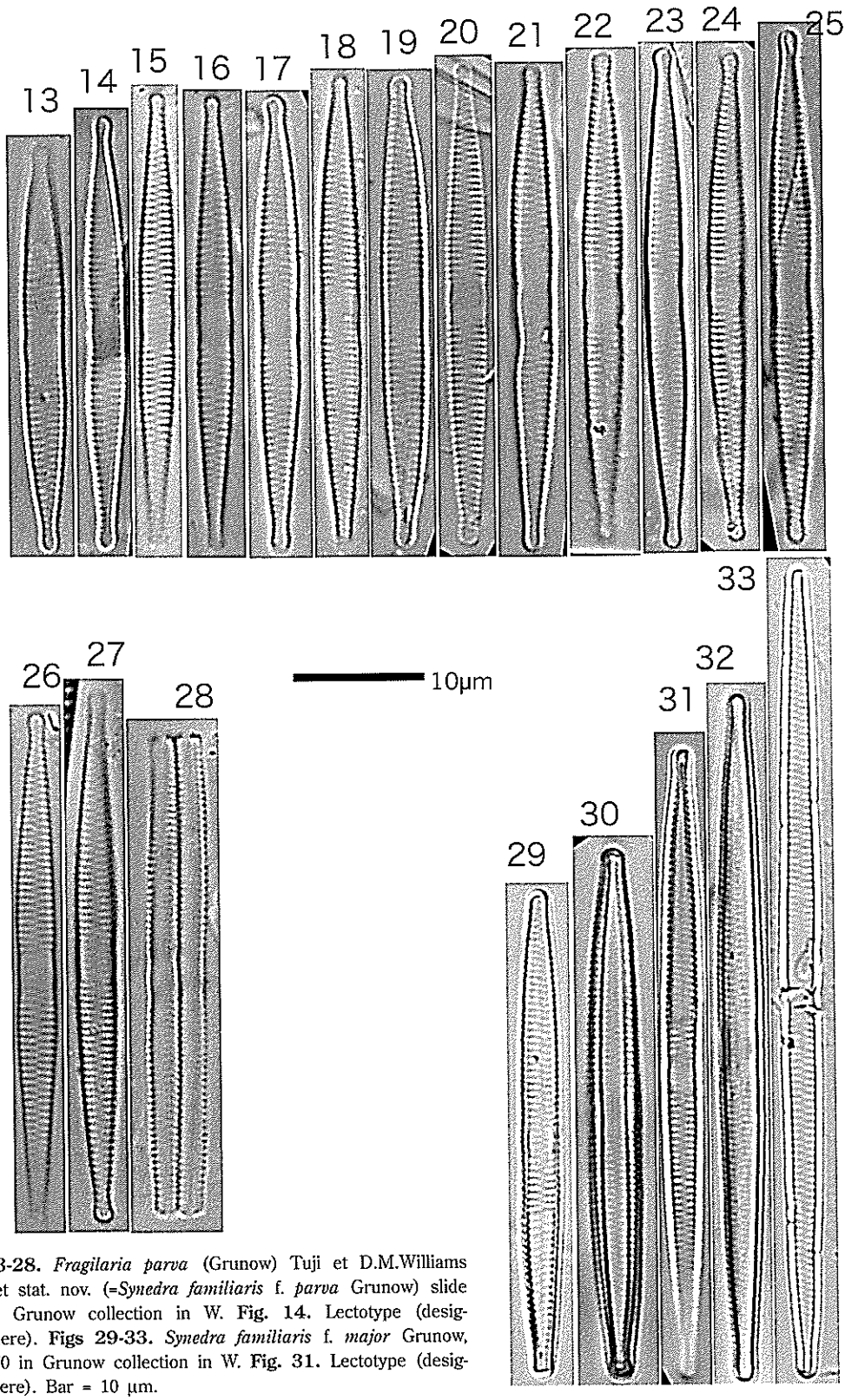
Three possible taxa exist that might be equated with *S. familiaris*. The first taxon can be identified as *Fragilaria vaucheriae* (Kütz.) J.B. Petersen (Figs 5, 6), the second as *Tabularia fasciculata* (C.Agardh) D.M.Williams & Round (Fig. 8) and the third as *Ctenophora pulchella* (Kütz.) D.M.Williams & Round (Figs 9, 10).

Since Kützing's original figure is so simple, it is very difficult to select a taxon for *S. familiaris*. However, the basionyms of these three possible taxa, *Exilaria vaucheriae* Kütz. 1833, *Diatoma fasciculata* C.Agardh 1812 and *S. pulchella* Ralfs ex Kütz. 1844, are described before *S. familiaris*, and *S. familiaris* should be a later synonym of one of these taxa. The name, *S. familiaris*, should not use in the meanings of current usage.

Relative to the *S. familiaris* problem, we examined the holotype slides for *S. familiaris* f. *parva* and *Synedra familiaris* f. *major* housed in Grunow's collection in the Natural History Museum, Vienna (W). Grunow had appended a copy of Van Heurck (1881), also housed in W, with the slide numbers and localities for each holotype (Fig. 32: see Tuji & Williams 2008). Many individuals, correspond to specimens illustrated in the original figures, were found (Figs 13-33). Since these slides include other taxa, we have designated as a lectotype individual specimens. The lectotype of *S. familiaris* f. *parva* corresponds to the current usage of *S. familiaris* (e. g. Patrick & Reimer 1966). As it has the characters for the genus *Fragilaria* sensu stricto (Tuji personal data), we have provided it with a new combination, *Fragilaria parva* (Grunow) Tuji et D.M.Williams comb. et stat. nov. Though, this taxon is close to *Fragilaria rumpens* (Kütz.) G.W.F. Carlson, this taxon is distinguished by the central



Figs 1-10. *Fragilaria* and *Synedra* sensu lato taxa in BM18307 in BM. Bar = 10 µm (Figs 1-10). **Fig. 1.** *Fragilaria* sp. **Figs 2, 3.** *Synedra ulna* Nitzsch, **Fig. 4.** *Hannaea arcus* (Ehrenb.) Patrick, **Figs 5, 6.** *Fragilaria vaucheriae* Kütz. **Fig. 7.** *Fragilaria mesolepta* Rabenh., **Fig. 8.** *Tabularia fasciculata* (C.Agardh) D.M.Williams & Round, **Figs 9, 10.** *Ctenophora pulchella* (Kütz.) D.M.Williams & Round. **Figs 11, 12.** Original figures in Kützing (1844. Bacillarien *pl. 15. f. XII.*). Kützing described a size as 1/27''' (about 80 µm). **Fig. 11.** Lectotype figure (designated here).



Figs 13-28. *Fragilaria parva* (Grunow) Tuji et D.M.Williams comb. et stat. nov. (=*Synedra familiaris* f. *parva* Grunow) slide 2654 in Grunow collection in W. **Fig. 14.** Lectotype (designated here). **Figs 29-33.** *Synedra familiaris* f. *major* Grunow, slide 970 in Grunow collection in W. **Fig. 31.** Lectotype (designated here). Bar = 10 μm.

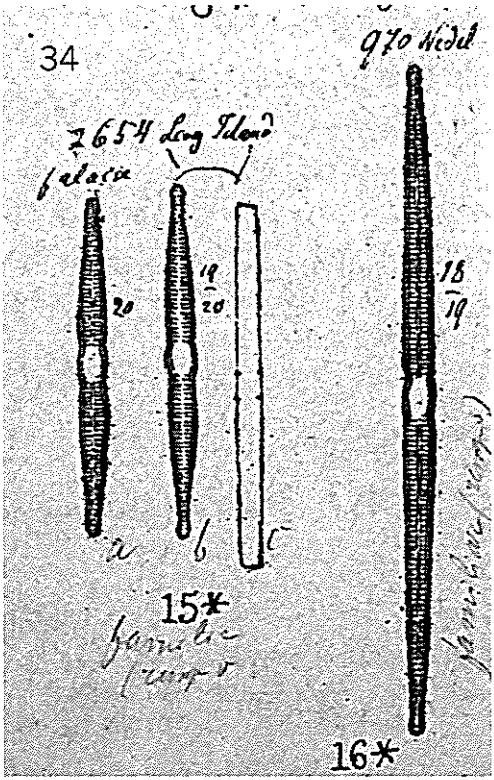


Fig. 34. Original figures in Van Heurck (1881. *Pl. XL. Figs 15, 16*). Magnification is 2/3 of Figs 13-33. Showing the type slide numbers, localities and density of striae.

swellings and capitate apices of valves. *Synedra familiaris* f. *major* may be a synonym of *F. parva*, a proposition that requires further investigation.

Conclusion

Synedra familiaris Kütz. Bacillarien p. 68. *pl. 15. f. XII*. 1844.

Lectotype (designated here): A figure XII in plate 15 in Kützing Bacillarien 1844.

Epitype (designated here followed Lange-Bertalot, 1980): BM18307 in BM.

Synedra familiaris* f. *parva Grunow in Van Heurck Syn. Diat. Belg. *pl. XL. f. 15*. 1881.

Holotype: slide 2654 in Grunow collection in W.

Lectotype (designated here): an individual specimen from slide 2654 in W (Fig. 14).

Synedra familiaris* f. *major Grunow in Van Heurck Syn. Diat. Belg. *pl. XL. f. 16*. 1881.

Holotype: slide 970 in Grunow collection in W.

Lectotype (designated here): an individual specimen from slide 970 in W (Fig. 31).

***Fragilaria parva* Tuji et D.M.Williams comb. et stat. nov.**

Basionym: *Synedra familiaris* f. *parva* Grunow in Van Heurck Syn. Diat. Belg. *pl. XL. f. 15*. 1881.

non: *Synedra parva* Kütz. Sp. Alg. p. 46., 1849; *Synedra parva* Kütz. Bacillarien, p. 67, *Pl. 15, fig. IX*, 1844 = *Synedra parvula* Kütz.; *Synedra parva* Kütz. Bacillarien, p. 152 is an orthographic error in the index for *parvula*.

Synonym: ? *Synedra familiaris* f. *major* Grunow in Van Heurck Syn. Diat. Belg. *pl. XL. f. 16*. 1881.

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