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The Transfer of Two Japanese *Synedra* Species (Bacillariophyceae) to the Genus *Ulnaria*

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Abstract Two Japanese diatom species, *Synedra japonica* F. Meister and *S. rostrata* F. Meister, described by Friedrich Meister (1913) from Lake Suwa, are transferred to the genus *Ulnaria*. The two species have diagnostic characters of the genus *Ulnaria*, including one rimportula at each apex of the valve and closed girdle bands.

Key words : diatom, new combination, nomenclature, *Synedra japonica* F. Meister, *Synedra rostrata* F. Meister, *Ulnaria japonica* (F. Meister) Tuji, *Ulnaria rostrata* (F. Meister) Tuji.

Introduction

Synedra japonica F. Meister and *S. rostrata* F. Meister were described by Meister (1913) from Lake Suwa. The type slides have been examined by Tuji and Williams (2007), who designated lectotypes for these taxa. Morphological descriptions based on light microscopy are also done in Tuji and Williams (2007).

The generic placement of *Synedra ulna* Nitzsch and related species, including *S. japonica* and *S. rostrata*, which is discussed in this paper, has been confused during the last twenty years. Williams and Round (1986) separated the genus *Synedra* Ehrenb. *sensu lato* into six genera based on morphological characters. This reclassification is widely accepted by recent diatomists. Williams (1986) mentioned the problem of the type species of the genus *Synedra* noting "it will be necessary to conserve the type of *Synedra* if the most commonly associated species are to retain that name". However, no proposal to conserve the type of *Synedra* has been submitted. Compère (2001) notes that the taxon known as *S. ulna* and related species do not belong to *Synedra* if *Synedra balthica* Ehrenb. is recognized as the generitype. As a result, Compère (2001) formally proposed the genus *Ulnaria* (Kützing) Compère, based on Kützing's previously unranked *Synedra* subgenus *Ulnaria* Kützing (1844) and Frenguelli's *Synedra* subgenus *Ulnaria* (Kützing) Frenguelli (1929), which are typified by *S. ulna*. Many monographs such as *Iconographia Diatomologica, Bibliotheca Diatomologica*, etc.) are recognizing and using *Ulnaria*. Furthermore, with the formal recognition of *Ulnaria* at the genus level, it has become increasingly difficult to revert back to the name *Synedra* through a proposal to conserve the type.

Although Compère (2001) carefully worded argument for recognizing *Ulnaria* at the genus level and his transfer of five taxa was perfectly valid, the lack of a summary description of the characters that are shared by *Ulnaria* species has slowed the acceptance of *Ulnaria*. Furthermore, there has not yet been a monographic treatment of *Ulnaria*, and many taxa that clearly belong in this genus await formal transfer. A summary of the morphological characters that are shared among *Ulnaria* species include: linear to lanceolate valves with uniseriate or biseriate striae composed of areolae occluded by simple vela, two apical pore fields and rimoportulae (labiate process) per valve, one at each valve end, apical pore fields of the ocellulimbus type, multiple closed girdle bands, and two girdle-appressed plate-like plastids.

Because of the confusion of taxonomic posi-

tions of *S. japonica* and *S. rostrata* based on characters resolved in the light microscope (Tuji and Williams, 2007), we examined the ultrastructure, especially the number and position of rimoportulae per valve and band morphologies using SEM, and discuss the synonymy and generic placement of these taxa.

Materials and Methods

Two collections of raw material housed in TNS (Department of Botany, National Museum of Nature and Science), were examined using an SEM (JSM-6390 with LaB_6 gun, JEOL, Japan).

The material for *Synedra rostrata* F. Meister, TNS-AL-TW-12581 was collected from River Tamagawa (R. Obonai), Akita Pref., Japan [39°41′N, 140°43′E] on 13/xi/1994 by Toshiharu Watanabe. The electric conductivity at the time of collection was 195 μS/cm, pH was 8.2, and water temperature was 10.5 Celscius degrees. This material was also used for *Algae aquae dulcis Japonicae* exsiccata: nos. 2 (Tuji, 2007).

The material for *Synedra japonica* F. Meister, TNS-AL-55265 was collected from Lake Yogo, Shiga Pref., Japan [35°31.752′N, 136°11.662′E] on 18/iv/2000 by Akihiro Tuji. The electric conductivity at the time of collection was 94 μS/cm, and pH was 8.1. This material is going to be distributed for the next issue of *Algae aquae dulcis Japonicae* exsiccata.

Results and Discussion

Ulnaria rostrata (F. Meister) Tuji **comb. nov.**

Basionym: *Synedra rostrata* F. Meister, Arch. Hydrobiol. **8**: 312. *pl. IV, f. 7*. 1913.

Lectotype (designated in Tuji & Williams 2007): BRM "K2/57"!

Isotype: Slide no. 801 Tempère et Peragallo (2nd edition), BM69152!

Synonyms:

Synedra inaequalis H. Kobayasi in Kobayasi, H., Idei, M., Kobori, S. & Tanaka, H. Diatom **3**: 9–10. *f. 2–13*. 1987.

Ulnaria inaequalis (H. Kobayasi) M. Idei in H. Kobayasi's Atlas Jap. Diat. Electr. Microsc. **1**: 86. 2006.

Type locality: Lake Suwa, Nagano Pref., Japan.

From SEM observations, two large rimoportulae exist, one at each end of the valves (Figs. 1–8). At least, three closed girdle bands were observed (Figs. 4–5). Small, rounded apical pore fields surrounded externally by a slightly thickened siliceous rim are on each end of the valve.

SEM micrographs of this taxon were also presented by Kobayasi *et al*. (1987) and Kobayasi *et al*. (2006) as *S. inaequalis*. The variation observed for *Synedra rostrata* F. Meister is that of *Synedra* inaequalis H. Kobayasi in Kobayasi *et al*. (1987), suggesting they are synonyms. My observation in this paper, that two large rimoportulae exist, one at each end of the valve, also agrees these previous observations. A rimportula at each valve apex was also observed using LM in the designated lectotype in LM (Tuji and Williams, 2007).

Because the characters of two rimportulae per valve and closed girdle bands are those of the genus *Ulnaria* (Compère, 2001), I hereby propose the transfer of *Synedra rostrata* to the genus *Ulnaria*.

Ulnaria japonica (F. Meister) Tuji **comb. nov.**

Basionym: *Synedra japonica* F. Meister, Arch. Hydrobiol. **8**: 312. *pl. IV, f. 5–6*. 1913.

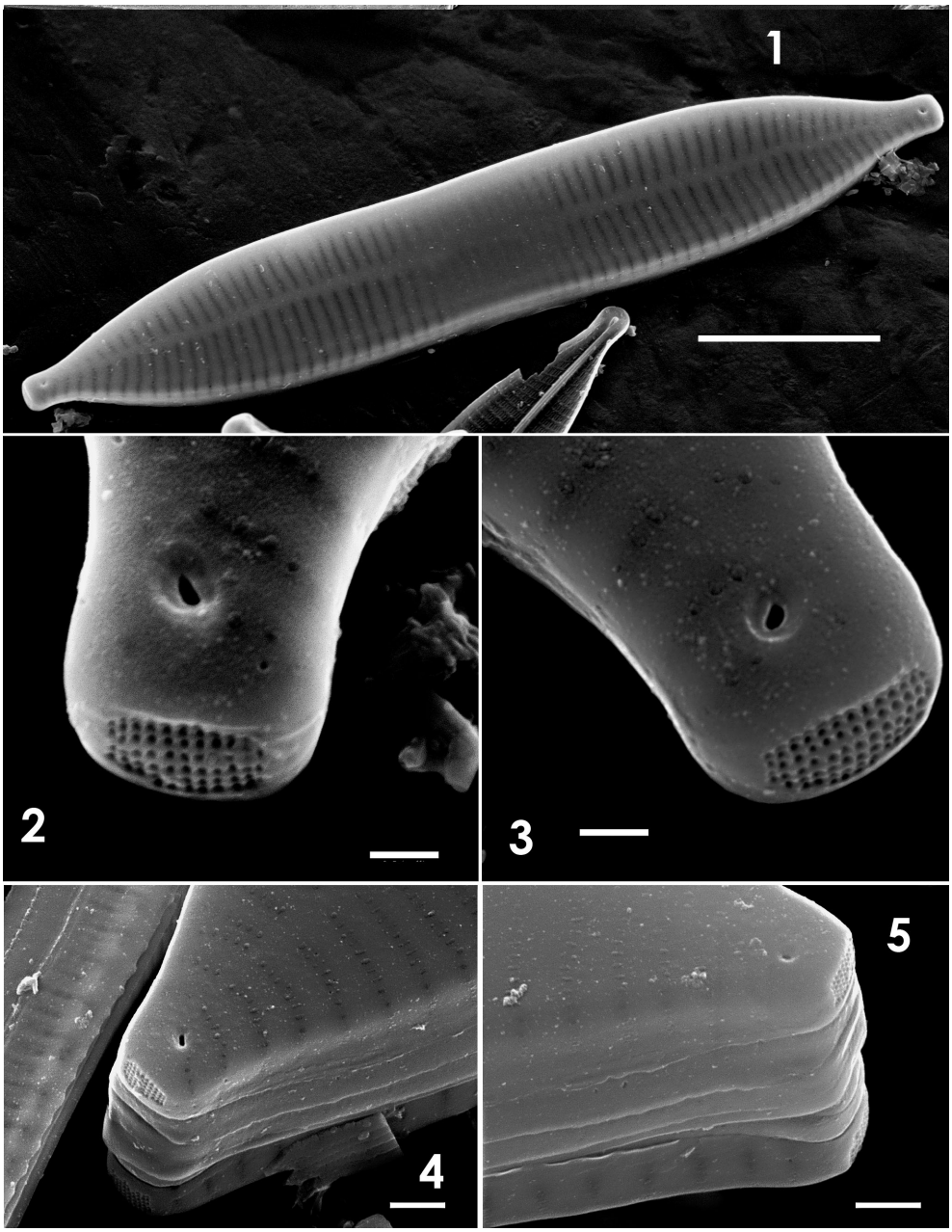
Lectotype (designated in Tuji & Williams 2007): BRM "K2/59" !

Isotype: Slide no 801, Tempère et Peragallo (2nd edition), BM69152!

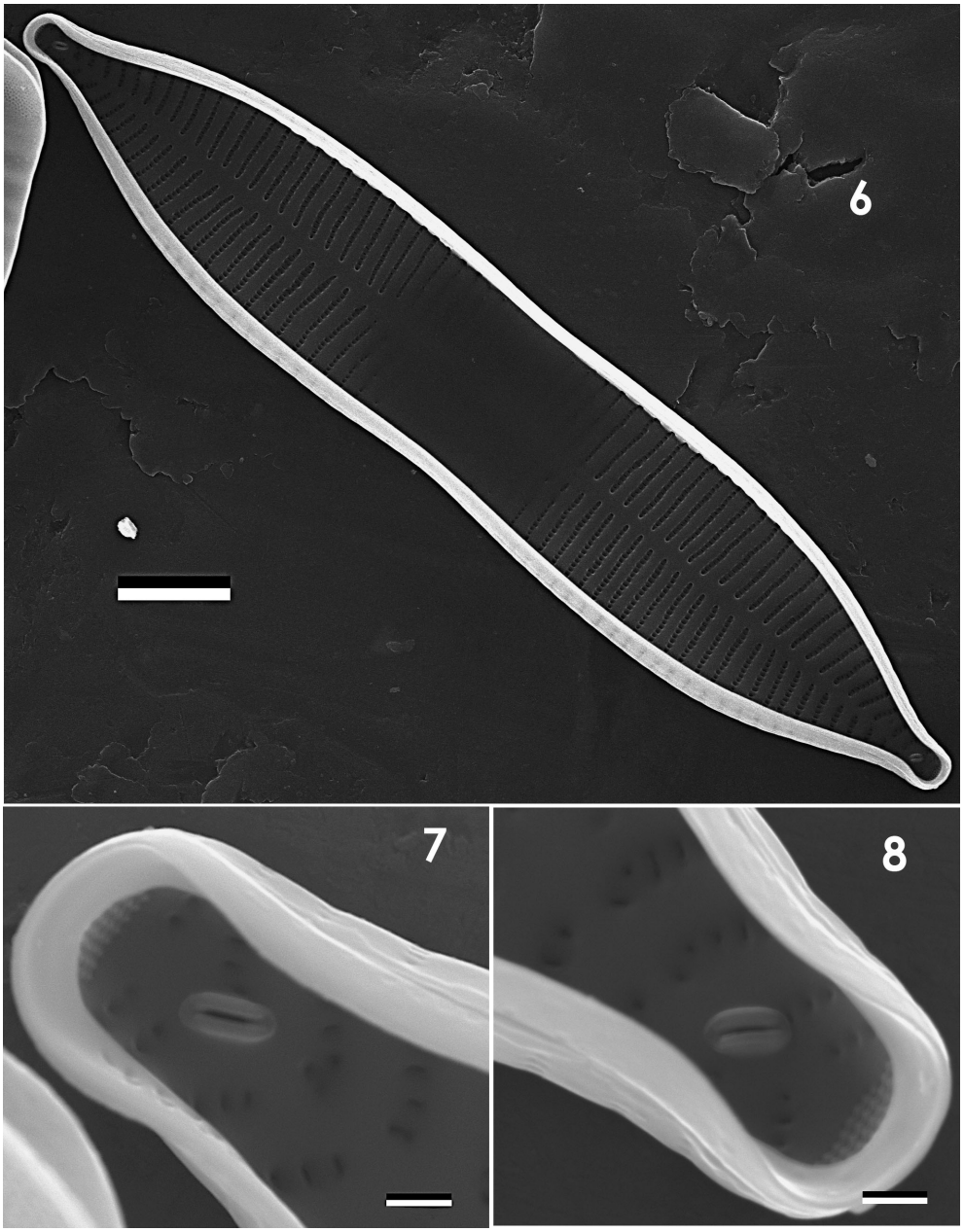
Type locality: Lake Suwa, Nagano Pref., Japan.

In SEM observations, two large rimoportulae exist, one at each end of the valve (Figs. 11, 12, 13 and 15). Three closed girdle bands are observed (Figs. 9–12). The central area is much longer than broad (Fig. 14). A rimportula at each valve apex was also observed in LM in the designated lectotype (Tuji and Williams, 2007).

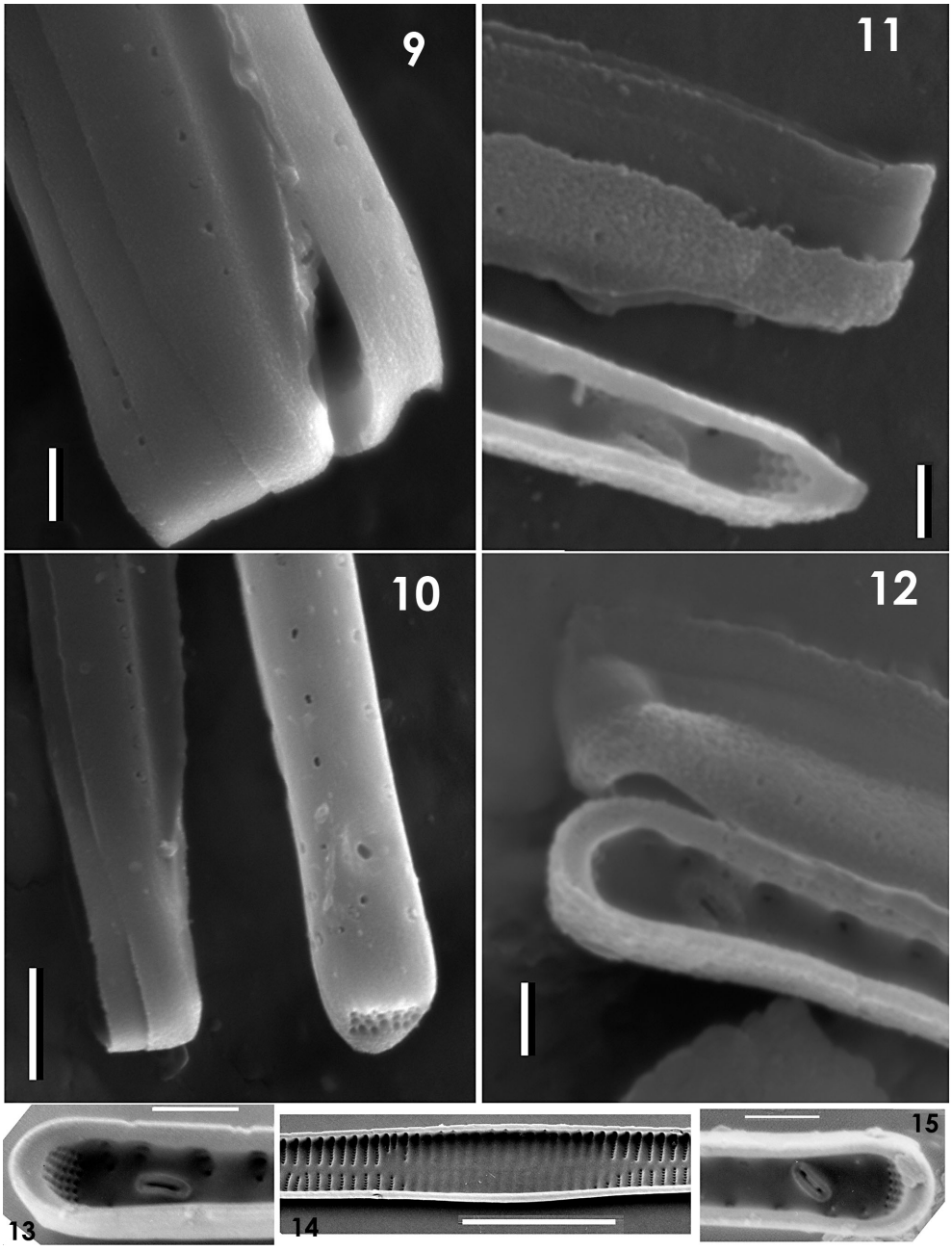
Because the characters, two rimportulae per



Figs. 1–5. *Ulnaria rostrata* (F. Meister) Tuji comb. nov., TNS-AL-TW-12581. 1–5. Outer view of a valve. 1–3. same valve. 1. Whole valve, 2–5. A rimoportula is located at each apex. 4 and 5. At least, three closed girdle bands exist. 1. bar=10 μm. 2 and 3 bar=0.5 μm. 4 and 5. bar=1 μm.



Figs. 6–8. Inner view of a valve, all images of same valve. 6. whole valve. 7 and 8. A rimoportula and apical pore field are found at each valve apex. 6. bar=5 μm. 7 and 8. bar=0.5 μm.



Figs. 9–15. *Ulnaria japonica* (F. Meister) Tuji comb. nov. 9–12. TNS-AL-55265, three closed valves are exist. 11–15. A rimoportula and apical pore field are located in each valve apex. 9, 11 and 12. bar=0.5 μm. 10, 13 and 15. bar=1 μm. 14. bar=5 μm. 13–15. after Tuji and Williams (2007: p. 73).

valve and closed girdlebands, are characters shared among species in the genus *Ulnaria* (Compère, 2001), I hereby propose the transfer of this taxon to the genus *Ulnaria* as *U. japonica*.

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