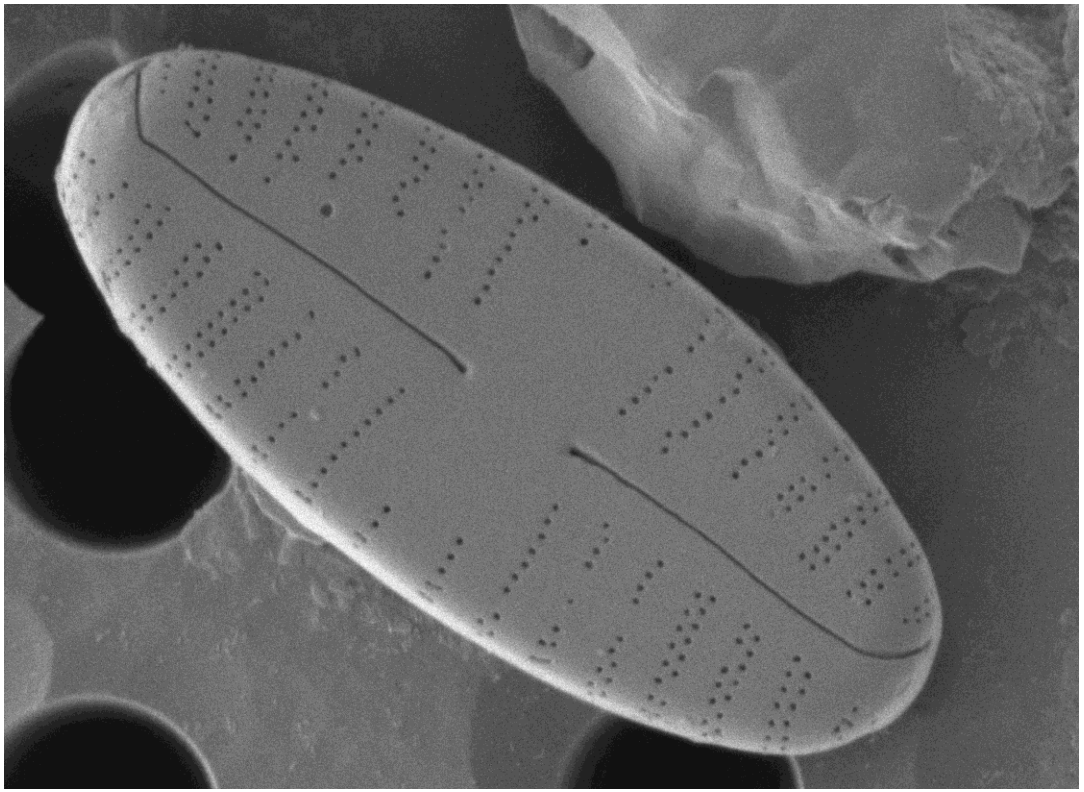
8th NVKD taxonomic workshop

Small-celled naviculoids part I



Bart Van de Vijver & Adrienne Mertens

Botanic Garden Meise

Universiteit Antwerpen

Gent, 09th of June 2017

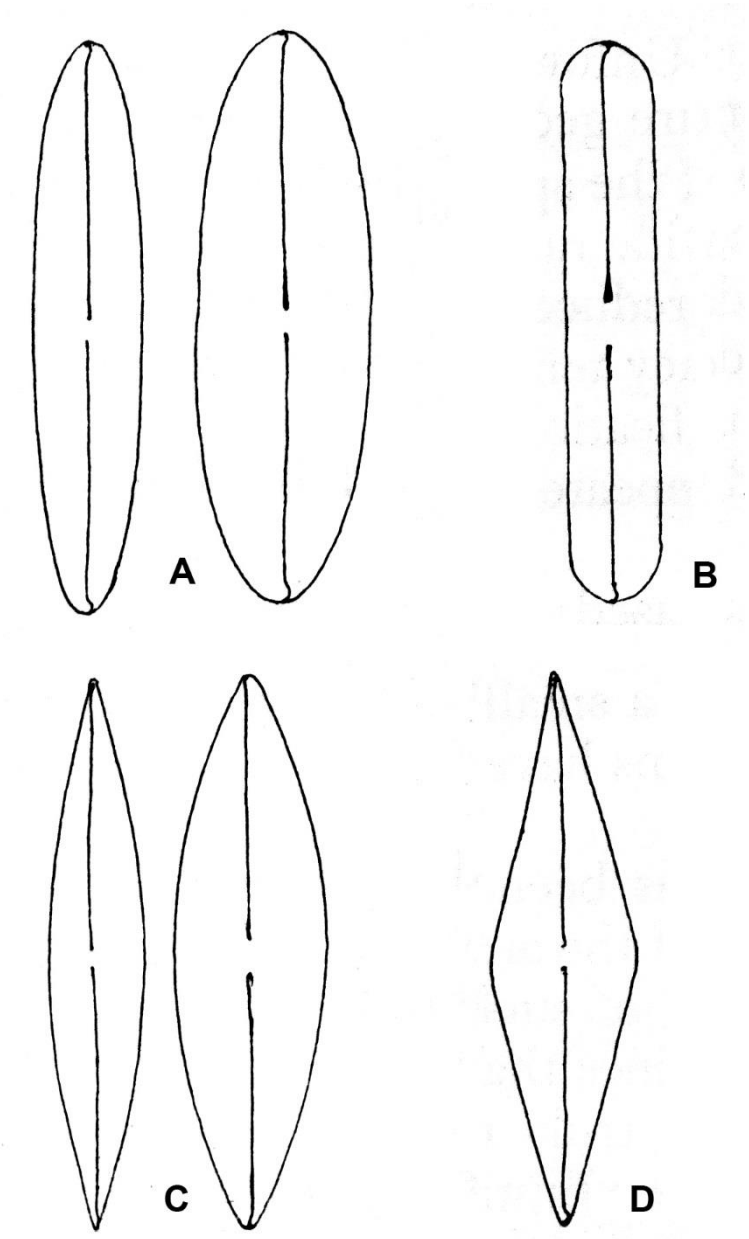
Planning of the workshop

1. Introduction: terminology, general structure
2. Small-celled naviculoids: selected genera
3. *Navicula microrhombus*
4. Small-celled *Sellaphora* taxa
5. Microscopical analysis of selected populations

1. Introduction: terminology, general structure

- Shape and outline
- Shape of the apices
- Raphe structure

Shape and outline

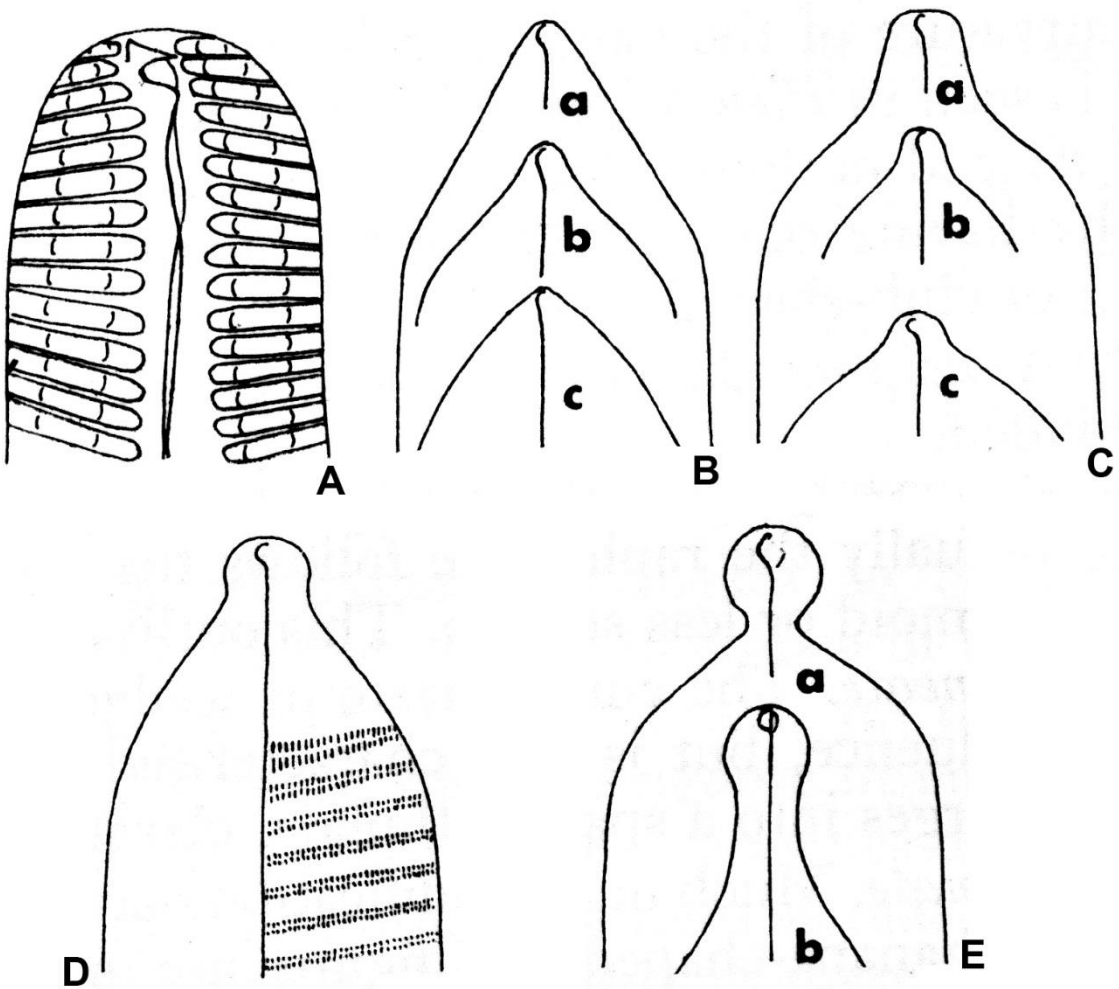


A. narrowly-elliptical to elliptical

B. linear

C. narrowly-lanceolate to lanceolate

Shapes of the apices



A. broadly rounded
NOT protracted

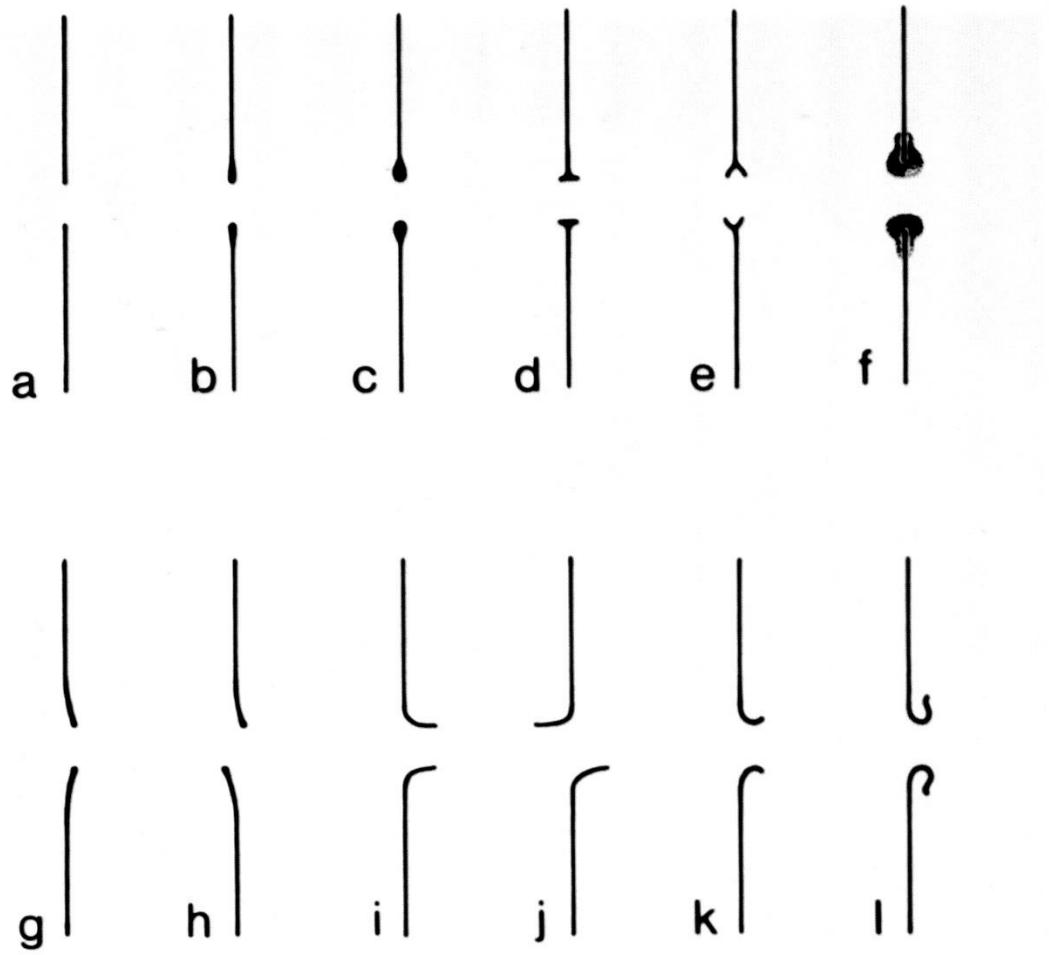
B. a. cuneate
b. subrostrate cuneate
c. bluntly cuneate

C. a. rostrate
b. rostrate
c. subrostrate

D. rostrate-capitate

E. a. capitate
b. capitate- protracted

Proximal raphe endings

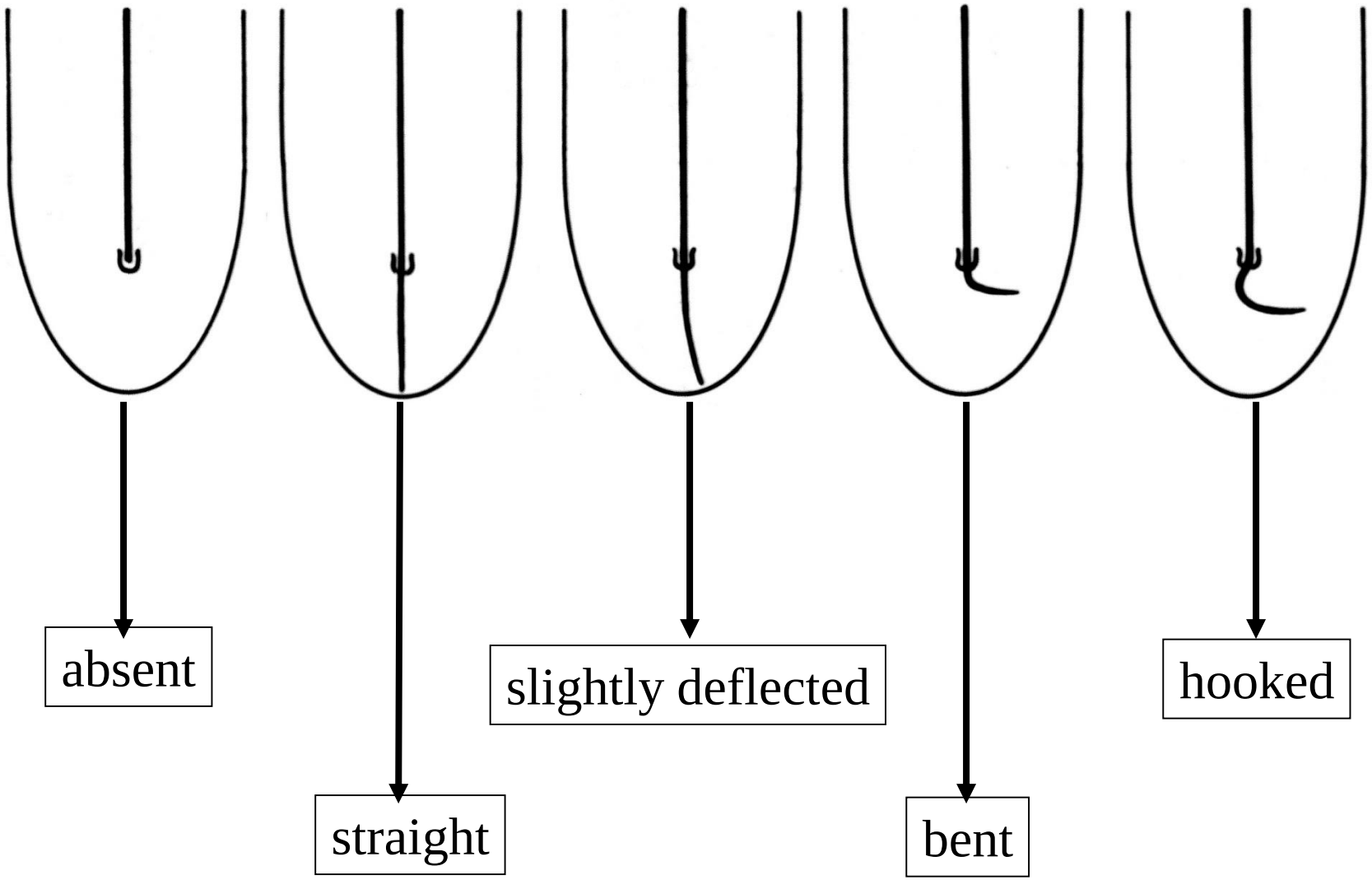


a-c. straight

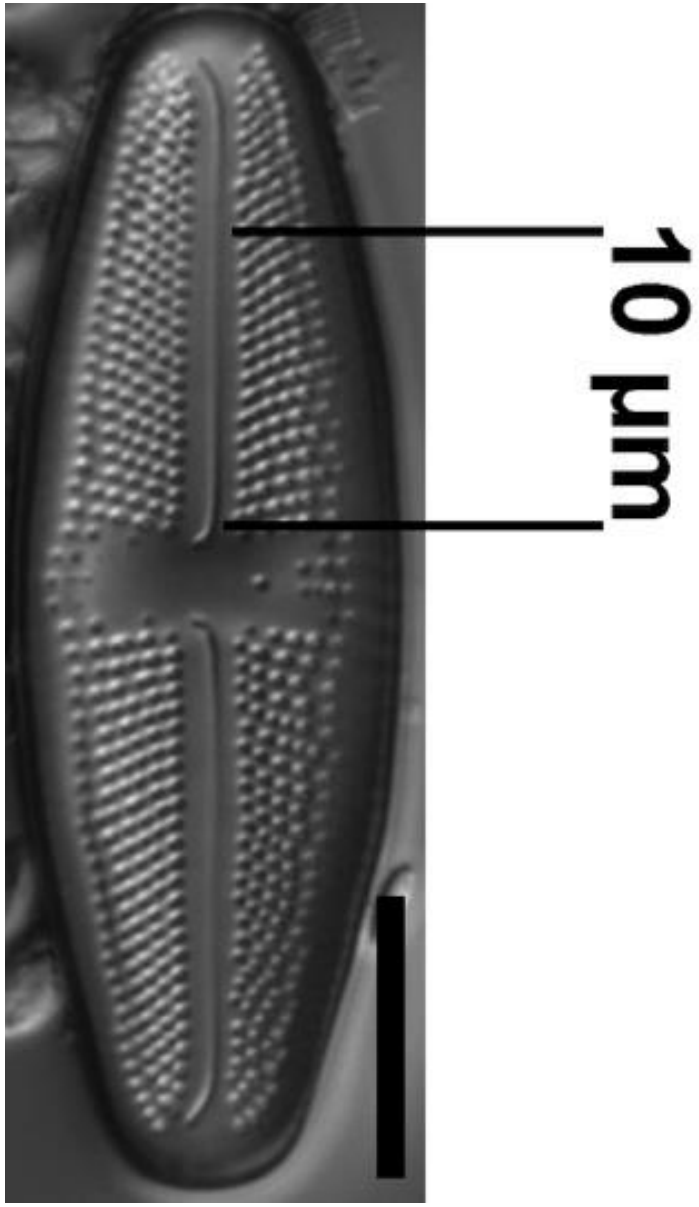
- a. simple
- b. slightly expanded
- c. expanded, drop-like

g-h. deflected

Distal raphe endings



How to count striae?



Always count in 10 µm
When impossible,
count in 5 µm (but less accurate)

NEVER!!!! Go over the central area!!!

Check if striae are different throughout the entire valve
Near the apices and/or central area often higher/lower number

Skip the first stria after the central area

2. Small-celled naviculoids: selected genera

Once upon a time, there was a garbage bag genus....

and it was called…

Navicula s.l.

traditionally a genus where species that do not fit into other genera have been placed

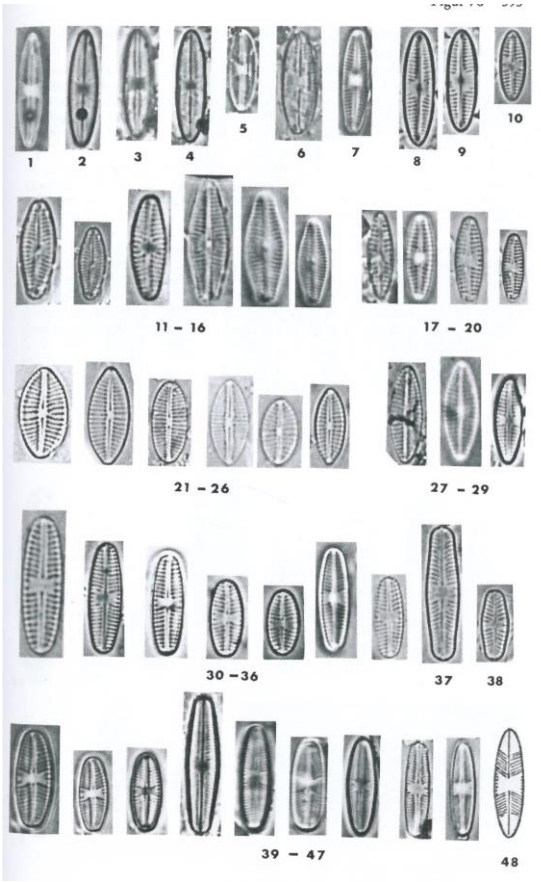
a large collection of taxa that are probably not interrelated.

taxa within *Navicula* with structural similarities = traditionally been placed in subgenera

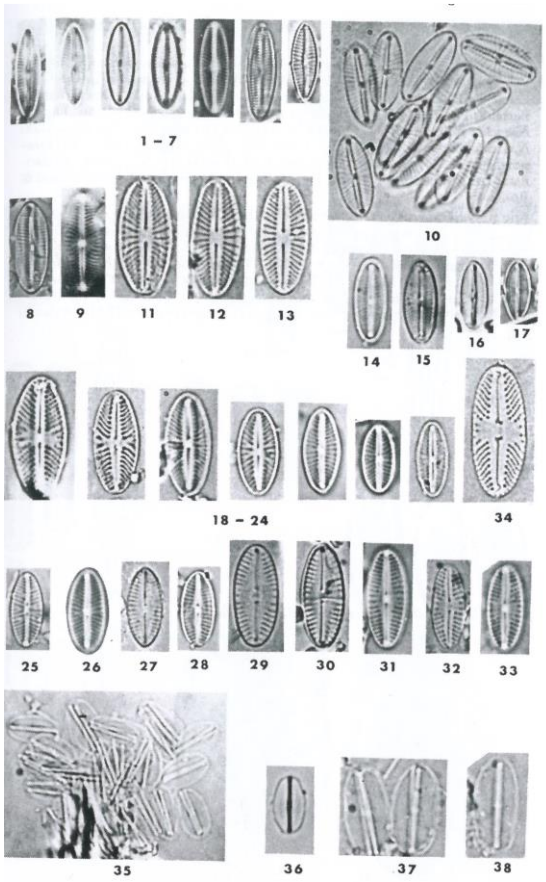
many of these have recently been erected to genus status

Navicula s.l.

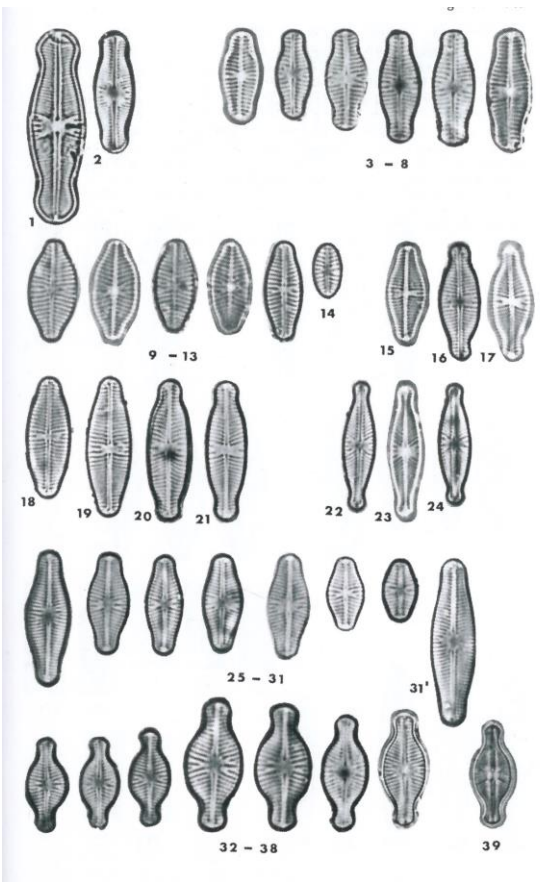
A large number of small-celled naviculoids were previously included in *Navicula* s.l.



Sellaphora Chamaepinnularia



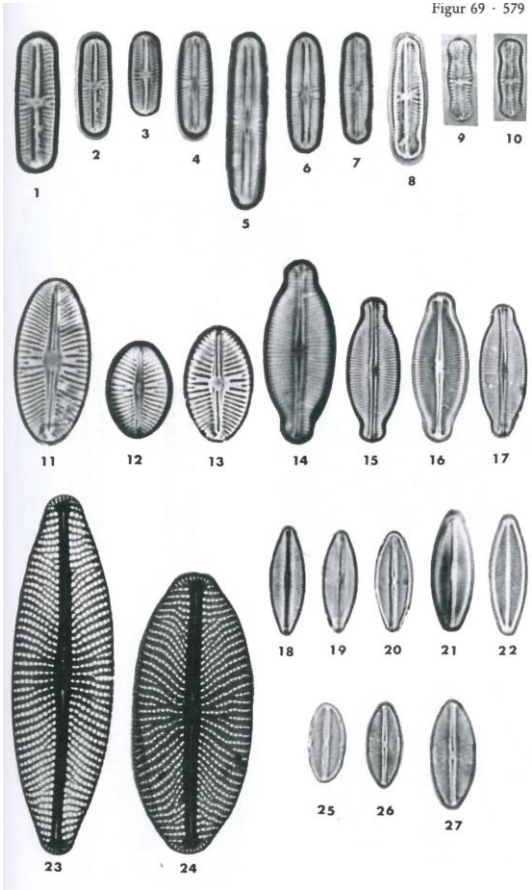
Mayamaea Fistulifera



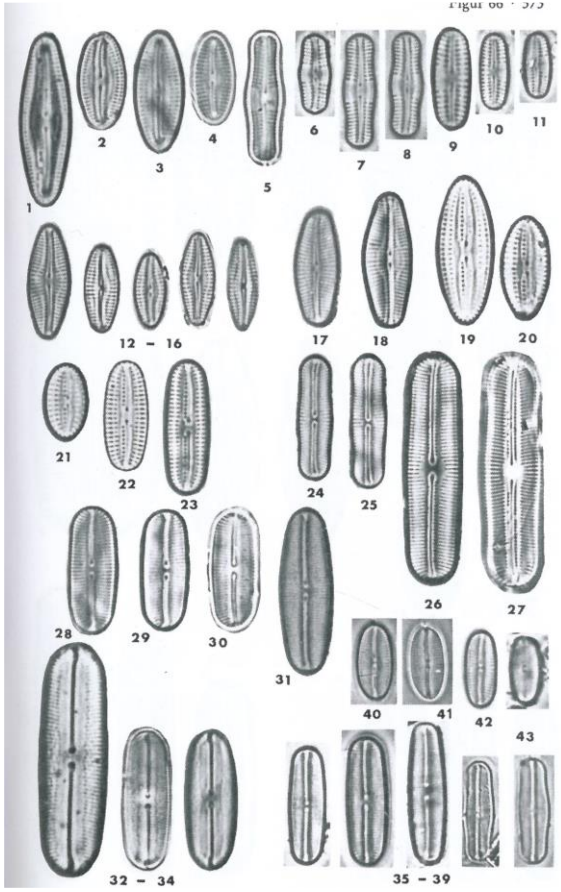
Sellaphora Craticula

Navicula s.l.

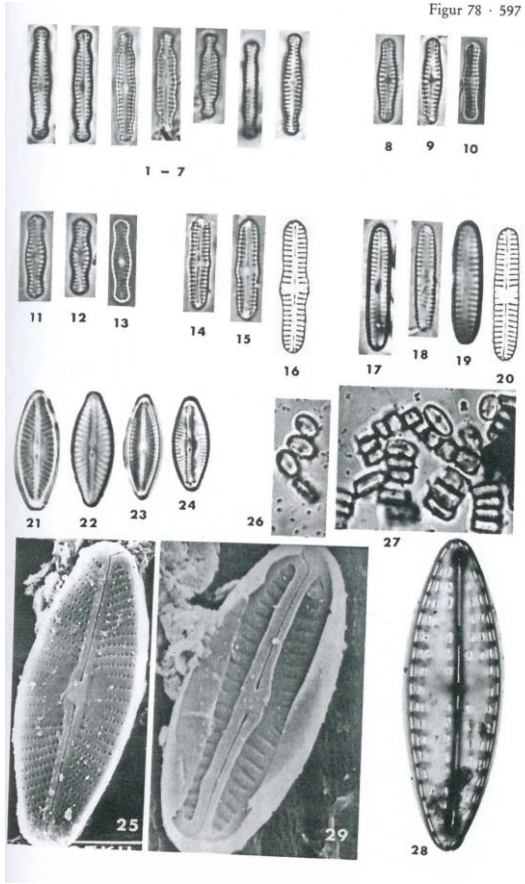
A large number of small-celled naviculoids were previously included in *Navicula* s.l.



Adlafia



Fallacia



Chamaepinnularia

Small-celled naviculoids: target taxa

2 different genera

Sellaphora

atomoides
chistiakovae
crassulexigua
elorantana
labernardierei
multiconfusa
nigri
pseudoventralis
raederiae
rhombelliptica
saugerresii
seminulum
utermoehlii
vekhovii
verecundiae
vitabunda

Navicula s.l.

microrhombus

WORKSHOP 2017

Small-celled naviculoids: target taxa

6 different genera

Mayamaea

alcimonica
atomus
excelsa
ingenua
permitis

Fistulifera

pelliculosa
saprophila

Adlafia

langebertalotii
minuscula
minuscula* var. *muralis
suchlandtii

Chamaepinnularia

evanida

Fallacia

indifferens
monoculata
muraloides

Craticula

dissociata
minusculoides
molestiformis
subminuscula

WORKSHOP 2018 or 2019

3. *Navicula microrhombus*

Originally described by Cholnoky in 1970 from Transvaal, South Africa as *Fragilaria microrhombus*

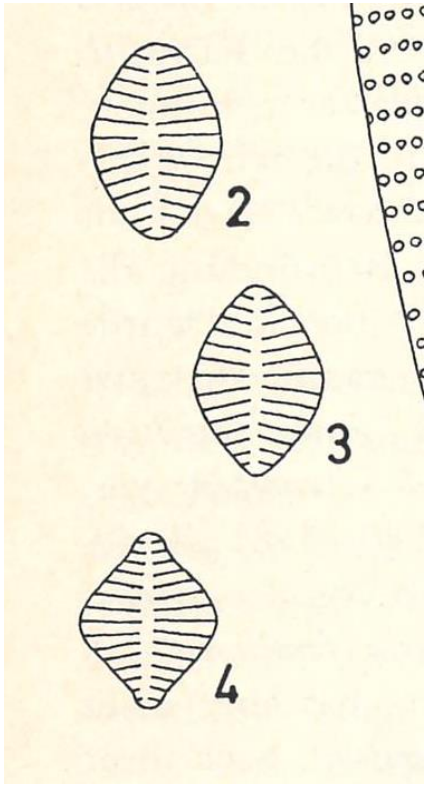


Fig. 2—4 *Fragilaria microrhombus* n. sp.

F. microrhombus n. sp. — In den unten angeführten zwei Proben habe ich sehr häufig eine *Fragilaria*-Art beobachtet, die vielleicht am ehesten mit *F. atomus* HUSTEDT (1927—1966, Teil 2: 164, F. 672 B) vergleichbar ist, womit aber durch ihre charakteristische Schalenform, dichtere und mehr radiale Streifung und weitere Axialarea nicht zu verbinden war. Die Schalen ähnelten gewissen Formen der *F. construens* (EHRENBERG) GRUNOW (vgl. oben), besonders der sog. „var. *venter* (EHRENBERG) GRUNOW", mit der sie aber durch ihre geringeren Abmessungen und viel dichtere Streifung ebensowenig in eine Beziehung gebracht werden konnte. — Die gesehenen sehr vielen Schalen waren breit rhombisch oder rhombisch-lanzettlich mit regelmäßig oder spitzlich gerundeten, manchmal schwach vorgezogenen Enden, auffallend konstant 6—7 μ lang und etwa 5 μ breit. Axialarea schmallanzettlich, scharf begrenzt, in der Mitte nicht erweitert, wodurch eine Zentralarea fehlt. Transapikalstreifen in der ganzen Länge der Schalen radial, sehr konstant etwa 24 in 10 μ, gegen die Schalenenden nicht dichter gestellt. Längsrippen kaum sichtbar. Die Zellen bilden lange Ketten.

Valvae late rhomboideae, sive rhomboideo lanceolatae, apicibus regulariter sive acutiuscule rotundatis, nonnumquam leviter protractis, notabiliter constanter 6—7 μ longae et criciter 5 μ latae. Area axialis anguste lanceolata, distincte definita, in media parte non dilatata, itaque area centralis nulla. Striae transapicales in tota longitudine valvae radiantes, neque ad apices versus densior positae, circiter et constanter 24 in 10 μ. Costae longitudinales haud visibiles. Cellulae colonias catenaeformes construent.

Habitat: in aquis dulcibus piscinarum provinciae Transvaal prope pagum Marble Hall Africae Meridionalis.

Typus: praeparatum no. MH 21 in collectione C. S. I. R., Pretoria.

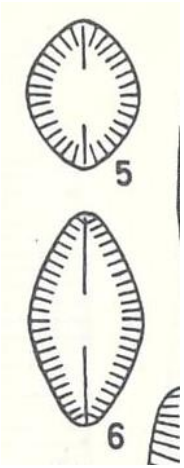
Iconotypus: figurae nostrae no. 2—4.

Über die Autökologie der Art kann nichts ausgesagt werden. Sie war nur in den Proben 27 (3,4%) und 30 (38,2%), in denen aber reichlich vorhanden. — Fig. 2—4.

(Cholnoky 1970, Bot. Marina suppl.)

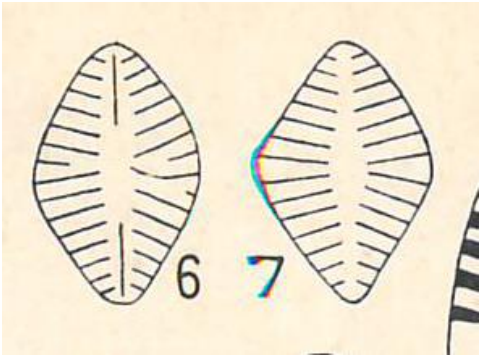
3. *Navicula microrhombus*

In 1966, Archibald described *Navicula adamantiformis* from South Africa



In 2006 , this species was transferred to *Navigiolum adamantiforme* by Taylor & Lange-Bertalot

In 1971, another new South Africa species was described by Archibald: *Achnanthes cogita*

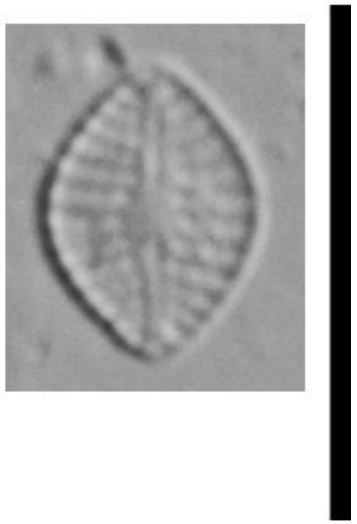


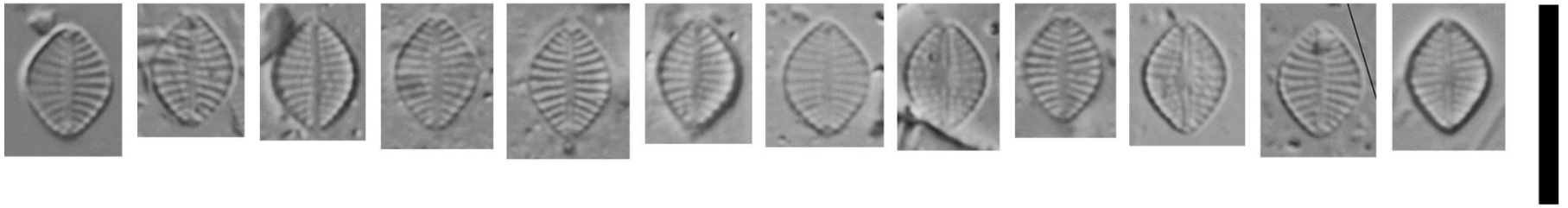
In 1977 , *Fragilaria microrhombus* was transferred to *Navicula microrhombus* by Schoeman & Archibald.

Navicula microrhombus
(Cholnoky) Schoeman & Archibald

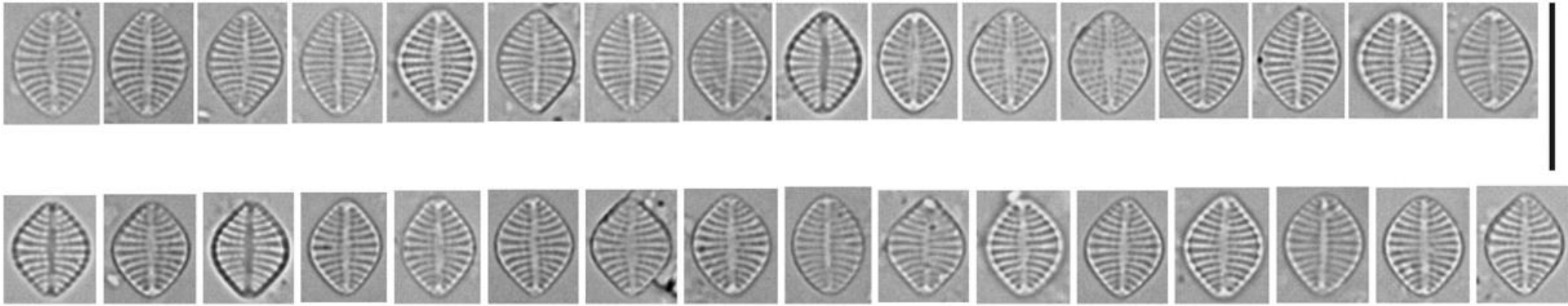
Basionym: *Fragilaria microrhombus* Cholnoky
Synonym: *Achnanthes cogita* Archibald ???
***Navicula adamantiformis* (Archibald) Archibald ???**

- **Valves broadly rhombic with very convex margins**
- **Apices acutely rounded, never protracted**
- **Length 6.0-7.0 µm, width 4.4-5.0 µm**
- **Striae 22-30 in 10 µm, radiate thoughout, more towards the apices, clearly punctate**
- **Axial area very narrow, linear**
- **Raphe not always visible!!!**
- **Central area absent**





(Winterbeek, Belgium)

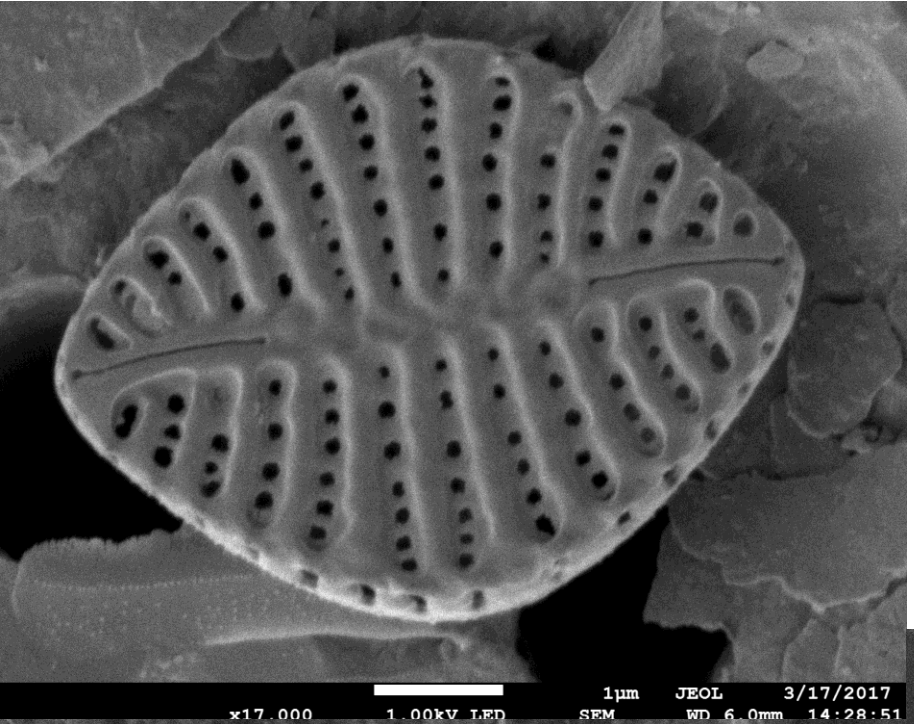


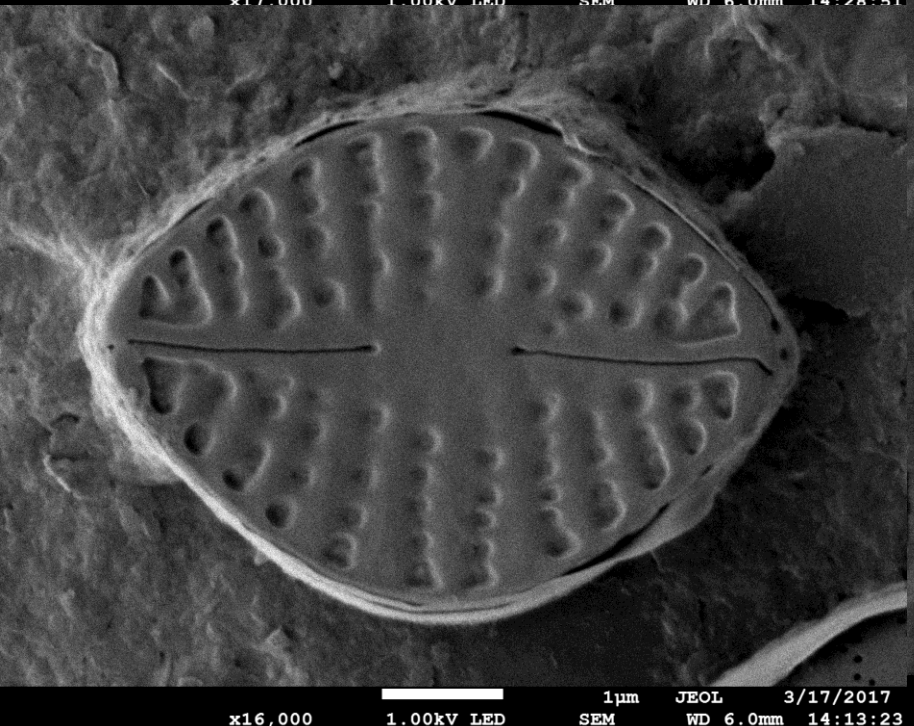
(Acheneau, France)
(Photos: Ector et al. 2015)

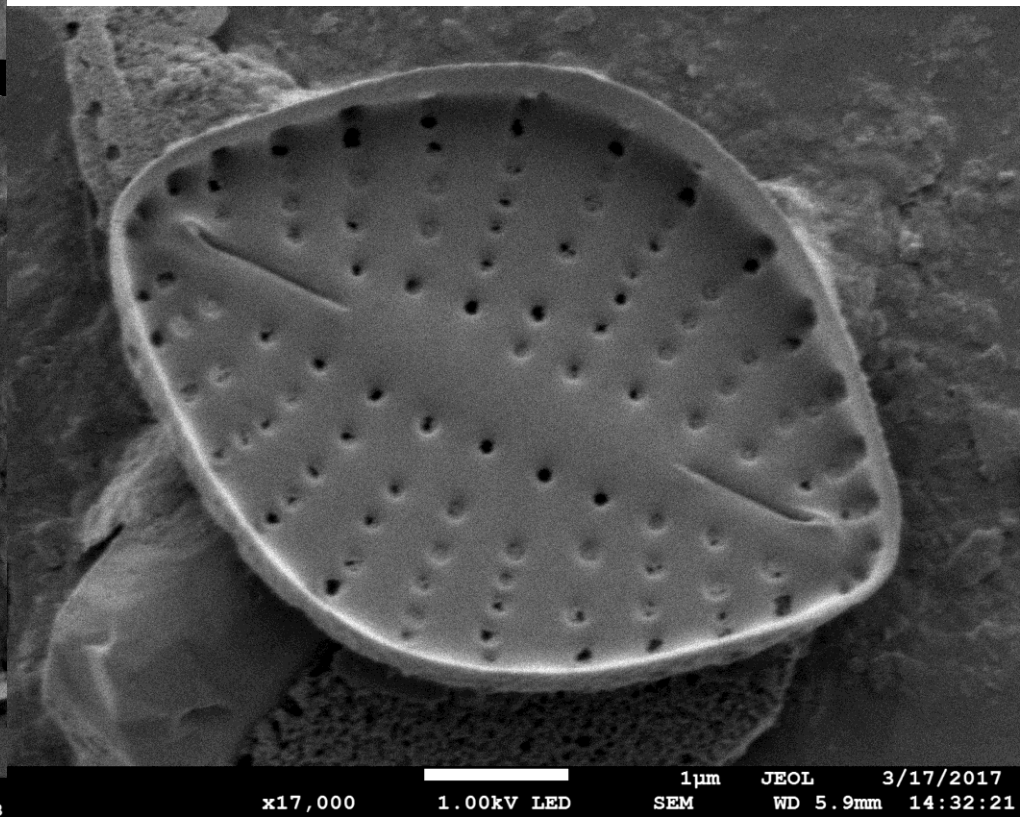
Usually very short raphe branches

Striae uniseriate

(Winterbeek, Belgium)







Ecology

Schoeman & Archibald (1977)

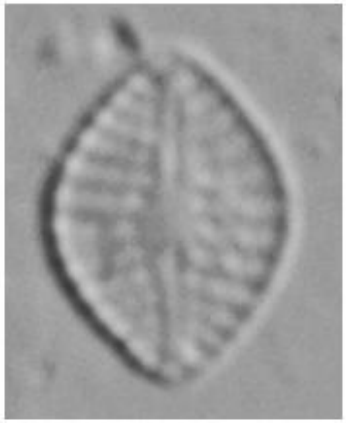
present in fishponds

Taylor et al. (2007)

probably in polluted, alkaline water bodies

elevated electrolyte content

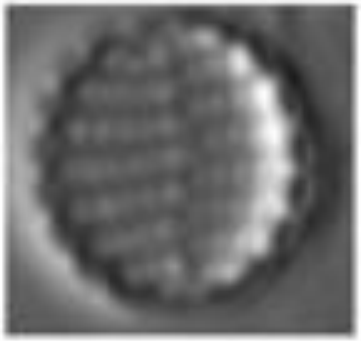
Can be confused with



Different valve outline

Presence of axial area

Raphe!

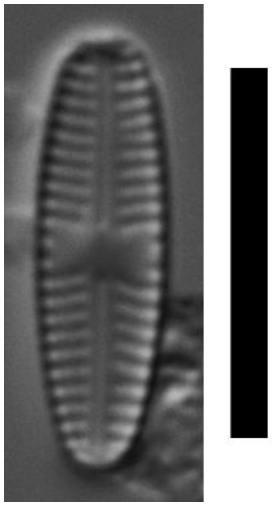


N. microrhombus
L 6.0-7.0 µm
W 4.4-5.0µm
S 22-30 in 10 µm

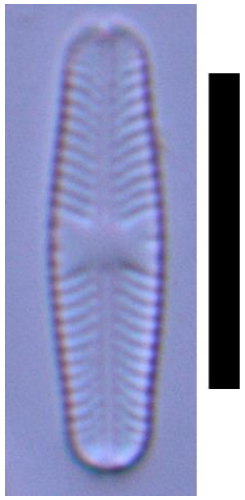
Pseudostaurosira trainorii
L 2-9 µm
W 1.5-4.5 µm
S 20-25 in 10 µm

4. Small-celled *Sellaphora*

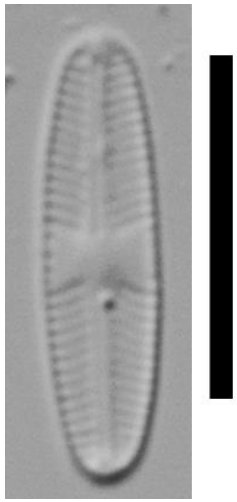
Elongated taxa without markedly inflated part



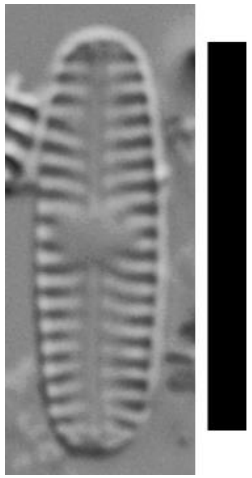
saugerresii



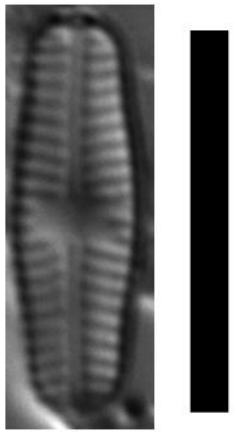
seminulum



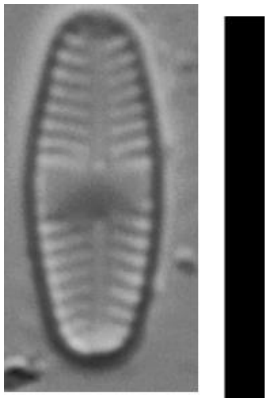
atomoides



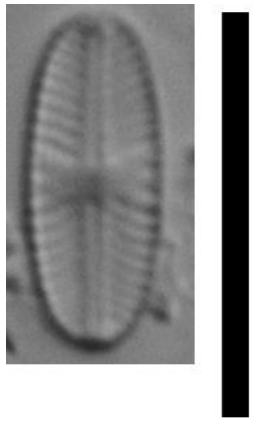
vekhovii



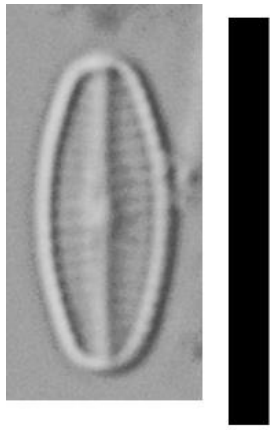
elorantana



labernadierei



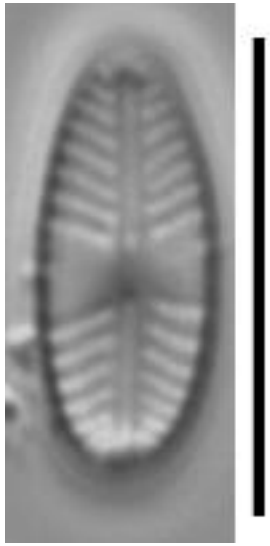
nigri



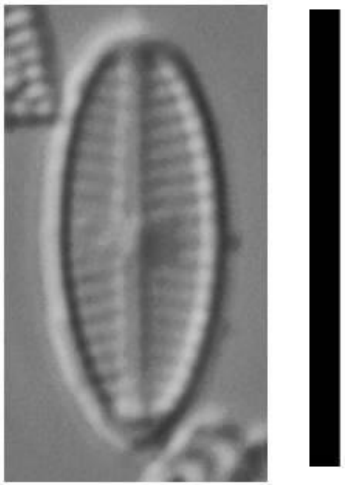
rhombelliptica

4. Small-celled *Sellaphora*

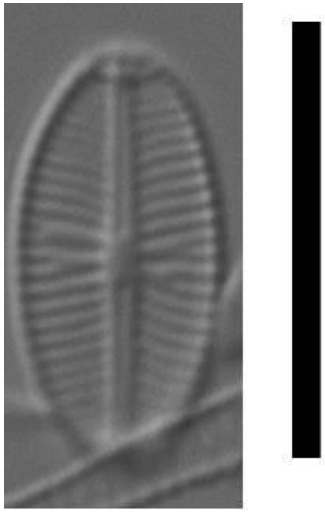
Linear-elliptic taxa with broadly rounded outline



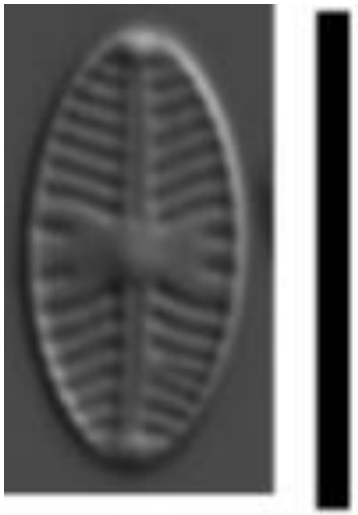
crassulexigua



raederiae



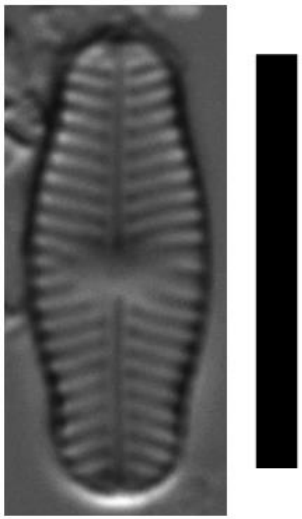
utermoehlii



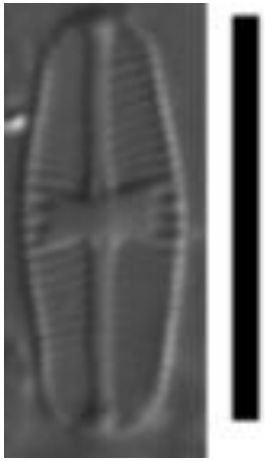
chistiakovae

4. Small-celled *Sellaphora*

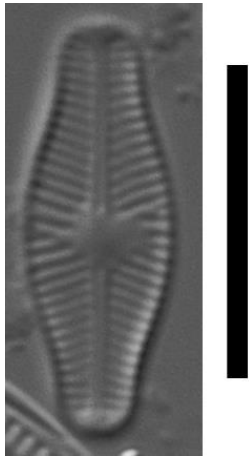
Elongated taxa markedly inflated part



pseudoventralis

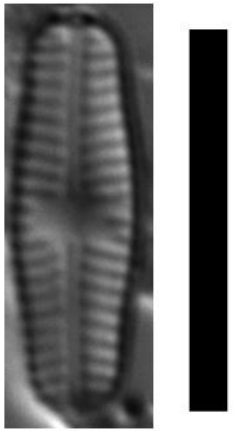


multiconfusa



verecundiae

vitabunda

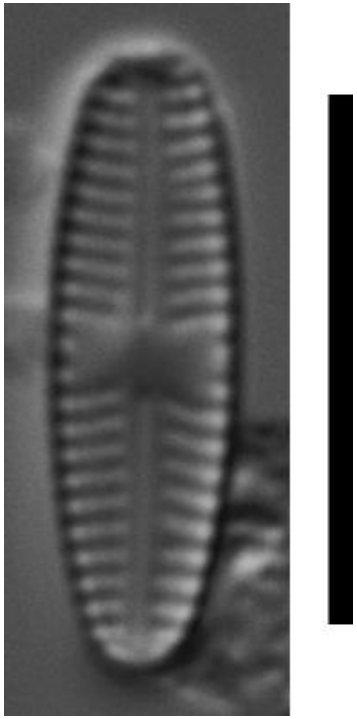


elorantana

Sellaphora saugerresii (Desmazières) C.E.Wetzel & D.G.Mann

Basionym: ***Navicula saugerresii*** **Desmazières**
Synonym: ***Navicula minima*** **Grunow in Van Heurck 1880 pro parte**
Navicula seminulum **Grunow sensu Krammer & L-Bertalot 1986**
Sellaphora seminulum **(Grunow) D.G.Mann sensu Hofmann et al. 2011**

- **Valves linear-elliptic to linear-lanceolate**
- **Apices bluntly rounded**
- **Length 6.5-11.0 µm, width 3.3-3.8 µm**
- **Striae 21-22 in 10 µm, weakly radiate in center, parallel near the apices**
- **Axial area very narrow**
- **Central area wide, symmetrical, bow-tie shaped**
  2-3 shorter striae present in central area

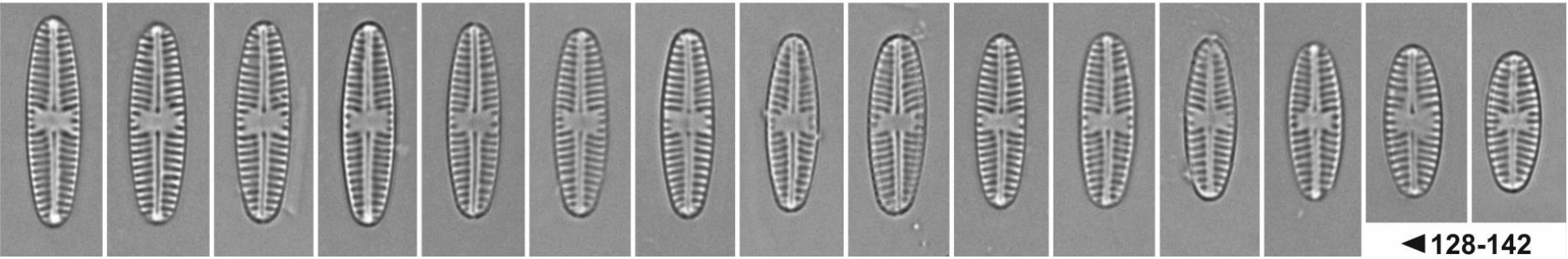


History of *Sellaphora saugerresii*

1858 **Description of *Navicula saugerri* by Desmazières**

1860 **Description of *Navicula seminulum* by Grunow**

1880 **Description of *Navicula minima* Grunow in Van Heurck collection**

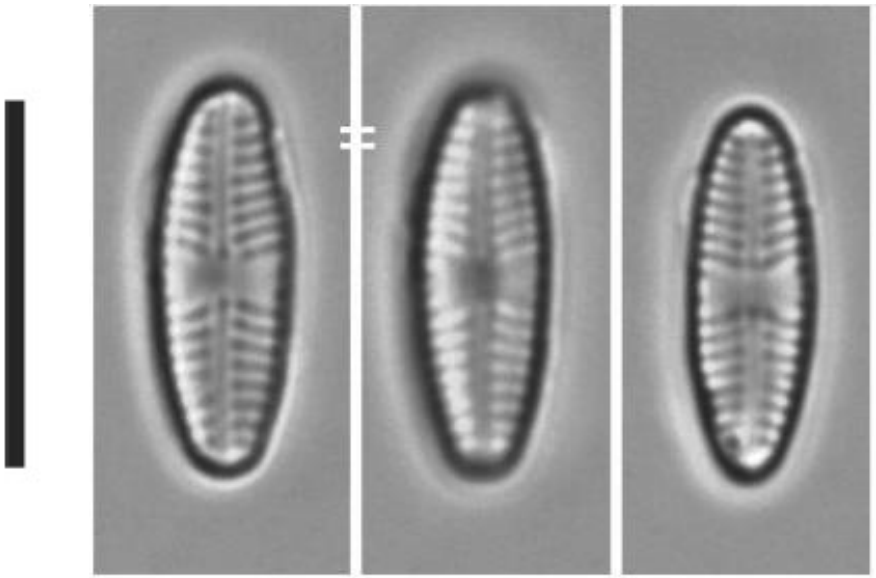


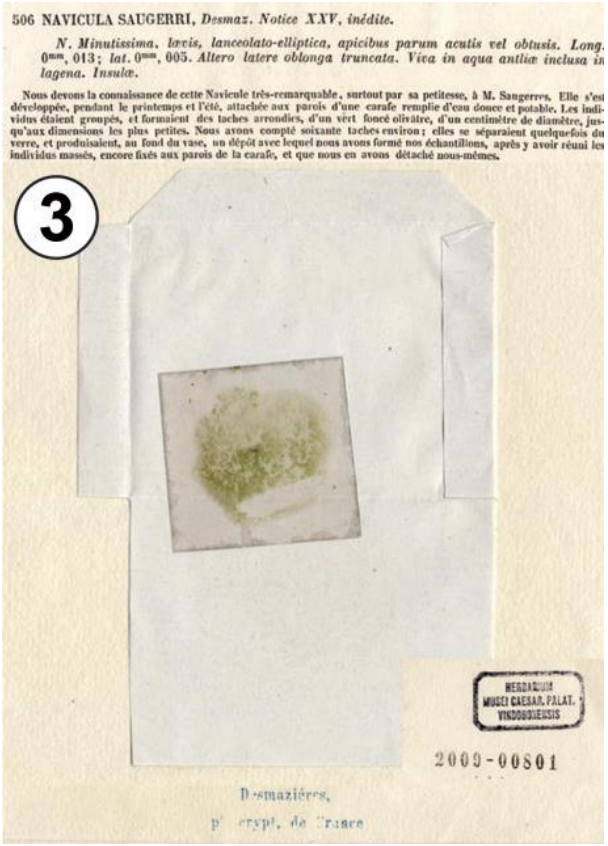
1986 ***Navicula saugerri* was named a doubtful synonym by K&LB of *Navicula seminulum***

(source: Wetzel et al. 2015)

Original description

***N(avicula)* minutissima, laevis, lanceolato-elliptica, apicibus parum acutis vel obtusis. Long. 0.013 mm; lat. 0.005 mm. Altero latere oblonga truncata. Viva in aqua antilae inclusa in lagena.**





506 NAVICULA SAUGERRI, *Desmaz. Notice XXV, inédite.*

N. Minutissima, lævis, lanceolato-elliptica, apicibus parum acutis vel obtusis. Long. 0mm, 013; *lat.* 0mm, 005. *Altero latere oblonga truncata. Viva in aqua antliæ inclusa in lagena. Insulæ.*

Nous devons la connaissance de cette Navicule très-remarquable, surtout par sa petitesse, à M. Saugerres. Elle s'est développée, pendant le printemps et l'été, attachée aux parois d'une carafe remplie d'eau douce et potable. Les individus étaient groupés, et formaient des taches arrondies, d'un vert foncé olivâtre, d'un centimètre de diamètre, jusqu'aux dimensions les plus petites. Nous avons compté soixante taches environ; elles se séparaient quelquefois du verre, et produisaient, au fond du vase, un dépôt avec lequel nous avons formé nos échantillons, après y avoir réuni les individus massés, encore fixés aux parois de la carafe, et que nous en avons détaché nous-mêmes.

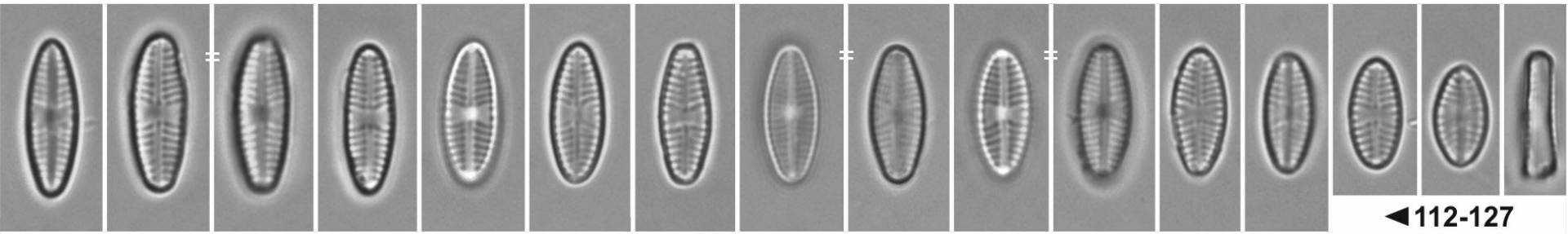
3

HERBARIUM MUSEI CAESAR. PALAT. VINDOBONENSIS

2009-00801

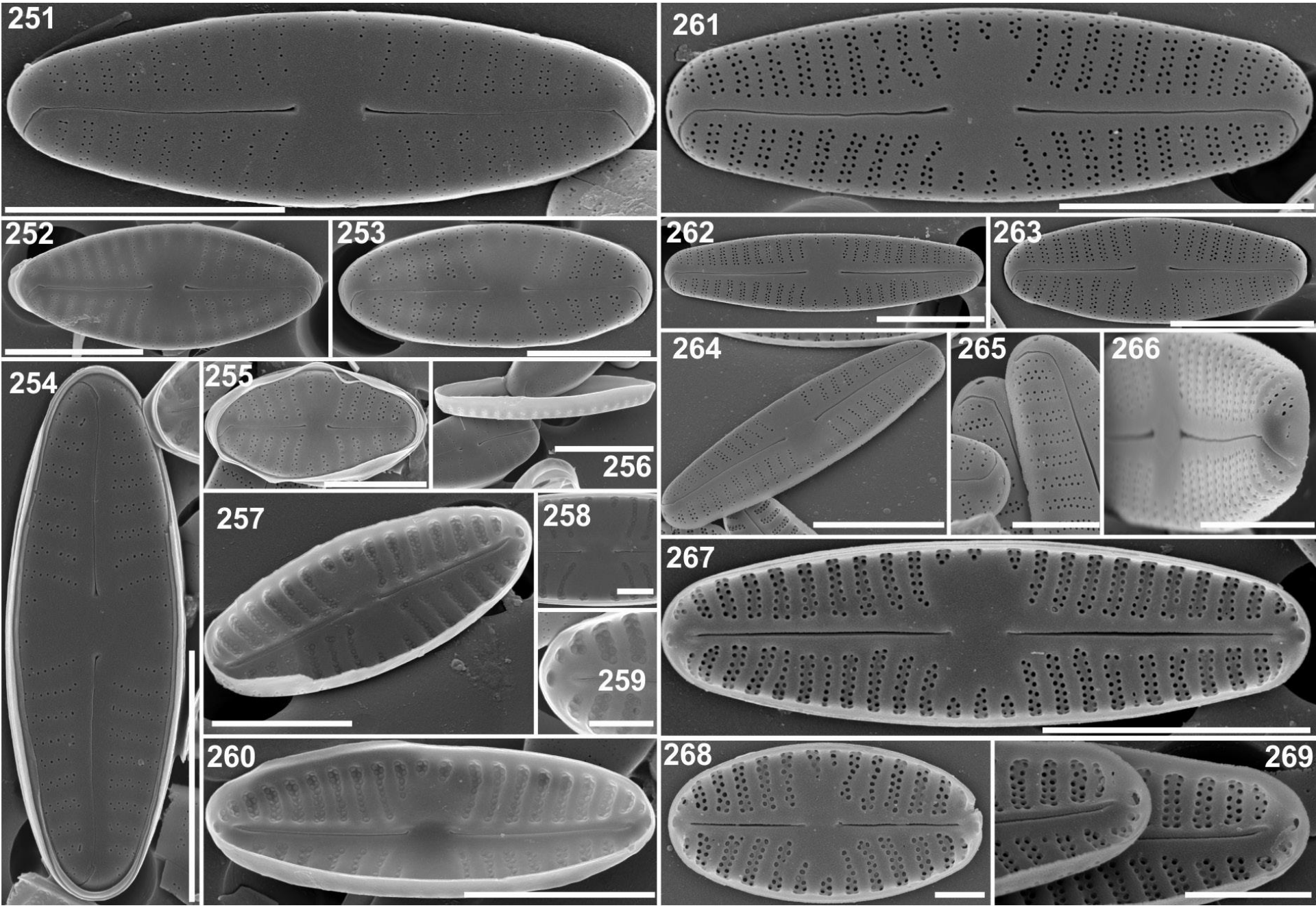
Desmazières,

p. crypt. de France



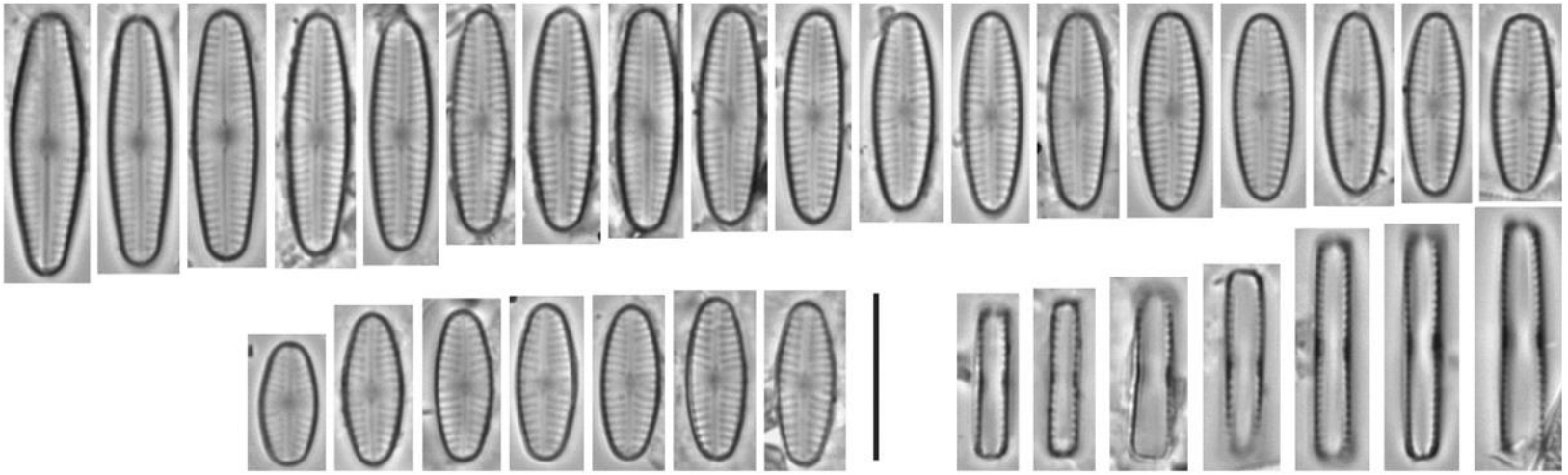
◄112-127

(source: Wetzel et al. 2015)

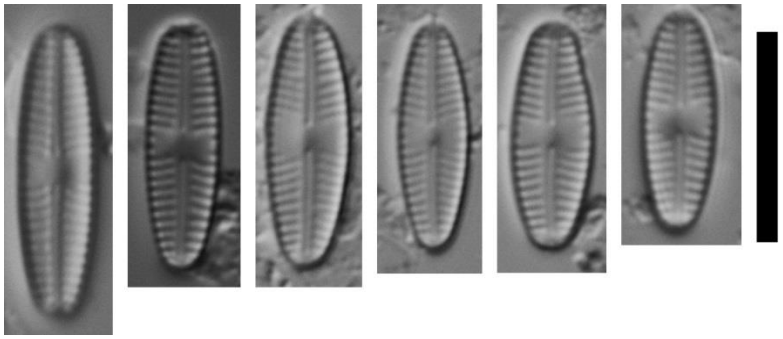


(source: Wetzel et al. 2015)

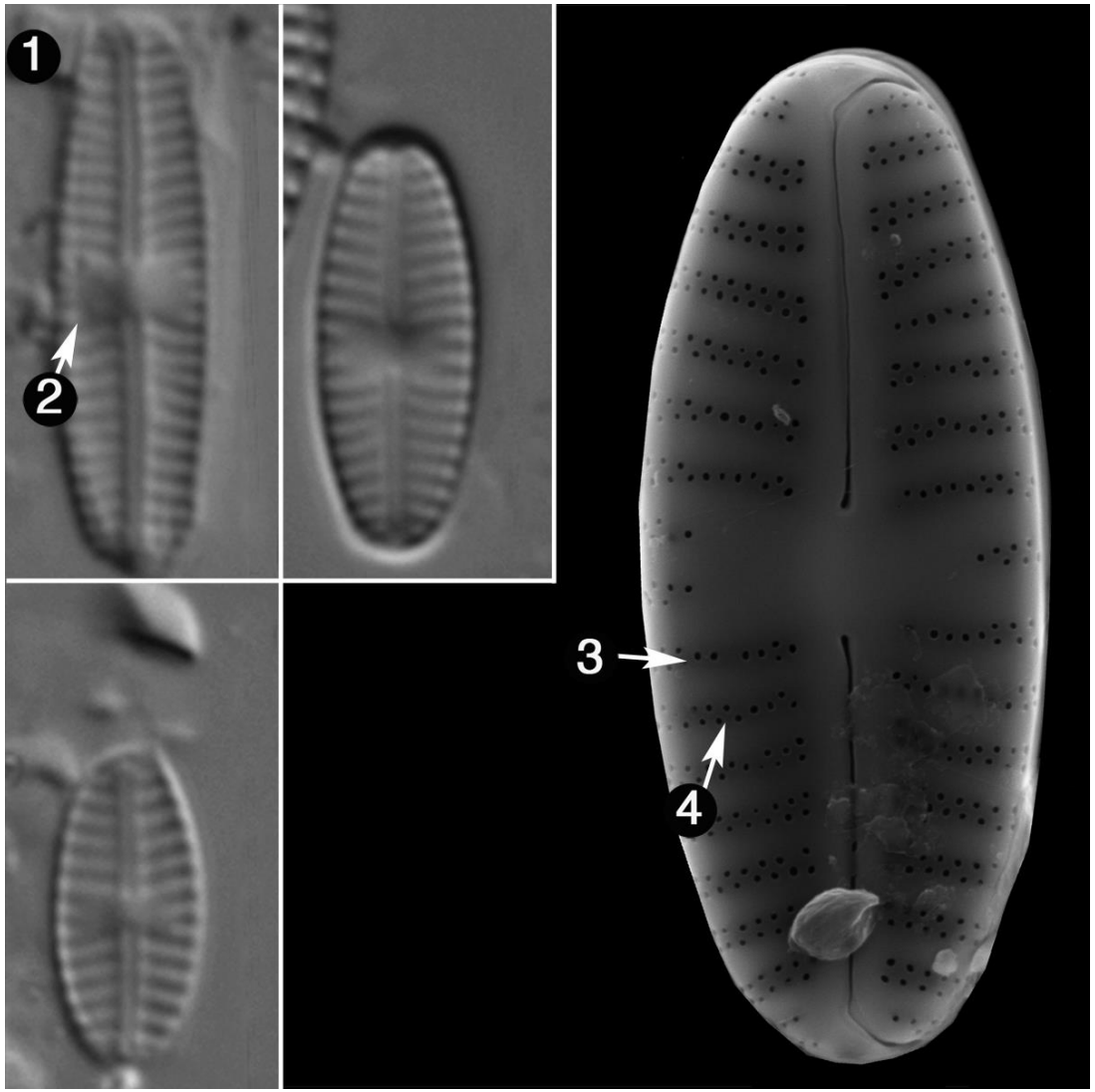
Other populations



(Guyon à Venansault, France)



(Aa, Belgium)



1. **Valves linear-elliptic to linear-lanceolate**
2. **Central area wide, more or less symmetric, bow-tie shaped**
3. **Striae radiate at central valve, becoming parallel near poles**
4. **Striae biseriate**

(source: westerndiatoms.colorado.com)

Ecology

Van Dam et al. (1994)

circumneutral
fresh-brackish
α-mesosaprobic/polysaprobic
eutraphentic

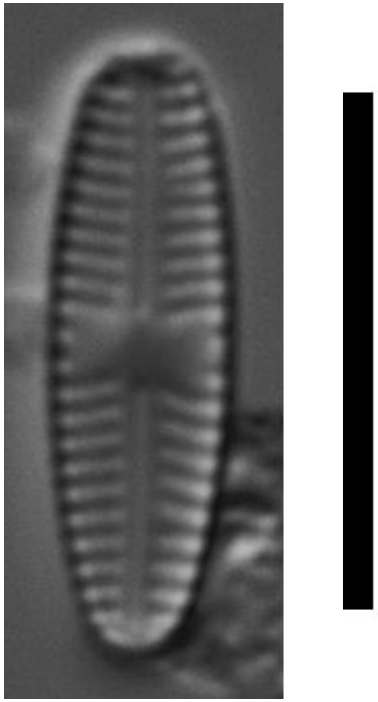
Krammer & Lange-Bertalot (1986)

electrolyte rich
heavily eutrophicated waters
moderate polysaprobic water
often mass blooms in cleaned waste water

Hoffmann & Werum (2011)

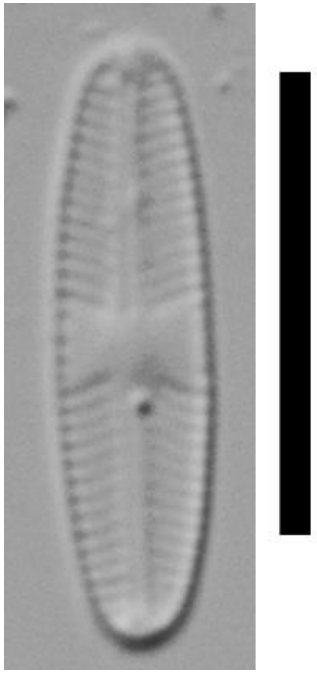
alkaline
moderate to high electrolyte rich
very high level of eutrophication
saprobity-tolerant up to polysaprobic waters

Can be confused with



Coarser striae

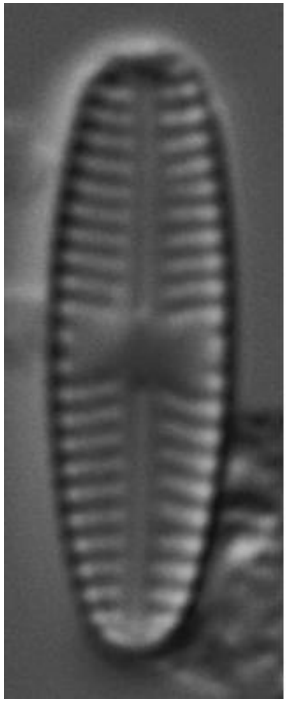
Slightly narrower width



S. saugerresii
L 6.5-11 µm
W 3.3-3.8 µm
S 21-22 in 10 µm

S. atomoides
L 3.4-16.3 µm
W 2.6-3.7 µm
S 30-36 in 10 µm

Can be confused with

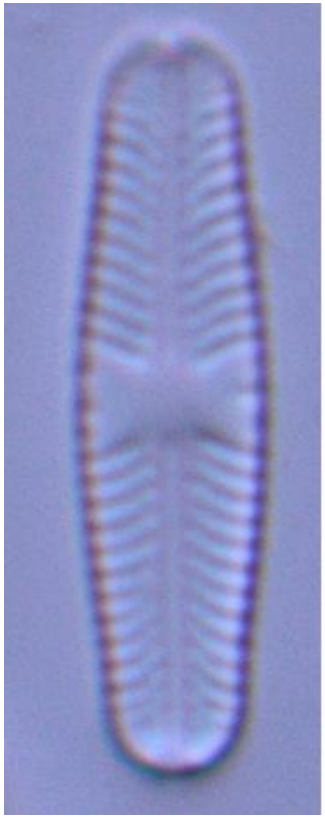


Striae less radiate

No elongated or conspicuous striae in the central part

Narrower width (valves rarely broader than 3.8)

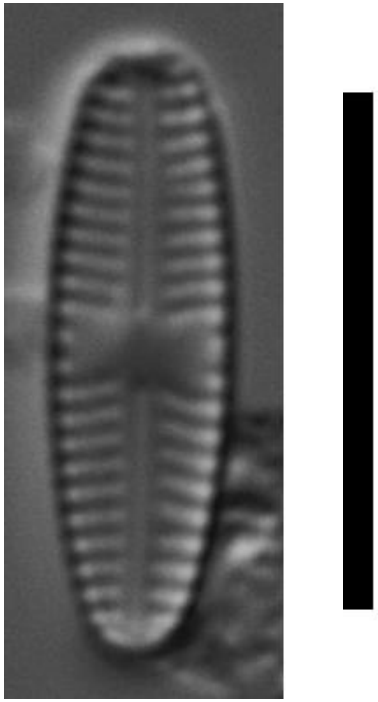
No protracted apices



S. saugerresii
L 6.5-11 µm
W 3.3-3.8 µm
S 21-22 in 10 µm

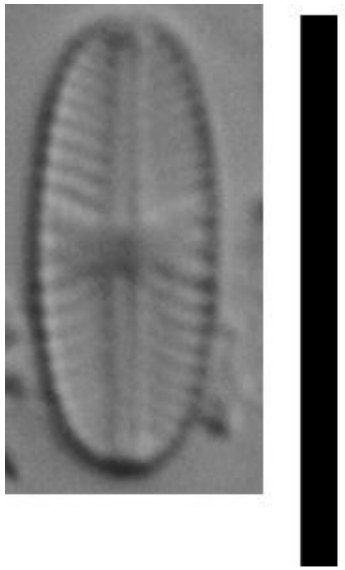
S. seminulum
L 9.8-16.5 µm
W 3.5-4.5 µm
S 18-22 in 10 µm

Can be confused with



Coarser striae

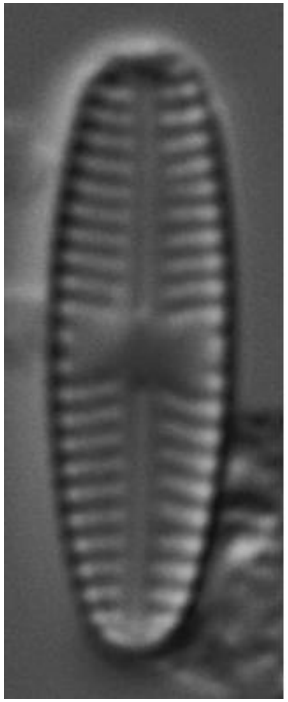
Slightly narrower width



S. saugerresii
L 6.5-11 µm
W 3.3-3.8 µm
S 21-22 in 10 µm

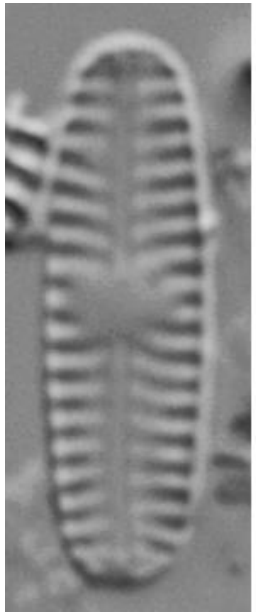
S. nigri
L 3.7-13.0 µm
W 2.7-4.8 µm
S 25-32 in 10 µm

Can be confused with



Higher striae density

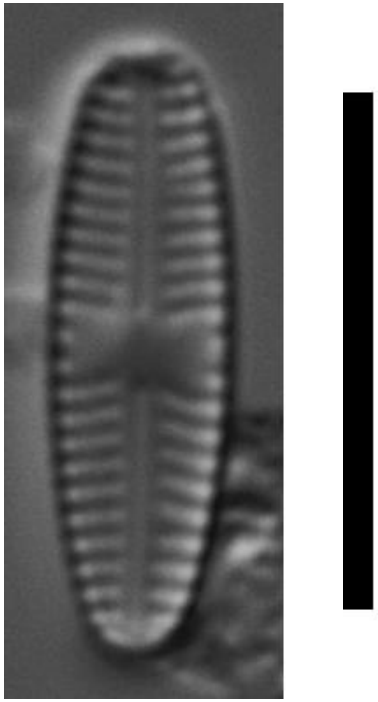
Slightly more convex margins



S. saugerresii
L 6.5-11 µm
W 3.3-3.8 µm
S 21-22 in 10 µm

S. vekhovii
L 14-18 µm
W 3.3-3.5 µm
S 14-16 in 10 µm

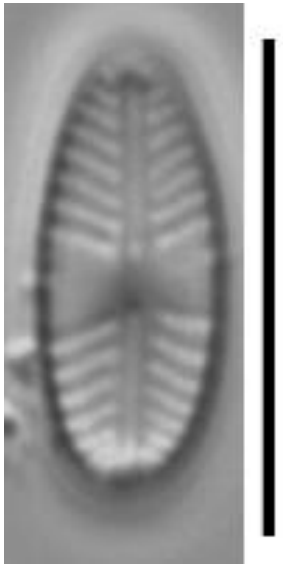
Can be confused with



Less convex margins

Symmetrical central area

More or less parallel striae



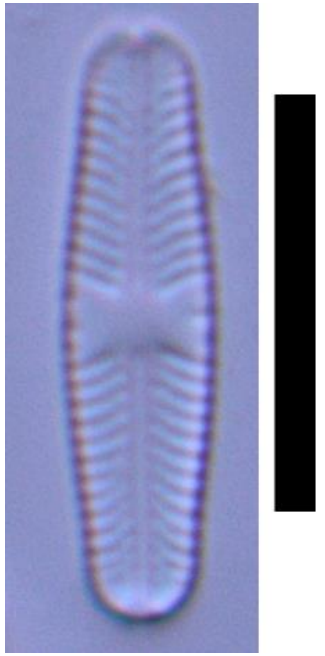
S. saugerresii
L 6.5-11 µm
W 3.3-3.8 µm
S 21-22 in 10 µm

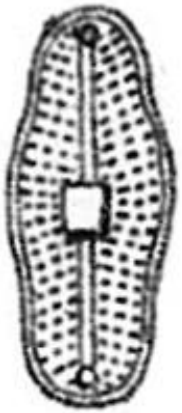
S. crassulexigua
L 5.5-14.0 µm
W 2.7-4.4 µm
S 17-23 in 10 µm

Sellaphora seminulum (Grunow) D.G.Mann

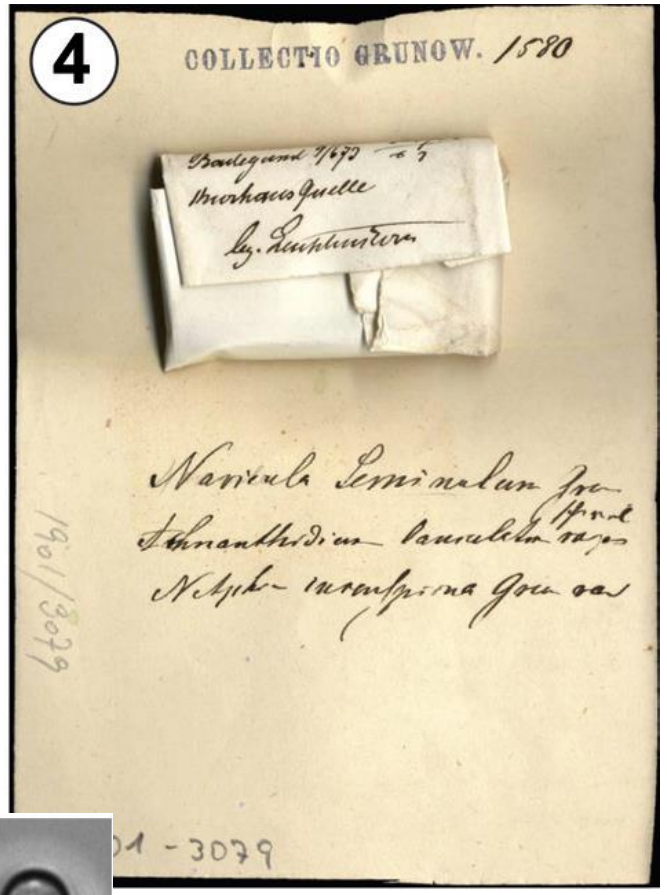
Basionym: ***Navicula seminulum*** **Grunow 1880**
Synonym: ***Navicula seminulum*** **var.** ***radiosa*** **Hustedt**
Navicula joubaudii **Germain**
Sellaphora radiosa **(Hustedt) Kobayasi in Mayama et al.**
Sellaphora joubaudii **(Germain) Aboal in Aboal et al.**

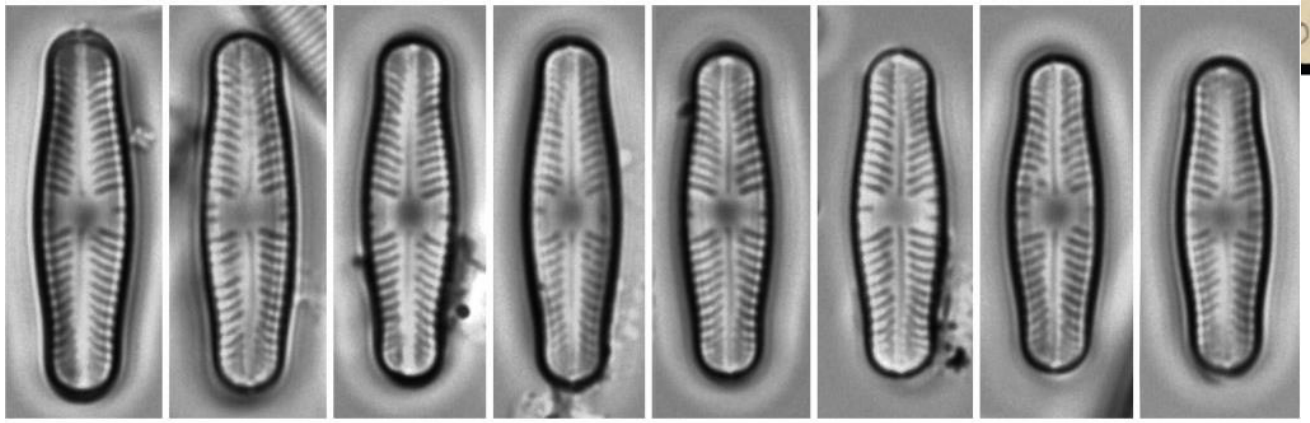
- **Valves linear-lanceolate to broadly lanceolate**
- **Margins clearly convex, inflated in the middle**
- **Apices protracted, broadly rounded, slightly rostrate**
- **Length 9.8-16.5 µm, width 3.4-4.4 µm**
- **Striae markedly radiate, arcuate, especially towards the apices, 18-22 in 10 µm, denser near apices**
- **Axial area narrow, linear-lanceolate**
- **Central area butterfly-shaped, bordered by 2-3 shorter striae, 1 usually very conspicuous**





Grunow: original drawing

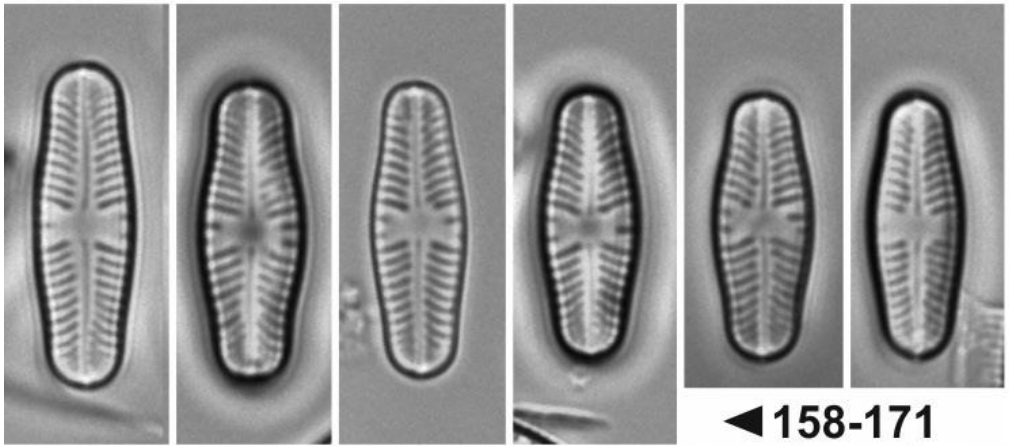




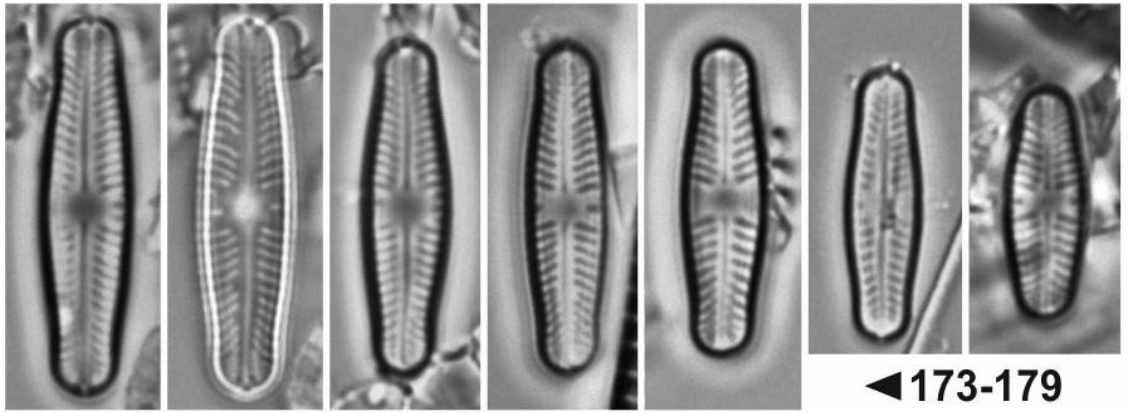
Type population: material n° 1580 (Radegund, Liechtenstein)

(source: Wetzel et al. 2015)

Other populations



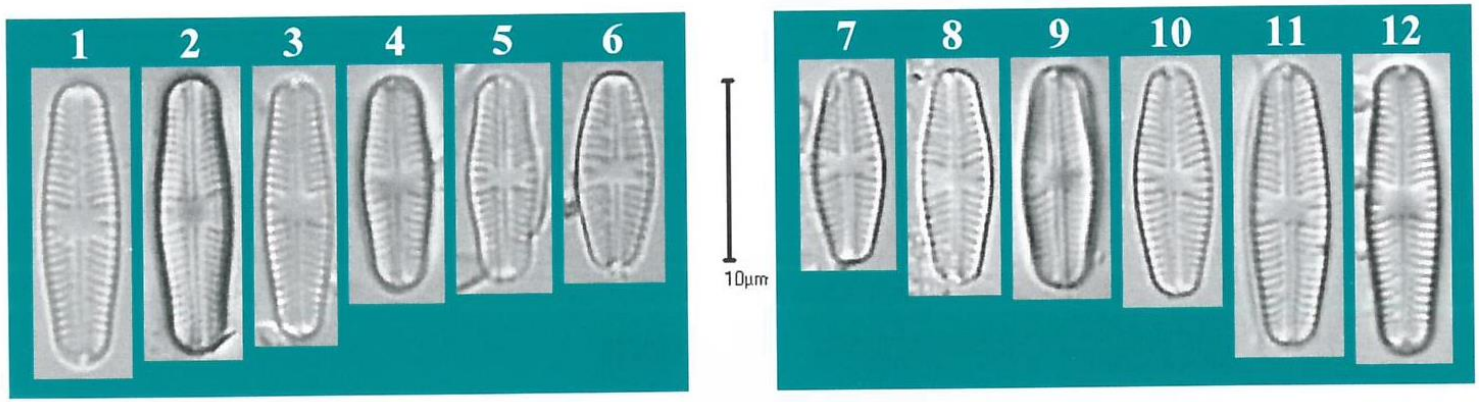
(Van Heurck: Types du Synopsis 143 - Brussels)



(*Navicula seminulum* var. *radiosa* Hustedt)
(Sample E5926 Immerather Maar, Eifel, Germany)

(source: Wetzel et al. 2015)

Other populations



(Oron, France) (Photo: MY Bey)

Ecology

Van Dam et al. (1994)

circumneutral
fresh-brackish
β-mesosaprobic
eutraphentic

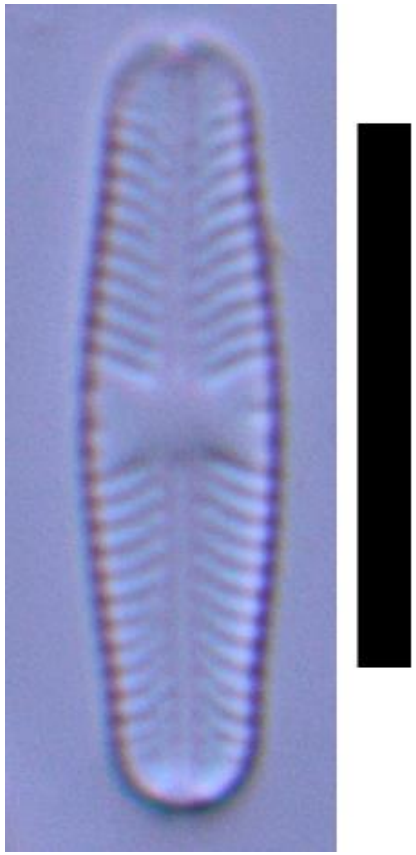
Krammer & Lange-Bertalot (1986) (as *Navicula joubaudii*)

oligo- to beta-mesosaprobic waters
often on flooded rocks and stones, outside waterbodies

Hoffmann & Werum (2011) (as *Sellaphora joubaudii*)

drying sources
chalk-rich, oligo- to weakly beta-mesosaprobic
also in löss-containing soils

Can be confused with



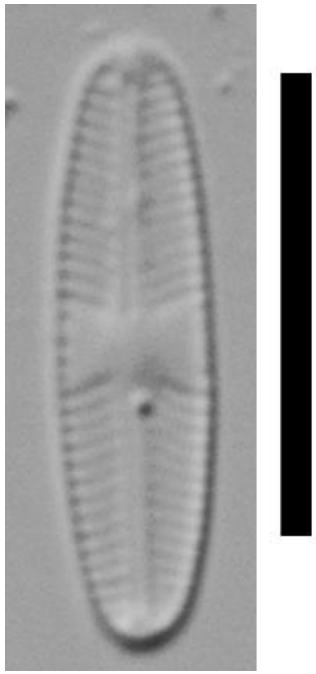
S. seminulum
L 9.8-16.5 µm
W 3.5-4.5 µm
S 18-22 in 10 µm

Inflated central part

Lower stria density

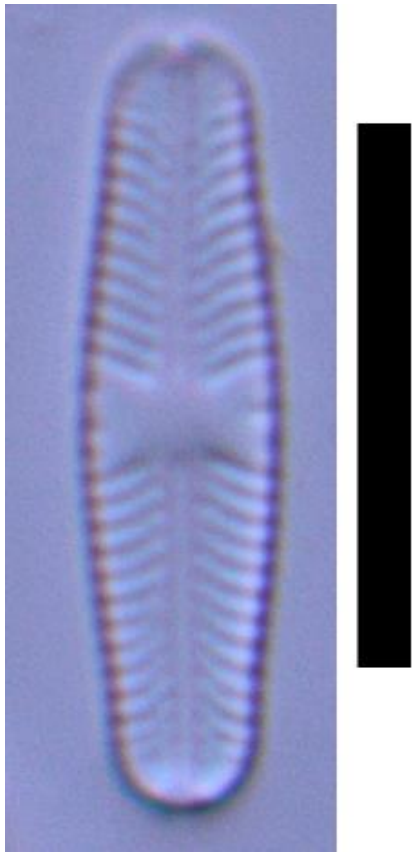
Clearly rostrate, protracted apices

Striae clearly radiate, arcuate



S. atomoides
L 3.4-16.3 µm
W 2.6-3.7 µm
S 30-36 in 10 µm

Can be confused with



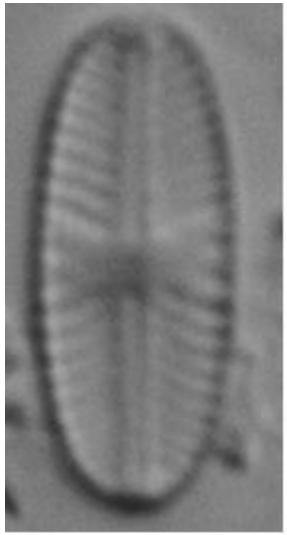
S. seminulum
L 9.8-16.5 µm
W 3.5-4.5 µm
S 18-22 in 10 µm

Inflated central part

Lower stria density

Clearly rostrate, protracted apices

Conspicuous striae present in central area

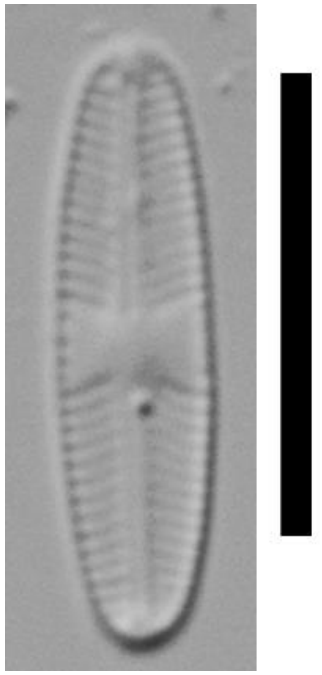


S. nigri
L 3.7-13.0 µm
W 2.7-4.8 µm
S 25-32 in 10 µm

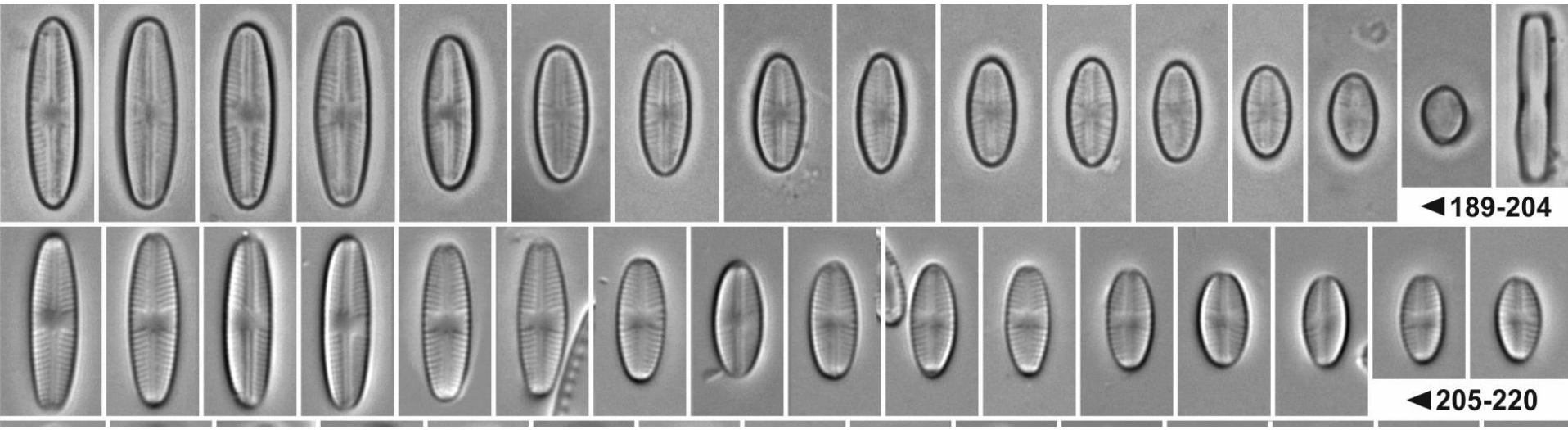
Sellaphora atomoides
(Grunow) C.E.Wetzel & Van de Vijver

Basionym: ***Navicula atomoides*** **Grunow in Van Heurck 1880**
Synonym: ***Eolimna minima*** **(Grunow) Lange-Bertalot pro parte**
Navicula minima **sensu Krammer & Lange-Bertalot 1986 pro parte**
Navicula tantula **Hustedt 1934**
Stauroneis fonticola **Hustedt 1937**

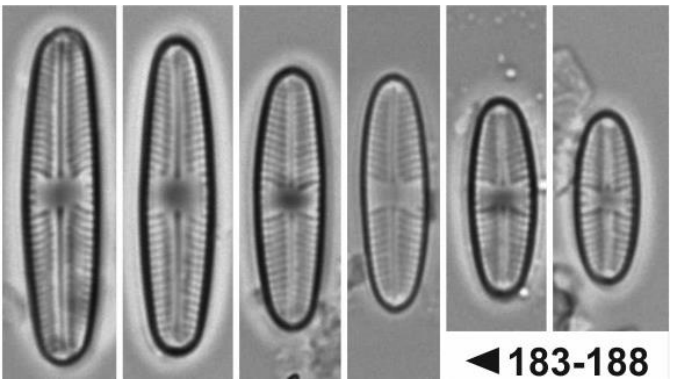
- **Valves elliptical to oval with parallel sides**
- **Apices broadly rounded**
- **Length 3.5-16.5 µm, width 2.5-4.0 µm**
- **Striae radiate throughout, 30-36 in 10 µm**
- **Axial area linear**
- **Central area wide, bow-tie shaped, with only very short striae**



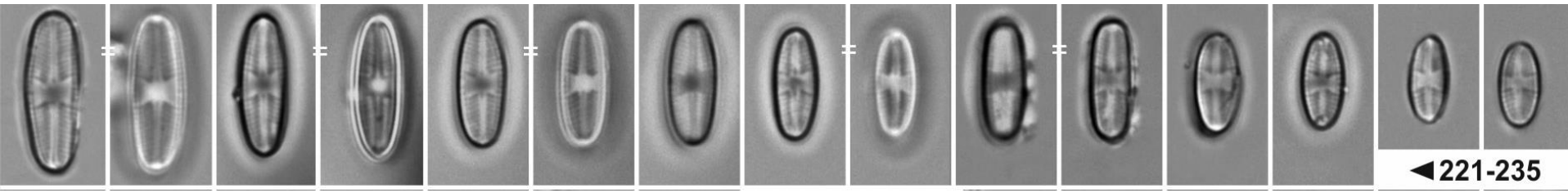
Original description



Navicula atomoides

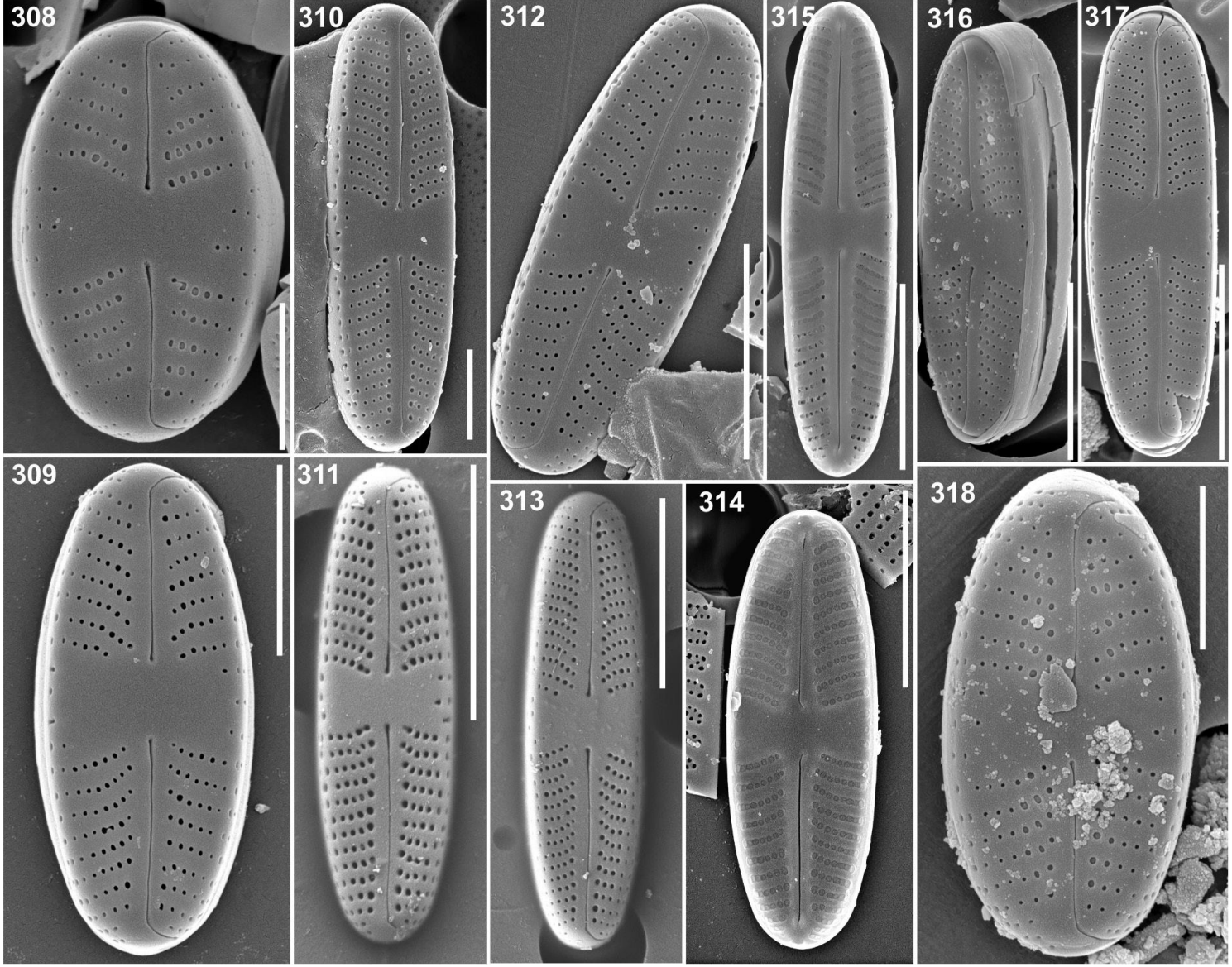


Navicula tantula



(Wetzel et al. 2015)

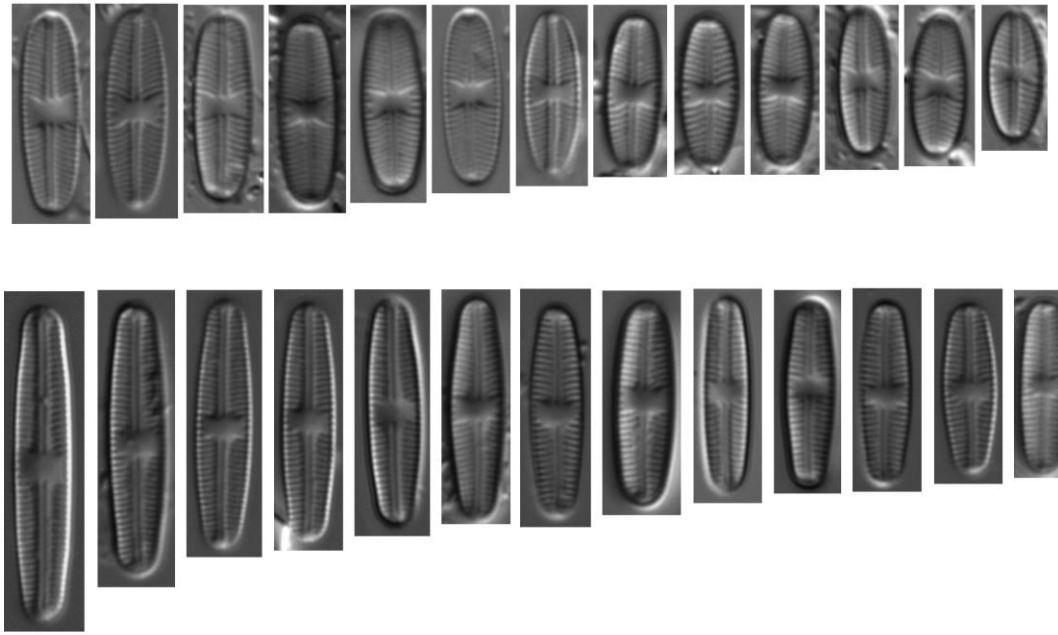
Stauroneis fonticola



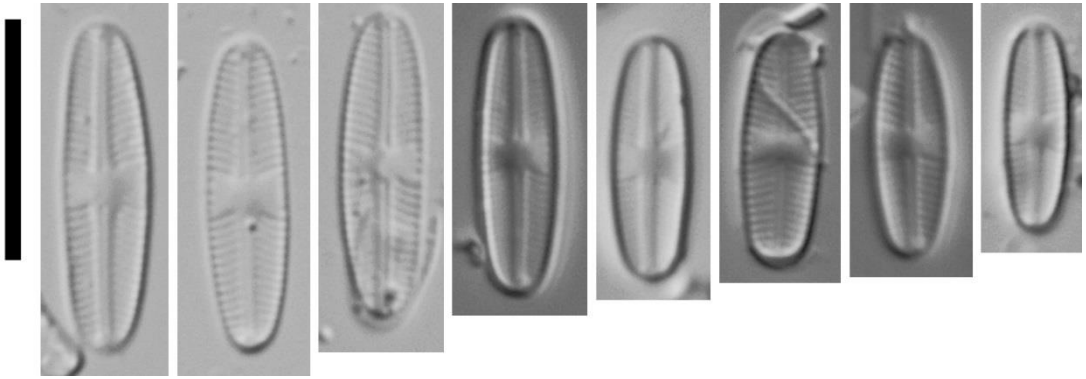
Figs 308–318. *Sellaphora atomoides* comb. nov. SEM images: (308–309) *Navicula atomoides* Grunow in Van Heurck (1880), sample "Type n° 143" from Brussels, Van Heurck collection (BR); (310–315) *Navicula tantula* Hustedt. (1934a, b), sample E869 from Poggenpohls Moor, Niedersachsen (Germany); (316–318) *Stauroneis fonticola* Hustedt. (1937), sample AS1321 from Tengger mountains (Java). Scale bars 5 μm (310, 311, 313, 315, 317), 4 μm (312, 314, 316), 3 μm (309), 2 μm (308, 318).

(Wetzel et al. 2015)

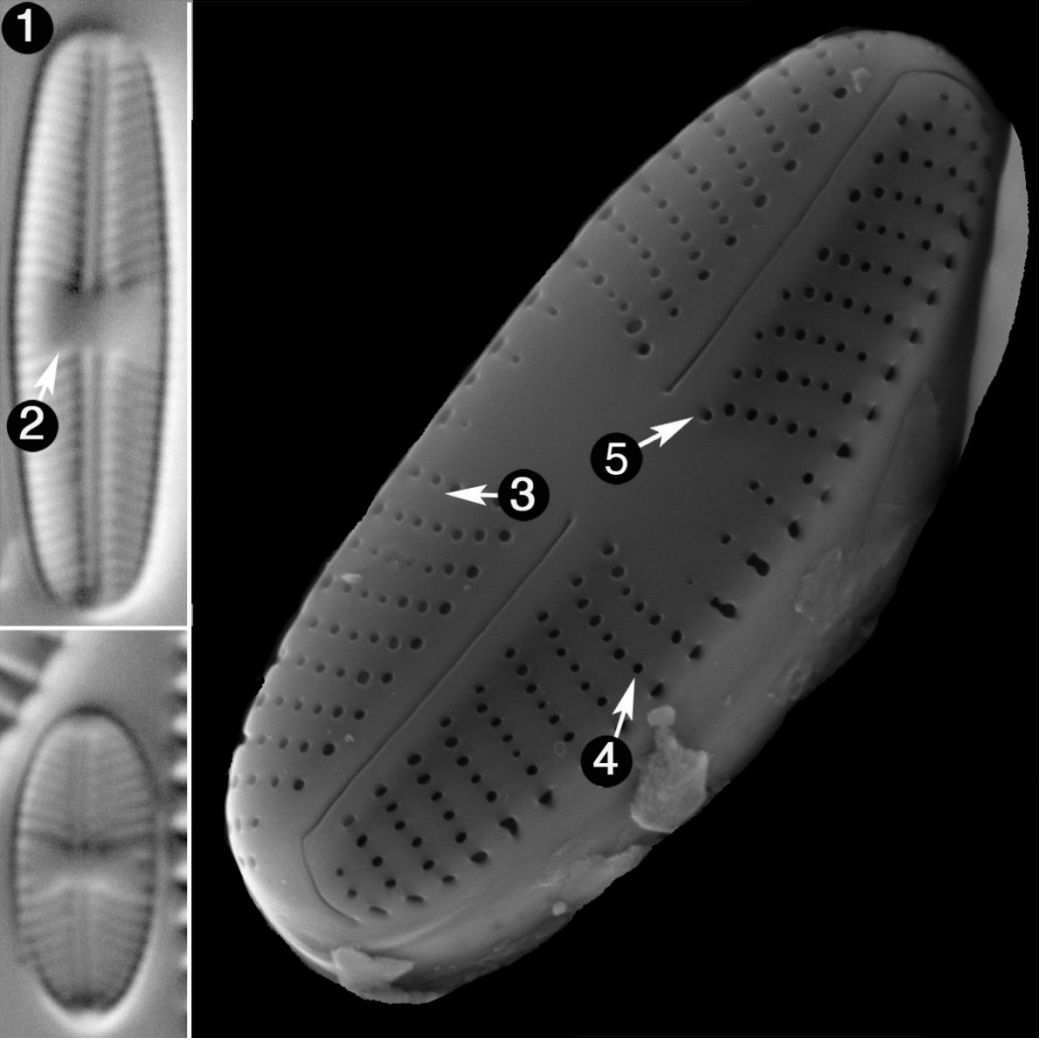
Other populations



(Swedish rivers)



(The Netherlands)



1. **Valves linear to linear-elliptic**
2. **Central area rectangular or bow tie-shaped**
3. **Striae radiate**
4. **Striae uniseriate**
5. **Striae curved near central area**

(source: westerndiatoms.colorado.com)

Ecology

Van Dam et al. (1994) (as *Navicula tantula*)

alkaliphilous
fresh-brackish
α-mesosaprobic/polysaprobic
eutraphentic

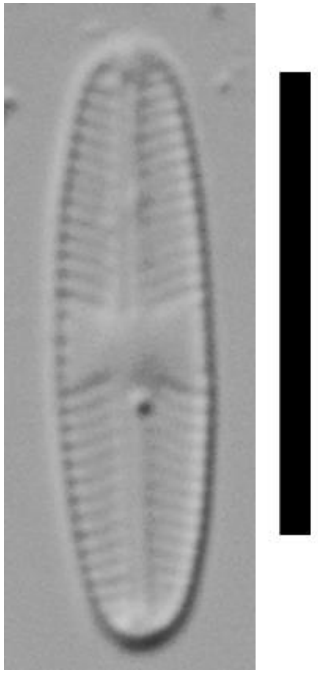
Krammer & Lange-Bertalot (1986) (as *Navicula minima*)

organic detritus
pollution-resistant
α-mesosaprobic/polysaprobic

Hoffmann & Werum (2011) (as *Navicula minima/tantula*)

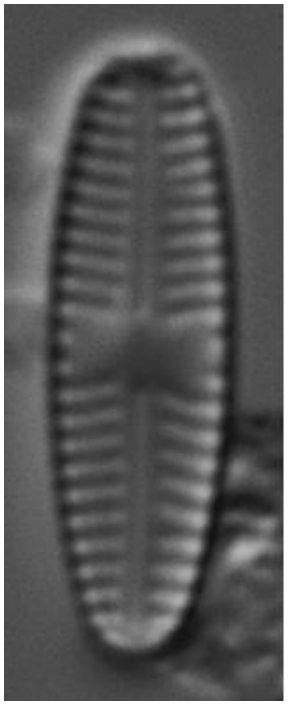
alkaline
elektrolyte poor, oligotrophic till heavily polluted waters
α-mesosaprobic/polysaprobic

Can be confused with



Higher stria density

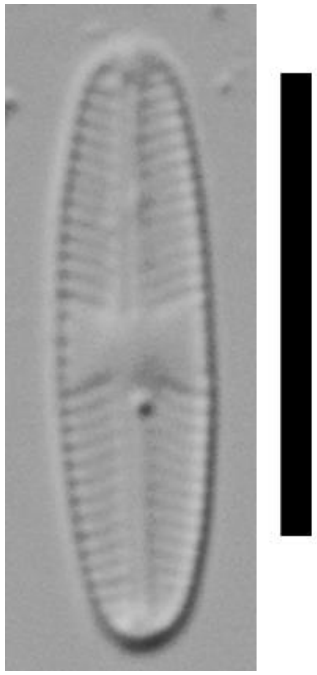
Slightly narrower width



S. atomoides
L 3.4-16.3 µm
W 2.6-3.7 µm
S 30-36 in 10 µm

S. saugerresii
L 6.5-11 µm
W 3.3-3.8 µm
S 21-22 in 10 µm

Can be confused with

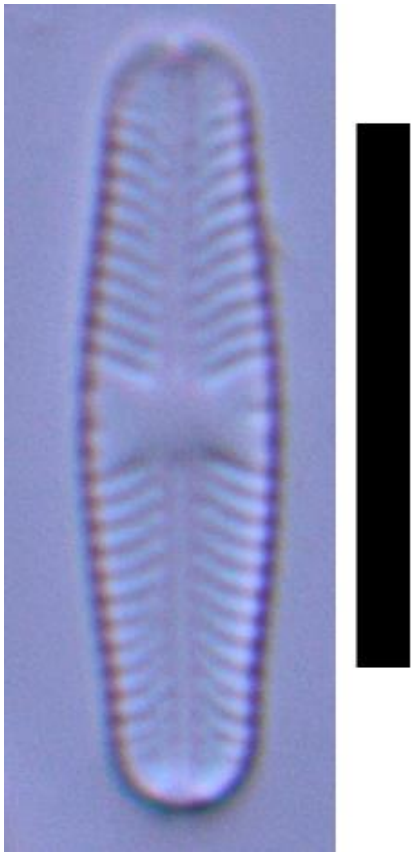


Never inflated central part

Higher stria density

Never rostrate, protracted apices

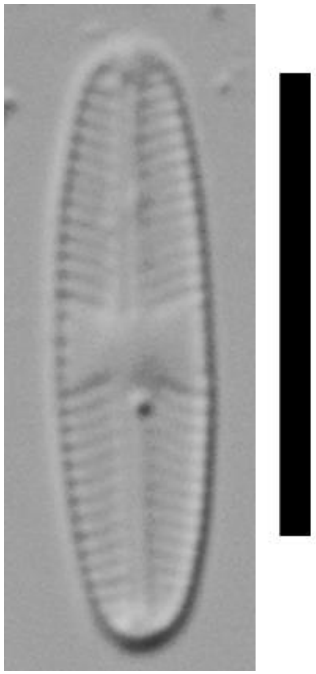
Striae never typically arcuate



S. atomoides
L 3.4-16.3 µm
W 2.6-3.7 µm
S 30-36 in 10 µm

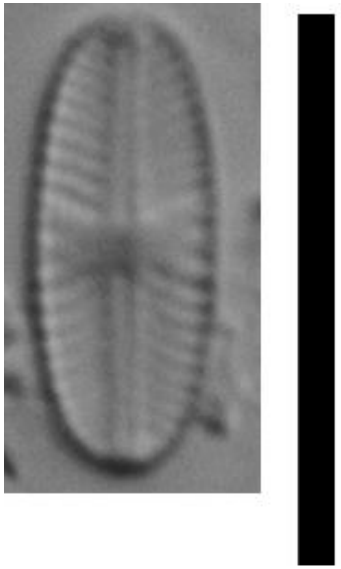
S. seminulum
L 9.8-16.5 µm
W 21-22 µm
S 18-22

Can be confused with



Larger central area due to only very short striae, 4-5 instead of 2-3

Valves usually narrower



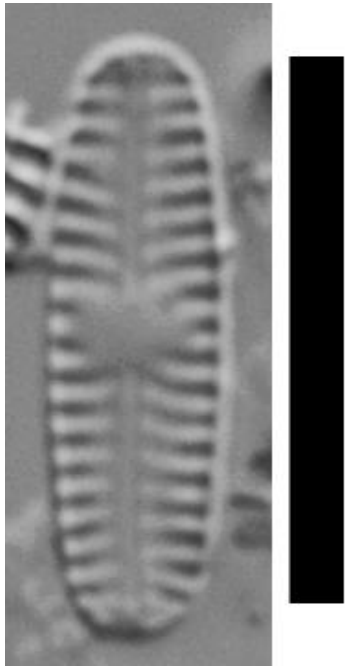
S. atomoides
L 3.4-16.3 µm
W 2.6-3.7 µm
S 30-36 in 10 µm

S. nigri
L 3.7-13.0 µm
W 2.7-4.8 µm
S 25-32 in 10 µm

Sellaphora vekhovii
(Lange-Bertalot & Genkal) C.E.Wetzel & D.G.Mann

Basionym: ***Naviculadicta vekhovii*** **Lange-Bertalot & Genkal 1999**

- **Valves linear with parallel margins**
- **Apices broadly rounded, never protracted**
- **Length 14-18 µm, width 3.3-3.5 µm**
- **Striae weakly radiate, parallel near the apices, 14-16 in 10 µm**
- **Axial area narrow, linear**
- **Central area rather large, bordered by 2-3 shortened striae**



Original description

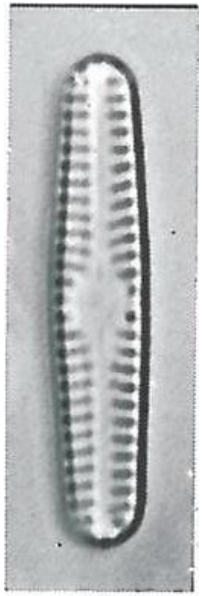
Naviculadicta vekhovii Lange-Bertalot & Genkal nov. spec. [Fig. 20:20, 21]

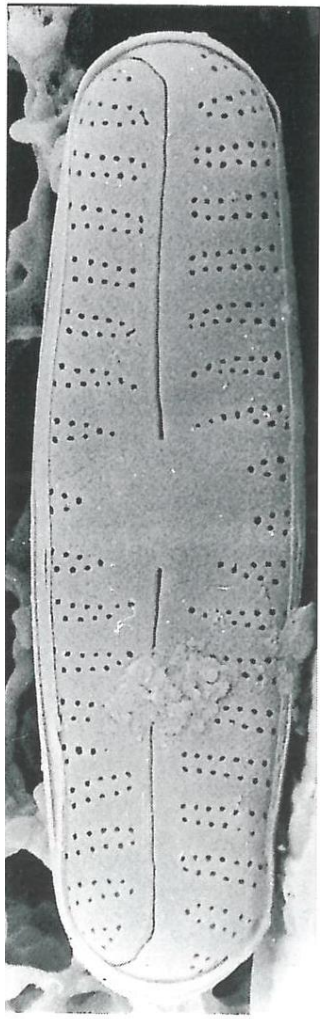
Synonym: *Naviculadicta* spec. Nr. 3 Julma Ölkky LANGE-BERTALOT & METZELTIN 1996, fig. 28:21-23

Valvae lineares marginibus in media parum convexis apicibus late rotundatis, 14-18 µm longae, 3.3-3.5 µm latae. Raphe filiformis ramis leviter curvatis ad poros centrales inconspicuos sed distincte distantes inter se positos. Area axialis angusta, area centralis satis lata variabilis ad instar. Striae transapicales crassae apparentes modice radiantes sed sub apices parallelae denique modice convergentes, 14-16 in 10 µm. Aspectus in microscopo electronico (vide fig. 20:21): Series areolarum duplices, foramina areolarum distincte distantia inter se posita ita atque ad instar valvarum differentia a *Naviculadicta elorantana* Lange-Bertalot et *Navicula(dicta) seminulum*.

Typus: Praep. RUS-40 in Coll. LANGE-BERTALOT, Botanisches Institut, J.W. Goethe-Universität Frankfurt am Main

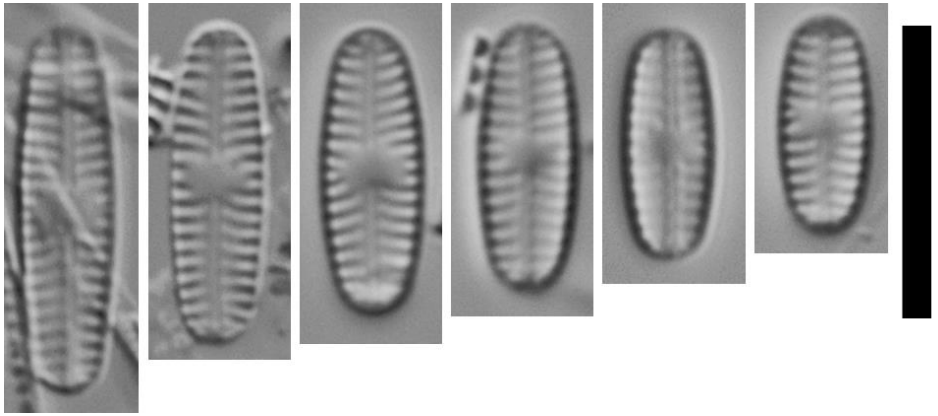
Locus typicus: Yugorsky paeninsula in oceano arctico, Siberia boreo-occidentalis, lacus aquae dulcis prope ostium fluminis Kharayakha, super gramina (leg. N.V. VEKHOV, 11.9.1995)



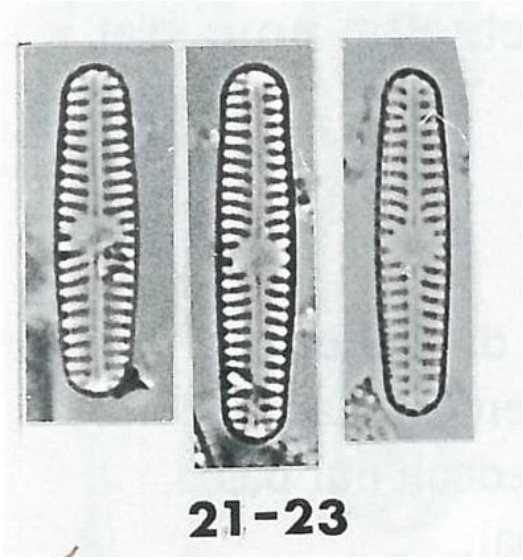


Lange-Bertalot & Genkal
Iconographia Diatomologica 6

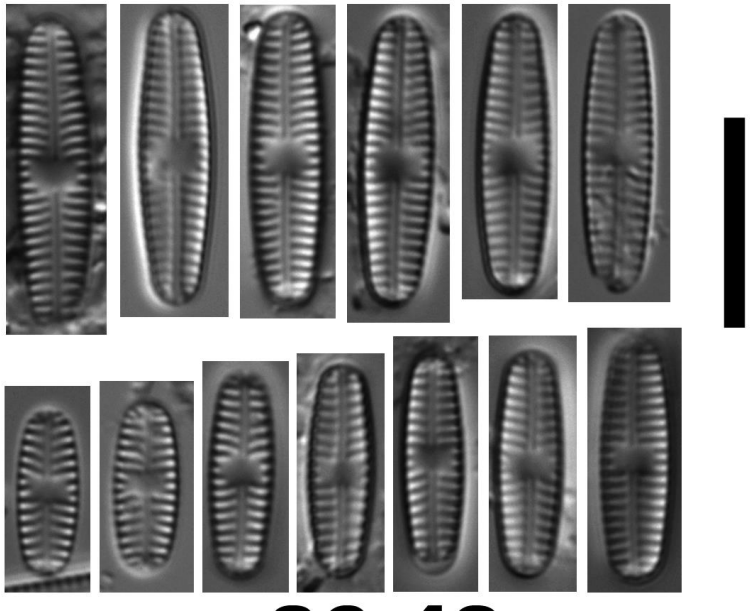
Other populations



(The Netherlands)



(Julma Ollky)
Icon. Diatom. 2



(Swedish rivers)

Ecology

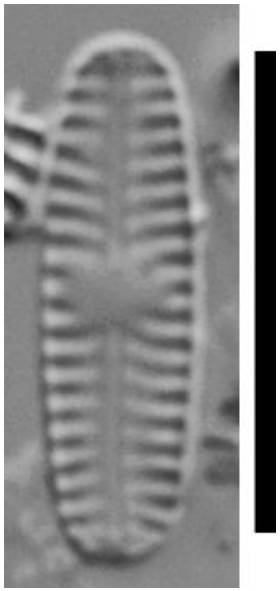
Van Dam et al. (1994)

acidophilous
freshwater

Lange-Bertalot & Genkal (2011)

more or less high electrolyte levels
eutrophic
saprobic level up to α-mesosaprobic

Can be confused with

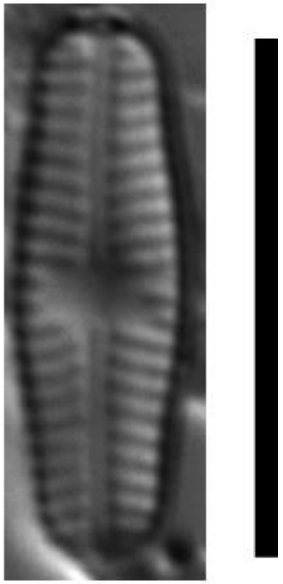


Lower valve width

No inflated central part

No protracted apices

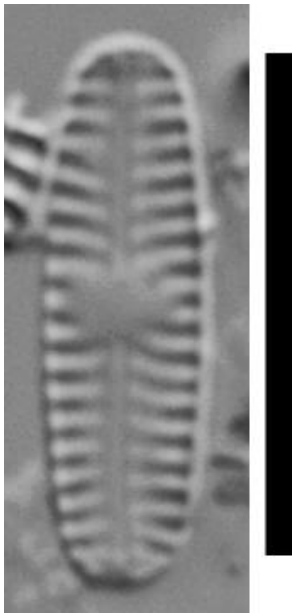
Lower stria density



S. vekhovii
L 14-18 µm
W 3.3-3.5 µm
S 14-16 in 10 µm

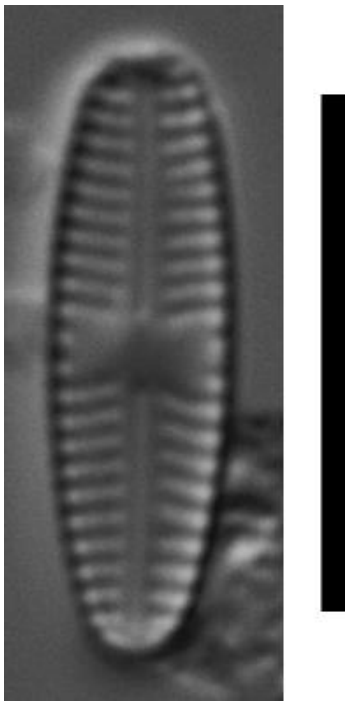
S. elorantana
L 10.0-14.0 µm
W 3.5-4.0 µm
S 18-20 in 10 µm

Can be confused with



Lower stria density

Strictly parallel margins



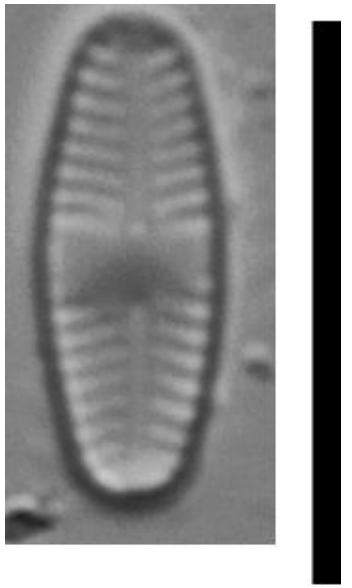
S. vekhovii
L 14-18 µm
W 3.3-3.5 µm
S 14-16 in 10 µm

S. saugerresii
L 6.5-11 µm
W 3.3-3.8 µm
S 21-22 in 10 µm

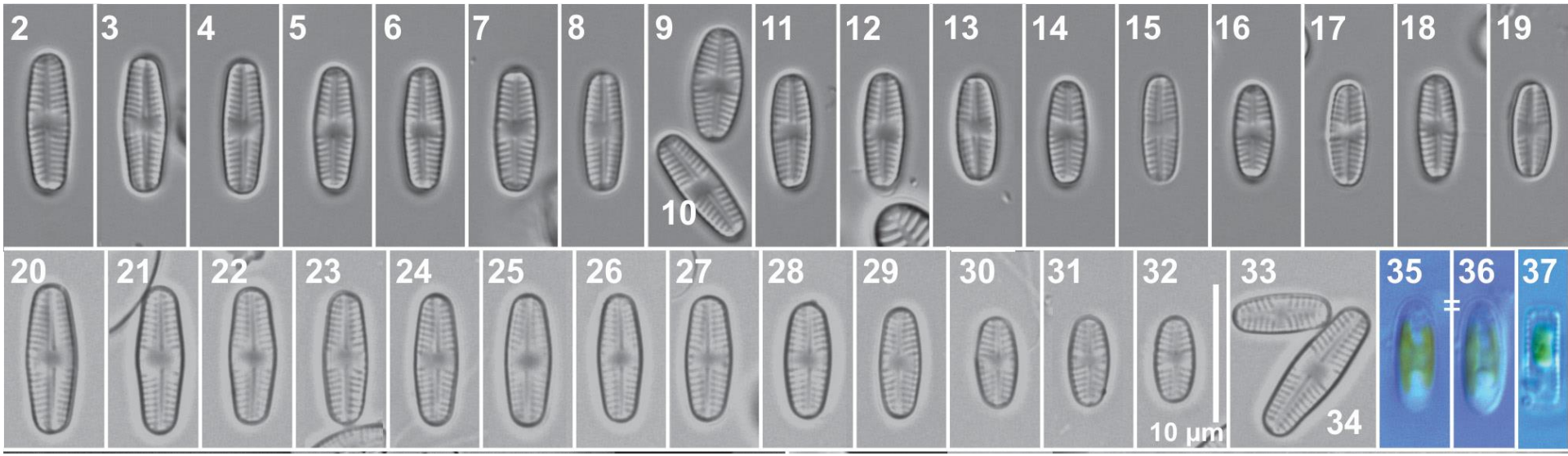
Sellaphora labernardierei Beauger, C.E.Wetzel & Ector

Basionym: *Sellaphora labernardieri* Beauger, C.E.Wetzel & Ector

- **Valves linear to linear-elliptical with slightly inflated central part**
- **Apices broadly rounded, rarely protracted**
- **Length 6-11 µm, width 2.2-3.5 µm**
- **Striae slightly radiate, 20-28 in 10 µm**
- **Axial area narrow, linear**
- **Central area large, bow-tie-shaped, bordered by several shortened striae**



Original description



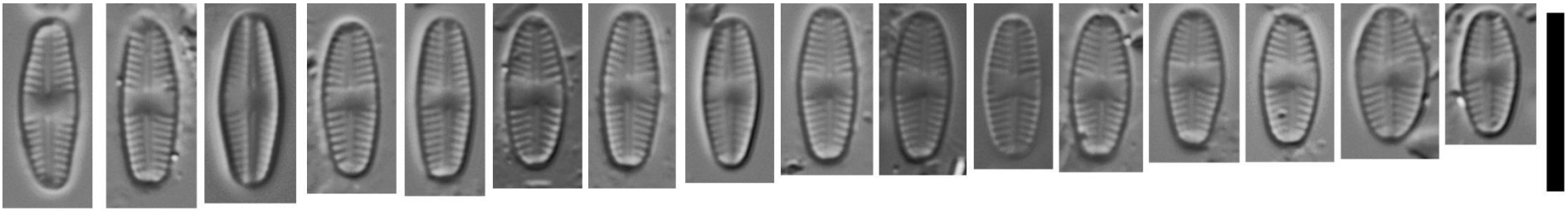
***Sellaphora labernardierei* Beauger, C.E.Wetzel & Ector, *sp. nov*. (Figs 2–42)**

Light microscopy observations (Figs 2–37): The valves are linear to linear-elliptical with usually linear to convex margins (slightly inflated in the middle) and broadly rounded apices. Valve dimensions (n=50): length 6.1–11.0 µm, width 2.2–3.4 µm. Central area is large, bow-tie-shaped, bordered by several very short striae. The striae are clearly visible in LM, slightly radial (Figs 2–34) and about 20–28 in 10 µm (mainly 24–25). Areolae are not discernible in LM. The axial area is narrow and linear over most of the valve. Raphe is filiform with enlarged proximal raphe endings. The cells present a single H-shaped chloroplast (Figs 35–36). In girdle view, cells are rectangular (Fig. 37). Scanning electron microscopy observations (Figs 38–42): External raphe is straight and the drop-like proximal raphe endings are slightly deflected to the same side. Distal raphe fissures are hooked, bent to the same side of the valve, and extended onto the mantle (Figs 38–39). The striae are biseriate, sometimes uniseriate near the centre of the valve. The striae bordering the central area are generally uniseriate and slightly curved; at the centre shorter striae with only one areola on the valve face can be present (Figs 38, 40–42). Internally, the proximal raphe endings are straight or very slightly deflected and the distal raphe fissure ends in helictoglossa (Figs 41 and 42). Each areola is internally occluded by a hymen (Fig. 41).

Type:—FRANCE. Les Martres-de-Veyre: Font-de-Bleix spring, sample S11_BA_3115, 45° 40’ 52.4” N, 3° 12’ 09.9” E, 332 m a.s.l., *A. Beauger*, *1 December 2014* (holotype: CLF!, slide no. 104700, here depicted in Figs 2–42; isotypes: CLF! slide no. 104701, BR! slide no. 4435).

(Beauger et al. 2016)

Other populations



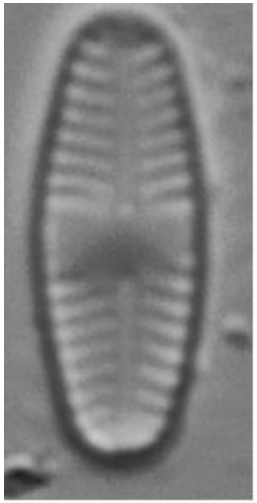
(Flanders, Belgium)

Ecology

Beauger et al. (2016)

acidic habitats
elevated conductivity level
enriched with calcium

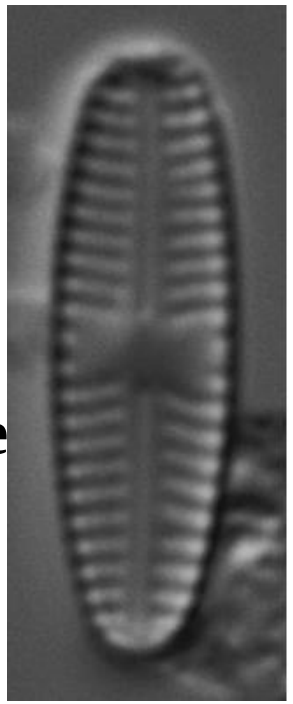
Can be confused with



Slightly lower stria density

Inflated central part

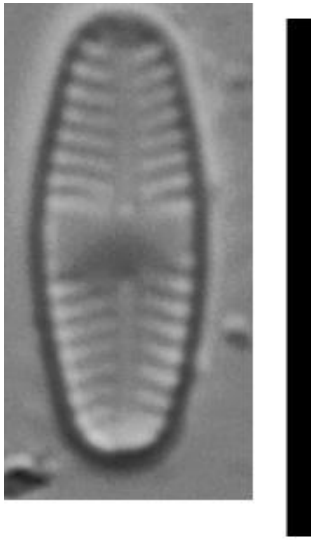
Protracted, usually subcapitate apice



S. labernardierei
L 10-14 µm
W 3.5-4.0 µm
S 18-20 in 10 µm

S. saugerresii
L 6.5-11 µm
W 3.3-3.8 µm
S 21-22 in 10 µm

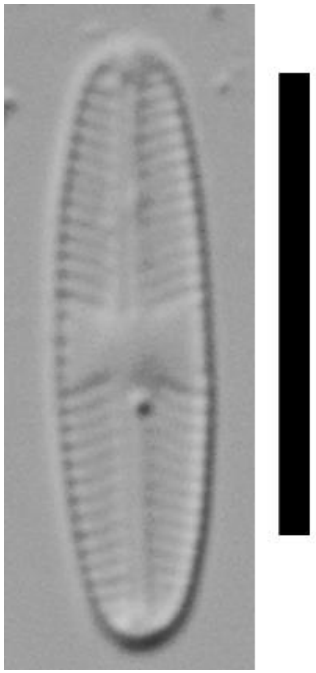
Can be confused with



Lower stria density

Inflated central part

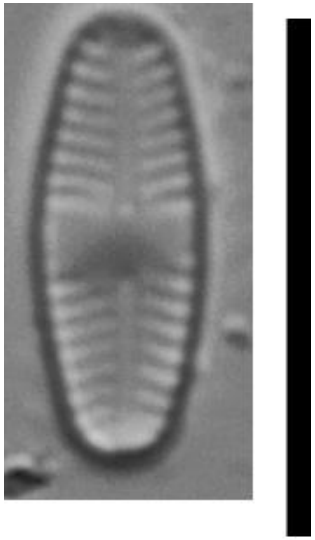
Protracted, usually subcapitate apices



S. labernardierei
L 10-14 µm
W 3.5-4.0 µm
S 18-20 in 10 µm

S. atomoides
L 3.4-16.3 µm
W 2.6-3.7 µm
S 30-36 in 10 µm

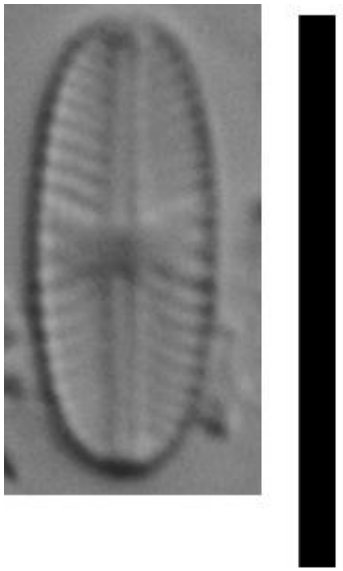
Can be confused with



Lower stria density

Inflated central part

Protracted, usually subcapitate apices



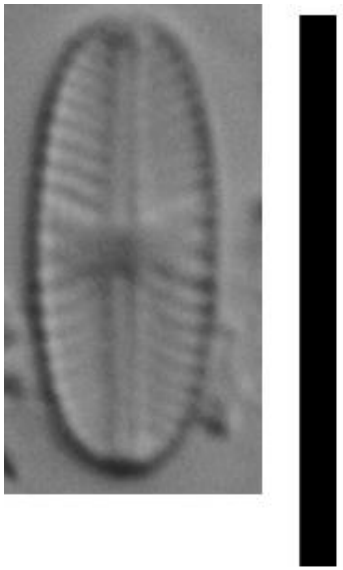
S. labernardierei
L 10-14 µm
W 3.5-4.0 µm
S 18-20 in 10 µm

S. nigri
L 3.7-13.0 µm
W 2.7-4.8 µm
S 25-32 in 10 µm

Sellaphora nigri (De Notaris) C.E.Wetzel & Ector

Basionym: ***Navicula nigri*** **De Notaris in De Notaris & Baglietto 1872**
Synonym: ***Navicula minima*** **Grunow in Krammer & Lange-Bertalot pro parte**
Eolimna minima **(Grunow) Lange-Bert. in Moser et al. 1998 pro parte**

- **Valves elliptic to oval**
- **Apices broadly rounded, never protracted**
- **Length 3.7-13.0 µm, width 2.7-4.8 µm**
- **Striae radiate throughout, 25-32 in 10 µm**
- **Axial area, linear, widening near central area**
- **Central area symmetrical, irregularly bow-tie shaped to irregularly squared**
- **Shorter striae of variable length bordering central area**

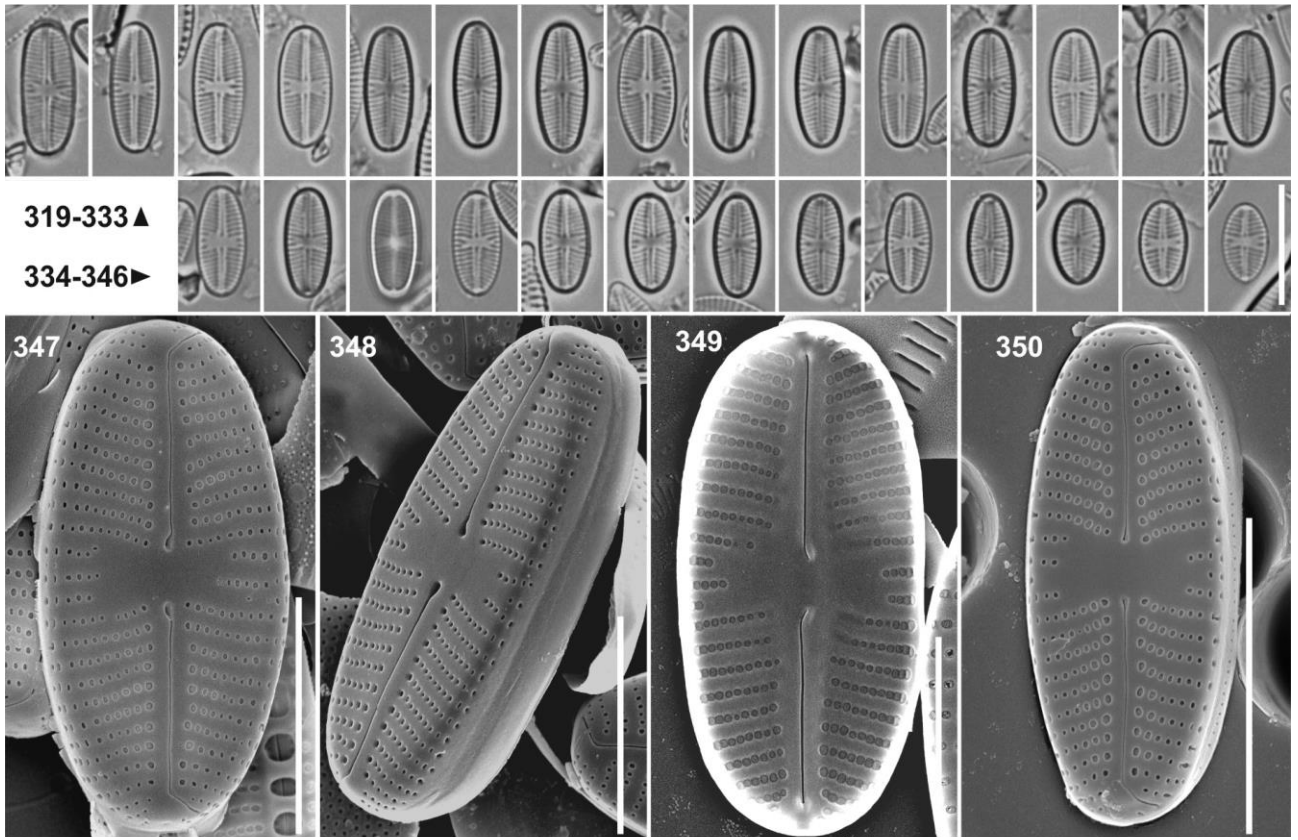


Original description

632. Navicula Nigri.

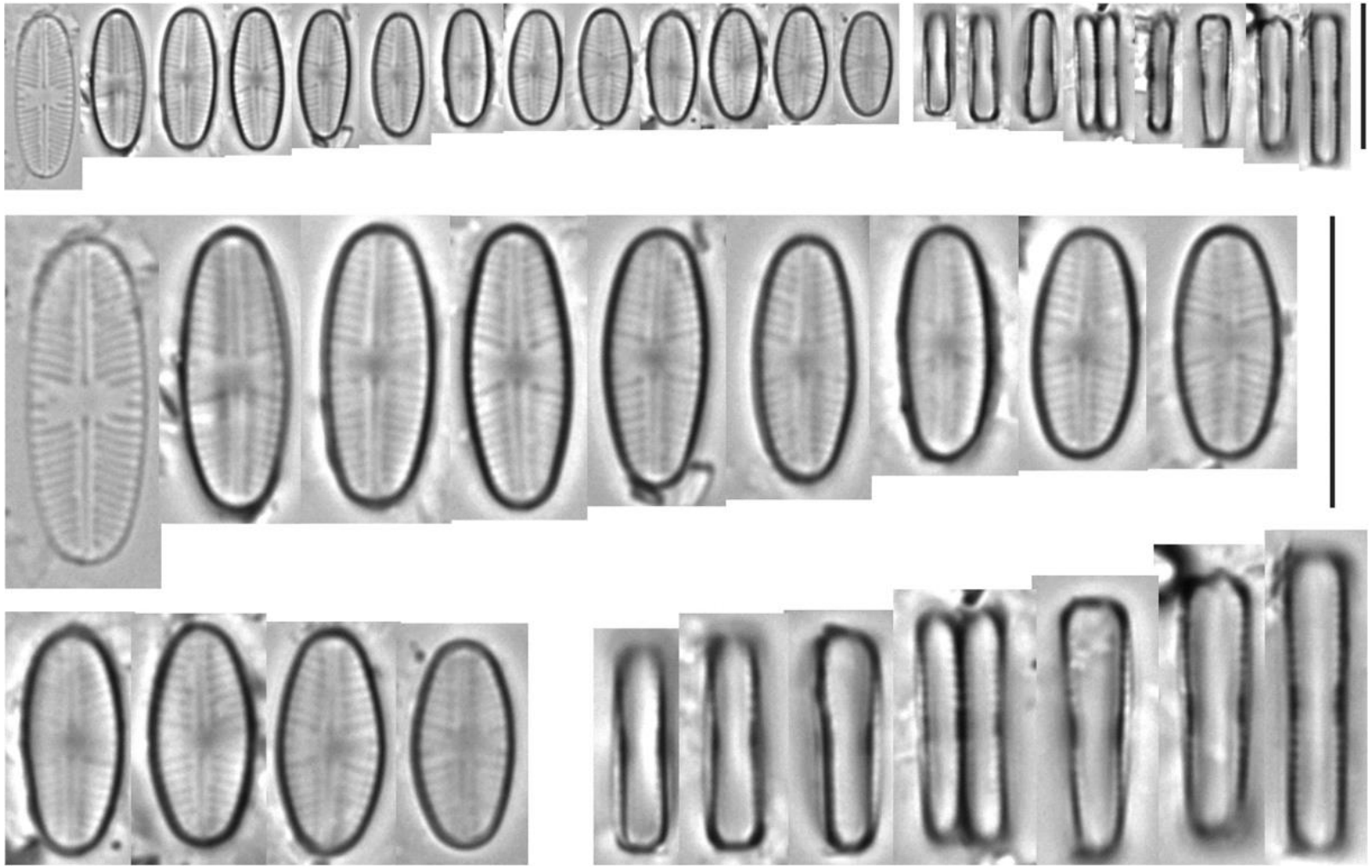
N. a latere exacte paralellogramma, a fronte elliptica, vel elliptico-oblongata, vix $^1/_{100}$ millim. longitudine excedens, nodulo valido, ex striis aegre conspicuis, radiantibus, ad æquatorem lineam mediam non attingentibus, stauroideo instructa. — Ad Naviculam pelliculosam Hils. in Rabenh. Alg. n. 1265 acedit, sed noduli forma me judice distinguenda *DNtrs.*

A profusione sulle foglie di *Nuphar luteum* nelle

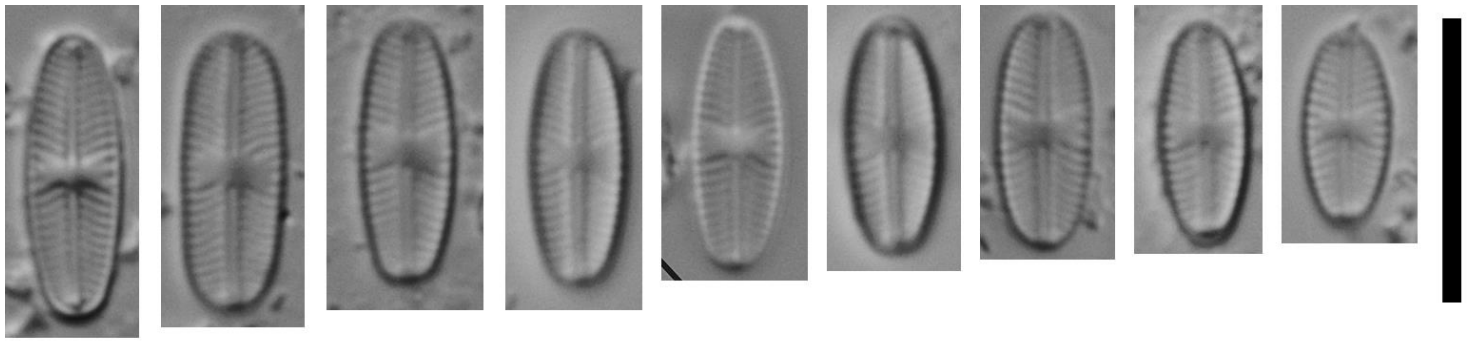


(Wetzel et al. 2015)

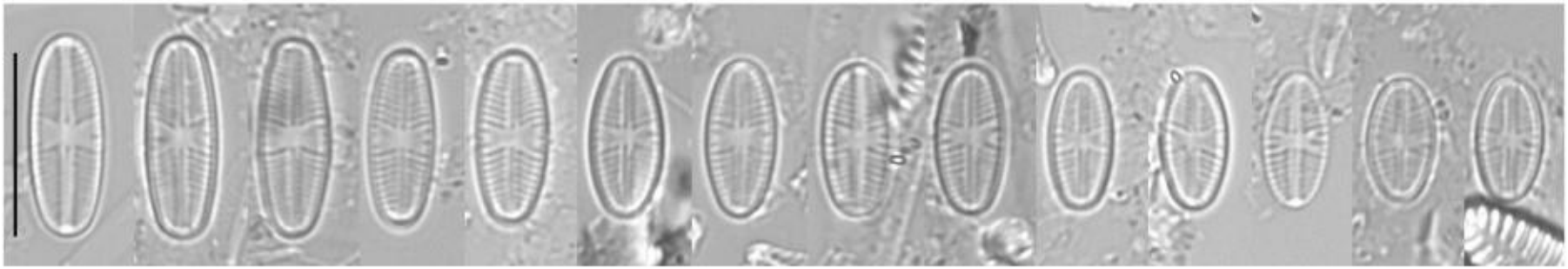
Other populations



(France, Photos: Ector et al. 2015)



(Gulp, Oeverbron, The Netherlands)



Brandy Brook, Newgale, Pembrokeshire, Wales

Jüttner I. *Sellaphora nigri* (De Not.) C.E.Wetzel & Ector; 2015; 221. In: Jüttner I., Bennion H., Carter C., Cox E.J., Ector L., Flower R., Jones V., Kelly M.G., Mann D.G., Sayer C., Turner J. A., Williams D.M. 2017 . *Freshwater Diatom Flora of Britain and Ireland*. Amgueddfa Cymru - National Museum Wales. Available online at http://naturalhistory.museumwales.ac.uk/diatoms/browsespecies.php?-recid=2477. [Accessed: 18 May 2017].

Ecology

Van Dam et al. (1994) (as *Navicula minima*)

alkaliphilous
fresh-brackish
α-mesosaprobic/polysaprobic
eutraphentic

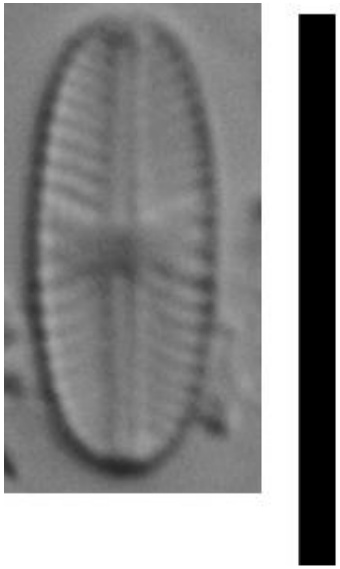
Krammer & Lange-Bertalot (1986) (as *Navicula minima*)

organic detritus
pollution-resistant
α-mesosaprobic/polysaprobic

Hoffmann & Werum (2011) (as *Navicula minima/tantula*)

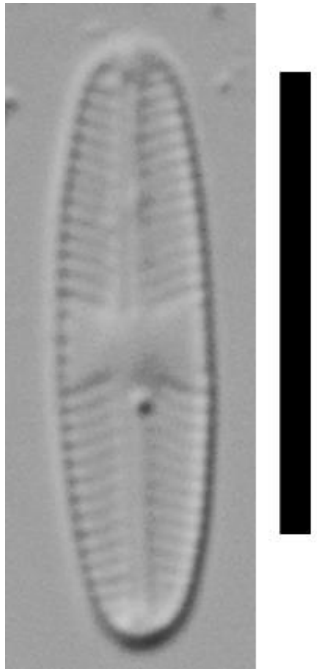
alkaline
elektrolyte poor, oligotrophic till heavily polluted waters
α-mesosaprobic/polysaprobic

Can be confused with



Always visible 2-3 shorter striae in central area

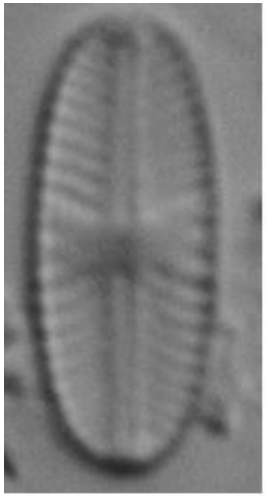
Valves usually broader



S. nigri
L 3.7-13.0 µm
W 2.7-4.8 µm
S 25-32 in 10 µm

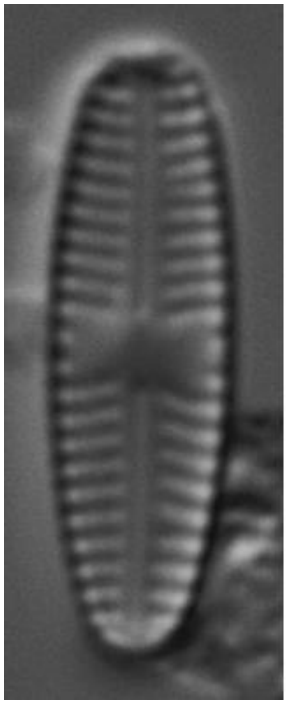
S. atomoides
L 3.4-16.3 µm
W 2.6-3.7 µm
S 30-36 in 10 µm

Can be confused with



Higher stria density

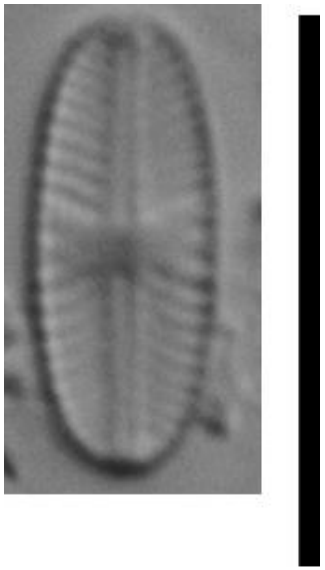
Usually higher valve width



S. nigri
L 3.7-13.0 µm
W 2.7-4.8 µm
S 25-32 in 10 µm

S. saugerresii
L 6.5-11 µm
W 3.3-3.8 µm
S 21-22 in 10 µm

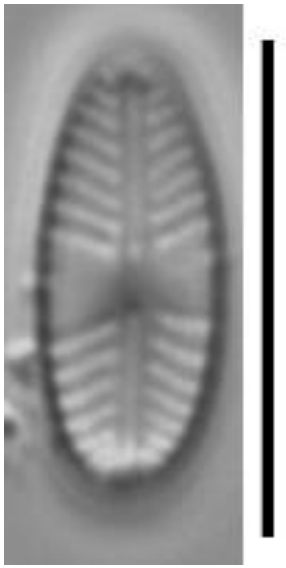
Can be confused with



Higher stria density

Symmetrical central area

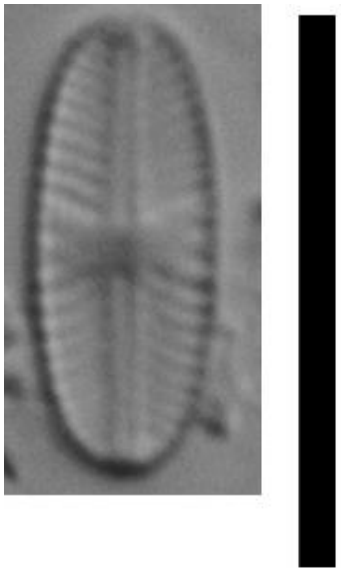
Smaller central area



S. nigri
L 3.7-13.0 µm
W 2.7-4.8 µm
S 25-32 in 10 µm

S. crassulexigua
L 5.5-14.0 µm
W 2.7-4.4 µm
S 17-23 in 10 µm

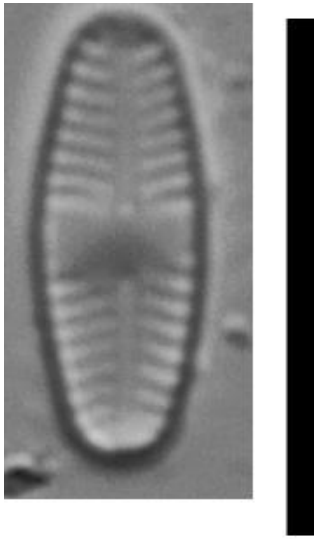
Can be confused with



Higher stria density

Never inflated central part

Broadly rounded apices



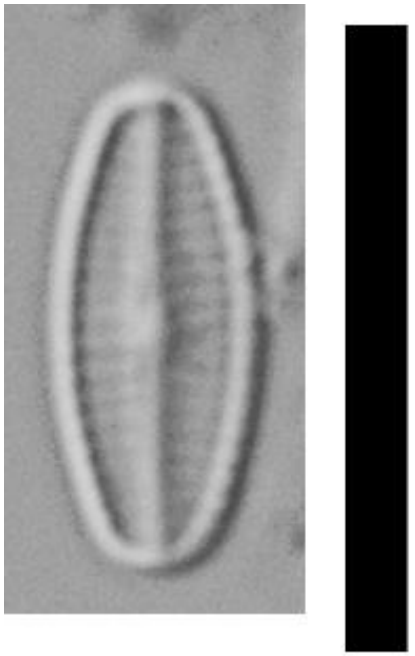
S. nigri
L 3.7-13.0 µm
W 2.7-4.8 µm
S 25-32 in 10 µm

S. labernardierei
L 10-14 µm
W 3.5-4.0 µm
S 18-20 in 10 µm

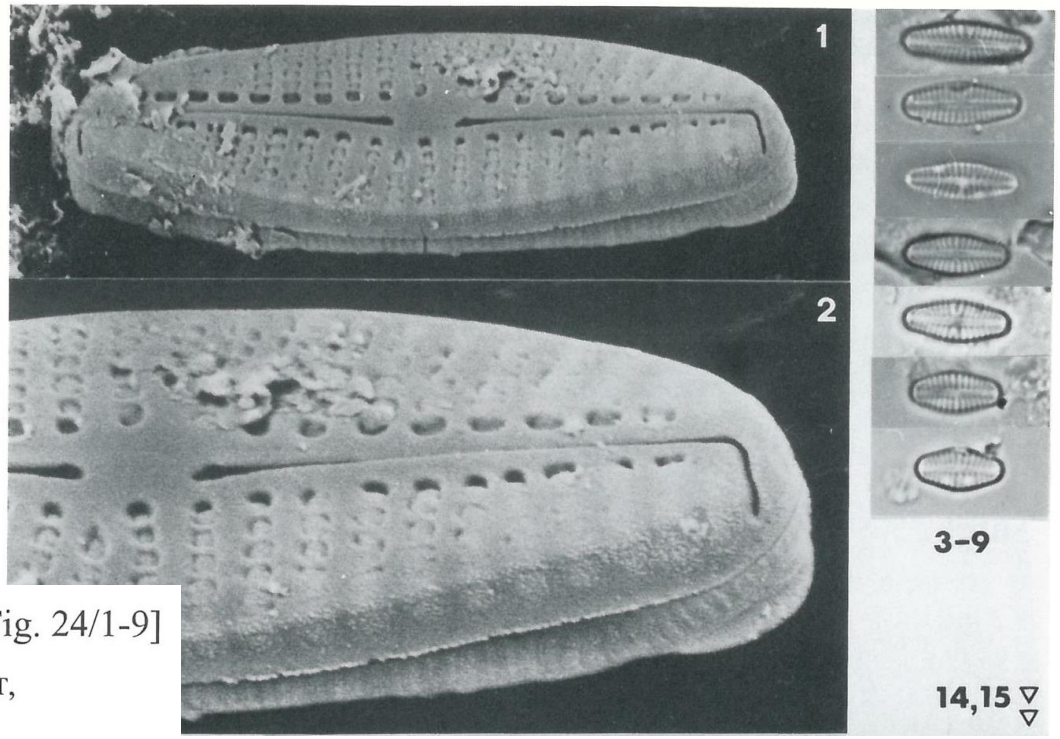
Sellaphora rhombelliptica (Gerd Moser, Lange-Bertalot & Metzeltin) C.E.Wetzel & Ector

Basionym: *Eolimna rhombelliptica* Gerd Moser, Lange-Bertalot & Metzeltin 1998

- **Valves rhombic to rhombic-lanceolate and rhombic-elliptical**
- **Apices bluntly rounded, never protracted**
- **Length 5.0-12.0 µm, width 2.8-3.0 µm**
- **Striae weakly radiate, parallel near the apices, 24-26 in 10 µm**
- **Axial area very narrow, linear**
- **Central area very small**



Original description



Eolimna rhombelliptica nov. spec. [Fig. 24/1-9]

Holotypus: Präparat *Au 109.2* aus Collection LANGE-BERTALOT, Botanisches Institut, Universität Frankfurt/Main.

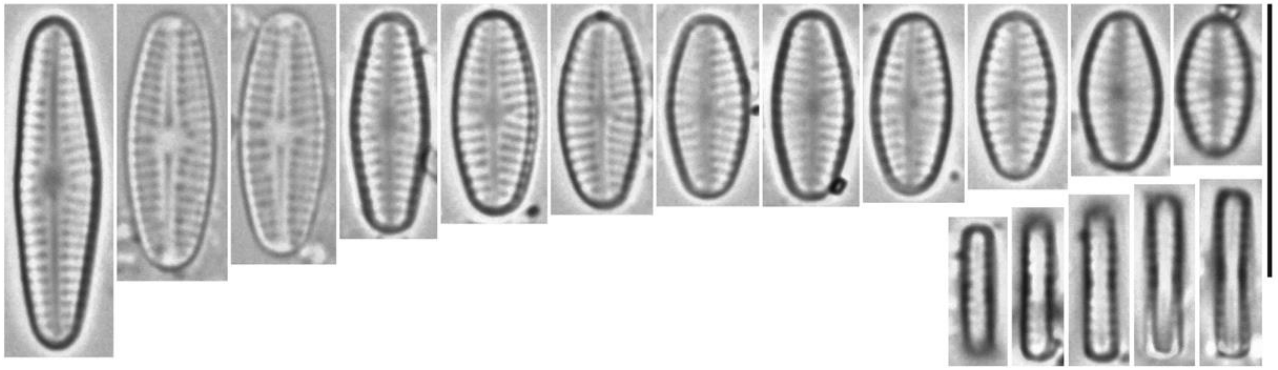
Locus typicus: Thio, Nouvelle-Calédonie (leg. R. SEIPP, März 1992).

Numerische Merkmale: Länge 6,5-7,5 µm, Breite 2,8-3 µm, Streifen 25/10 µm.

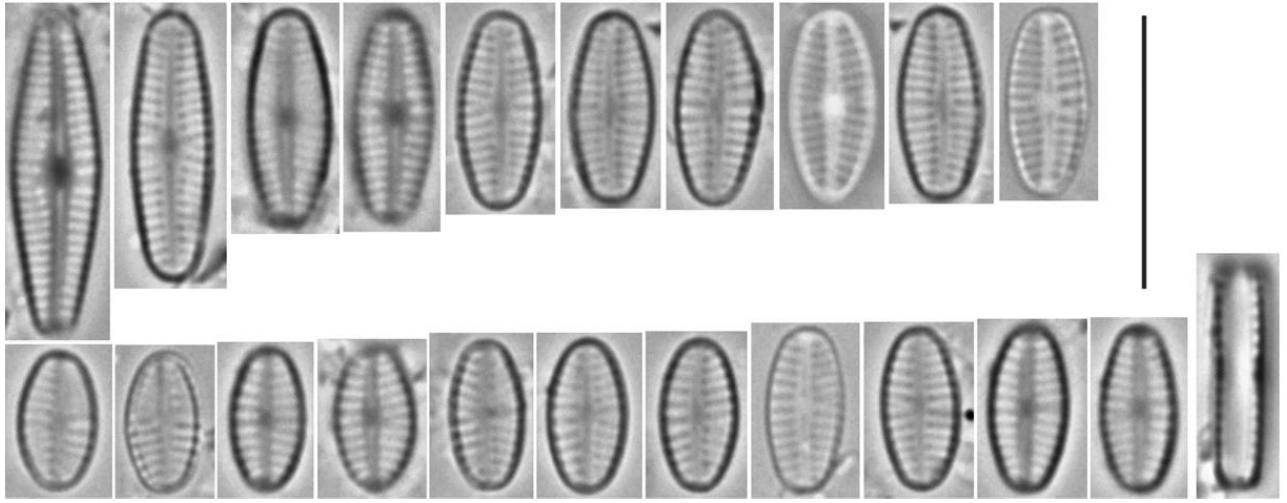
Diagnose: Schalen rhombisch bis breit rhombisch-lanzettlich oder rhombisch-elliptisch mit stumpf gerundeten Enden. Raphe filiform, gerade, mit kaum markierten Zentralporen und gleichseitig in den Mantel abgekrümmten Terminalspalten (REM). Axialarea sehr eng, scheinbar linear, aber (im REM zu erkennen) doch zur Mitte hin etwas lanzettlich erweitert, Zentralarea nicht ausgeprägt oder sehr klein. Streifen insgesamt radial, in Relation zur sehr geringen Schalengröße ziemlich grob erscheinend. REM: Areolen mit relativ weitem Durchmesser und dicht unter den äußeren Foramina liegenden Siebmembranen – wie in dieser Gattung charakteristisch.

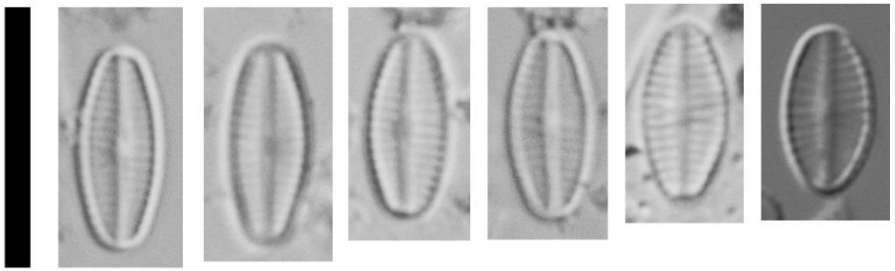
(Moser et al. Bib. Diatomologica 1998)

Other populations



(French Rivers, photos: Ector et al. 2015)





(Flemish rivers)

Ecology

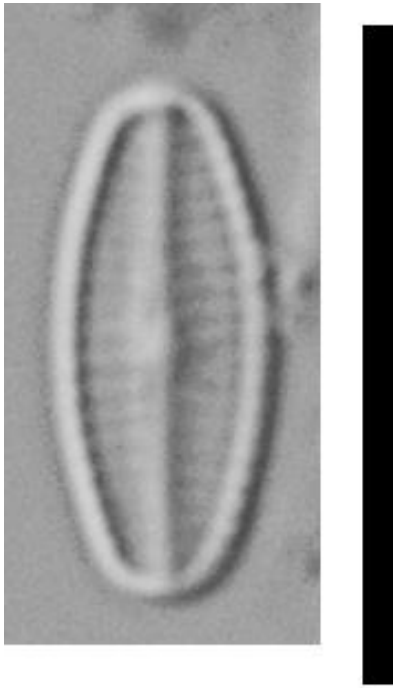
Moser et al. (1998)

described from New Caledonia

Own data

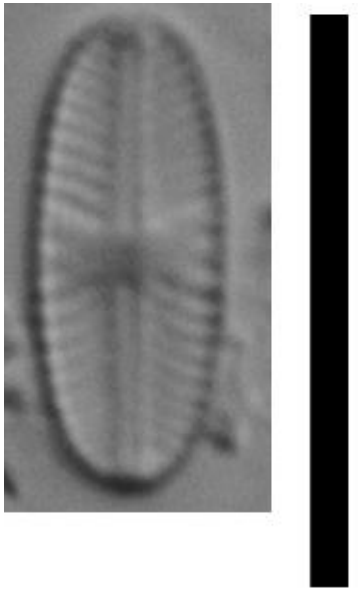
Found together with *Nitzschia palea*, *N. dissipata*, *N. amphibia*, *Sellaphora saugerresii*, *Navicula cryptotenella*, *N. gregaria*, *Platessa oblongella*

Can be confused with



Lower valve width

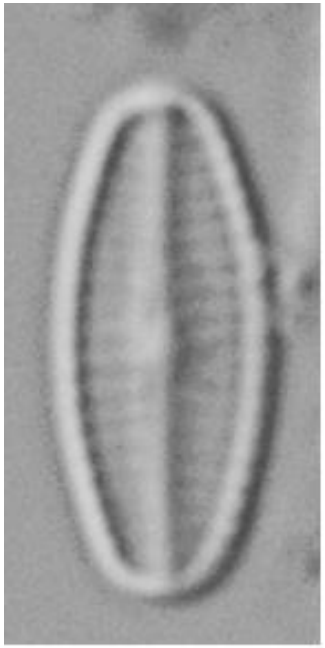
Very small central area
(striae almost till the middle)



S. rhombelliptica
L 5.0-12.0 µm
W 2.8-3.0 µm
S 24-26

S. nigri
L 3.7-13.0 µm
W 2.7-4.8 µm
S 25-32 in 10 µm

Can be confused with



Biraphid!

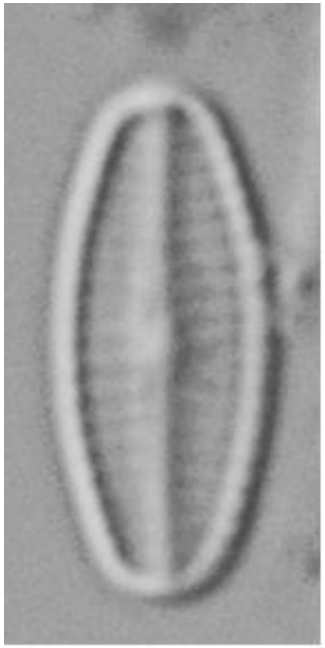
Entirely flat valve face (not curved)

Coarser striae

S. rhombelliptica
L 5.0-12.0 µm
W 2.8-3.0 µm
S 24-26

Achnanthidium sp.

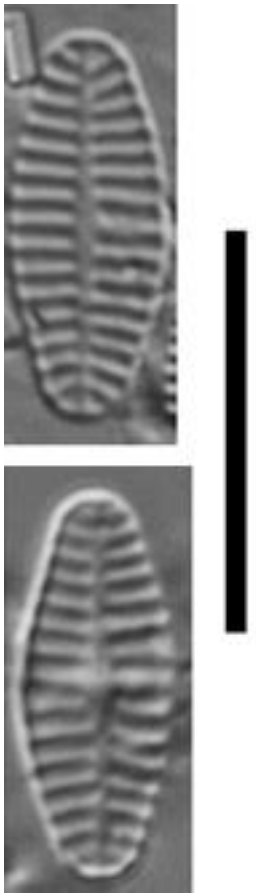
Can be confused with



Biraphid!

Entirely flat valve face (not curved)

Finer striae



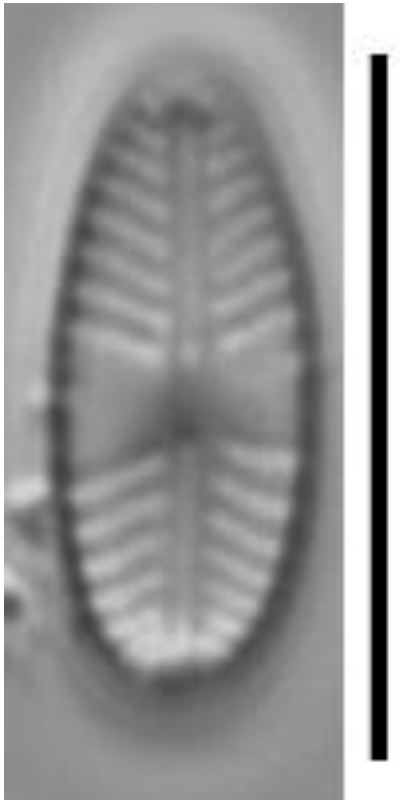
S. rhombelliptica
L 5.0-12.0 µm
W 2.8-3.0 µm
S 24-26

Planothidium granum
L 7.0-9.0 µm
W 3.6-4.2 µm
S 15-17

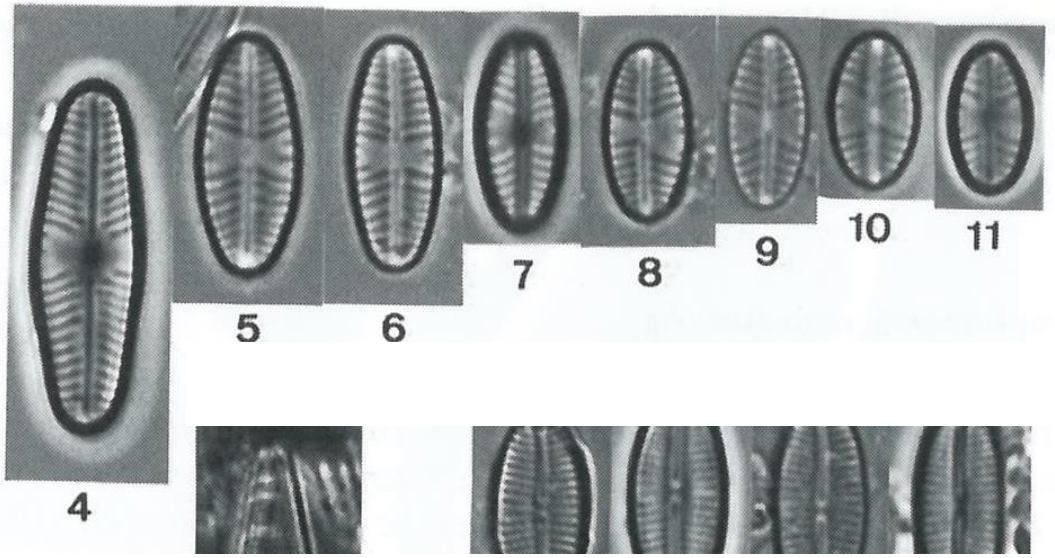
Sellaphora crassulexigua (E.Reichardt) C.E.Wetzel & Ector

Basionym: ***Navicula crassulexigua*** **E.Reichardt 1994**
Synonym: ***Eolimna crassulexigua*** **(E.Reichardt) E.Reichardt 2011**

- **Valves linear-elliptical to linear-lanceolate with convex margins**
- **Apices broadly rounded, never protracted, Length 5.5-14 µm, width 2.7-4.4 µm**
- **Striae radiate at center, less radiate near apices, 17-23 in 10 µm**
- **Axial area narrow, linear**
- **Central area large, asymmetrical**



Original description



Navicula crassulexigua n.sp. Taf. 3/4-11, 28-29

Valvae ellipticae ad elliptico-lanceolatae apicibus obtuse rotundatis, 6-15µm longae, 3,5-4,8µm latae. Raphe filiformis, recta. Area axialis anguste linearis, area axialis fere ampla margines valvae non attingens nonnullis striis brevissimis terminata. Striae transapicales radiantes, 18-23 in 10µm.

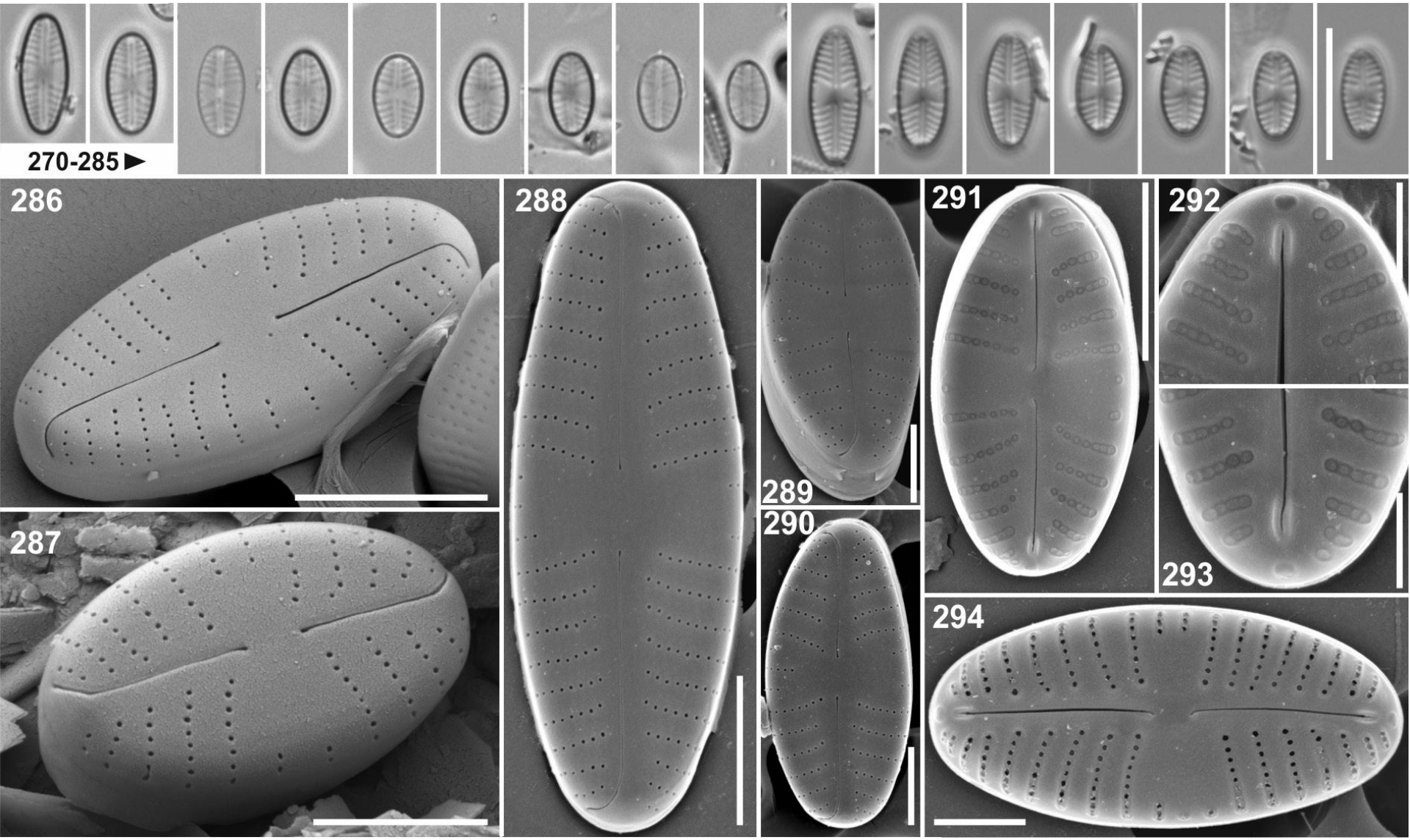
Holotypus: Sub no. S668-T01 in collectione Reichardt

Isotypus: Sub no. Zu 4/32 in collectione Bremerhaven (BRM)

Typushabitat: Steinerne Rinne bei Erasbach, Landkreis Neumarkt/Opf. (Probe 16 dieser Arbeit)

Schalen elliptisch bis elliptisch-lanzettlich mit stumpf gerundeten Enden, 6-15µm lang, 3,5-4,8µm breit. Raphe gerade, fadenförmig. Axialarea schmal linear, Zentralarea groß, bis nahe an den Schalenrand reichend und hier von einigen stark verkürzten Streifen begrenzt. Transapikalstreifen deutlich radial, 18-23 in 10µm.

(Reichardt 1994)



(Wetzel et al. 2015)

Ecology

Van Dam et al. (1994)

alkaliphilous
fresh-brackish
oligo-mesotraphentic

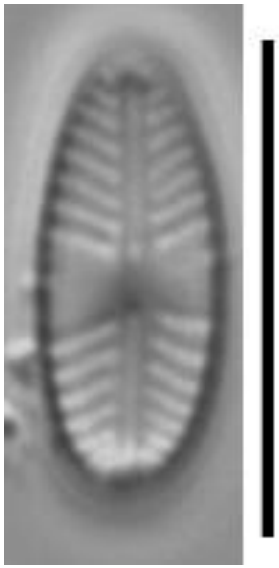
Reichardt (1994) (as *Navicula crassulexigua*)

flooded mosses in a tufa-forming spring

Wetzel et al. (2015)

calcareous springs
aerial populations colonizing wet and artificially illuminated
calcareous walls in caves

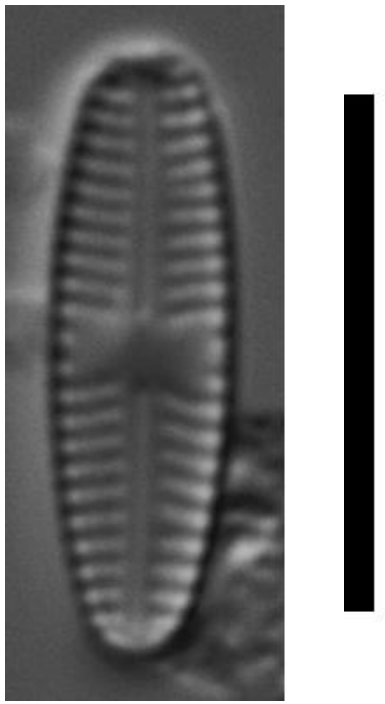
Can be confused with



More convex margins

Asymmetrical central area

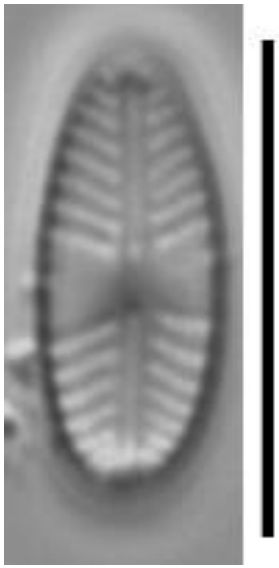
Markedly radiate striae



S. crassulexigua
L 5.5-14.0 µm
W 2.7-4.4 µm
S 17-23 in 10 µm

S. saugerresii
L 6.5-11 µm
W 3.3-3.8 µm
S 21-22 in 10 µm

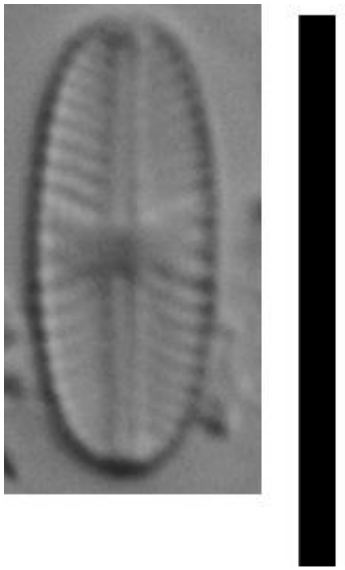
Can be confused with



Lower stria density

Asymmetrical central area

Larger central area



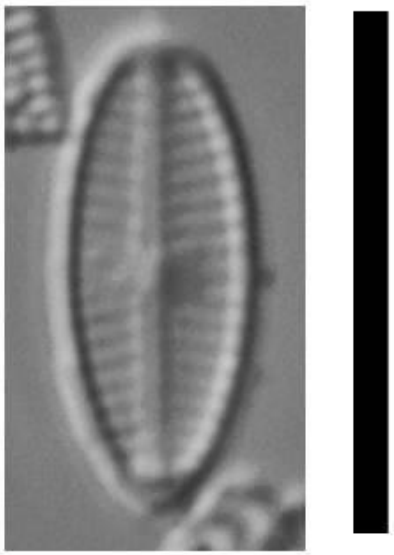
S. crassulexigua
L 5.5-14.0 µm
W 2.7-4.4 µm
S 17-23 in 10 µm

S. nigri
L 3.7-13.0 µm
W 2.7-4.8 µm
S 25-32 in 10 µm

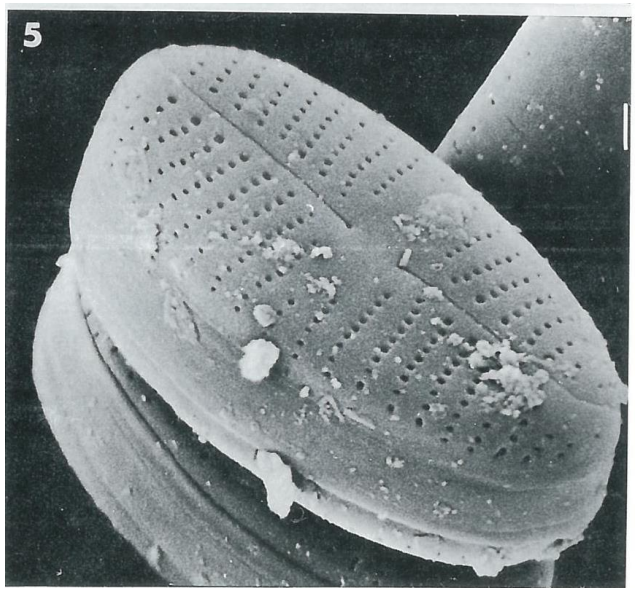
Sellaphora raederiae (Lange-Bertalot) C.E.Wetzel

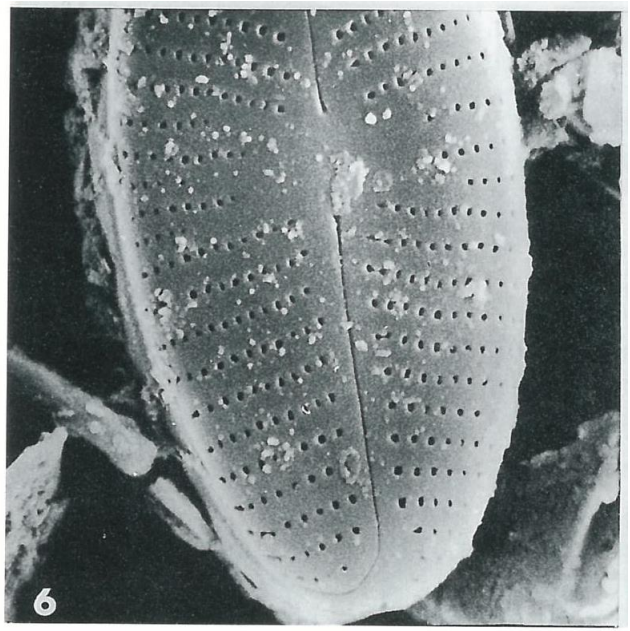
Basionym: ***Naviculadicta raederiae*** **Lange-Bertalot in Lange-Bertalot & Metzeltin 1996**
Synonym: ***Eolimna raederiae*** **(als** ***E. raederae*** **☹) (Lange-Bertalot) Lange-Bertalot & Kulikovskiy in Kulikovskiy et al. 2010**

- **Valves broadly elliptical with convex margins**
- **Apices broadly rounded, never protracted**
- **Length 7.0-9.0 µm, width 3.5-4.0 µm**
- **Striae radiate throughout, 26-29 in 10 µm**
- **Axial area very narrow, linear**
- **Central area variable, usually enlarged due to shortening of 2-4 central striae**



Original description





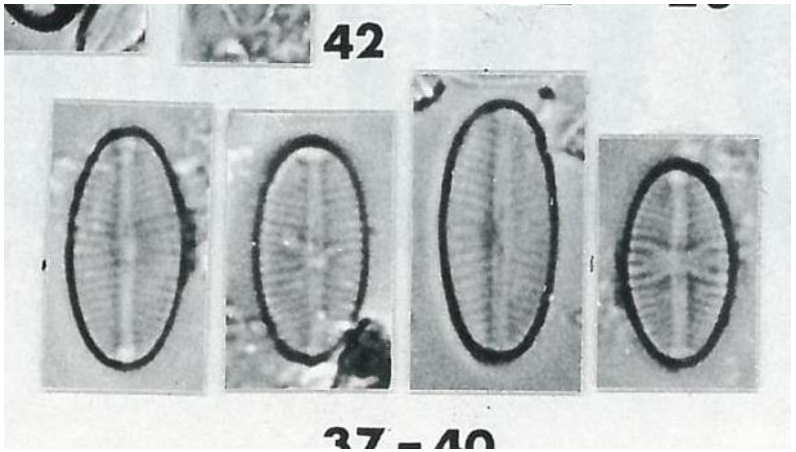
Naviculadicta raederiae Lange-Bertalot nov. spec. Taf. 83: 37-40; Taf. 116: REM-Fig. 5-6

Valvae late ellipticae apicibus late rotundatae numquam protractae, 7-9 µm longae, 3,5-4 µm latae. Raphe filiformis recta apparens sed non facile aspectabilis in microscopo photonico ad apices versus, in media valvae pori centrales distinctiores et paullo distantes positae. Area axialis angustissima, area centralis interdum parva et non distincta plerumque transverse dilatata. Striae transapicales modice radiantes sub polos interdum fere parallelae, 26-29 in 10µm. In media parte utrimque 2-4 striae abbreviatae omnino vel 2-3 striae curtae intermissae inter longiores. In microscopo electronico: Foramina areolarum punctiformia, circiter 60 in 10µm. Fissurae terminales raphis longae unilateraliter declinatae (vide REM-Fig. 116: 5-6).

Typus: Praep. Seen 96 in Coll. Lange-Bertalot, Bot. Inst. der J. W. Goethe - Universität Frankfurt a. M.

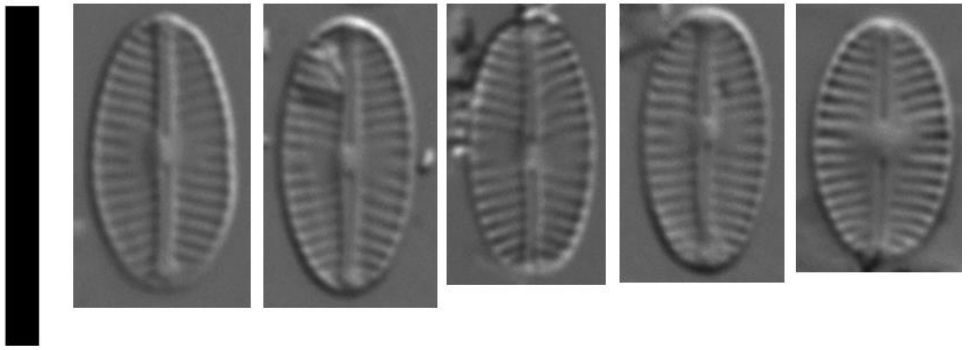
Locus typicus: Mittersee bei Lermoos, Tirol, Austria, leg. K. Külbs, Okt. 1978.

Schalen breit-elliptisch mit breit gerundeten Enden, die niemals vorgezogen sind, 7-9µm lang, 3,5-4µm breit. Raphe filiform und gerade erscheinend, distaler Verlauf im LM nicht leicht erkennbar, deutlicher die proximalen Enden mit den Zentralporen, die etwas distant gestellt sind. Axialarea sehr schmal, Zentralarea variabel, manchmal klein und wenig ausgeprägt, meistens aber deutlich quer erweitert. Das ist abhängig von der Stellung der mittleren Streifen, denn 2-4 Streifen können ± gleichmäßig stark verkürzt sein oder 2-3 verkürzte Streifen sind zwischen längeren eingeschoben. Streifen mäßig radial, dicht unter den Polen manchmal annähernd parallel, 26-29 /10µm. REM: Areolenforamina klein und rundlich, ca. 60/10 µm, nur wenig oder gar nicht über den Mantelrand hinauslaufend. Terminalspalten der Raphe einseitig abkrümmend und weit über den Mantelrand hinauslaufend.

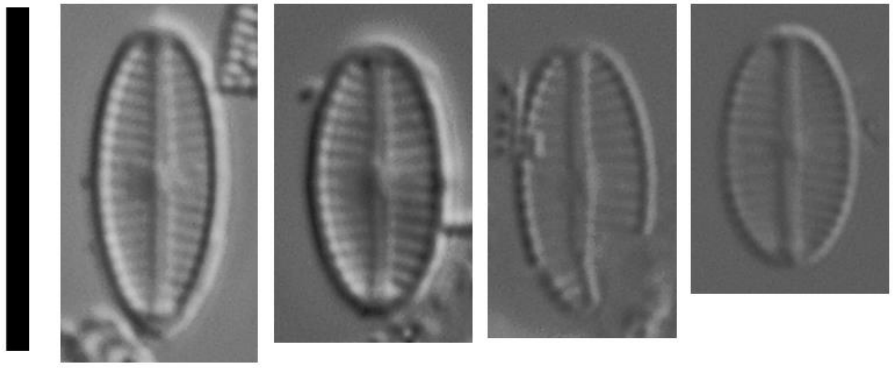


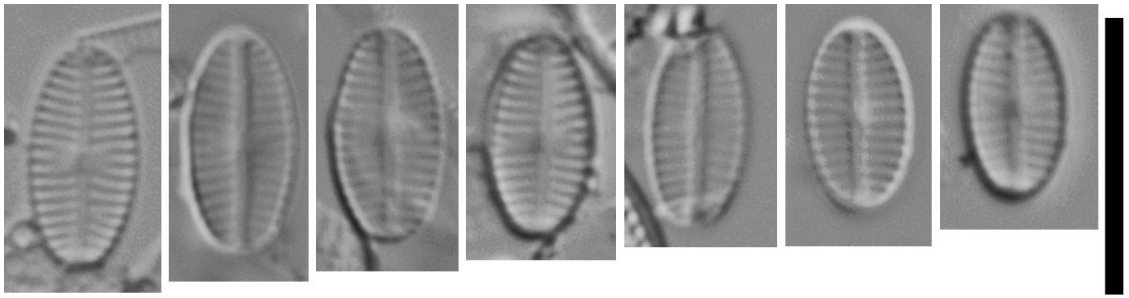
Lange-Bertalot & Metzeltin (1996)
Iconographia Diatomologica 2

Other populations



(Swedish rivers)





(The Netherlands)

Ecology

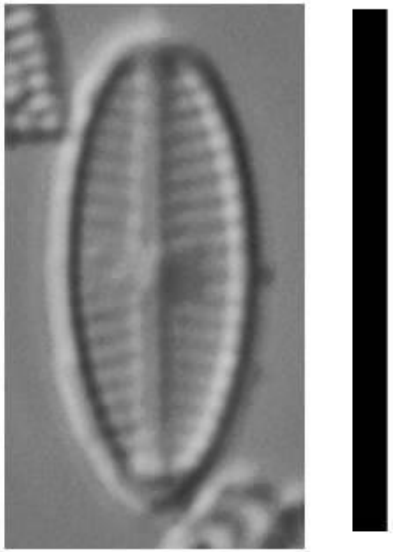
Van Dam et al. (1994)

circumneutral
fresh-brackish
oligo-mesotraphentic

Lange-Bertalot & Metzeltin (1996)

alkaliphilous
oligo- to mesotrophic lakes in Central Europe

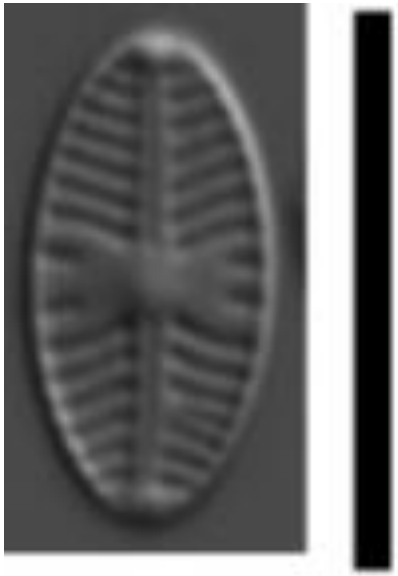
Can be confused with



Higher stria density

Smaller central area

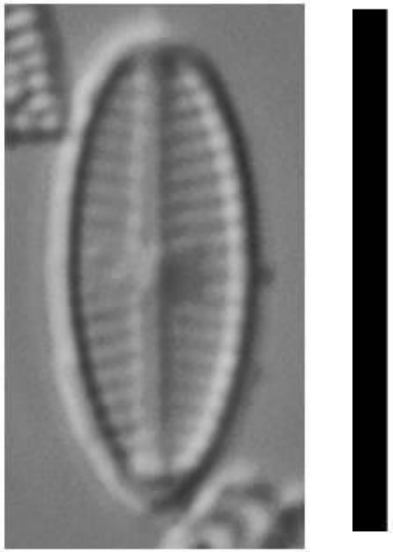
Lower valve width



S. raederiae
L 7.0-9.0 µm
W 3.5-4.0 µm
S 26-29 in 10 µm

S. chistiakovae
L 8.0-11.0 µm
W 4.5-6.5 µm
S 16-20 in 10 µm

Can be confused with

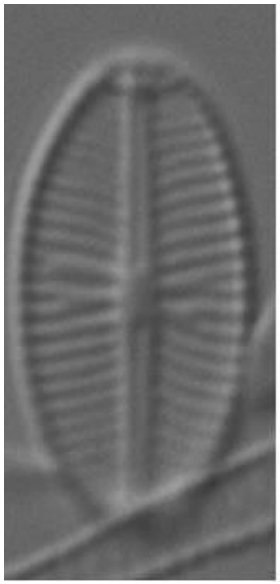


Lower stria density

Larger central area

Lower valve width

Usually shorter



S. raederiae
L 7.0-9.0 µm
W 3.5-4.0 µm
S 26-29 in 10 µm

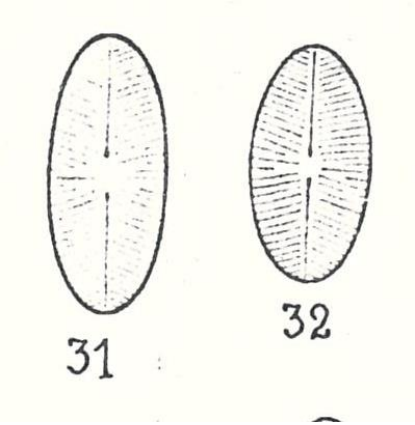
S. utermoehlii
L 8.0-12.0 µm
W 4.5-6.0 µm
S 24-36 in 10 µm

Sellaphora utermoehlii (Hustedt) C.E.Wetzel & D.G.Mann

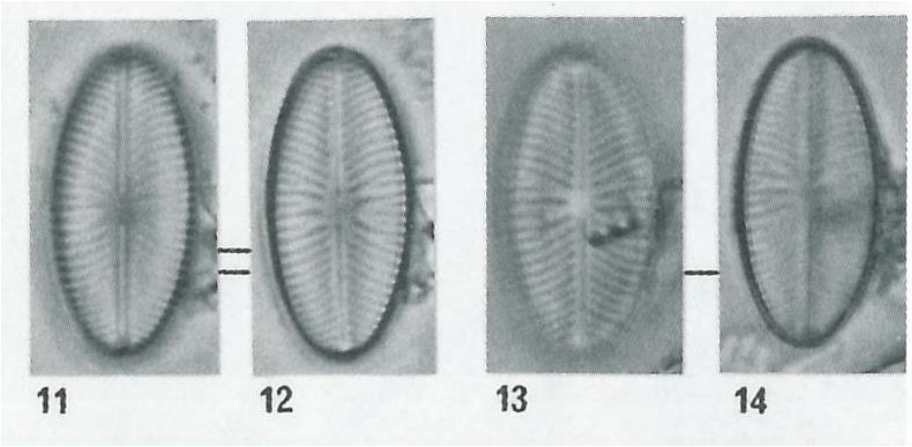
Basionym: ***Navicula utermoehlii*** **Hustedt 1942**
Synonym: ***Eolimna utermoehlii*** **(Hustedt) Kulikovskiy et al. 2010**
Navicula subrotundata **Hustedt**

- **Valves broadly elliptical with convex margins**
- **Apices broadly rounded, never protracted**
- **Length 8.0-12.0 µm, width 4.5-6.0 µm**
- **Striae radiate throughout, 24-36 in 10 µm, denser near the apices**
- **Axial area narrow, linear**
- **Central area very small, irregular due to irregularly shortened striae**

Original description



A.Schmidt Atlas plate 404



(Simonsen 1987, Hustedt catalogue)

1115. NAVICULA UTERMÖHLII Hust.,
in A. S. Atl. (1936), Taf. 404, Fig. 31, 32

Synonym: *Nav. mollicula* Hust., Arch. f. Hydrobiol. **40** (1945) 917, Taf. 41, Fig. 30—33.

Schalen elliptisch mit breit gerundeten Enden, 9—12 μ lang, 5—6 μ breit. Rhaphe gerade, fadenförmig, Axialarea sehr schmal linear, um den Zentralknoten kaum erweitert, aber hier beider-

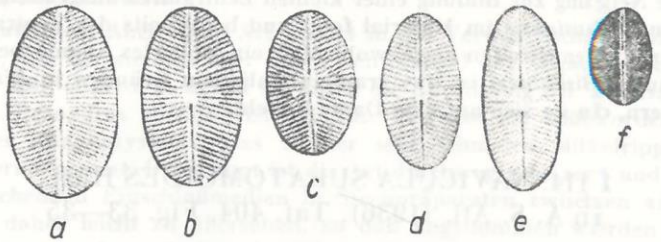


Fig. 1401. *Navicula Utermöhlii.* a—e 2000/1, f 1000/1. (Nach Hustedt.)

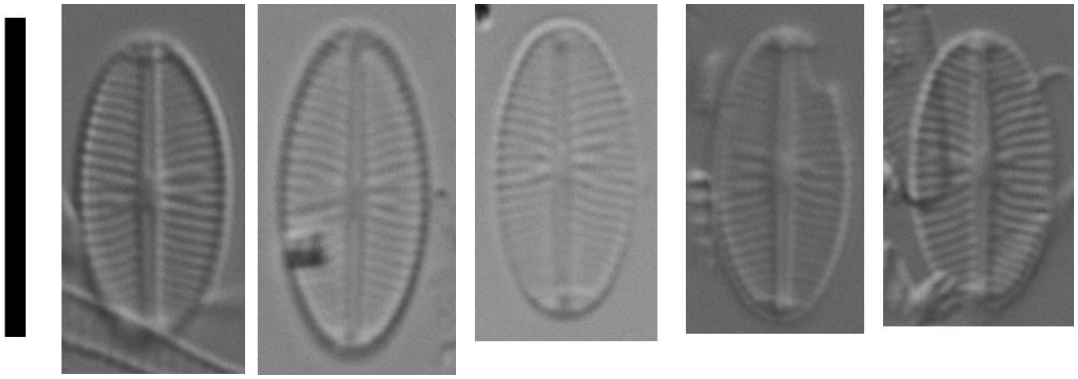
seits sehr unregelmäßig begrenzt. Transapikalstreifen durchweg radial, etwa 32—36 in 10 μ, in der Mitte mit eingeschobenen kürzeren Streifen. Fig. 1401.

Vorkommen und Verbreitung: In alkalischen Gewässern, besonders Seen, von der Ebene bis ins Hochgebirge verbreitet.

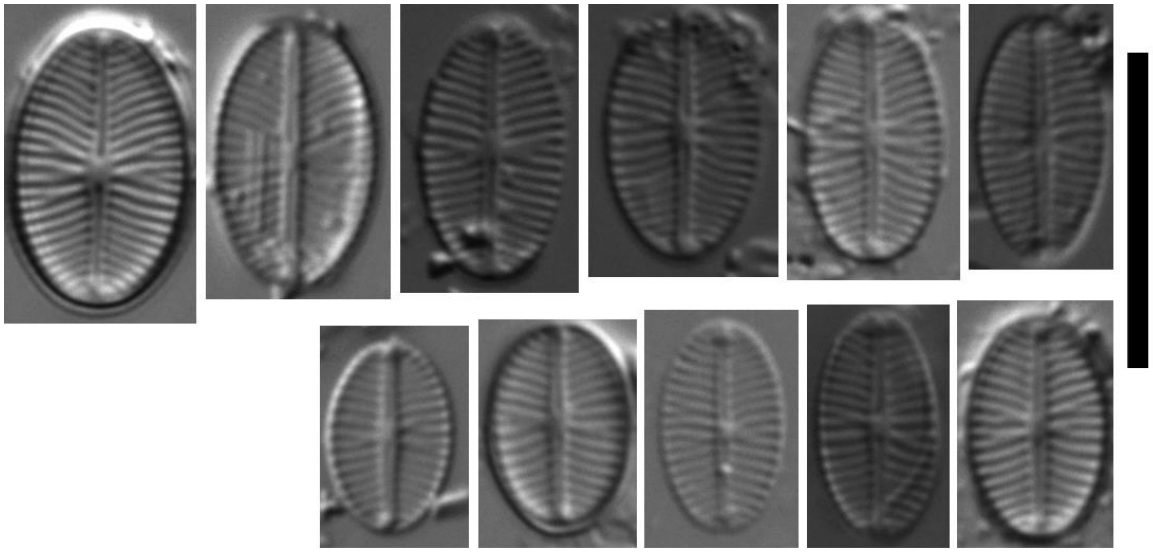
Systematisches: Nach Untersuchung weiterer Individuen aus norddeutschen Seen erscheint mir eine Abtrennung der von der Balkanhalbinsel beschriebenen *Nav. mollicula* nicht mehr für berechtigt. Die seinerzeit angegebenen Differenzen sind nicht konstant, sondern fallen in den Variationsbereich der Art.

(Hustedt 1965)

Other populations



(The Netherlands)



(Swedish rivers)

Ecology

Van Dam et al. (1994)

alkaliphilous
fresh-brackish
oligosaprobic
meso-eutraphentic

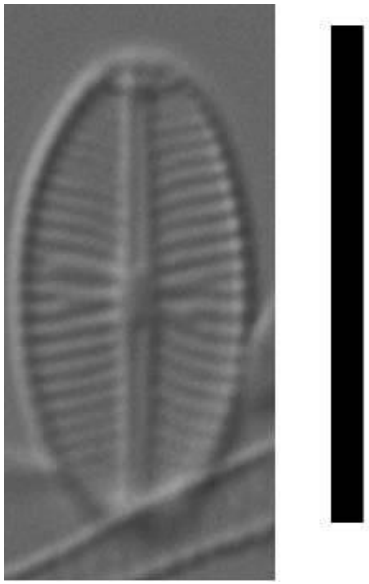
Krammer & Lange-Bertalot (1986) (as *Navicula utermoehlii*)

higher electrolyte levels
oligosaprobic

Hoffmann & Werum (2011) (as *Navicula utermoehlii*)

chalk-enriched
meso-eutrophic lakes

Can be confused with



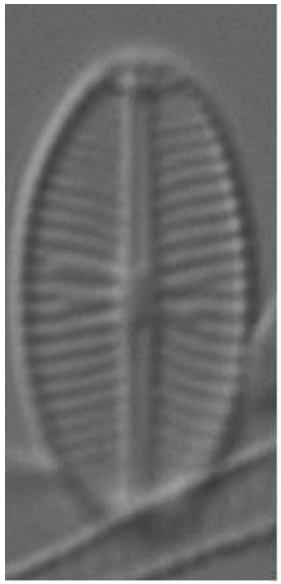
Higher stria density

Smaller central area

S. utermoehlii
L 8.0-12.0 µm
W 4.5-6.0 µm
S 24-36 in 10 µm

S. chistiakovae
L 8.0-11.0 µm
W 4.5-6.5 µm
S 16-20 in 10 µm

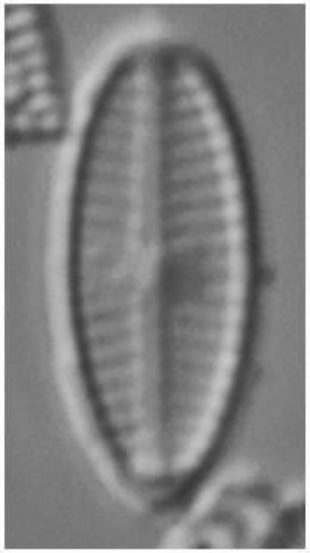
Can be confused with



Higher stria density

Smaller central area

Usually larger valves



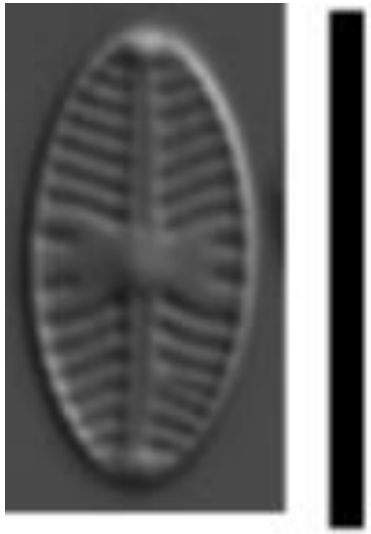
S. utermoehlii
L 8.0-12.0 µm
W 4.5-6.0 µm
S 24-36 in 10 µm

S. raederiae
L 7.0-9.0 µm
W 3.5-4.0 µm
S 26-29 in 10 µm

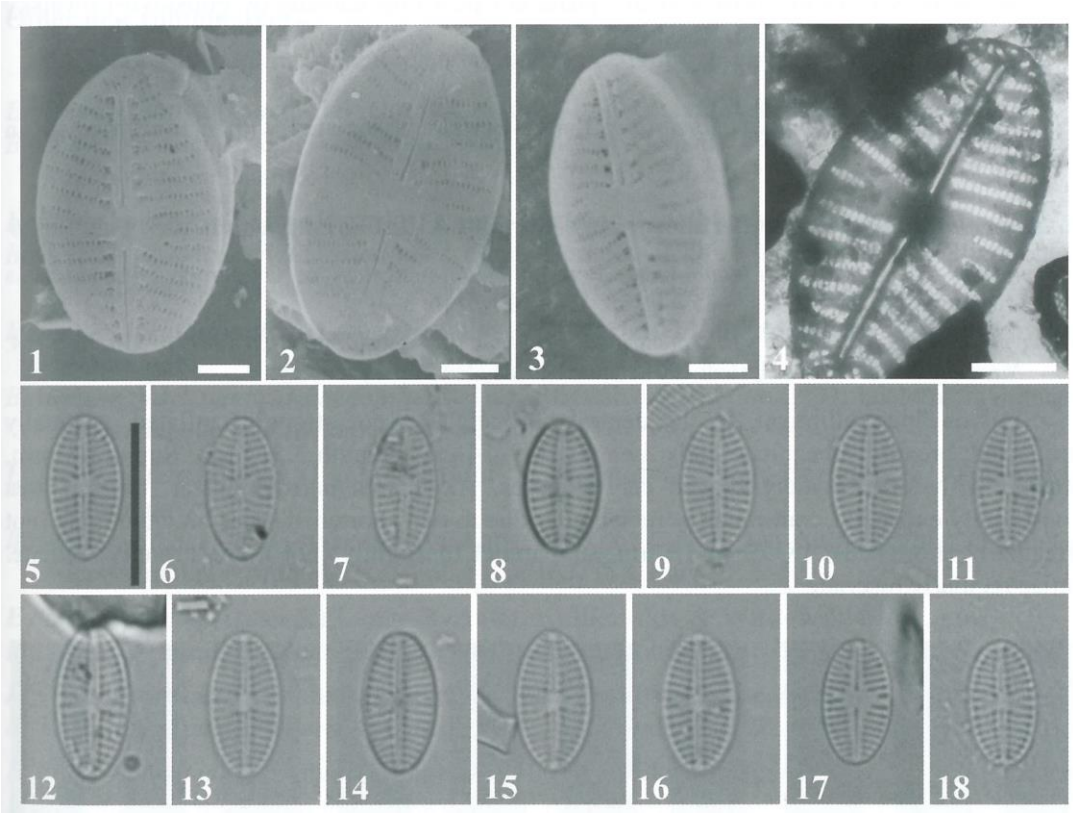
Sellaphora chistiakovae (Kulikovskiy & Lange-Bertalot) C.E.Wetzel et al.

Basionym: *Eolimna chistiakovae* Kulikovskiy & Lange-Bertalot 2010

- **Valves broadly elliptical with convex margins**
- **Apices broadly rounded, never protracted**
- **Length 8.0-11.0 µm, width 4.6-6.4 µm**
- **Striae radiate throughout, 16-20 in 10 µm**
- **Axial area narrow, linear**
- **Central area expanded, bow-tie shaped, bordered by 2-3 shortened striae**



Original description



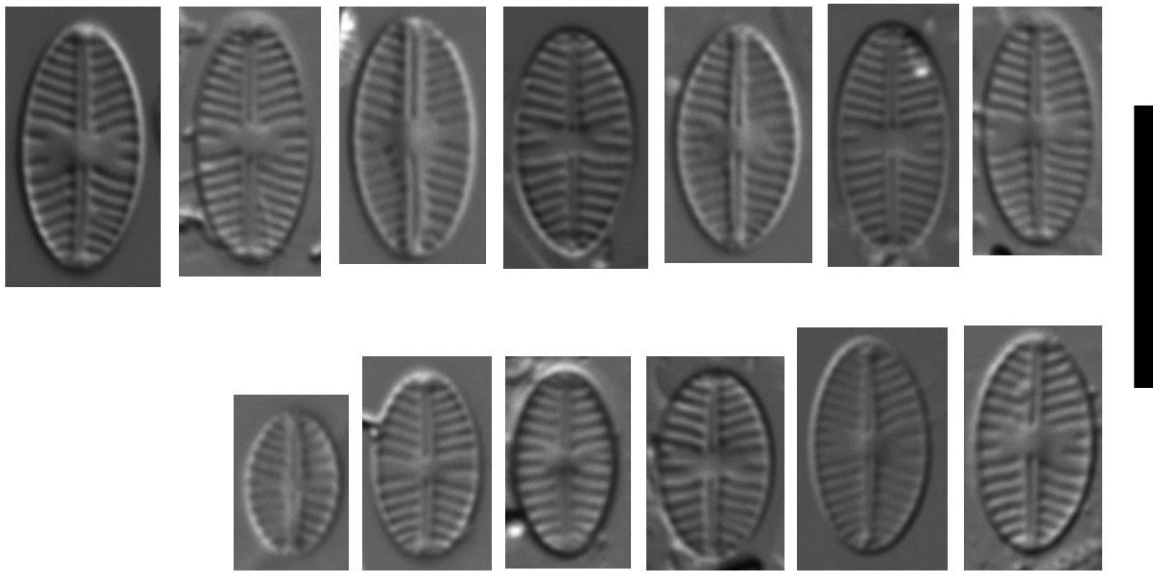
Type locality: Polistovo-Lowatsky Sphagnum bog, Novgorod region, Russia.

***Eolimna chistiakovae* Kulikovskiy, Lange-Bertalot sp. nov.** Figs 1–18

Descriptio: Individua quoad dimensiones et densistatem striarum conspicue variabilia. Valvae late ellipticae apicibus late rotundatis. Longitudo 8–10.7 µm, latitudo 4.6–6.4 µm. Raphe filiformis fere recta apparens poris centralibus aliquid distanter sitis inter se. Area axialis modice angusta. Area centralis distincte separata transapicaliter expansa 1–3 striis variabiliter abbreviatis. Striae transapicales comparate crassae apparentes, moderate radiantes omnino, 16–20 in 10 µm. Aspectus ultramicroscopicus externus vide. Fissurae raphis omnino in sterno externo sitae comparabiles cum *Eolimna neocaledonica* (Manguin) Moser, Lange-Bertalot et Metzeltin ex Nova Caledonia (vide infra). Fissurae terminales simpliciter distincte deflexae in limbos valvae. Externa centralia raphis aliquid indistincte ad latus primum valvae deflexa leviter dilatata. Series areolarum interruptae ad iuncturam inter faciem et limbum valvae ut communiter in genere, uniseriatae cum singulis areolis duplicatis ad sternum sitis. Areolae fere dense sitae inter se sed 56–60 in 10 µm comparabiles cum *E. neocaledonica* et *E. inconspicua* Moser, Lange-Bertalot et Metzeltin.

(Kulikovskiy et al. 2010)

Other populations



(Swedish rivers)

Ecology

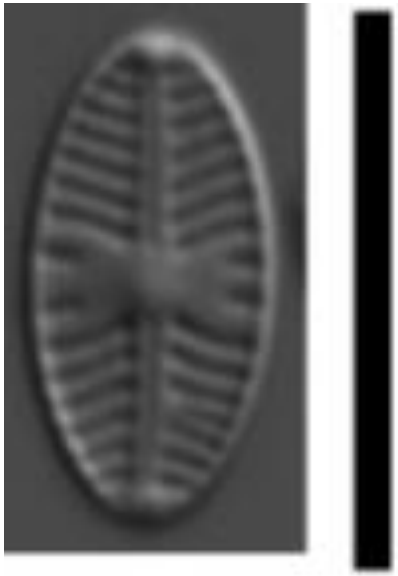
Van Dam et al. (1994)

acidophilous
fresh
oligosaprobic
oligotraphentic

Kulikovskiy et al. (2010) (as *Eolimna elorantana*)

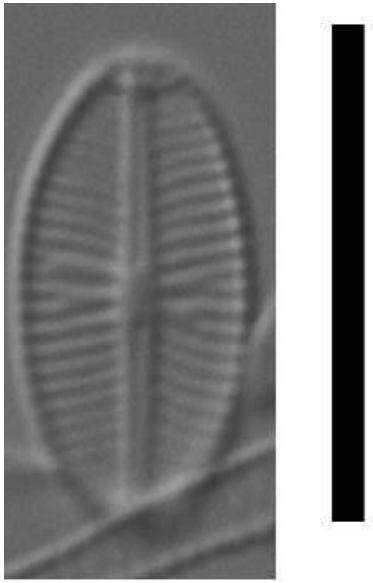
acidic habitats, typical in peatbogs

Can be confused with



Lower stria density

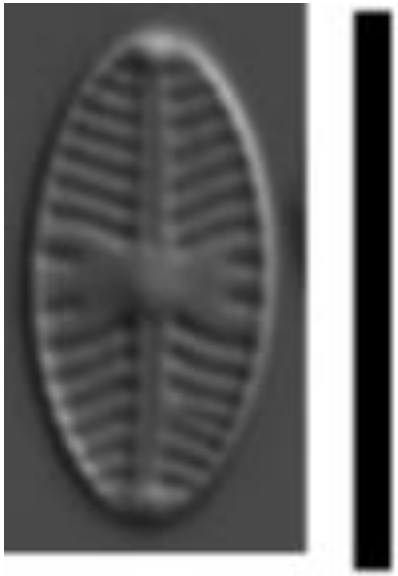
Larger central area



S. chistiakovae
L 8.0-11.0 µm
W 4.5-6.5 µm
S 16-20 in 10 µm

S. utermoehlii
L 8.0-12.0 µm
W 4.5-6.0 µm
S 24-36 in 10 µm

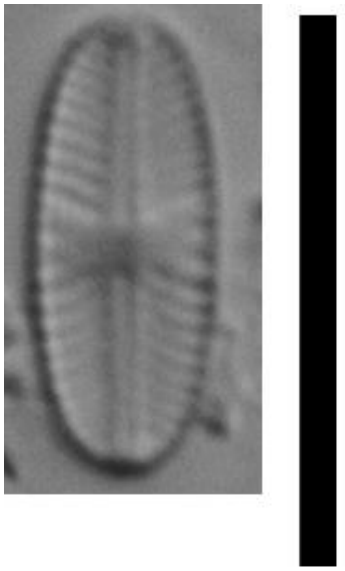
Can be confused with



Larger valve width

More elliptic valve outline

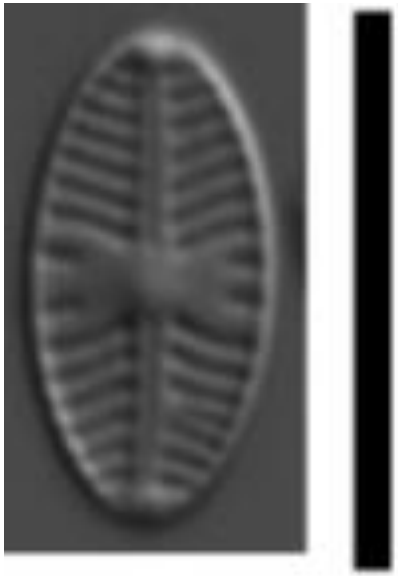
Lower stria density



S. chistiakovae
L 8.0-11.0 µm
W 4.5-6.5 µm
S 16-20 in 10 µm

S. nigri
L 3.7-13.0 µm
W 2.7-4.8 µm
S 25-32 in 10 µm

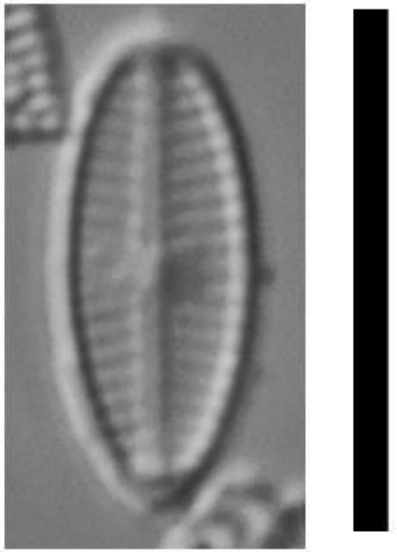
Can be confused with



Lower stria density

Larger central area

Higher valve width



S. chistiakovae
L 8.0-11.0 µm
W 4.5-6.5 µm
S 16-20 in 10 µm

S. raederiae
L 7.0-9.0 µm
W 3.5-4.0 µm
S 26-29 in 10 µm

Sellaphora vitabunda (Hustedt) D.G.Mann

Basionym: ***Navicula vitabunda*** **Hustedt 1930**
Synonym: ***Naviculadicta vitabunda*** **(Hustedt) Lange-Bertalot in Moser et al. 1994**

- **Valves elliptic-lanceolate with convex margins, not markedly inflated central part**
- **Apices broadly rounded, protracted**
- **Length 8.0-15.0 µm, width 4.5-5.5 µm**
- **Striae moderately radiate throughout, 27-30 in 10 µm**
- **Axial area very narrow, linear**
- **Central area very small, due to irregularly shortened striae**

Original description

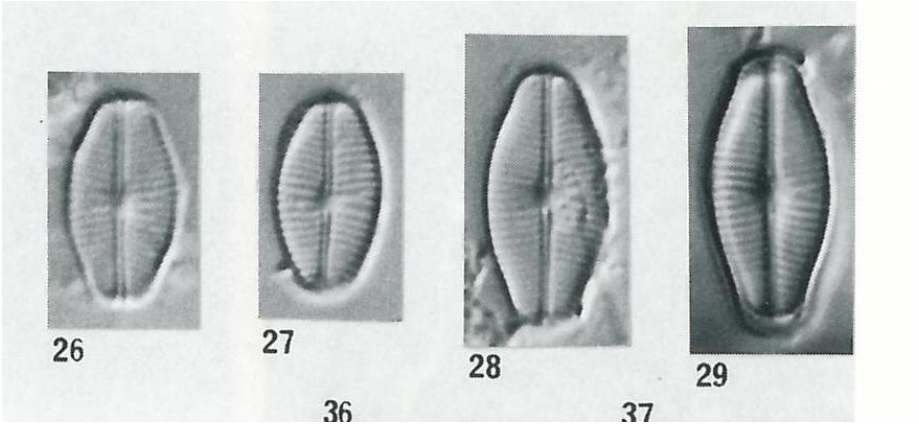
holsteinische Seen, zerstreut!

23. **Navicula vitabunda** Hust. (Fig. 523). Schalen elliptisch-lanzettlich mit kaum vorgezogenen, breit gerundeten Polen, 8—10 µ lang, 4—5 µ breit. Axialarea sehr eng, Zentralarea klein, etwas quer verbreitert. Transapikalstreifen durchweg radial, zart, um den Mittelknoten abwechselnd kürzer und länger, 23 in 10 µ.

Vereinzelt im Grundschlamm holsteinischer Seen! Vielleicht mit voriger zu verbinden, doch habe ich bislang keine Zwischenformen feststellen können.

523

(Hustedt 1930 in Pascher)



(Simonsen 1987, Hustedt catalogue)

Ecology

Hofmann et al. (2011) (as *Naviculadicta vitabunda*)

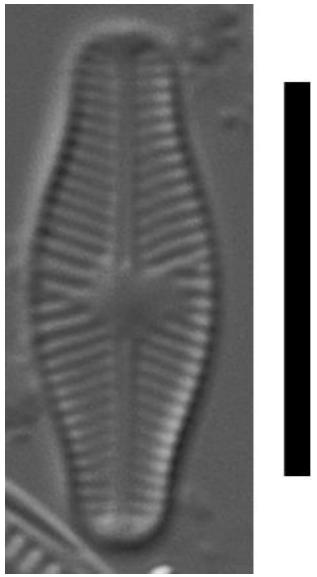
rare in alkaline lakes in the Alps

not yet found in rivers

Sellaphora verecundiae Lange-Bertalot

Basionym: *Sellaphora verecundiae* Lange-Bertalot in Moser et al. 1994
Synonym: *Navicula vitabunda* sensu Lange-Bertalot et al. 1986

- **Valves linear-elliptical to rhombic-elliptical with markedly inflated central part**
- **Apices broadly rounded, protracted**
- **Length 6.5-22.0 µm, width 3.5-7.0 µm**
- **Striae radiate throughout, not convergent near the apices, 22-26 in 10 µm**
- **Axial area very narrow, linear**
- **Central area very variable due to irregularly shortened striae**



Original description

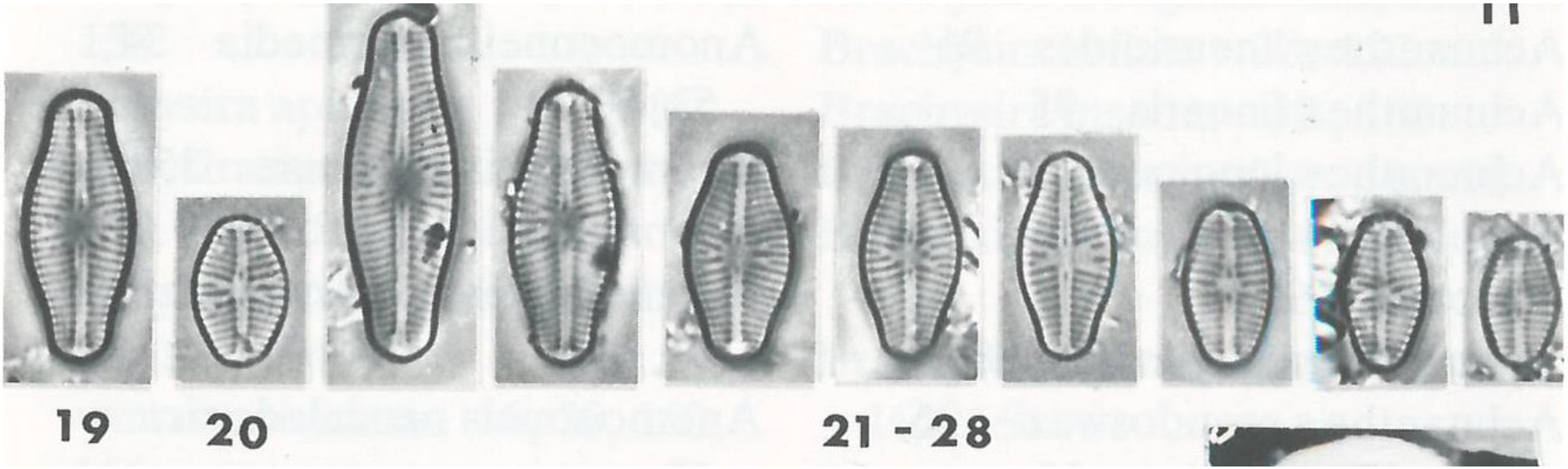
Sellaphora verecundiae Lange-Bertalot nov. spec.
(Fig. 52:19-28)

Holotypus: Präparat Seen-44 aus Collection Lange-Bertalot, Botanisches Institut, Universität Frankfurt/Main (Fig. 52:19,20)

Locus typicus: Hopfensee bei Füssen in Oberbayern, im Grundschlamm (leg. K. Krammer, 28.8.1974)

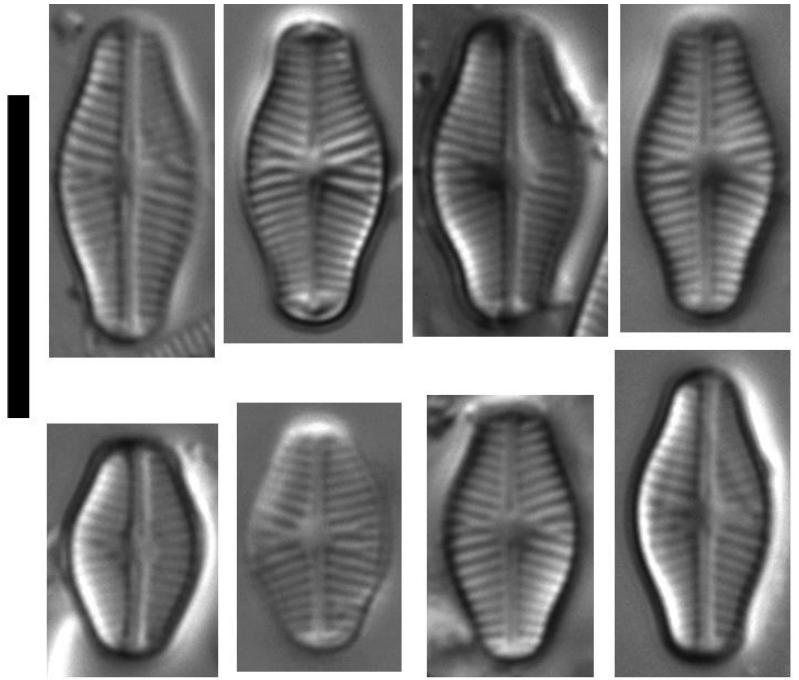
Synonyme: *Navicula vitabunda* sensu Kaczmarska 1979
Navicula vitabunda sensu Germain 1981, sensu Lange-Bertalot 1986 et auct. nonull.
(?) *Navicula verecunda* Hustedt 1930 pro parte, excl. Lectotypus
(?) *Navicula vitabunda* Hustedt 1930 pro parte, excl. Holotypus
(?) *Navicula vitabunda* sensu Mann 1989

Valvae satis variabiles ad instar, lineari-ellipticae aut late rhombico-lanceolatae inflatae in medio apicibus late protractis et late rotundatis, 6,5-22 µm longae, 3,5-7 µm latae. Raphe filiformis, recta poris centralibus inconspicuis distincte distantibus inter se. Area axialis angustissima, linearis, area centralis satis variabilis ad instar et magnitudinem striis irregulariter abbreviatis. Striae omnino — usque ad polos — radiantes, 22-26 in 10 µm, plerumque 24 in 10 µm. Structurae ultramicroscopicae vide KRAMMER & LANGE-BERTALOT 1986-1991, vol. 2/1, fig. 83:1. Differt complexione indiciorum typicorum *N. ventraloconfusa*, *N. multiconfusa*, *N. vitabunda*, *N. absoluta*, *N. geisslerae*, *N. verecunda* nom. ambiguum.

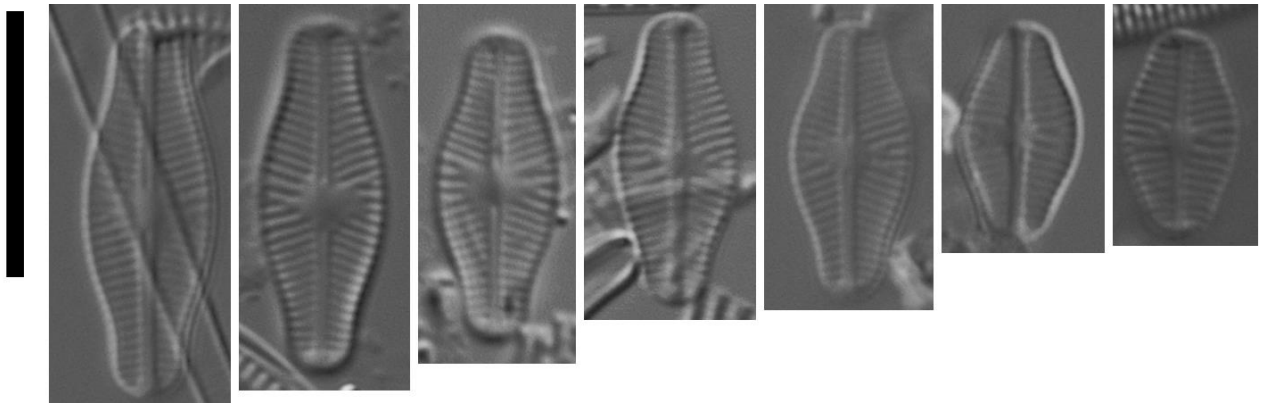


(Moser & Lange-Bertalot 1994)

Other populations



(Swedish rivers)



(The Netherlands)

Ecology

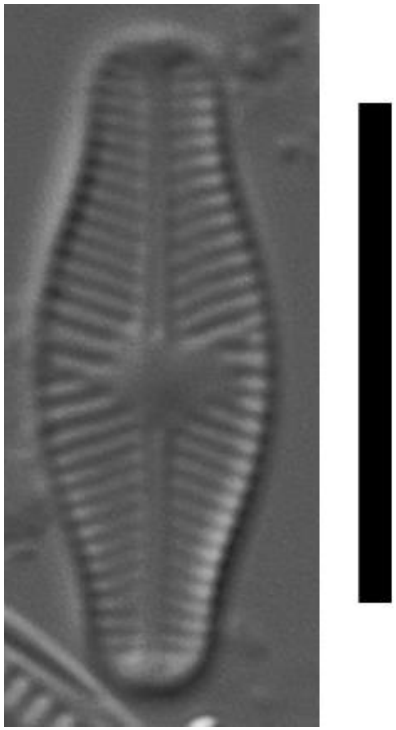
Van Dam et al. (1994)

alkaliphilous
fresh-brackish
oligosaprobic
trophic-indifferent

Moser et al. (1994)

moderate electrolyte content
mostly with high calcium levels
tolerant from oligo- to eutrophic
not in brackish water, not in waters with humic acids
not in fast flowing streams

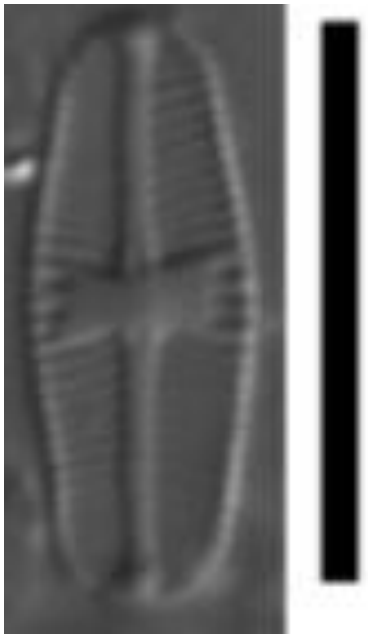
Can be confused with



Lower stria density

Highly inflated central part

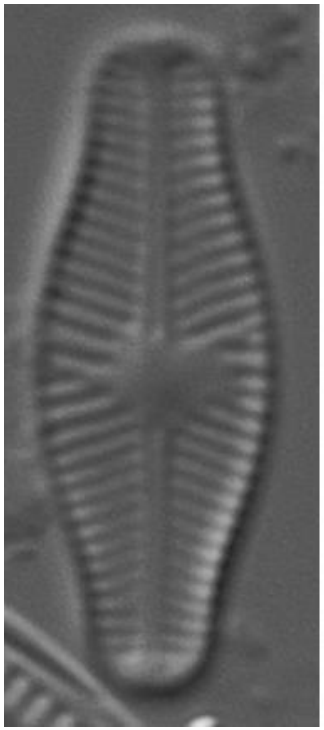
Central area smaller, more irregular



S. verecundiae
L 6.5-22.0 µm
W 3.5-7.0 µm
S 22-26 in 10 µm

S. multiconfusa
L 11.0-16.0 µm
W 4.5-5.6 µm
S 28 in 10 µm

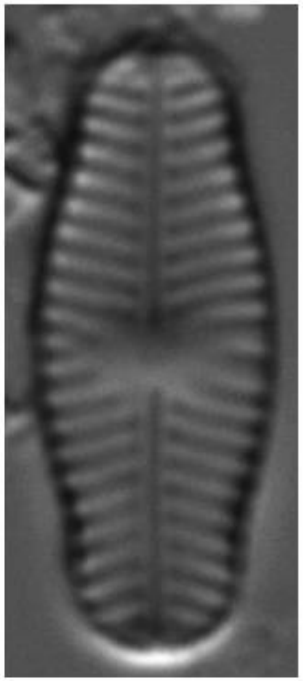
Can be confused with



Higher stria density

Highly inflated central part

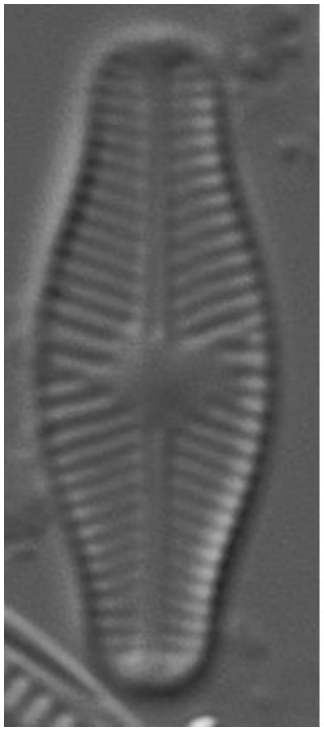
Central area smaller, more irregular



S. verecundiae
L 6.5-22.0 µm
W 3.5-7.0 µm
S 22-26 in 10 µm

S. pseudoventralis
L 8.0-15.0 µm
W 4.0-5.0 µm
S 18-20 in 10 µm

Can be confused with



More markeldy capitate

Larger central area

Lower stria density

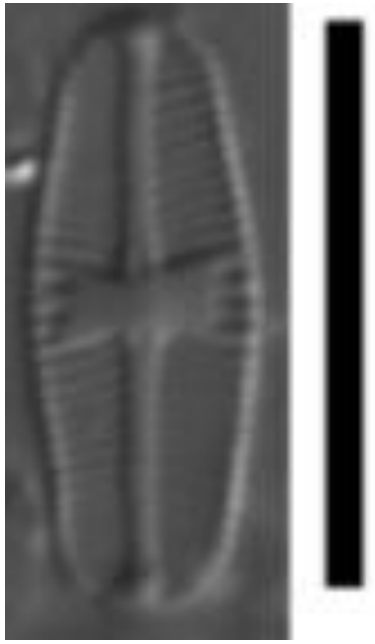
S. verecundiae
L 6.5-22.0 µm
W 3.5-7.0 µm
S 22-26 in 10 µm

S. vitabunda
L 8.0-15.0 µm
W 4.5-5.5 µm
S 27-30 in 10 µm

Sellaphora multiconfusa (Lange-Bertalot) C.E.Wetzel et al.

Basionym: ***Naviculadicta multiconfusa*** **Lange-Bertalot in Moser et al. 1994**
Synonym: ***Navicula ventralis var. simplex*** **Hustedt 1934 pro parte**
Navicula ventralis f. simplex **(Hustedt) Hustedt**

- **Valves elliptical to linear-elliptical with slightly inflated central part**
- **Apices broadly rounded, protracted, subcapitate**
- **Length 11-16 µm, width 4.5-5.5 µm**
- **Striae radiate throughout, 28 in 10 µm**
- **Axial area narrow, linear**
- **Central area bow tie-shaped to rounded, bordered by several irregularly shortened striae**



Original description

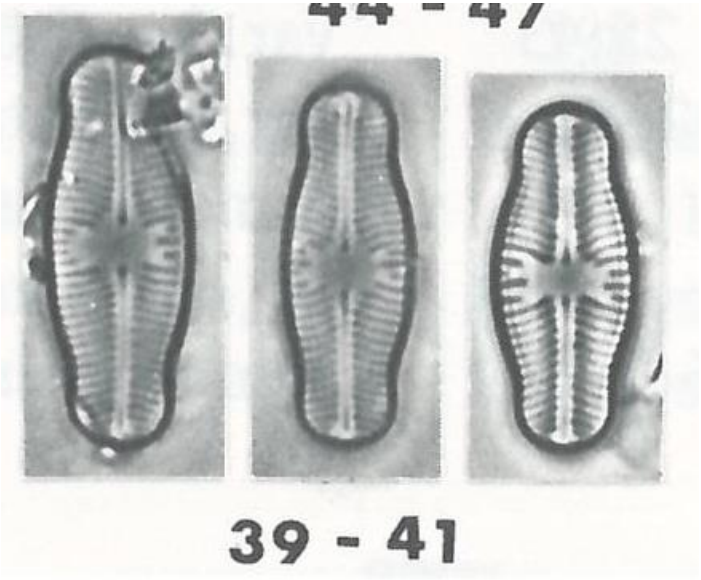
Naviculadicta multiconfusa Lange-Bertalot nov. spec.
(Fig. 52:39-43; Bibl. Diatom. 18, fig. 79:36,39)

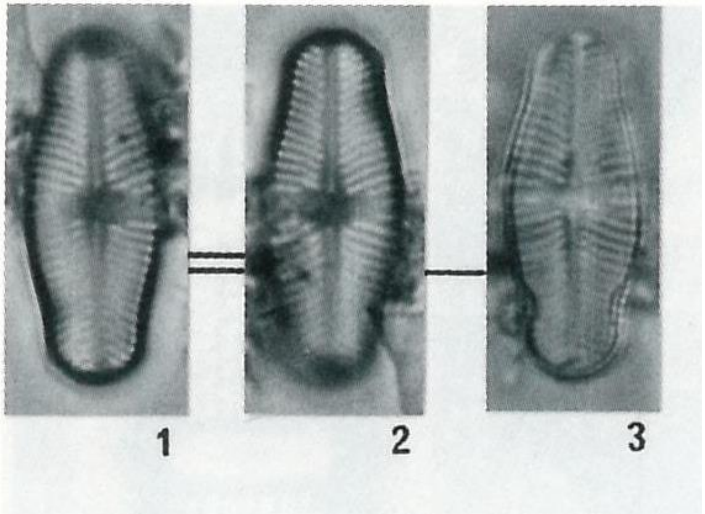
Holotypus: Präparat Canada-8 aus Collection Lange-Bertalot, Botanisches Institut, Universität Frankfurt/Main (Fig. 52:39,40)
Locus typicus: James-Lake, Canada (leg. Laufersweiler, 17.08.1977)
Synonyme: *Navicula ventralis* var. *simplex* Hustedt 1934 pro parte (excl. Holotypus)
Navicula ventralis fo. *simplex* (Hustedt) Hustedt 1961, p. 140

Valvae sicut *N. ventraloconfusa* ad instar et in structuris sed semper inferiores longitudine 11-16 µm et latitudine 4,5-5,5 µm (nec 18-25 et 5,5-7 µm).

Schalen im Umriß elliptisch bis linear-elliptisch mit breit vorgezogenen und breit bis annähernd flach gerundeten, nicht kopfig abgesetzten Enden. Länge 11-16 µm, Breite 4,5-5,5 µm. Raphe filiform, annähernd gerade, mit etwas entfernt gestellten und deutlich markierten Zentralporen. Axialarea eng, ± linear, Zentralarea variabel, quer-rechteckig bis rundlich, durch unregelmäßig verkürzte Streifen begrenzt. Streifen durchgehend radial, ziemlich konstant um 28/10 µm; Punktierung nicht erkennbar.

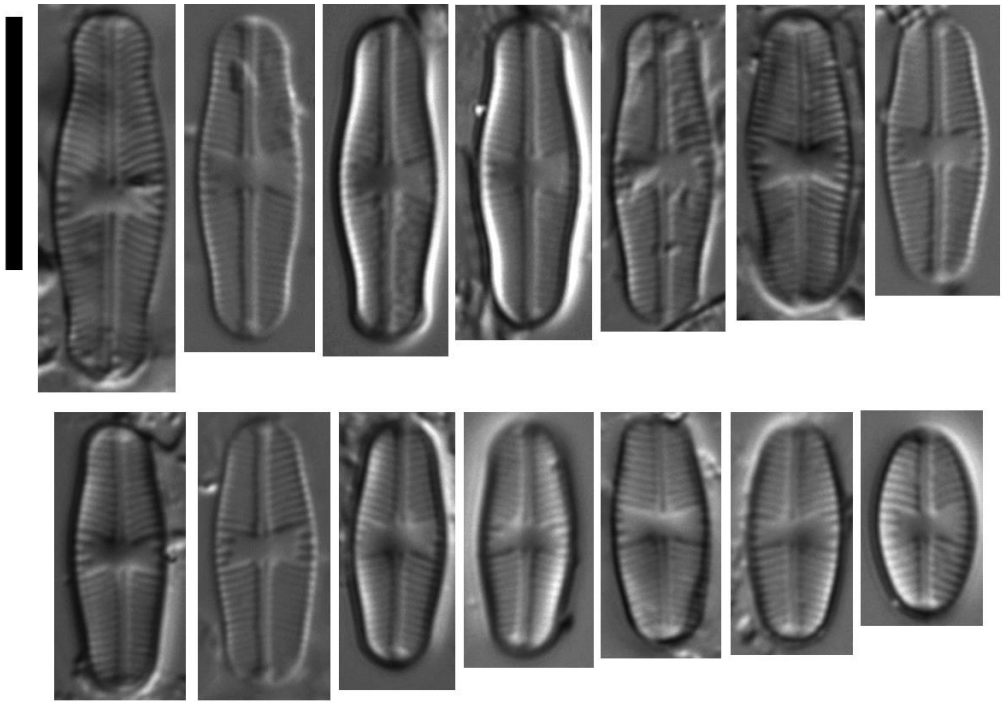
(Moser et al. 1994)



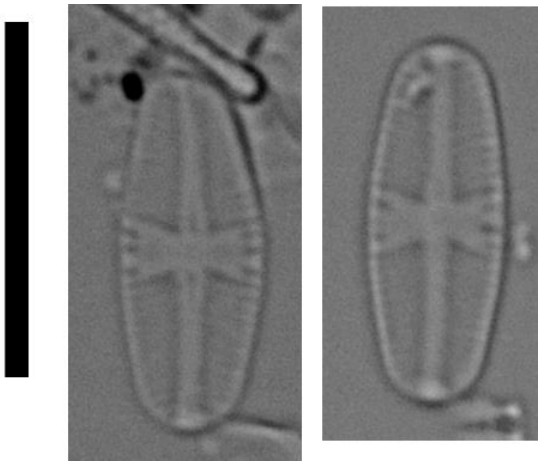


Navicula ventralis* var. *simplex
(Simonsen 1987, Hustedt catalogue)

Other populations



(Swedish rivers)



(Kolkven, The Netherlands)

Ecology

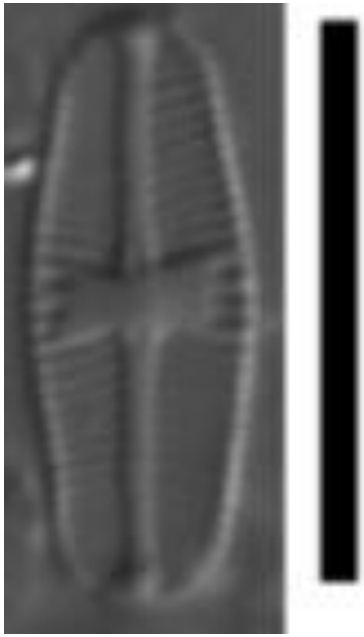
Van Dam et al. (1994)

fresh-brackish

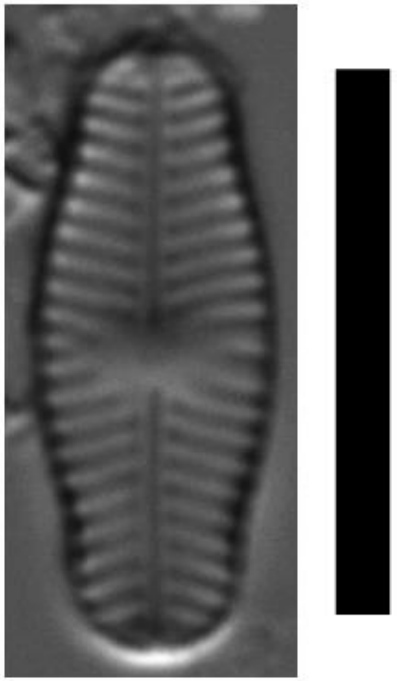
Moser et al. (1994) (as *Naviculadicta multiconfusa*)

low electrolyte levels
Nordic-alpine taxon
circumneutral
oligosaprobic
standing waterbodies

Can be confused with



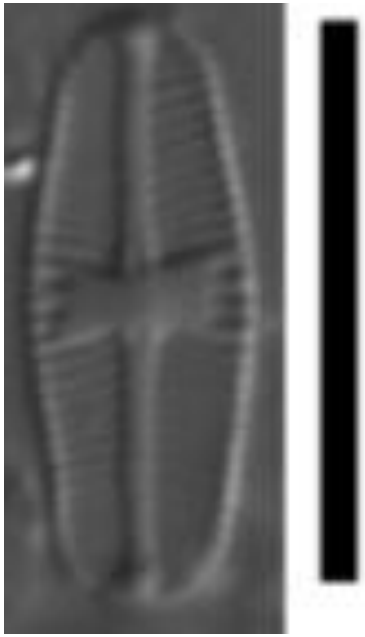
Higher stria density



S. multiconfusa
L 11.0-16.0 µm
W 4.5-5.6 µm
S 28 in 10 µm

S. pseudoventralis
L 8.0-15.0 µm
W 4.0-5.0 µm
S 18-20 in 10 µm

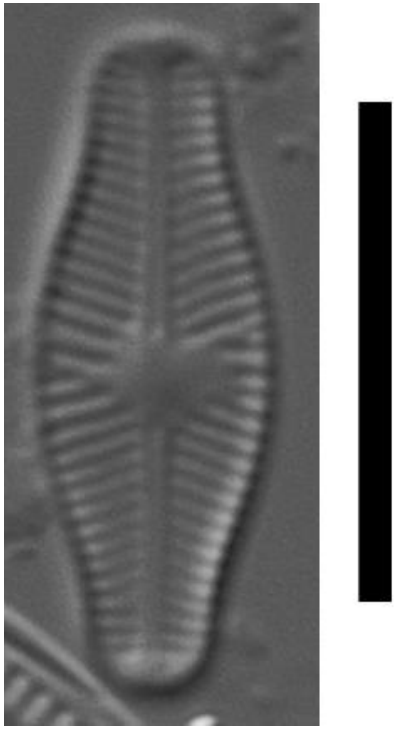
Can be confused with



Higher stria density

Less inflated central part

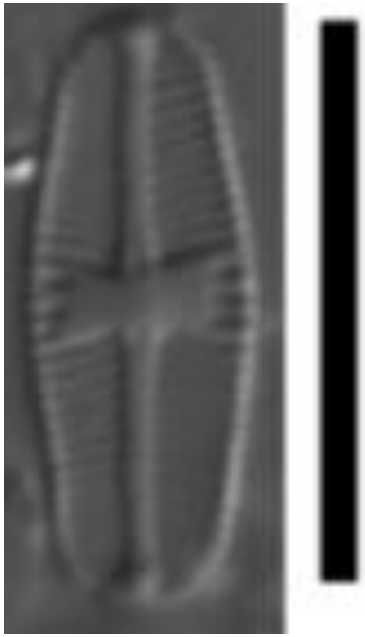
Central area larger



S. multiconfusa
L 11.0-16.0 µm
W 4.5-5.6 µm
S 28 in 10 µm

S. verecundiae
L 6.5-22.0 µm
W 3.5-7.0 µm
S 22-26 in 10 µm

Can be confused with



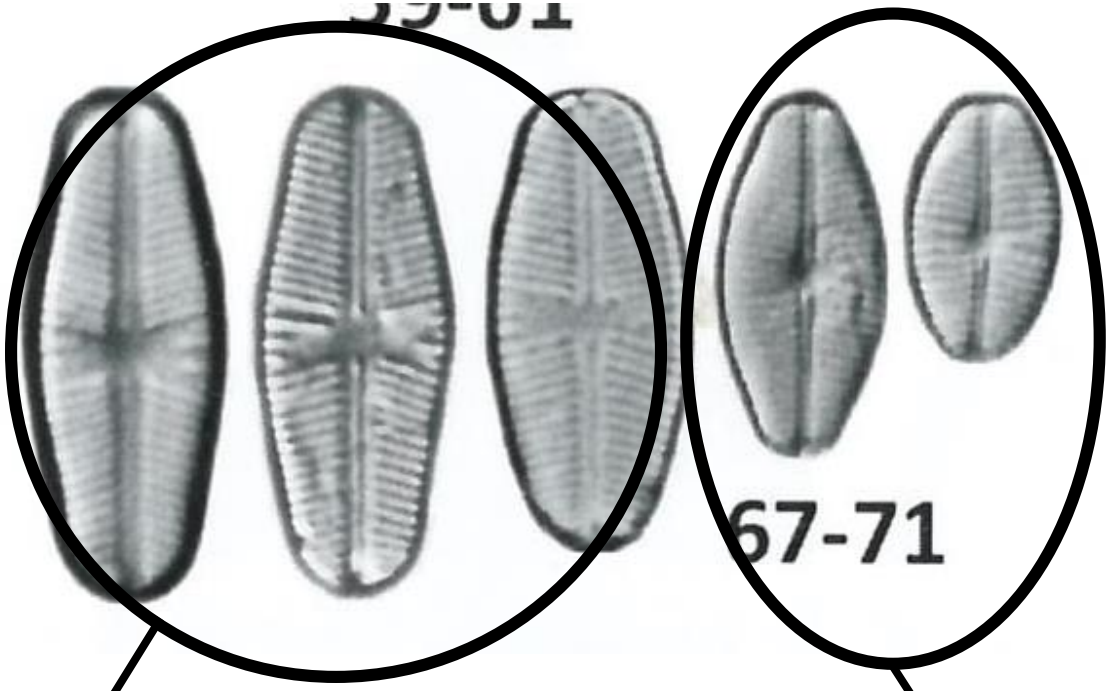
Larger central area

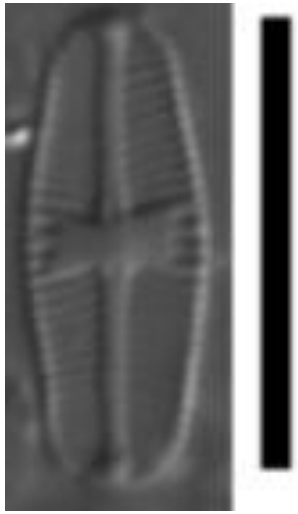
Less rhombic valves

S. multiconfusa
L 11.0-16.0 µm
W 4.5-5.6 µm
S 28 in 10 µm

S. vitabunda
L 8.0-15.0 µm
W 4.5-5.5 µm
S 27-30 in 10 µm

Can be confused with





Hofmann et al. 2011
Plate 42 (p. 687) figs 67-71
Naviculadicta vitabunda

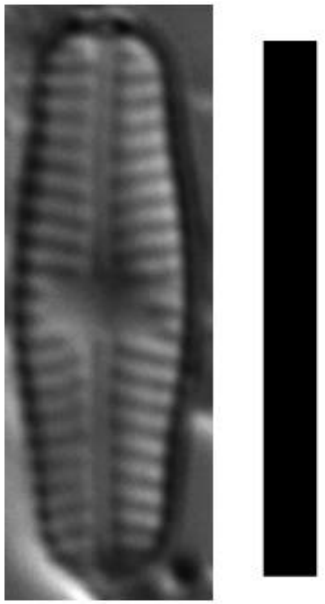
S. multiconfusa
L 11.0-16.0 µm
W 4.5-5.6 µm
S 28 in 10 µm

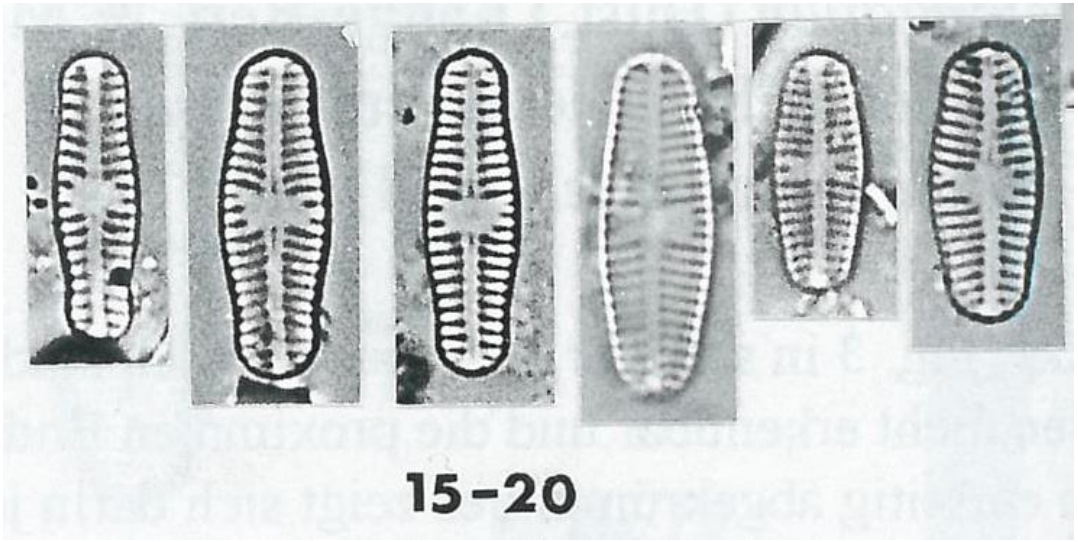
S. vitabunda
L 8.0-15.0 µm
W 4.5-5.5 µm
S 27-30 in 10 µm

Sellaphora elorantana (Lange-Bertalot) C.E.Wetzel

Basionym: ***Naviculadicta elorantana*** **Lange-Bertalot 1996**
Synonym: ***Eolimna elorantana*** **(Lange-Bertalot) Lange-Bertalot & Kulikovskiy 2010**

- **Valves linear-elliptical with slightly inflated central part**
- **Apices broadly rounded, protracted, subcapitate**
- **Length 10-15 µm, width 3.5-4.0 µm**
- **Striae very weakly radiate to almost parallel, parallel near the apices, 18-20 in 10 µm**
- **Axial area narrow, linear**
- **Central area expanded, bordered by 2 shortened striae**





Naviculadicta elorantana Lange-Bertalot nov. spec. Taf. 28: 15-20, Taf. 116: REM-Fig. 3-4

Valvae lineari-ellipticae marginibus in media inflatis apicibus plerumque protractis subcapitatis et late rotundatis, 9,5-14µm longae, 3,5-4,5 latae. Raphe filiformis, parum curvata unilateraliter poris centralibus modice distantibus positis inter se. Area axialis angusta, area centralis transapicaliter dilatata plusminusve rectangularis ad instar. Striae transapicales conspicue crassae apparantes, modice radiantes, saepe sub polos parallelae, 17-20 in 10µm. REM: Areolae seriebus duplicibus positis *Navicula seminulum* similibus. Item *N. pseudoventralis* Hustedt conspicue similis sed differt ad instar etiam poris centralibus latioribus et inclinatis fortius.

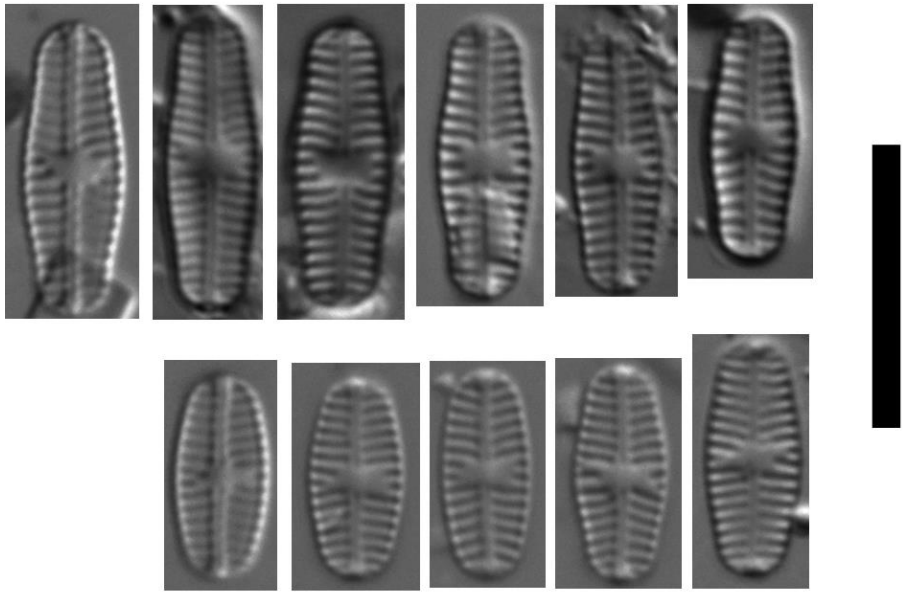
Typus: Praep. Eu-SF 152 in Coll. Lange-Bertalot,
Bot. Inst. der J. W. Goethe - Universität Frankfurt a. M. (Fig. 28: 20)

Locus typicus: Julma Ölkky bei Kuusamo, Finlandia, leg. A. & R. Dorn, 13. 6. 1992

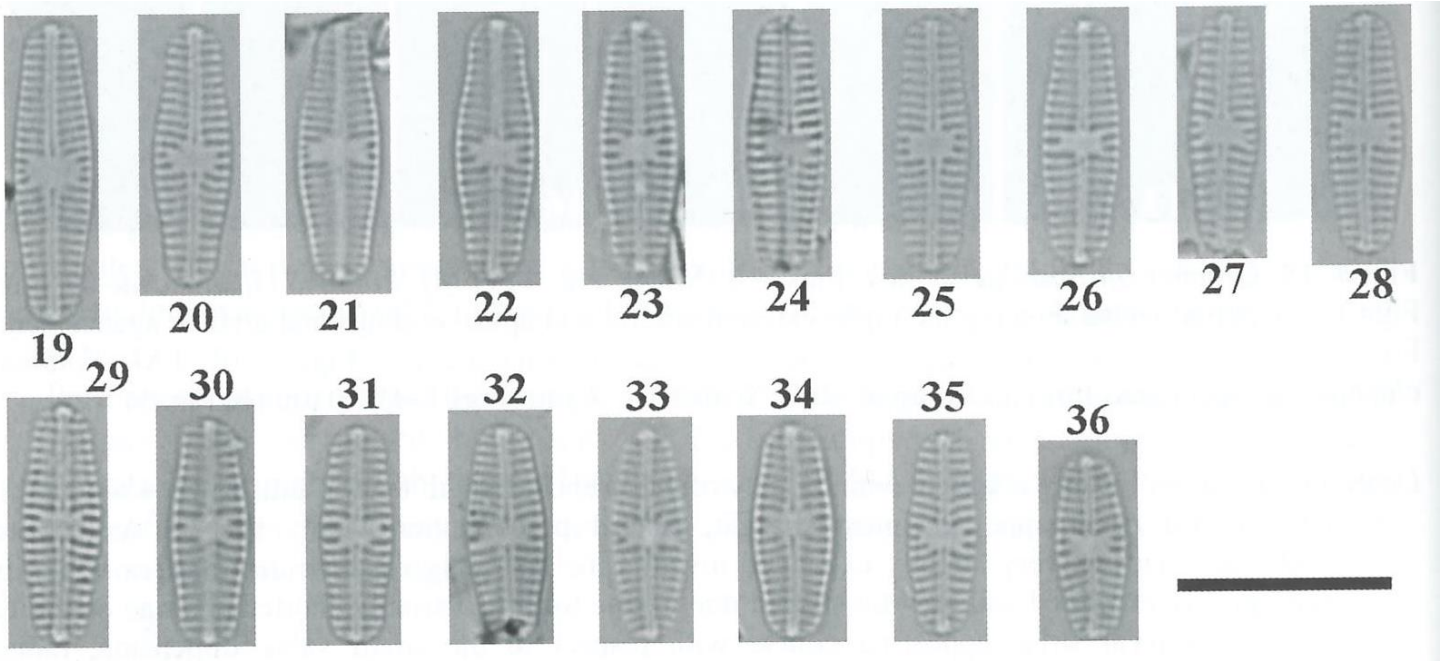
Das Taxon ist unserem finnischen Kollegen, von der Universität in Helsinki, dem Hydrobiologen Prof. Pertii Eloranta gewidmet.

(Lange-Bertalot & Metzeltin 1996)

Other populations



(Swedish rivers)



(Photos Kulikovskiy et al. 2010)

(Russia)

Ecology

Van Dam et al. (1994)

acidophilous
fresh
oligosaprobic
oligotraphentic

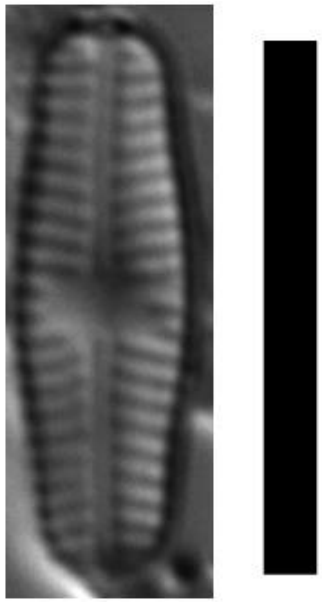
Lange-Bertalot & Metzeltin (1996) (as *Naviculadicta elorantana*)

oligotrophic, unpolluted water
electrolyte poor

Kulikovskiy et al. (2010) (as *Eolimna elorantana*)

acidic habitats, typical in peatbogs

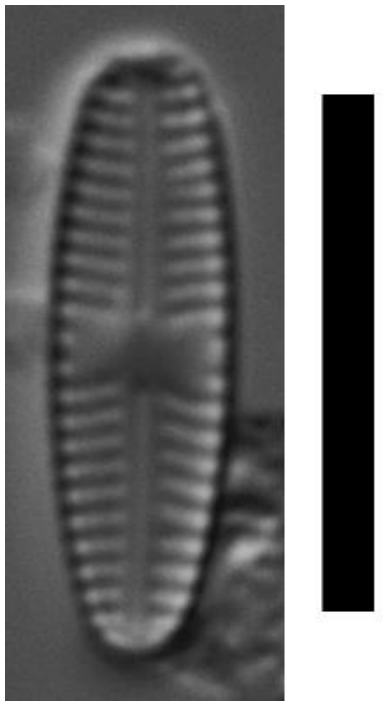
Can be confused with



Slightly lower stria density

Inflated central part

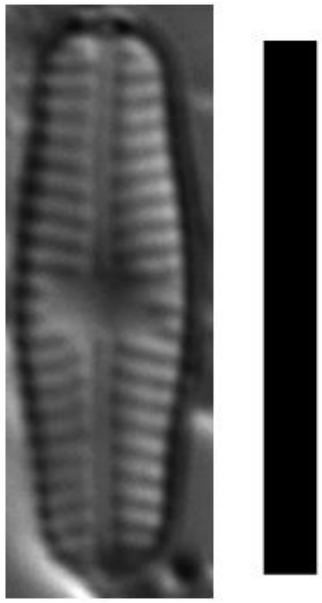
Protracted, subcapitate apices



S. elorantana
L 10-14 µm
W 3.5-4.0 µm
S 18-20 in 10 µm

S. saugerresii
L 6.5-11 µm
W 3.3-3.8 µm
S 21-22 in 10 µm

Can be confused with

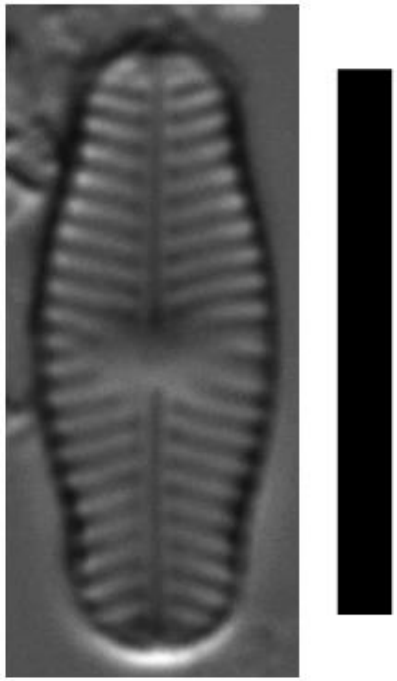


Slightly lower valve width

Less inflated central part

Less protracted apices

Somewhat larger central area



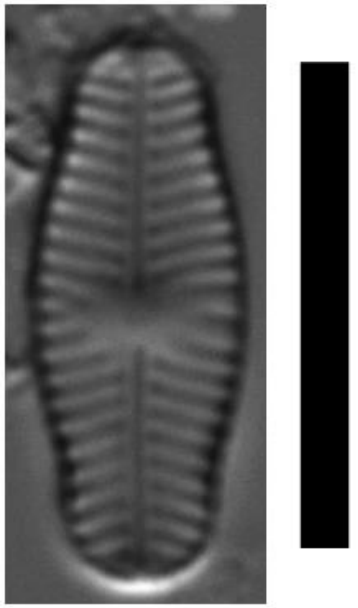
S. elorantana
L 10.0-14.0 µm
W 3.5-4.0 µm
S 18-20 in 10 µm

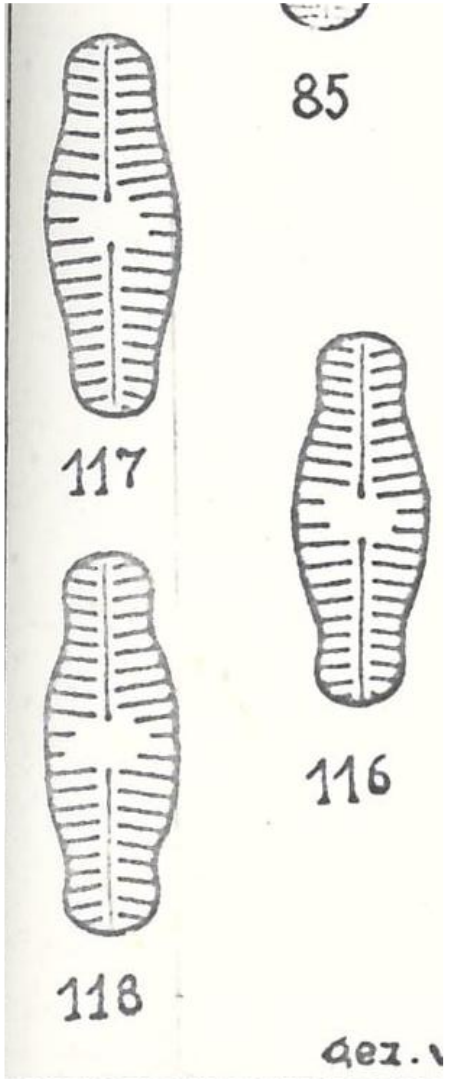
S. pseudoventralis
L 8.0-15.0 µm
W 4.0-5.0 µm
S 18-20 in 10 µm

Sellaphora pseudoventralis (Lange-Bertalot) C.E.Wetzel et al.

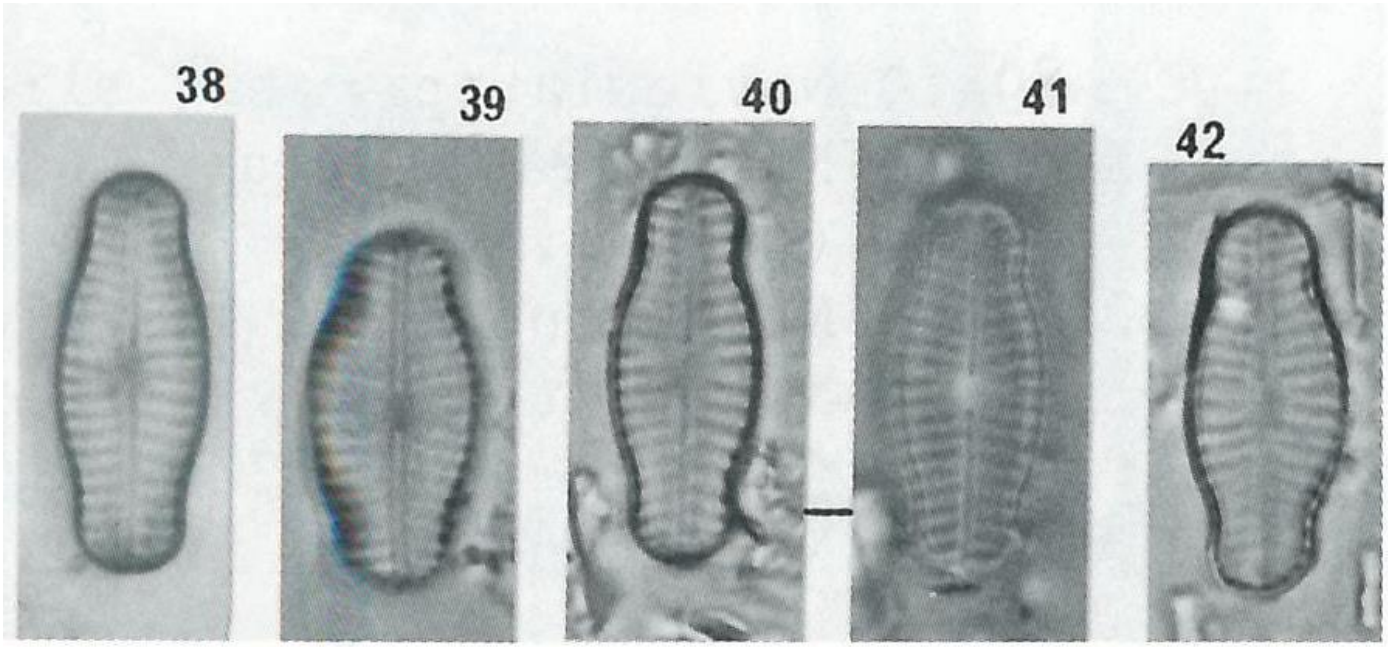
Basionym: ***Navicula pseudoventralis*** **Hustedt 1953**

- **Valves linear-elliptical with clearly inflated central part**
- **Apices broadly rounded, protracted, subcapitate**
- **Length 8-15 µm, width 4.0-5.0 µm**
- **Striae radiate, less radiate near the apices, 18-20 in 10 µm**
- **Axial area very narrow, linear**
- **Central area variable, rather small, bordered by several shortened striae**

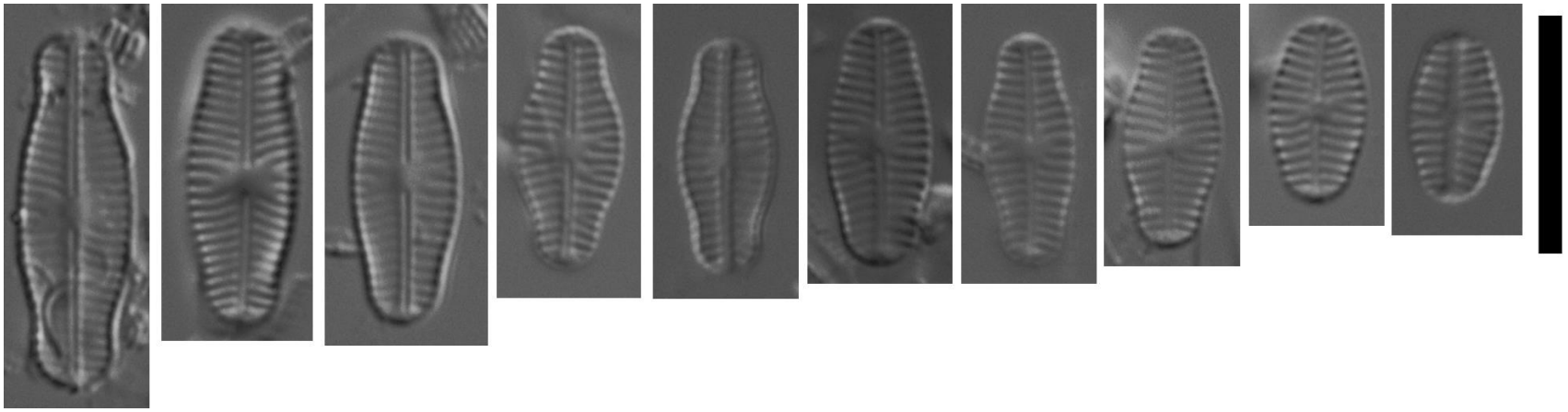




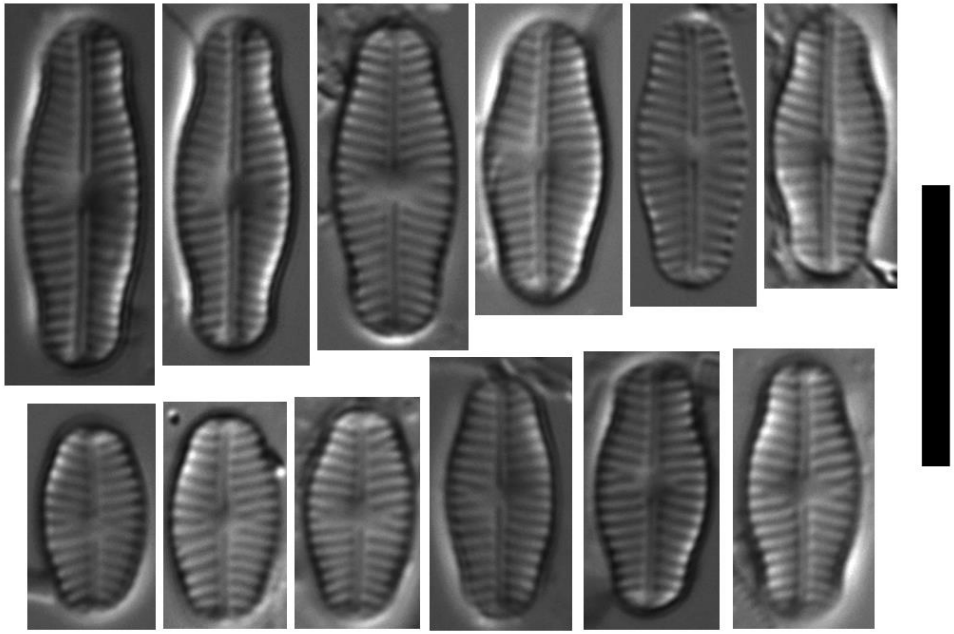
(A. Schmidt Atlas, 401)



(Simonsen 1987, Hustedt catalogue)



(Flemish rivers)



(Swedish rivers)

Ecology

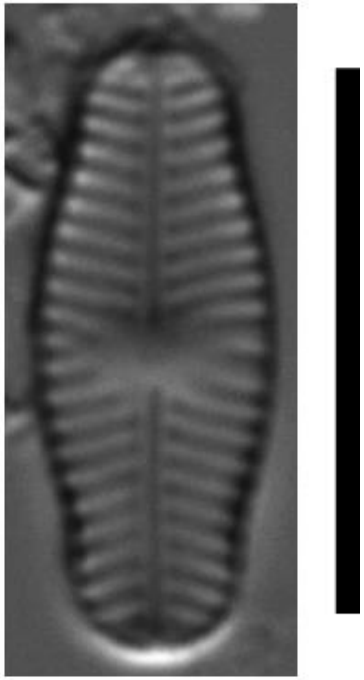
Van Dam et al. (1994) (as *Navicula pseudoventralis*)

alkaliphilous
fresh-brackish
oligosaprobic
oligo-mesotraphentic

Krammer & Lange-Bertalot (1986) (as *Navicula pseudoventralis*)

oligotrophic to mesotrophic waters
variable electrolyte contents
not in brackish waters and waters with high amount of humic acids

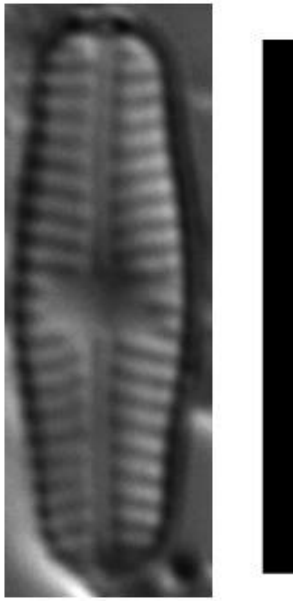
Can be confused with



Higher valve width

More inflated central part

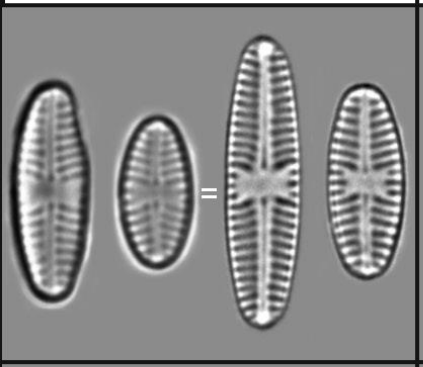
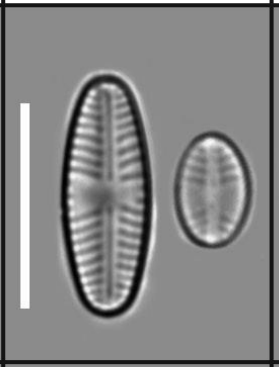
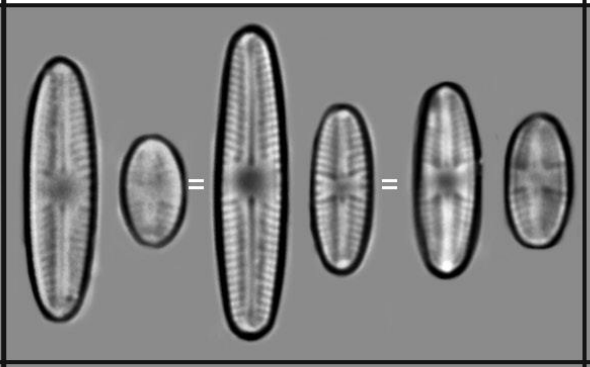
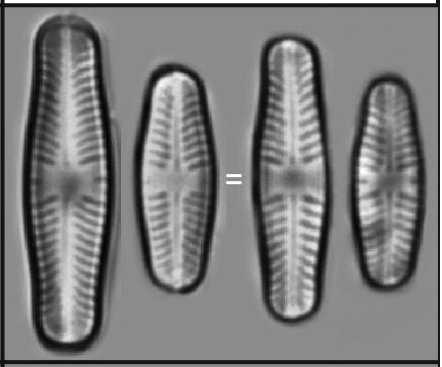
clearly protracted apices



S. pseudoventralis
L 8.0-15.0 µm
W 4.0-5.0 µm
S 18-20 in 10 µm

S. elorantana
L 10.0-14.0 µm
W 3.5-4.0 µm
S 18-20 in 10 µm

Comparison table

Sellaphora saugerresii	*Sellaphora crassulexigua*	*Sellaphora nigri*	*Sellaphora atomoides*	*Sellaphora seminulum*
				
Navicula saugerresii (1858) = *Navicula minima* (1880)	*Navicula crassulexigua* (1994)	*Navicula nigri* (1872)	*Navicula atomoides* (1880) = *Navicula tantula* (1934) = *Stauroneis fonticola* (1937)	*Navicula seminulum* (1860) = *Navicula seminulum* var. *radiosa* (1954)

(Wetzel et al. 2015)

Some interesting literature

Hofmann G., Werum M. & Lange-Bertalot H. (2011) Diatomeen im Süsswasser-Benthos von Mitteleuropa. A.R.G. Gantner Verlag K.G., pp 908.

Kulikovskiy M.S., Lange-Bertalot H. & Witkowski A. (2010) Diatom flora of Polistovo-Lowatski Sphagnum tract (European Russia). I. *Eolimna chistakoviae* sp. nov. and further transfers to the genus *Eolimna* Lange-Bertalot & Schiller; Diatom Research 25: 77-85.

Lange-Bertalot H. & Metzeltin D. (1996) Indicators of Oligotrophy. Iconographia Diatomologica 2: 1-390.

Reichardt E. (1994) Zur Diatomeenflora (Bacillariophyceae) tuffabscheidender Quellen un Bäche im Sudlichen Frankenjura. *Berichte Bayerische Botanische Gesellschaft* 64: 119-133.

Wetzel C.E., Ector L., Van de Vijver B., Compère P. & Mann D.G. (2015) Morphology, typification and critical analysis of some ecological important small naviculoid species (Bacillariophyta). *Fottea* 15: 203-234.

Acknowledgements

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Botanic Garden Meise

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Thanks a lot!