

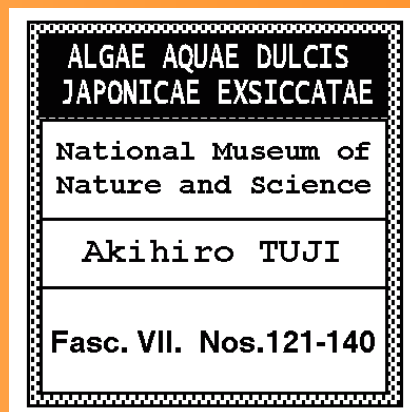


ALGAE AQUAE DULCIS JAPONICAE EXSICCATAE VII

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PREFACE

This exsiccata set was made from Japanese freshwater micro-algal specimens and is issued by the National Museum of Nature and Science. It is the 7th fascicle and comprises 20 slides.

The slides in this fascicle were made from culture strains. The culture strains were isolated by me from the various places using the pipette method, and d medium (Tuji 2000), which is a modified WC medium. It is difficult to maintain diatom culture strain for a long time and most of these strains have since died.

The study of culture strains is important for the understanding of morphological variation in diatom species, though many strains have abnormal forms at the end of the culture period. Molecular analyses of these strains have been undertaken and will be published in future papers.

I have described four new species of diatom in this fascicle. These species are endemic to Japan.

Any problems experienced when using this exsiccatae set please contact me. I can send replacement slides. I am always pleased to receive comments and suggestions.

The exsiccatae sets including previous fascicles, have been sent to about 35 herbariorum. The catalogues (without specimens) have also been sent to several herbariorum and libraries including National diet library (Japan) and the library of National museum of nature and science. The PDF versions of the catalogue are published in the online environment, <http://www.kahaku.go.jp/research/db/botany/exsiccatae/index.html>.

CITATION

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No. 121

Prepared from strain Ak1138 (voucher specimens: TNS-AL-62138 in TNS). This culture strain was prepared from a sediment sample from Yamato-ga cave, Miyako Island, Okinawa Pref., Japan. Coll. A. Tuji, 14/xi/2013.

Gomphosphenia ryukyuensis Tuji et Ohtsuka sp. nov.

(Fig. 1-18)

Valves clavate with broadly rounded head pole and slightly rostrate foot pole (Figs 1-11). Central region of valve tumid (Figs 12, 16), length 15-22 μ m, width 4.7-6.7 μ m. Apical porefields, septa and pseudosepta absent. Striae slightly radiant in central part of valve, becoming convergent towards both head and foot pole, 16-19 in 10 μ m (Figs 1-13, 18). Raphe straight, filiform, with straight external terminal fissures (Figs 15-18). Four open bands (Figs 13-14).

Similar to *Gomphosphenia grovei* (M.Schmidt) Lange-Bert., distinguished from it by the rounded head pole and slightly rostrate foot pole; similar to *Gomphonema punctatum* Hust., but distinguished from it by the valve outline and size.

Holotype: slide TNS-AL-62138s in TNS.

Isotype: raw material TNS-AL-62138m in TNS; no. 121 in *Algae Aquae Dulcis Japonicae Exsiccatae*. Fasc. 7. 2016.

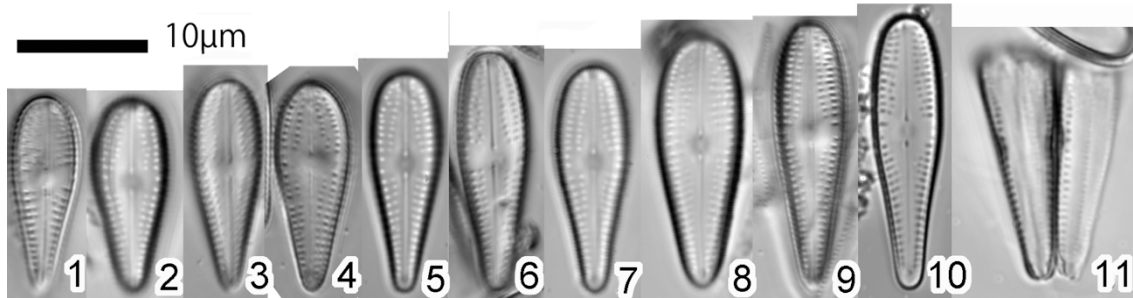
Type locality: Yamato-ga cave, Miyako Island, Okinawa Pref. Japan.

Etymology: Ryukyu is an old name for Okinawa Island.

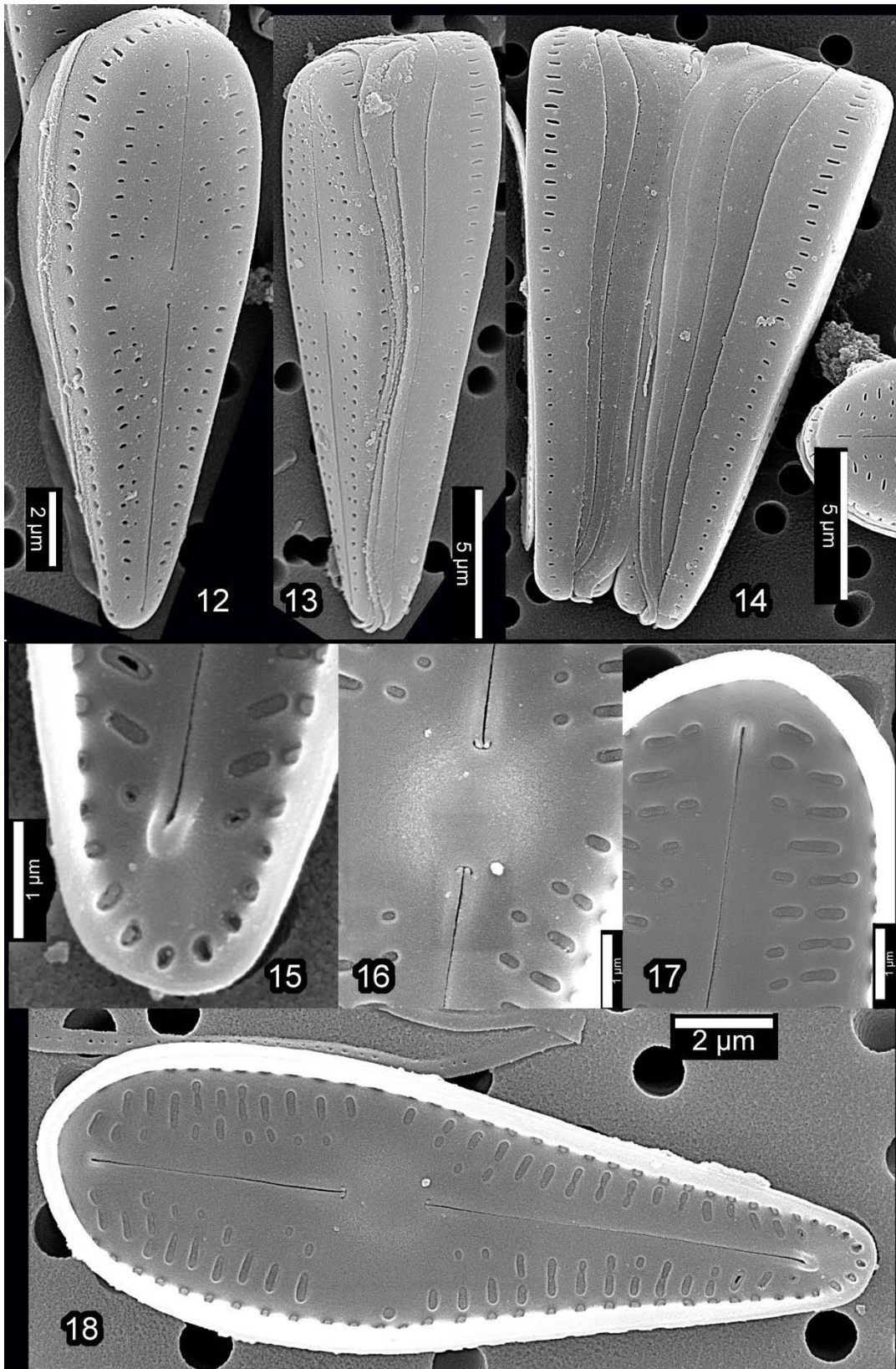
Synonym: *Gomphonema grovei* var. *lingulatum* sensu Nakai 1987, p. 192. *pl. 2, f. 30-32*.

Gomphonema grovei var. *lingulatum* reported by Nakai (1987) from Okinawa Main Island, should be a synonym of this newly described taxon. Although its valves are much longer (28-34 μ m) than the types, they are considered in an earlier stage of a size reduction sequence.

(Tuji, A. & Ohtsuka, T.)



Figs 1-11. *Gomphosphenia ryukyuensis* Tuji sp. nov. (LM).



Figs 12-18. *Gomphosphenia ryukyuensis* Tuji sp. nov. (SEM).

No. 122

Prepared from strain Ak1059 (voucher specimens: TNS-AL-62059 in TNS). This culture strain was prepared from a sediment sample from Yamato-ga cave, Miyako Island, Okinawa Pref., Japan. Coll. A. Tuji, 14/xi/2013.

Stauroneis miyakoensis Tuji sp. nov.

(Fig. 1-8)

Valves linear-lanceolate to almost linear with softly triundulate margin and broad rostrate poles. Length 23-26 μ m, breadth 6.5-7.0 μ m. Pseudosepta unclear. Axial area relatively narrow, linear. Central area forming a narrow, almost rectangular fascia reaching valve margins. Striae weekly radiate throughout the entire valve, 20-22 in 10 μ m, consist 2-5 puncta per a row of stria.

Similar to *Stauroneis lauenburgiana* var. *angulata* Hust., but differ its rostrate poles.

Holotype: slide TNS-AL-62059s in TNS.

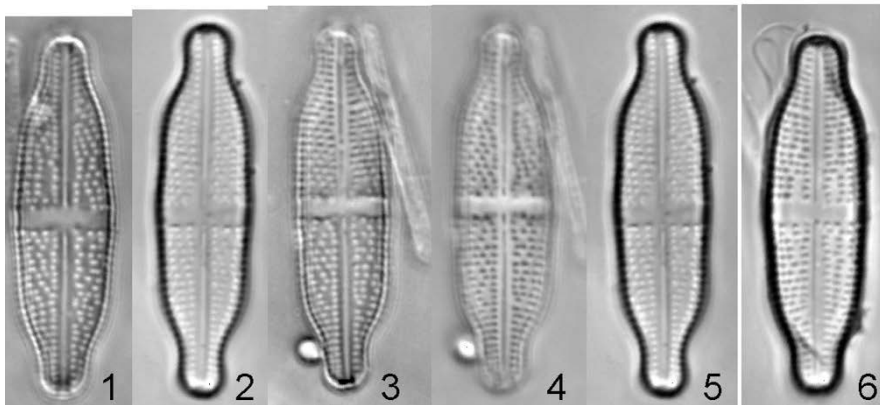
Isotype: raw material TNS-AL-62059m in TNS; no. 122 in *Algae Aquae Dulcis Japonicae Exsiccatae*. Fasc. 7. 2016.

Type locality: Yamato-ga cave, Miyako Island, Okinawa Pref. Japan.

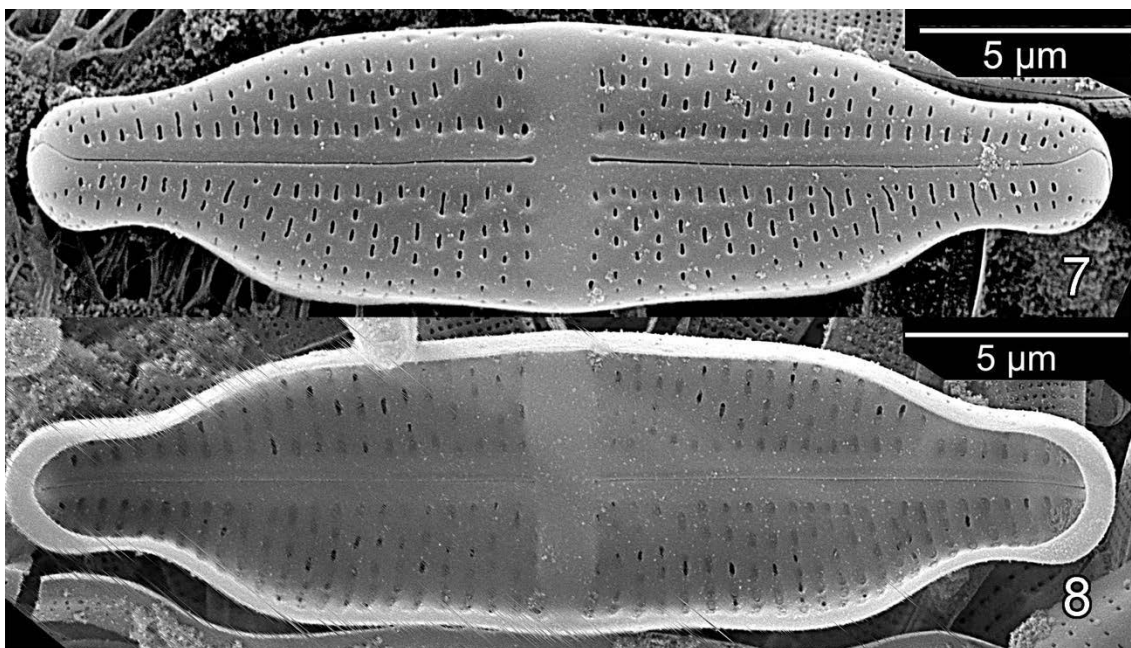
As the type locality is a cave (Yamato-ga cave, Miyako Island), the light intensity is very for this species. The cave is formed by Ryukyu limestone.

Stauroneis lauenburgiana f. *angulata* Hust. is similar to this taxon but specimens from its type material has capitate ends and relatively long valves (Simonsen 1987: pl. 545, figs 7, 8).

10µm



Figs 1-6. *Stauroneis miyakoensis* Tuji sp. nov. (LM).



Figs 7-8. *Stauroneis miyakoensis* Tuji sp. nov. (SEM).

No. 123

Prepared from strain Ak1155 (voucher specimens: TNS-AL-62155 in TNS). This culture strain was prepared from a specimen (TNS-AL-57998 in TNS) found in the Nyu River, Nara Pref., Japan. Coll. A. Tuji, 2/iv/2014.

Geissleria pusilla Tuji sp. nov.

(Fig. 1-6)

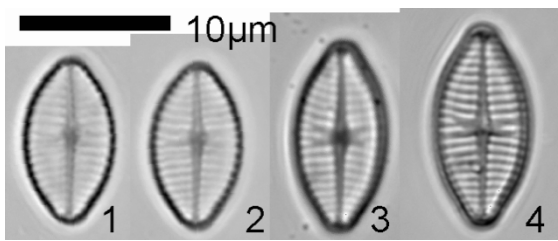
Valves broadly elliptical with sometimes shortly protracted, subcapitate and obtusely rounded poles, length 11-14 μ m, width 6.5-7.0 μ m. Sternum linear, narrow, central area small, formed by regularly alternating shorter and longer striae. Simple stigma adjacent to central nodule. Striae radiate at centre of valve, becoming parallel towards poles, 14-18 in 10 μ m. Puncta rectangular throughout.

Similar to *Geissleria modica* (Hust.) C.E.Wetzel et al. and *G. aikenensis* (Patrick) Torgan et M.A.Oliveira but differ from both by the parallel striae near valve poles. Distinguished from *G. bourbonensis* Le Cohu et al. by the shape of the puncta.

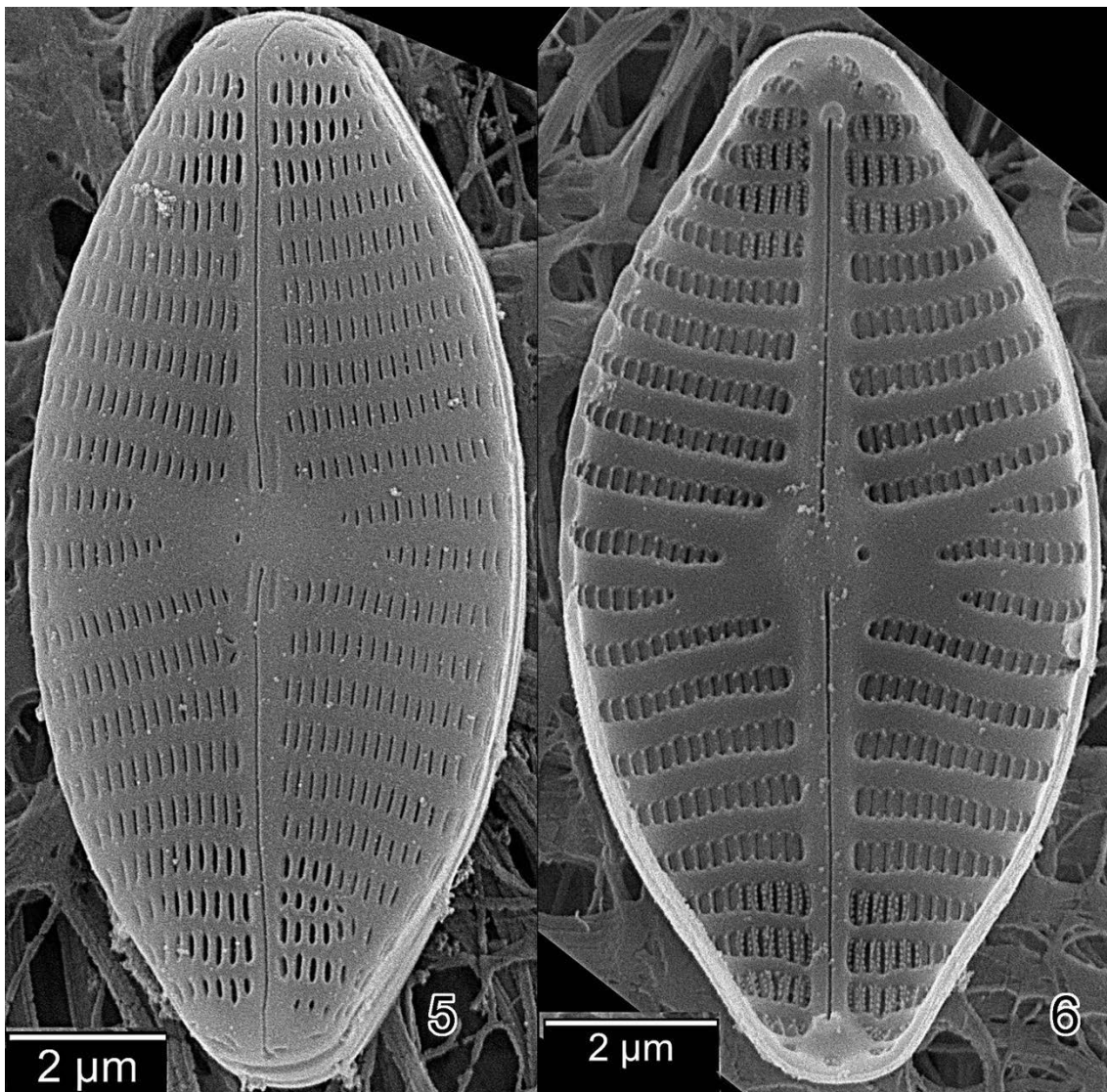
Holotype: slide TNS-AL-62155s in TNS.

Isotype: raw material TNS-AL-62155m and TNS-AL-57998 in TNS; no. 123 in *Algae Aquae Dulcis Japonicae Exsiccatae*. Fasc. 7. 2016.

Type locality: Nyu River, Nara Pref., Japan.



Figs 1-4. *Geissleria pusilla* Tuji sp. nov. (LM).



Figs 5-6. *Geissleria pusilla* Tuji sp. nov. (SEM).

No. 124

Prepared from strain Ak1056 (voucher specimens: TNS-AL-62056 in TNS). This culture strain was prepared from a specimen (TNS-AL-58291 in TNS) found in Nakaikemi Moor, Fukui Pref., Japan. Coll. A. Tuji, 16/ii/2014.

Neidium minus Tosh.Watan. et al. ex Tuji sp. nov.

(Fig. 1-6)

Valves broadly lanceolate, length 12-16 μ m, breadth 4.0-4.5 μ m. Sternum narrow and linear, central area rectangular and expanded. Striae almost parallel throughout, 35-38 in 10 μ m. Areolae circular to fusiform, 20-30 in 10 μ m.

Similar to *Neidium tenuissimum* Hust. or *N. alpinum* Hust., however, both of these taxa have convergent striae (Simonsen 1987) and hence differ from *Neidium minus*.

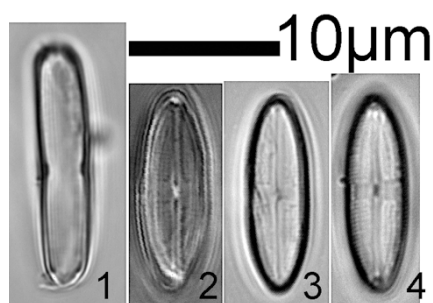
Watanabe et al. (2005) described *Neidium minor* nom. nud. from Ichi-numa pond, Shiga Highlands, Nagano Pref., Japan. *Neidium minor* nom. nud. Is the same taxon as described here.

Holotype: slide TNS-AL-62056s in TNS.

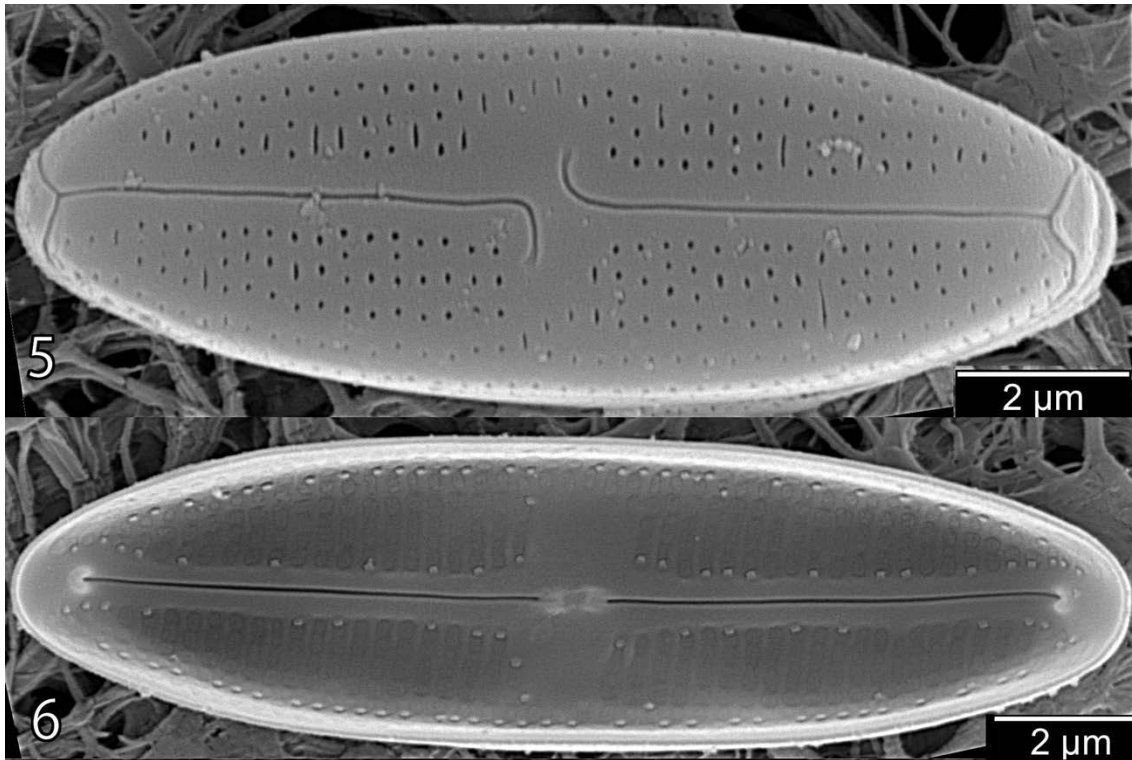
Isotype: raw material TNS-AL-62056m and TNS-AL-58291 in TNS; no. 124 in *Algae Aquae Dulcis Japonicae Exsiccatae*. Fasc. 7. 2016.

Type locality: Nakaikemi Moor, Fukui Pref., Japan.

Synonym: *Neidium minor* nom. nud. sensu Watanabe et al. 2005, p. 248. *pl. IIB3-8, f. 7-10*.



Figs 1-4. *Neidium minus* Tosh.Watan. et al. ex Tuji sp. nov. (LM).



Figs 5, 6. *Neidium minus* Tosh.Watan. et al. ex Tuji sp. nov. (SEM).

No. 125

Prepared from strain Ak1080 (voucher specimens: TNS-AL-62080 in TNS). This culture strain was prepared from a planktonic sample collected in Lake Shikotsu, Hokkaido Pref. Coll. A. Tuji 21/xii/13.

Aulacoseira italica (Ehrenb.) Simonsen 1979, p. 60.

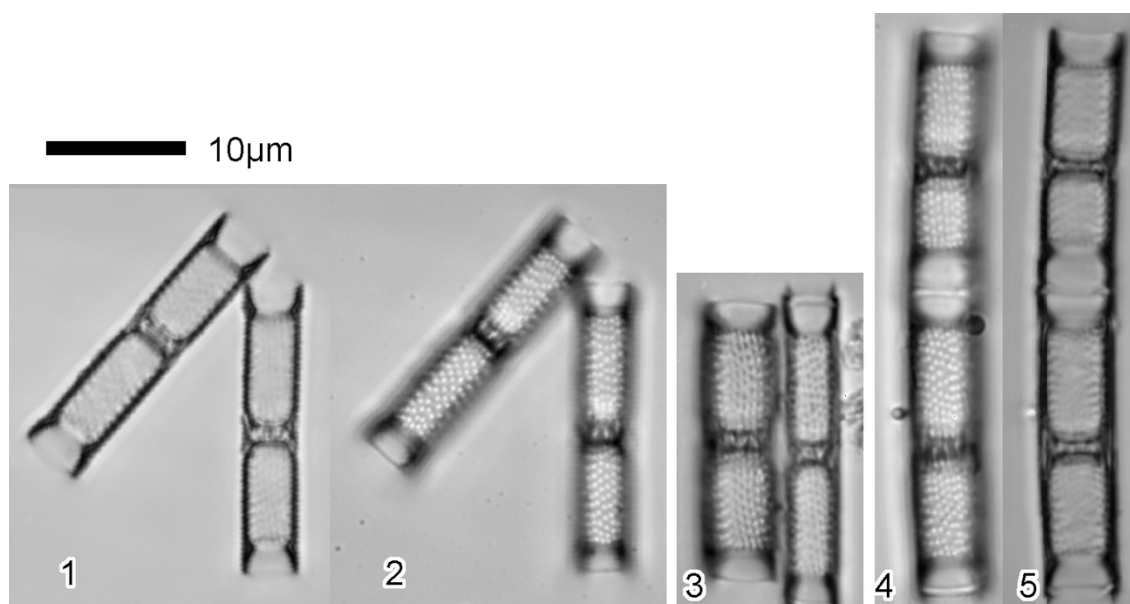
≡ *Gaillonella italica* Ehrenb. 1838, p. 171; pl. 10, fig. 6.

Lectotype (designated in Crawford et al. 2003): BHUPM Ehrenberg-Collection : 290706 a red.

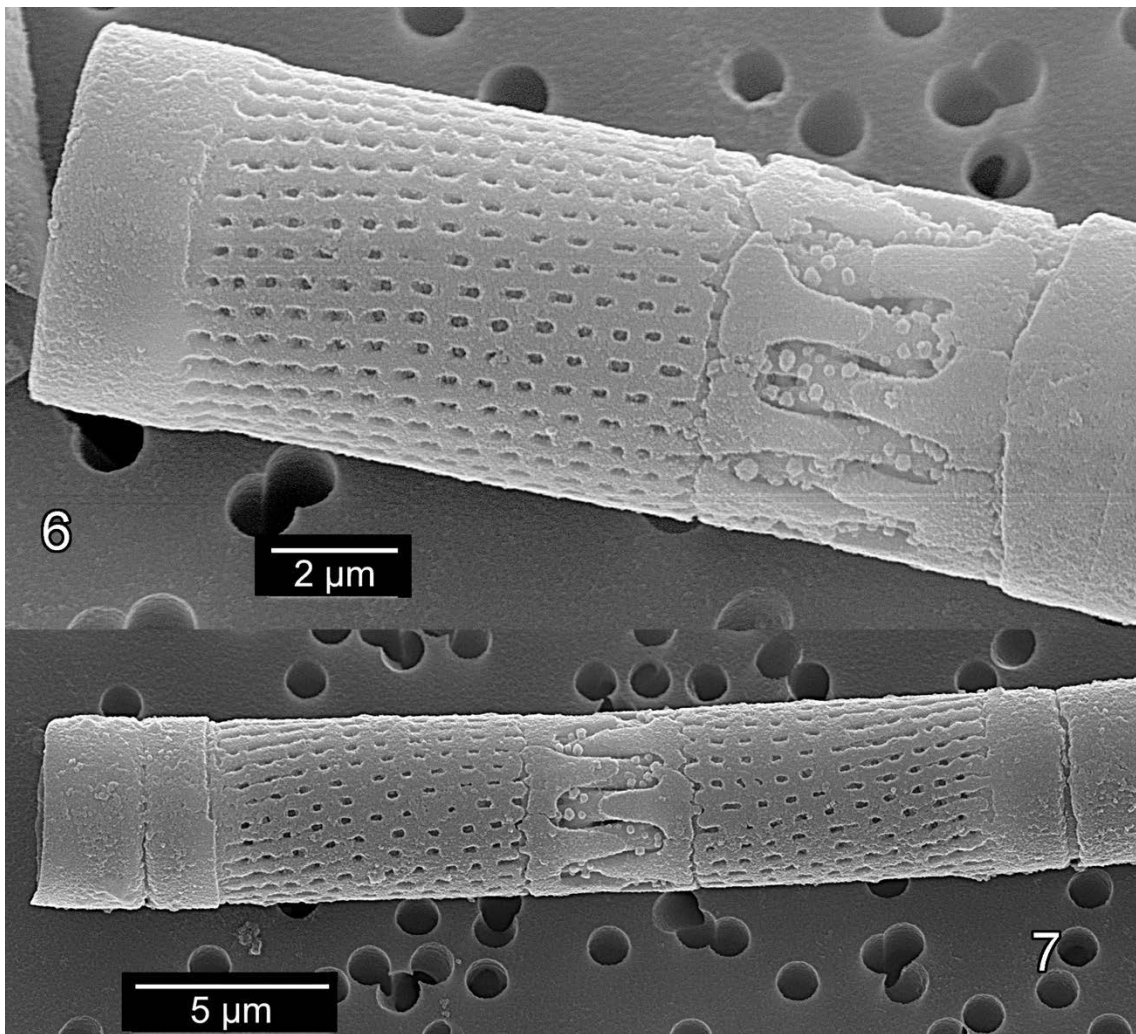
Type locality: Diatomaceous earth from Santa Fiora, collected by Klaproth.

A. italica has also been reported in a benthic sample from Lake Shirarutoro, Hokkaido in nos 54 and 55. The sample from Lake Shikotsu was collected using plankton net.

There are many granules on the linking spines. These granules are also found the specimens from Lake Shirarutoro. Crawford et al. (2003) examined type materials for this taxon. Our observation agree with the description in this paper.



Figs 1-5. *Aulacoseira italica* (LM).



Figs 6-7. *Aulacoseira italica* (SEM).

No. 126

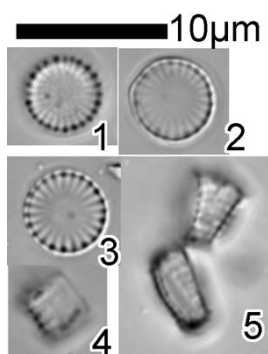
Prepared from strain Ak1144 (voucher specimens: TNS-AL-62044 in TNS). This culture strain was prepared from a specimen (Kasumi1311-9 in TNS) from Lake Kasumigaura, Ibaraki Pref., Japan. Coll. M. Nakagawa, 13/xi/2013.

Cyclostephanos dubius (Fricke) Round 1982, p. 326; fig. 7-18.

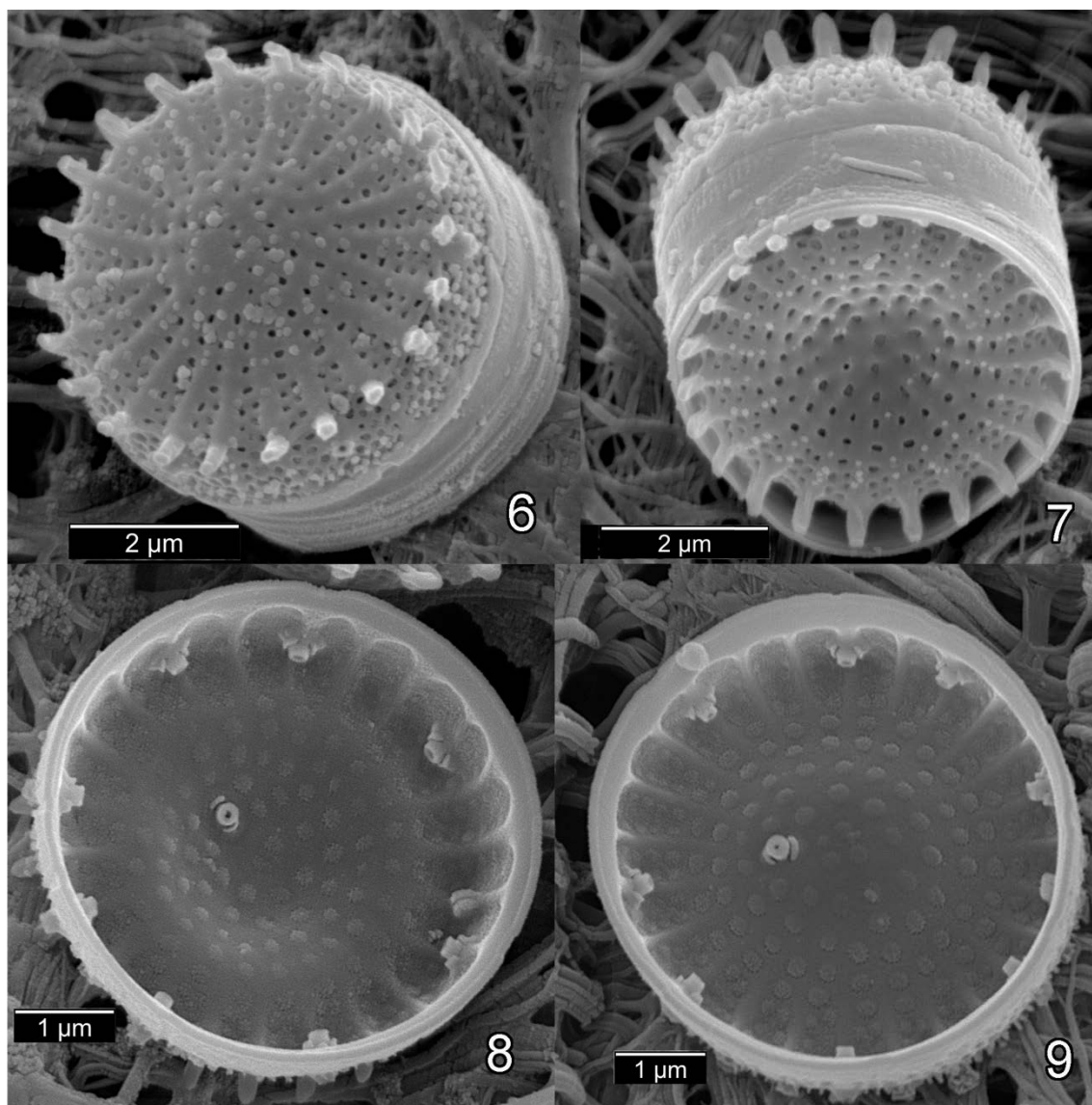
≡ *Cyclotella dubia* Fricke in Schmidt et al. 1900, pl. 222, fig. 23-24.

The field material from Lake Kitaura (near Lake Kasumigaura) (TNS-AL-56374), was reported at no. 26 in previous exsiccata fascicle 2. The character of this strain agree with the field material from Lake Kitaura.

The position of rimportula of this strain exist near valve-mantle junction, and differ from the specimen from Lake Biwa (Tuji & Houki, 2001).



Figs 1-5. *Cyclostephanos dubius* (LM).



Figs 6-9. *Cyclostephanos dubius* (SEM).

No. 127

Prepared from strain Ak999 (voucher specimens: TNS-AL-61999 in TNS). This culture strain was prepared from a specimen (Moni1000-Ikd2013-207 in TNS) from Lake Ikeda, Kagoshima Pref., Japan. Coll. M. Nishino, 27viii/2013.

Discostella woltereckii (Hust.) Houk & Klee 2004, p. 223.

≡ *Cyclotella woltereckii* Hust. 1942, p. 16; fig. 11-13.

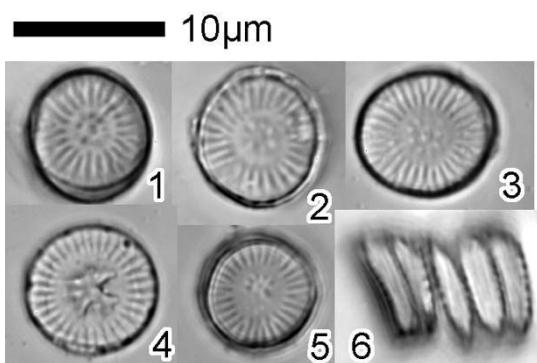
Holotype: A slide Ac/68 in BRM, examined by Simonsen, Atlas Cat. Diat. Typ. Fr.

Hust. pl. 400. f. 7-14. 1987.

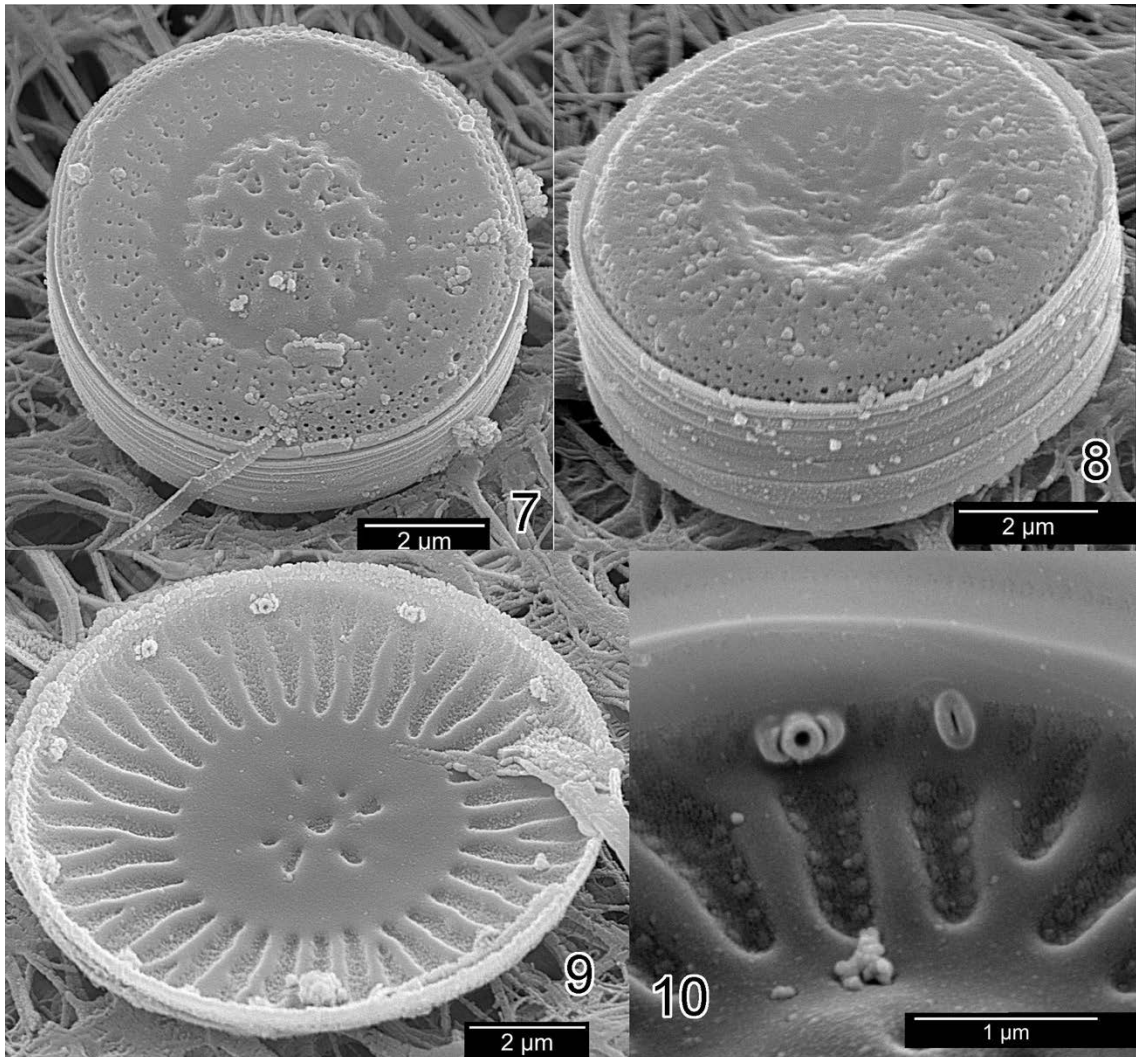
Lectotype: An individual at position 467.1 on the holotype slide BRM Ac/68,

designated in Tuji & Williams (2006b); micrograph presented by Simonsen, Atlas Cat. Diat. Typ. Fr. Hust. pl. 400. f. 9. 1987.

The strain from Haneji reservoir, Okinawa Prefecture (TNS-AL-57331), was reported at no. 96 in previous exsiccata fascicle 5. The character of this strain agree with the strain from Hanaji reservoir.



Figs 1-6. *Discostella woltereckii* (LM).



Figs 7-10. *Discostella woltereckii* (SEM).

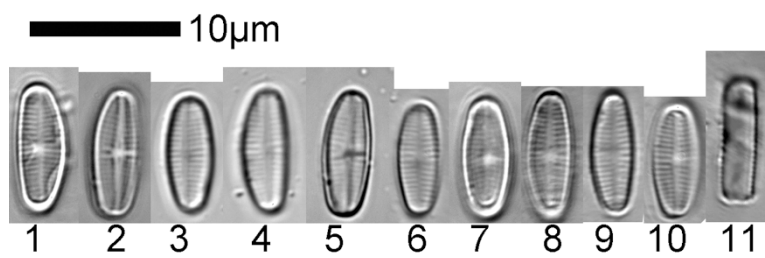
No. 128

Prepared from strain Ak1134 (voucher specimens: TNS-AL-62134 in TNS).

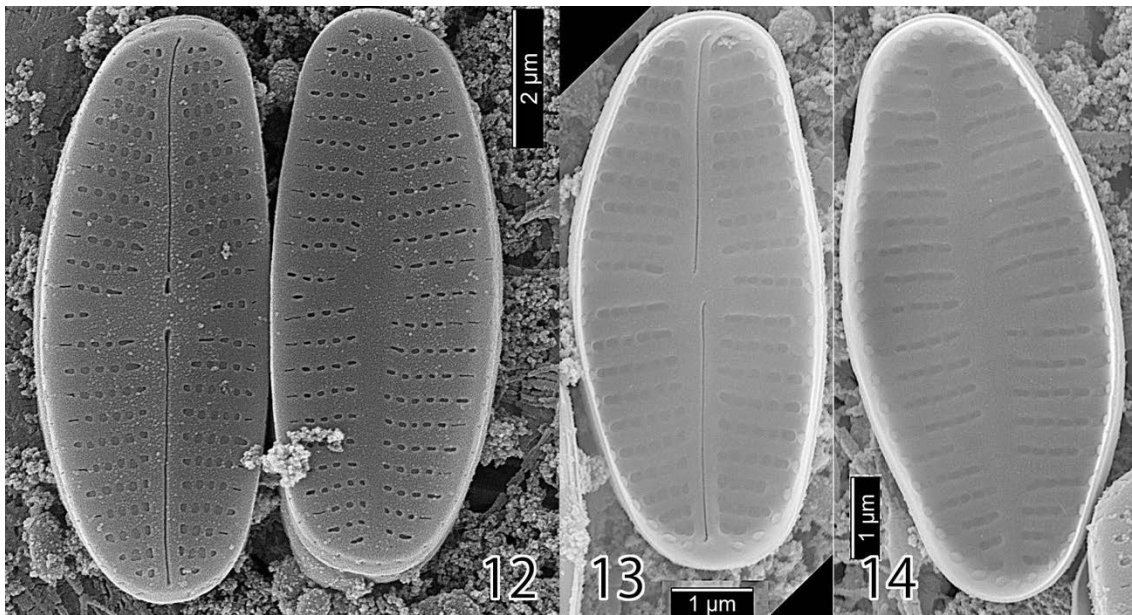
This culture strain was prepared from a specimen (TNS-AL-61518) from Lake Shikotsu, Hokkaido Pref. Coll. A. Tuji 21/xii/13.

Achnantheidium robustum (Hust.) Ohtsuka in Ohtsuka et al. 2007, p. 33.

≡ *Achnanthes minutissima* var. *robusta* Hust. 1937, p. 192-193; pl. 13, fig. 41-46.



Figs 1-11. *Achnantheidium robustum* (LM).



Figs 12-14. *Achnantheidium robustum* (SEM).

Nos. 129

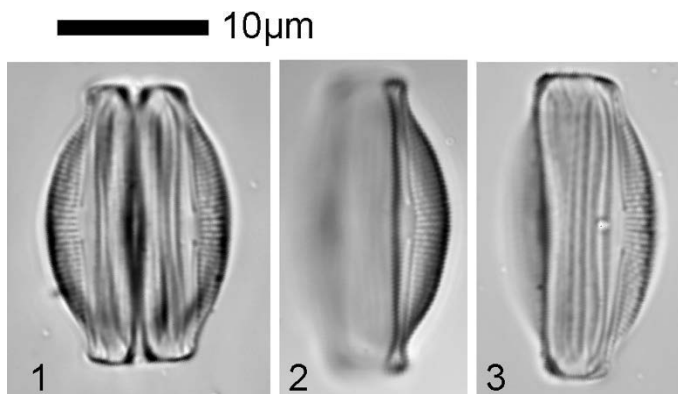
Prepared from strain Ak1145 (voucher specimens: TNS-AL-62145 in TNS).

This culture strain was prepared from a specimen (TNS-AL57955 in TNS) from a small branch of River Anbo, Yaku Island, Kagoshima Pref., Japan (30°18'38.6"N, 130°35'46.9"E). Coll. A. Tuji, 5/ii/2014.

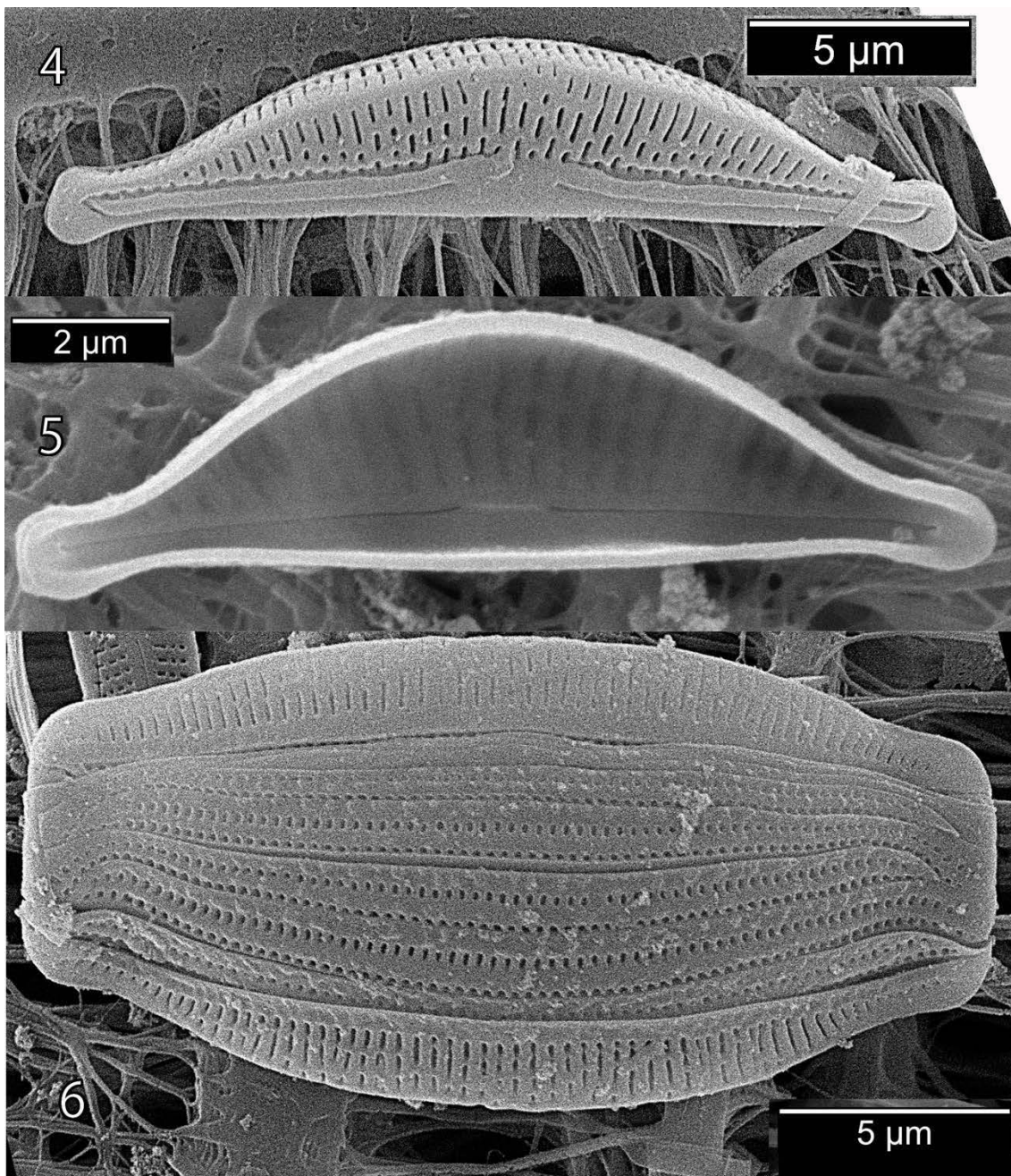
Halamphora oligotrappenta (Lange-Bert.) Z.Levkov 2009, p. 213.

≡ *Amphora oligotrappenta* Lange-Bert. in Lange-Bertalot & Metzeltin 1996, p. 28; pl. 96, fig. 21-22.

= *Amphora veneta* var. *capitata* E.Y.Haw. 1974, p. 48; fig. 6, 19.



Figs 1-3. *Halamphora oligotrappenta* (LM).



Figs 4-6. *Halamphora oligotrachenta* (SEM).

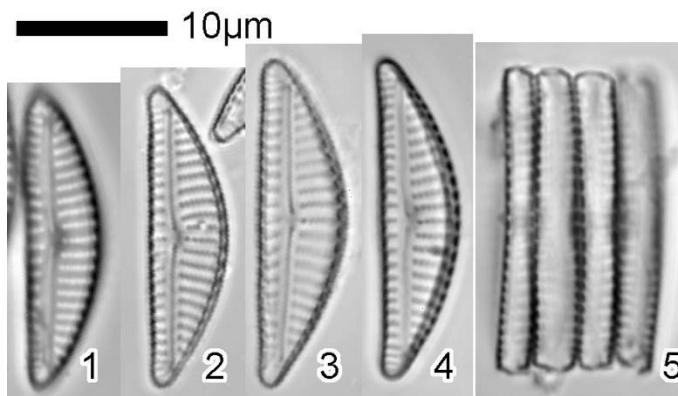
No. 130

Prepared from strain Ak1105 (voucher specimens: TNS-AL-62105 in TNS).
This culture strain was prepared from a specimen (TNS-AL-58297) from Lake Yogo,
Shiga Pref. Coll. A. Tuji 16/ii/14.

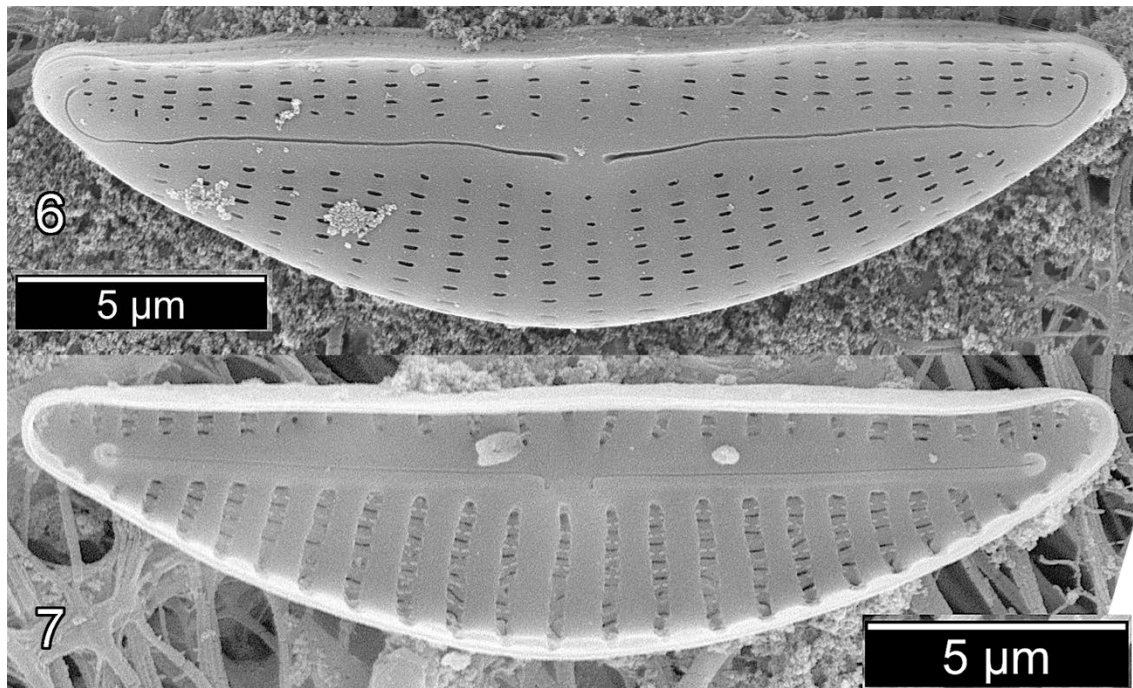
Encyonema silesiacum (Bleisch) D.G.Mann in Round et al. 1990, p. 667.

≡ *Cymbella silesiaca* Bleisch in Rabenhorst 1865, no. 1802.

≡ *Cymbella minuta* var. *silesiaca* (Bleisch) Reimer in Patrick & Reimer 1975, p. 49-50;
pl. 8, fig. 7a-10b.



Figs 1-5. *Encyonema silesiacum* (LM).



Figs 6-7. *Encyonema silesiacum* (SEM).

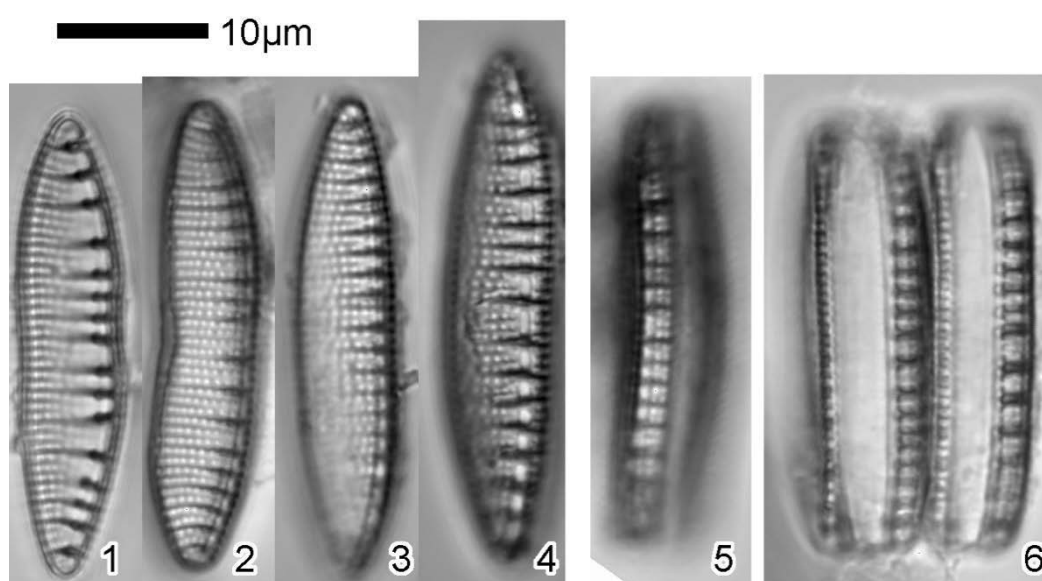
No. 131

Prepared from strain Ak1081 (voucher specimens: TNS-AL-62081 in TNS).
This culture strain was prepared from a specimen (TNS-AL-61513) from Lake Shikotsu,
Hokkaido Pref. Coll. A. Tuji 21/xii/13.

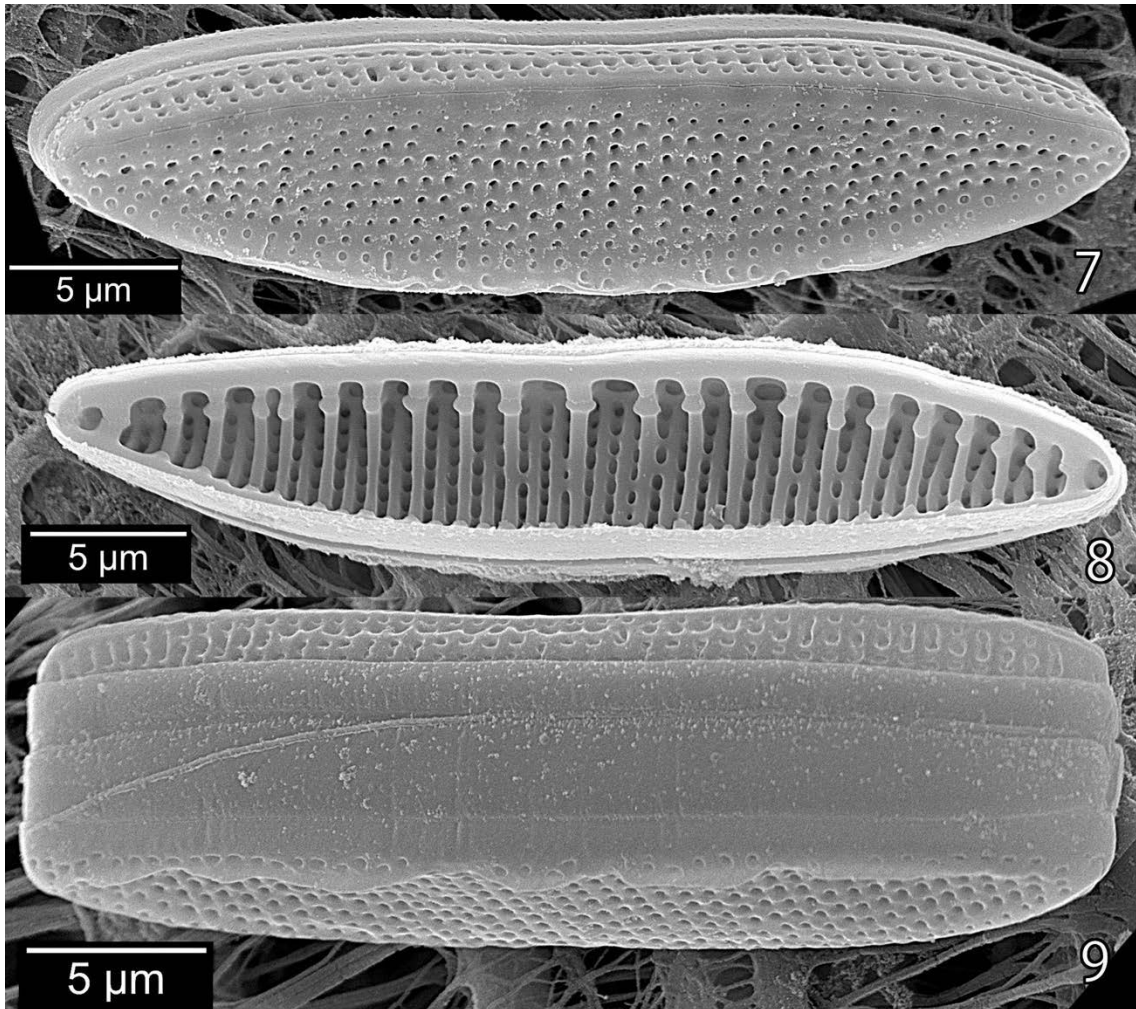
Nitzschia denticula Grunow in Cleve & Grunow 1880, p. 82.

≡ *Denticula kuetzingii* Grunow 1862, p. 546, 548; pl. 28/12, fig. 27.
non *Nitzschia kuetzingii* Rabenh. 1864.

Denticula kuetzingii was first described by Grunow (1862: 564). Tuji & Williams (2006a) examined Grunow's original drawings published in Grunow (1862) and Grunow in van Heurck (1881). The relevant part of both of these drawings is identical and the words 'Eulenstein 30' are written on both sheets. This refers to packet no. 30 in Eulenstein's exsiccatae set (Eulenstein 1868) and thus specimens in packet no. 30 are isotypes. Krammer in Lange-Bertalot & Krammer (1987) designated as lectotype the following slide in AWH: 'Denticula obtusa sensu W.Sm. 1856 in Coll. IV-I-CS, Eulenstein 30, Penzance, England'. There is also a specimen of 'Denticula obtusa' from 'Penzance' in W. Smith collection in AWH (Hoover 1976), which should be considered an iso-lectotype. Tuji & Williams (2006a) examined material in BM that was originated from AWH.



Figs 1-6. *Nitzschia denticula* (LM).



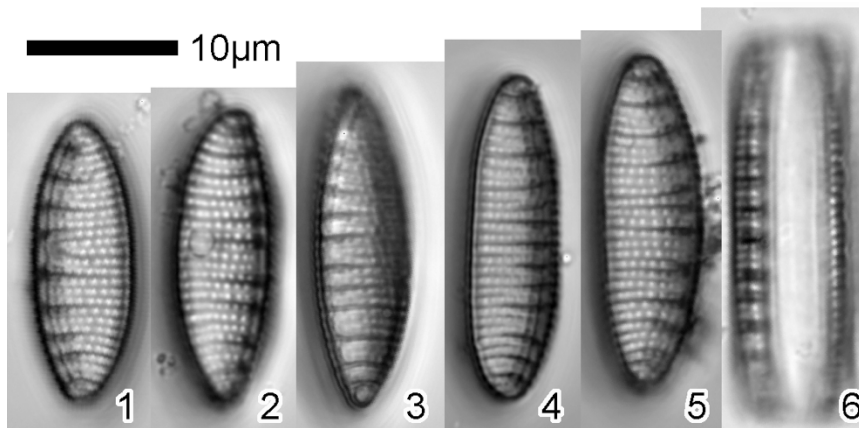
Figs 7-9. *Nitzschia denticula* (SEM).

No. 132

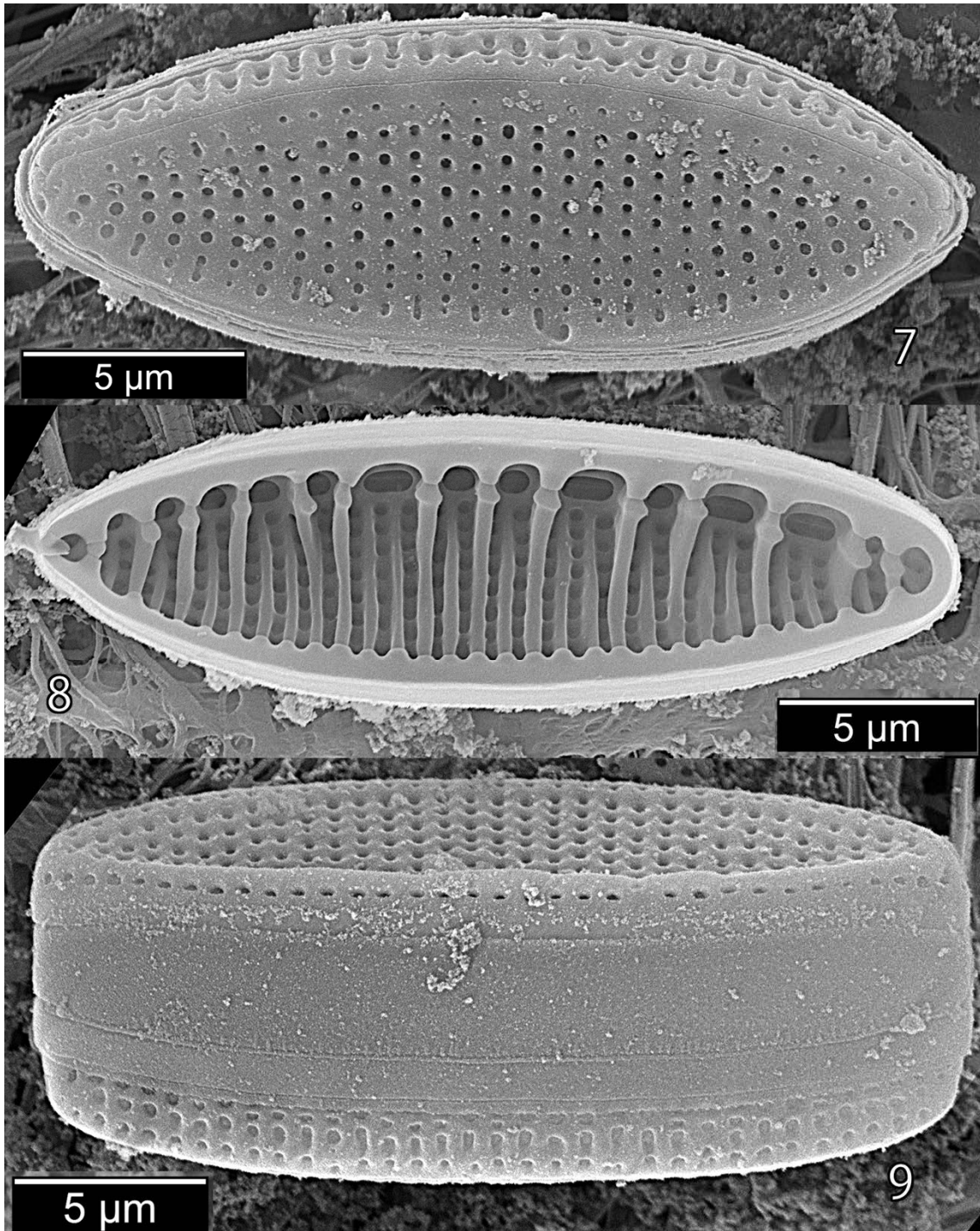
Prepared from strain Ak1113 (voucher specimens: TNS-AL-62113 in TNS).
This culture strain was prepared from a specimen (TNS-AL-61517) from Lake Shikotsu,
Hokkaido Pref. Coll. A. Tuji 21/xii/13.

Nitzschia denticula Grunow 1880.

Tuji & Williams (2006a) reported this taxon as genus *Denticula* because the band morphology is different from *Nitzschia amphibia* Grunow. Since, our molecular study suggests the similarity of both taxa, and I report this taxon in genus *Nitzschia* in here.



Figs 1-6. *Nitzschia denticula* (LM).



Figs 7-9. *Nitzschia denticula* (SEM).

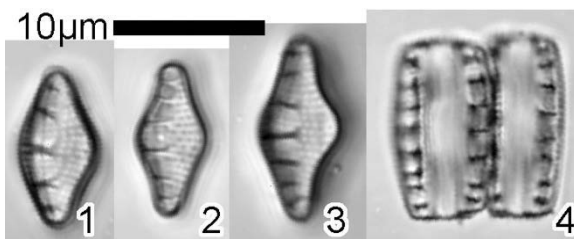
No. 133

Prepared from strain Ak11114 (voucher specimens: TNS-AL-62114 in TNS).
This culture strain was prepared from a specimen (TNS-AL-61517) from Lake Shikotsu,
Hokkaido Pref. Coll. A. Tuji 21/xii/13.

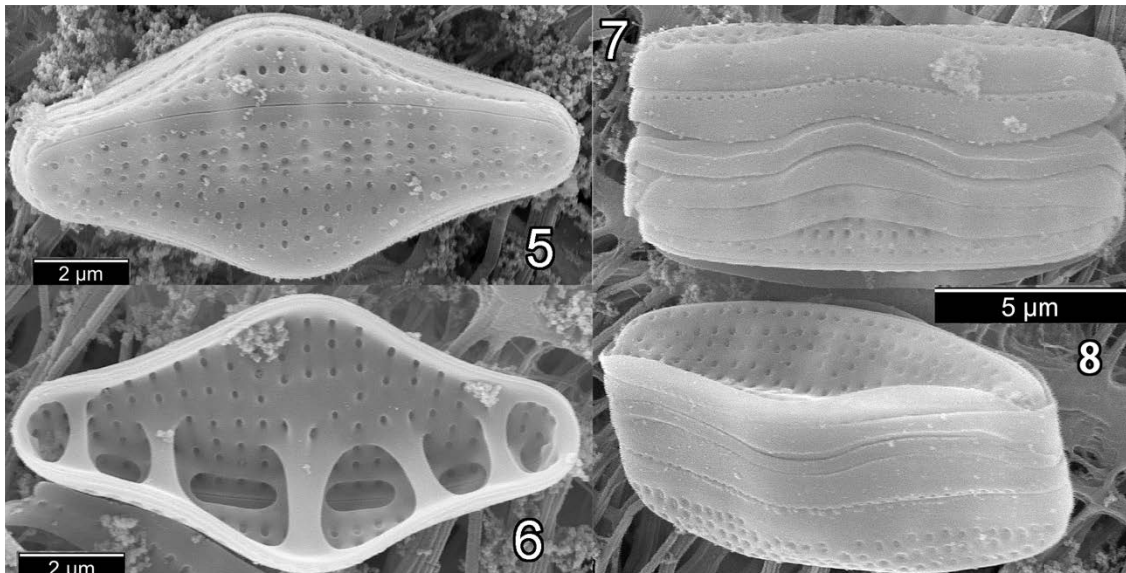
Nitzschia sinuata var. *tabellaria* (Grunow) Grunow in Van Heurck 1881, p. 176; pl. 60,
fig. 12-13.

≡ *Denticula tabellaria* Grunow 1862, p. 548; pl. 28/12, fig. 26.

This taxon has similar morphology with *Nitzschia denticula*. Tuji & Williams
(2006a) the ultra structure of both taxa.



Figs 1-4. *Nitzschia sinuata* var. *tabellaria* (LM).



Figs 5-8. *Nitzschia sinuata* var. *tabellaria* (SEM).

No. 134

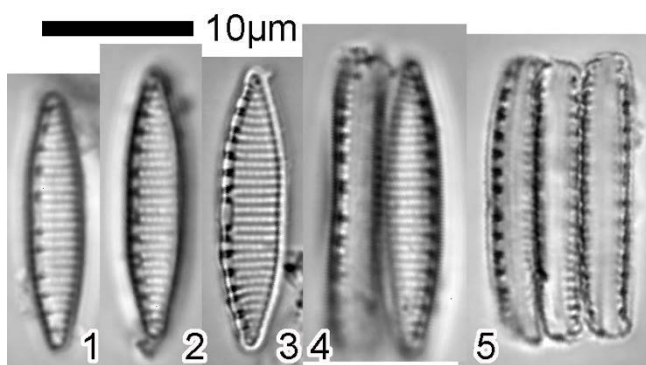
Prepared from strain Ak1083 (voucher specimens: TNS-AL-62083 in TNS).

This culture strain was prepared from a sample collected from Ukimi za, Miyako Island, Okinawa Pref. Coll. A. Tuji, 14/xi/2013.

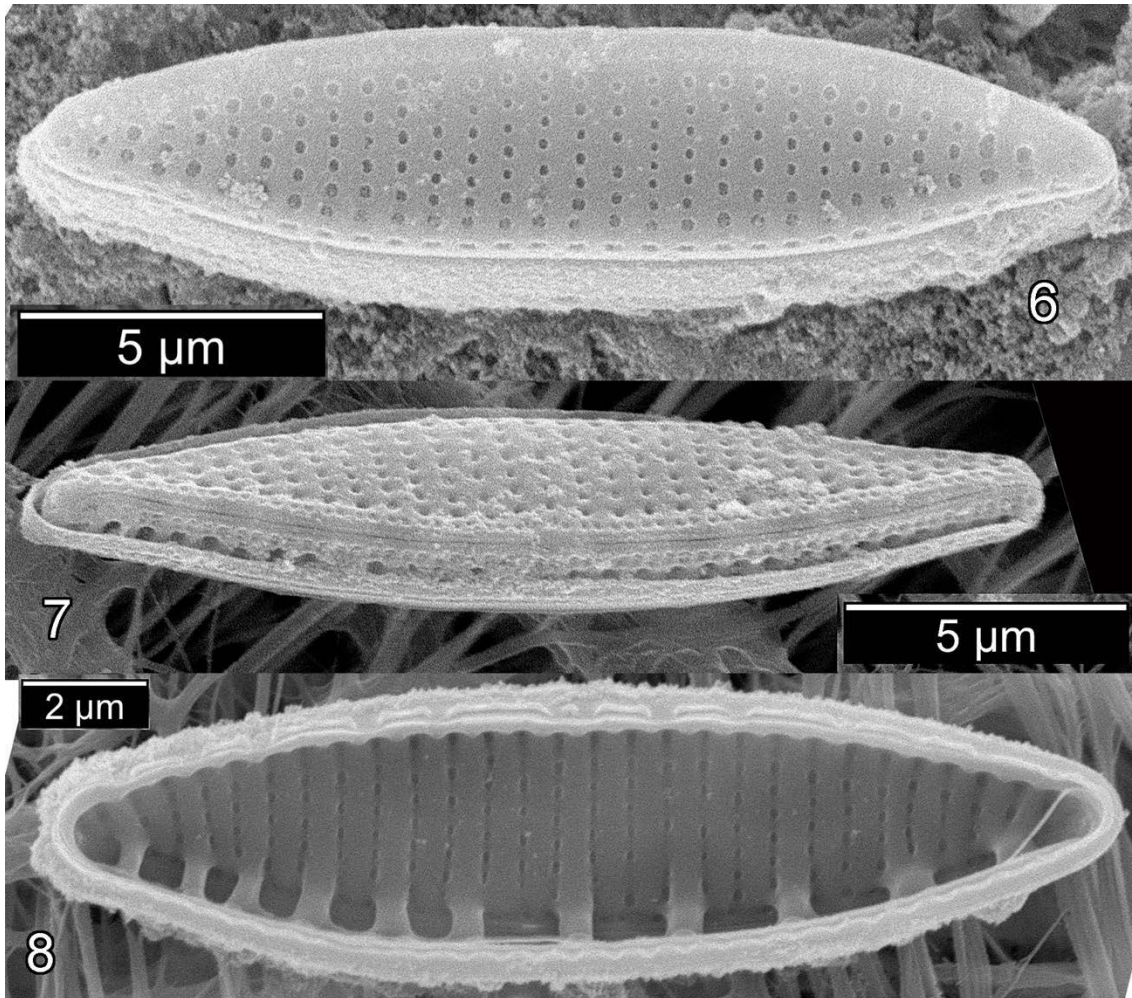
Nitzschia amphibia Grunow 1862, p. 574; pl. 28/12, fig. 23.

This taxon has similar morphology with *Nitzschia denticula* and *N. sinuata*.

Tuji & Williams (2006a) the ultra structure of these taxa.



Figs 1-5. *Nitzschia amphibia* (LM).

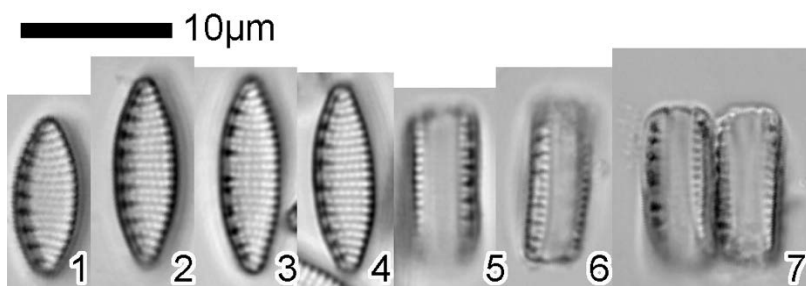


Figs 6-8. *Nitzschia amphibia* (SEM).

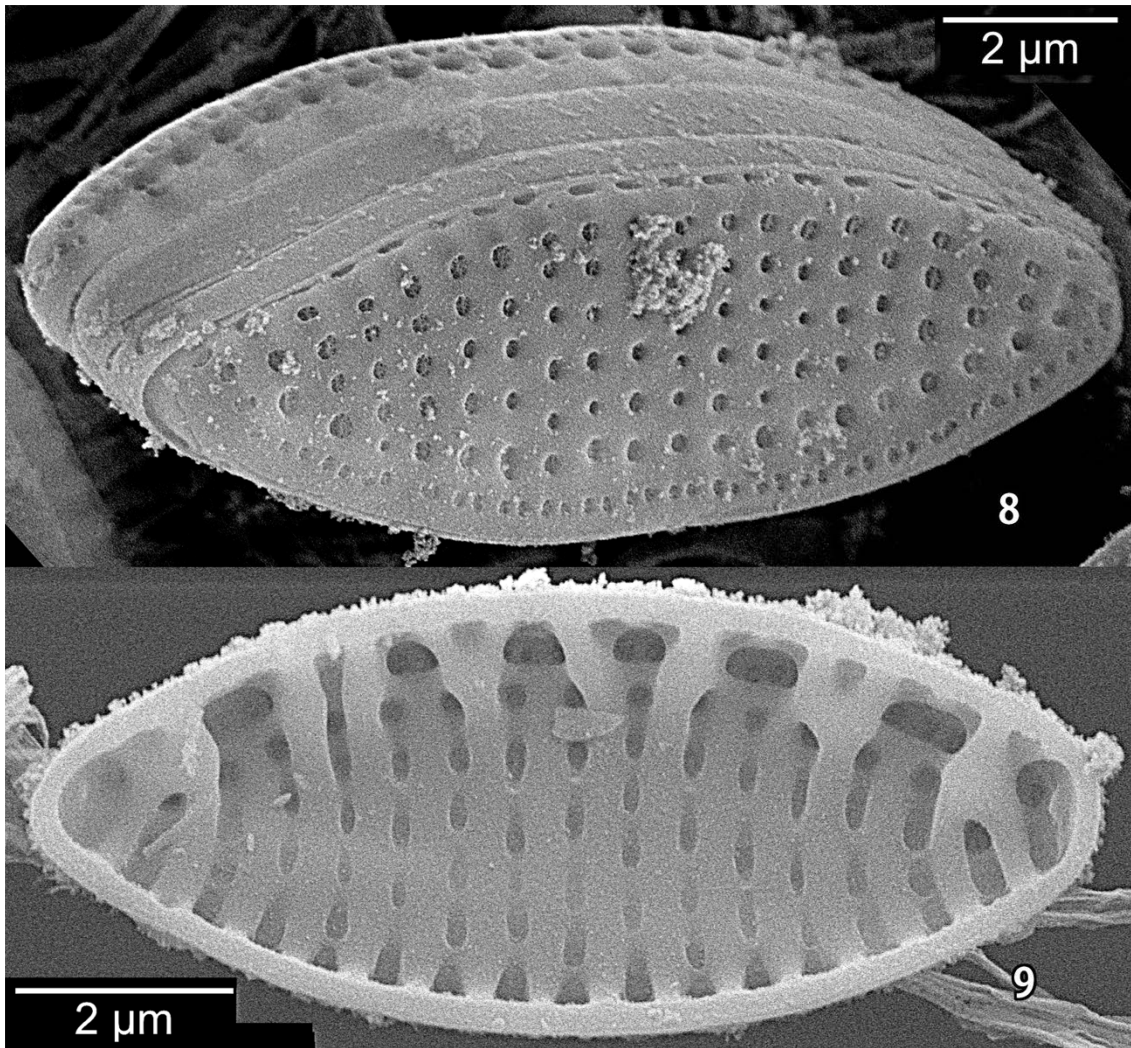
No. 135

Prepared from strain Ak1127 (voucher specimens: TNS-AL-62127 in TNS).
This culture strain was prepared from a specimen (TNS-AL-58297) from Lake Yogo,
Shiga Pref. Coll. A. Tuji 16/ii/14.

Nitzschia fonticola Grunow in Cleve & Möller 1879, No. 174.



Figs 1-7. *Nitzschia fonticola* (LM).



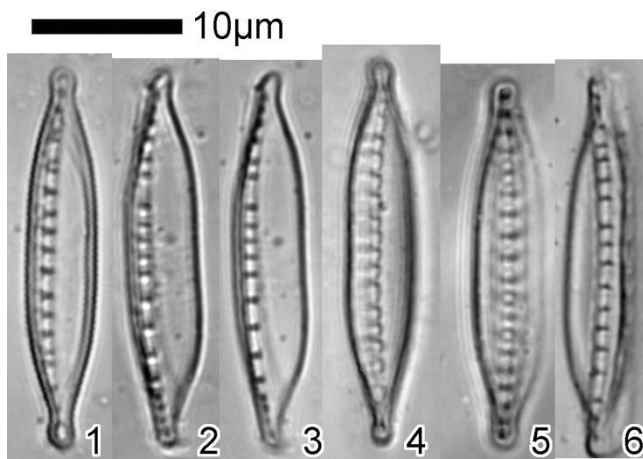
Figs 8-9. *Nitzschia fonticola* (SEM).

No. 136

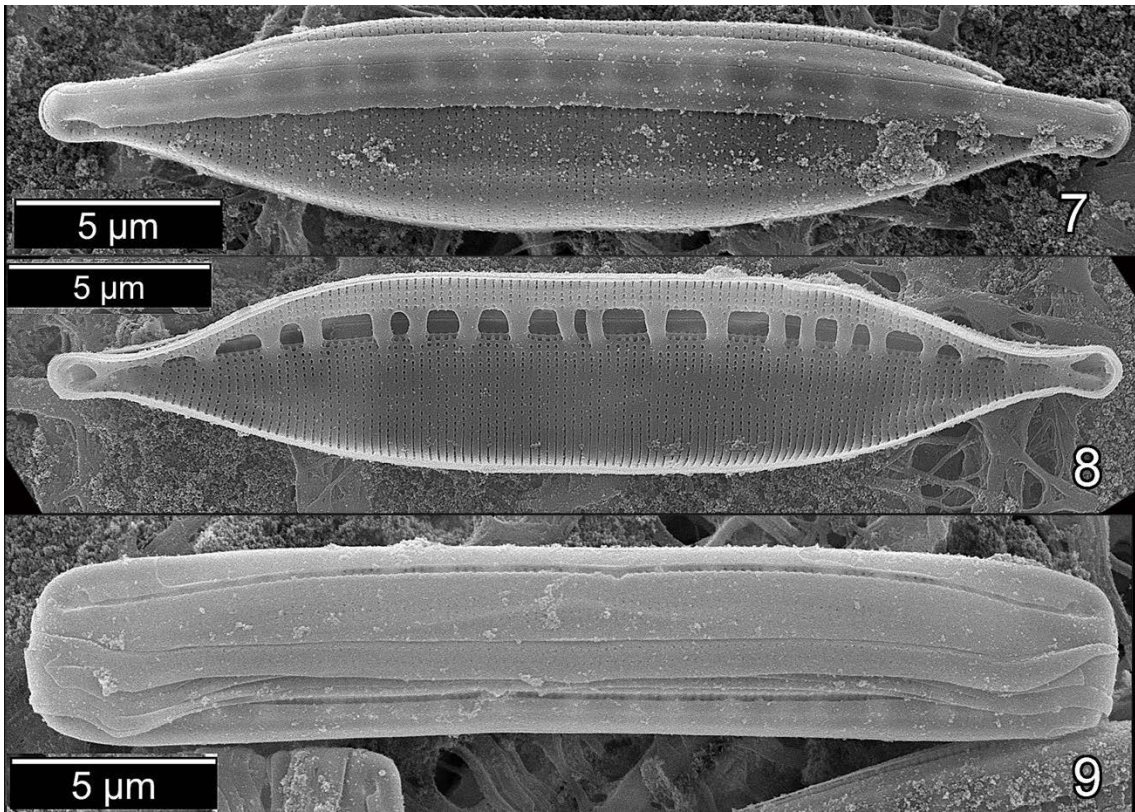
Prepared from strain Ak1148 (voucher specimens: TNS-AL-62148 in TNS).
This culture strain was prepared from a specimen (TNS-AL-57996) from Miyano-taki
Fall, Nara Pref. Coll. A. Tuji 2/iv/14.

Nitzschia dissipata (Kütz.) Grunow 1862, p. 561.

≡ *Synedra dissipata* Kütz. 1844, p. 64; pl. 14, fig. 3.



Figs 1-6. *Nitzschia dissipata* (LM).

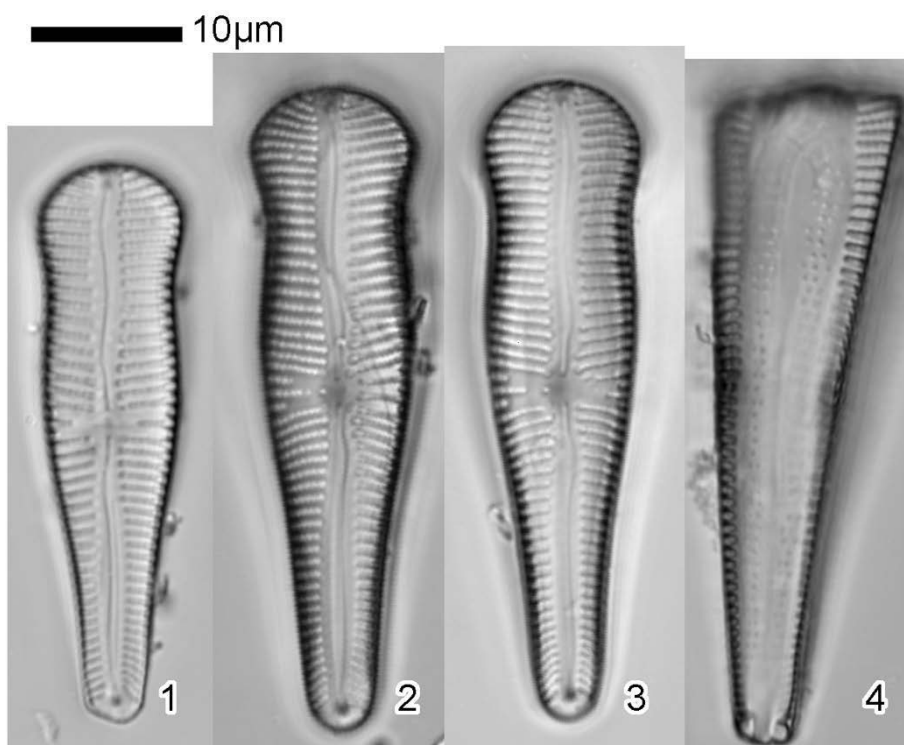


Figs 7-9. *Nitzschia dissipata* (SEM).

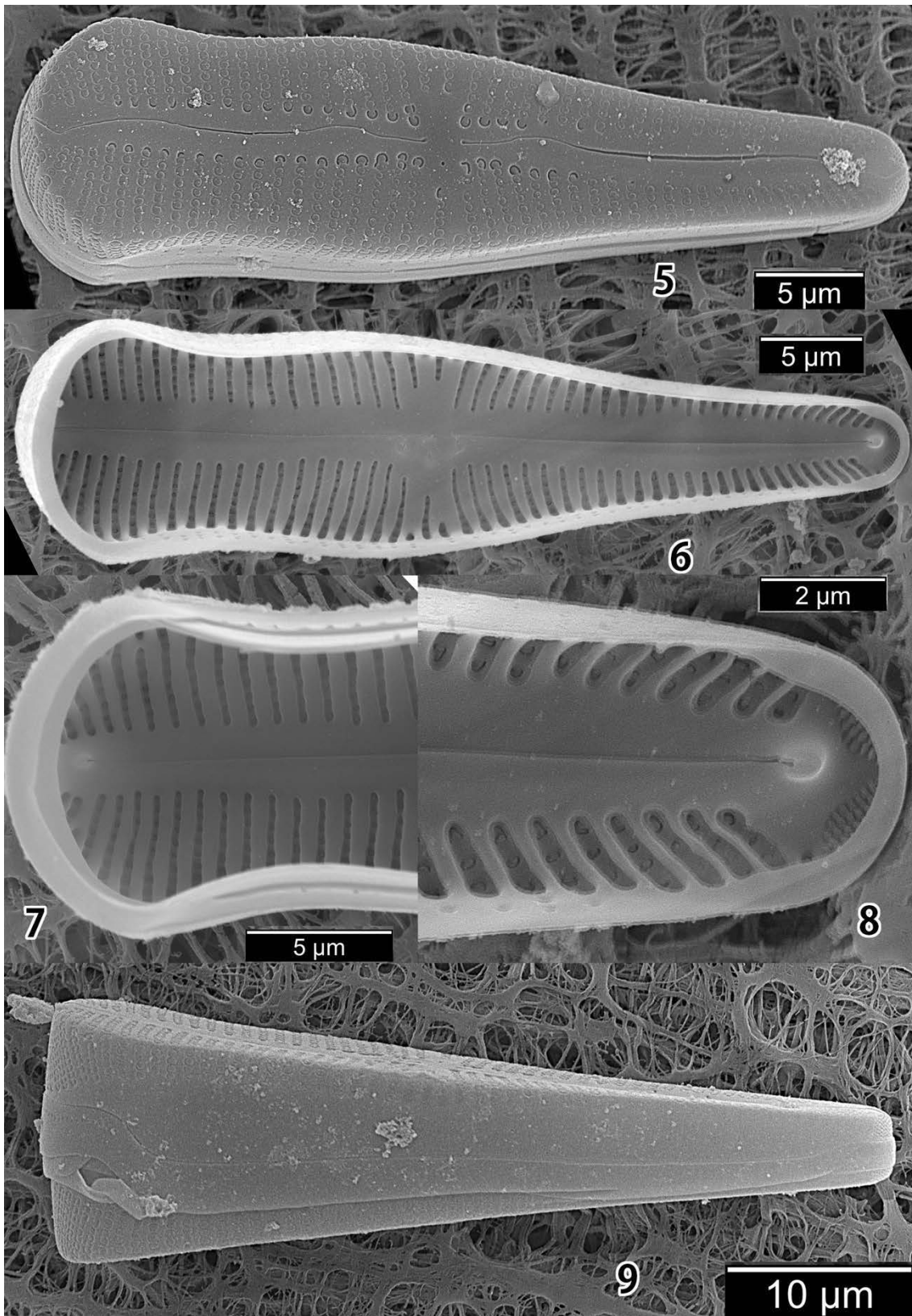
No. 137

Prepared from strain Ak1092 (voucher specimens: TNS-AL-62092 in TNS).
This culture strain was prepared from a planktonic sample collected in Lake Shikotsu,
Hokkaido Pref. Coll. A. Tuji 21/xii/13.

Gomphonema truncatum Ehrenb. 1832, p. 88.



Figs 1-4. *Gomphonema truncatum* (LM).



Figs 5-9. *Gomphonema truncatum* (SEM).

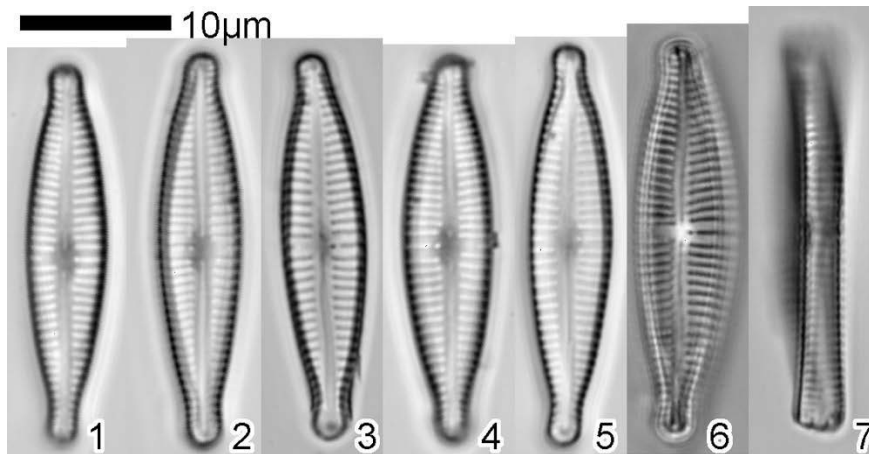
No. 138

Prepared from strain Ak1118 (voucher specimens: TNS-AL-62118 in TNS).

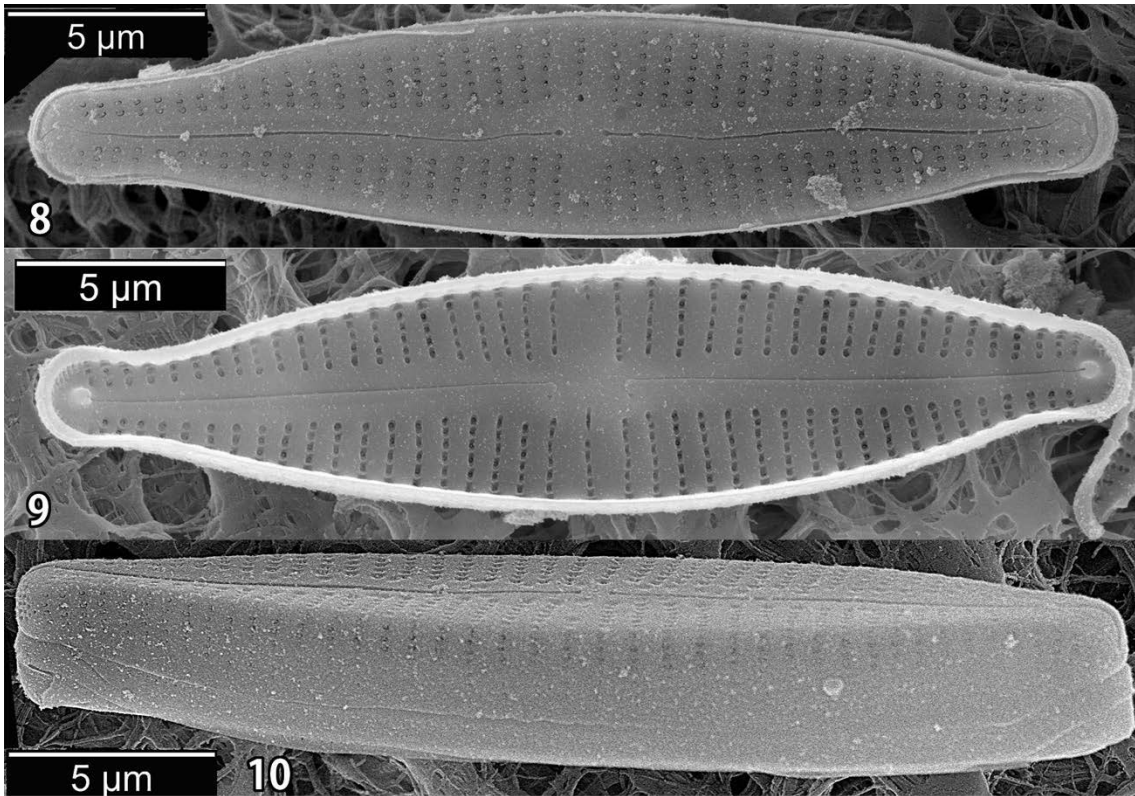
This culture strain was prepared from a specimen (TNS-AL57956 in TNS) from a small branch of River Anbo, Yaku Island, Kagoshima Pref., Japan (30°20'27.5"N, 130°35'38.5"E). Coll. A. Tuji, 5/ii/2014.

Gomphonema parvulum var. *exilis* Grunow 1878, p. 107.

This strain and strain Ak1117 for no. 139, were isolated from an oligotrophic mountain river at Yaku Island, southern Japan.



Figs 1-7. *Gomphonema parvulum* var. *exilis* (LM).

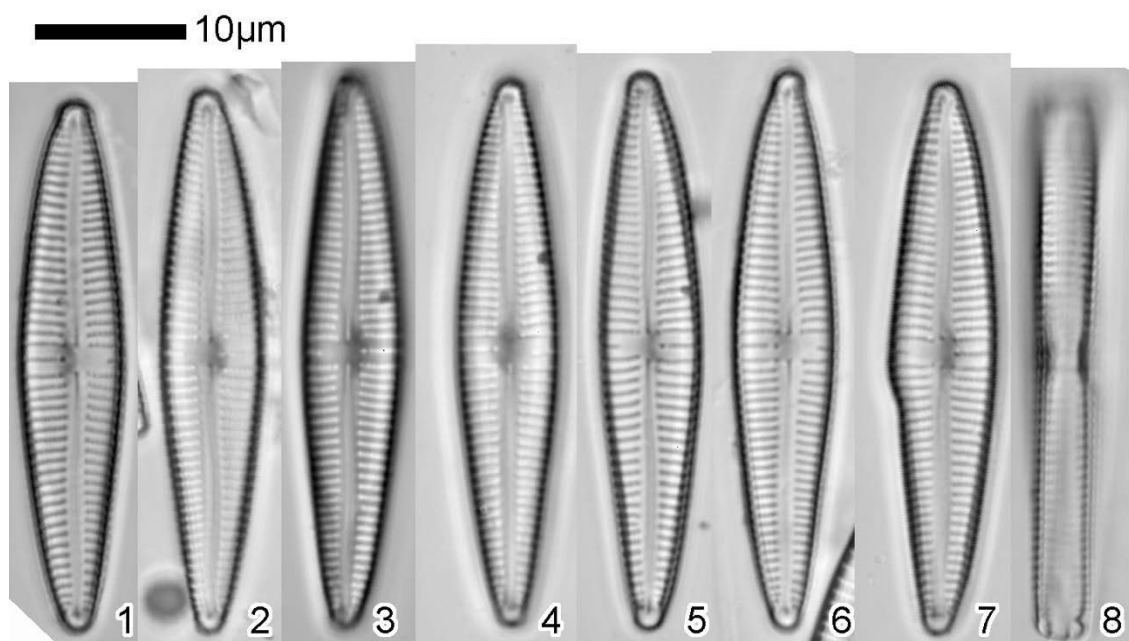


Figs 8-10. *Gomphonema parvulum* var. *exilis* (SEM).

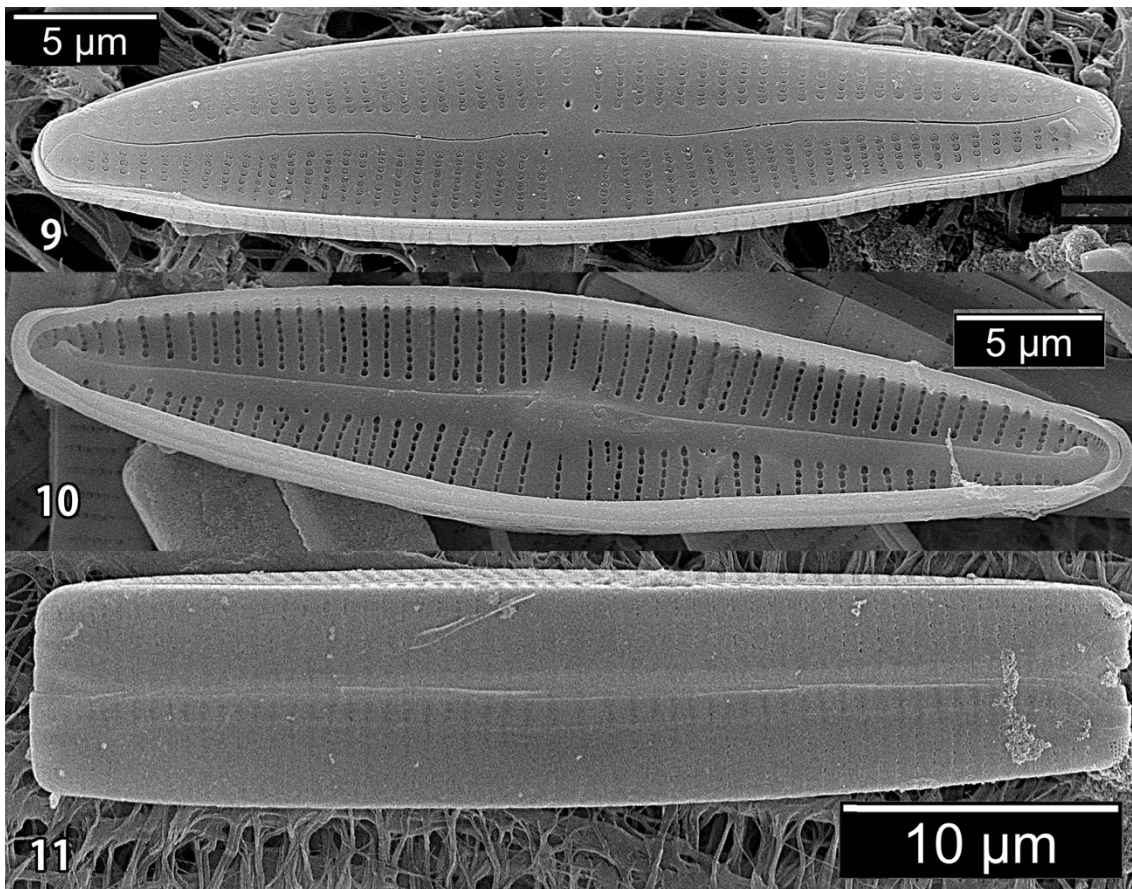
No. 139

Prepared from strain Ak1117 (voucher specimens: TNS-AL-62117 in TNS). This culture strain was prepared from a specimen (TNS-AL57962 in TNS) from small river, Yaku Island, Kagoshima Pref., Japan (30°20'45.8"N, 130°23'30.6"E). Coll. A. Tuji, 5/ii/2014.

Gomphonema gracile Ehrenb. 1838, p. 217; pl. 18, fig. 3.



Figs 1-8. *Gomphonema gracile* (LM).



Figs 9-11. *Gomphonema gracile* (SEM).

No. 140

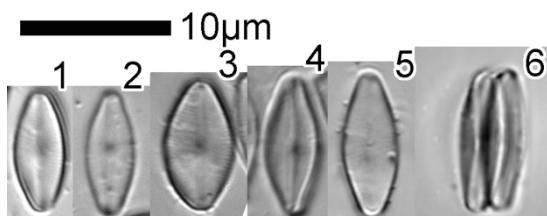
Prepared from strain Ak1136 (voucher specimens: TNS-AL-62136 in TNS). This culture strain was prepared from a sediment sample Yamato-ga cave, Miyako Island, Okinawa Pref., Japan. Coll. A. Tuji, 14/xi/2013.

Nupela sp.

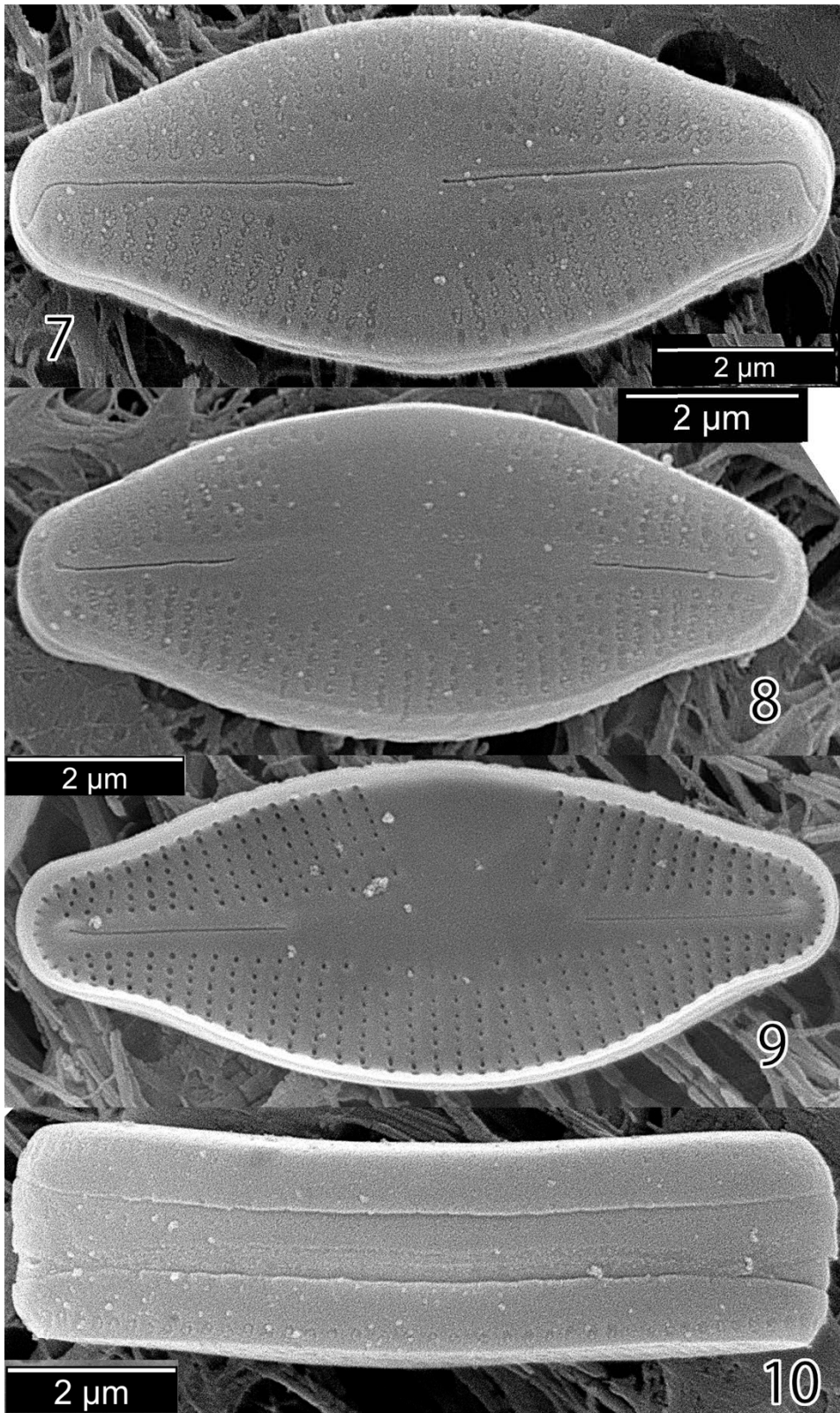
Valves lanceolate. Length 7-10 μ m, breath 3-5. Striae radiate at centre of valve, becoming convergent towards poles, 30-36 in 10 μ m. Since the morphological variation of outline of valves in this strain, is very wide, and striae is very fine and difficult to dissolve, it is difficult to compare with the other described taxa.

One valve with long raphe slits with curved terminal fissure. The other valve with distinctly shorter raphe slits and widely separated central endings.

Though, this strain is similar to *Nupela neglecta* Ponader et al., it is distinguished by density of striae and the form of central area. More examination is essential to understand this strain.



Figs 1-6. *Nupela* sp. (LM).



Figs 7-10. *Nupela* sp. (SEM).

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