Diatoms from Hvalnes Nature Reserve

Southeast Iceland

Lonsfjordur (Hvalnes Lagoon) looking west with whooper swans resting on pebble bar. Collection site at edge of water at lower left.

Introduction

This report displays some of the diversity in a sample from southeast Iceland and shows that this lagoon and probably the similar neighboring lagoons along this coast support abundant diatoms.

A description of this nature reserve prepared in 2000 (Birdlife 2023) describes Lonsfjordur as a brackish, coastal lagoon with intertidal mudflats about 30 km north-east of Hornafjardarbær (Höfn) town in south-east Iceland. Extensive beds of aquatic plants such as Ruppia, Zostera (eel grass), and algae grow in the lagoon. The area is surrounded by farms, grasslands, and marshes.

The marshes are grazed and fishing in the lagoon is done with nets and traps.
Key biodiversity recorded during an aerial survey in May 1990 included over 3,000 staging waders. Only molting Cygnus cygnus (whooper swan) has been counted annually since 1992. For instance, during the 1995 passage season 7,000 to 8,000 swans were counted.

Adjacent hayfields are regularly fertilized. Nutrient run-off from these fields may be affecting water quality in the lagoon. This area is on the list of sites of conservation interest in the Nature Conservation Register of Iceland.

Lonsfjordur is one of a series of coastal lagoons protected from the sea by long, pebble beach barriers. The pebbles consist of eroded lava from the surrounding mountains. Lava flowed into the sea and fractured into small pieces which the surf rounded into pebbles.

Methods

On 9 September 2023 a tablespoon full of mud and biofilm was collected from the edge of the water on the protected side of the pebble spit forming Lonsfjordur (Hvalnes Lagoon, lat-lon 64.4054927984231, -14.5554558792116).

Collection site marked with the icon on the protected side of the long spit of black pebbles. Outflow of lagoon at western end of the spit. The mountains and rainfall here suggest plenty of freshwater mixing with the tidal flow of ocean water. Flock of whooper swans was on the lagoon when sample was collected (Google Maps 2023).

The sample was stored in a plastic pill bottle for transport. After some images of live material were made, the sample was cleaned with three changes of hydrogen peroxide 35%, heating at about 90 C until all peroxide bubbling stopped. The sample was decanted twice to separate it from gravel and sand. Fortunately, the sample contained very little silt so only a few rinses after cleaning were needed. Coverslips were mounted in Zrax made by Bill Dailey.

Digital images were taken with a Canon T7 mounted on a Nikon Labophot-2 light microscope. Various lighting was used depending on the subject: brightfield (BF), oblique lighting (OL) using a paper card across the field lens, and circular oblique lighting (COL) using a black disc resting on the field filter. Windows 10 File Explorer was used to add tags and comments to the EXIF metadata of the images for use in the image captions. The metadata were exported using Exiftool.exe and MS-Access.

This report was started on 9 October 2023 by Rob Kimmich and last revised on 06 Feb 2024.

Results

Images for the plates were chosen from scans of two strew slides. As a rough guess, about 80% of species are presented. Missing are smaller araphids, some *Navicula* species, and some *Nitzschia* species. Images are arranged to roughly follow morphological groupings of Diatoms of North America (Spaulding et al 2023). Many species include several specimens to provide a sense of the range of sizes in the sample. Images with touching edges are details of a larger image or different optical slices through the same valve.

List of Species

Radial Centric
Hyalodiscus cf scoticus
Melosira nummuloides

Polar Centric
Dimeregramma minor
Odontella aurita

Araphid
Ctenophora pulchella
Delphineis surirella
Grammatophora oceanica
Martyana schulzii
Opephora marina
Rhabdonema arcuatum
Rhabdonema minutum
Tabularia fasciculata

Eunotioid
Eunotia praerupta

Symmetric Biraphid
Berkeleya rutilans
Caloneis liber
Caloneis subsalina
Climaconeis undulata
Diploneis didyma
Diploneis interrupta
Diploneis smithii
Fallacia forcipata
Fallacia pygmaea
Gyrosigma balticum
Gyrosigma sp1
Mastogloia elliptica
Mastogloia pusilla
Metascolioneis tumida
Navicula digitoradiata
Navicula directa var subtilis
Navicula hanseatica ssp hanseatica
Navicula palpebralis
Navicula slesvicensis
Navicula sp1
Navicula sp2
Navicula sp3
Navicula sp5
Navicula sp6
Parlibellus rhombicus
Parlibellus sp1
Petroneis marina
Scoliopleura sp1
Sellaphora pupula
Stauroneis constricta
Staurophora salina

Monoraphid
Achnanthes brevipes
Achnanthes delicatula
Achnanthes sp1
Cocconeis pinnata
Cocconeis scutellum

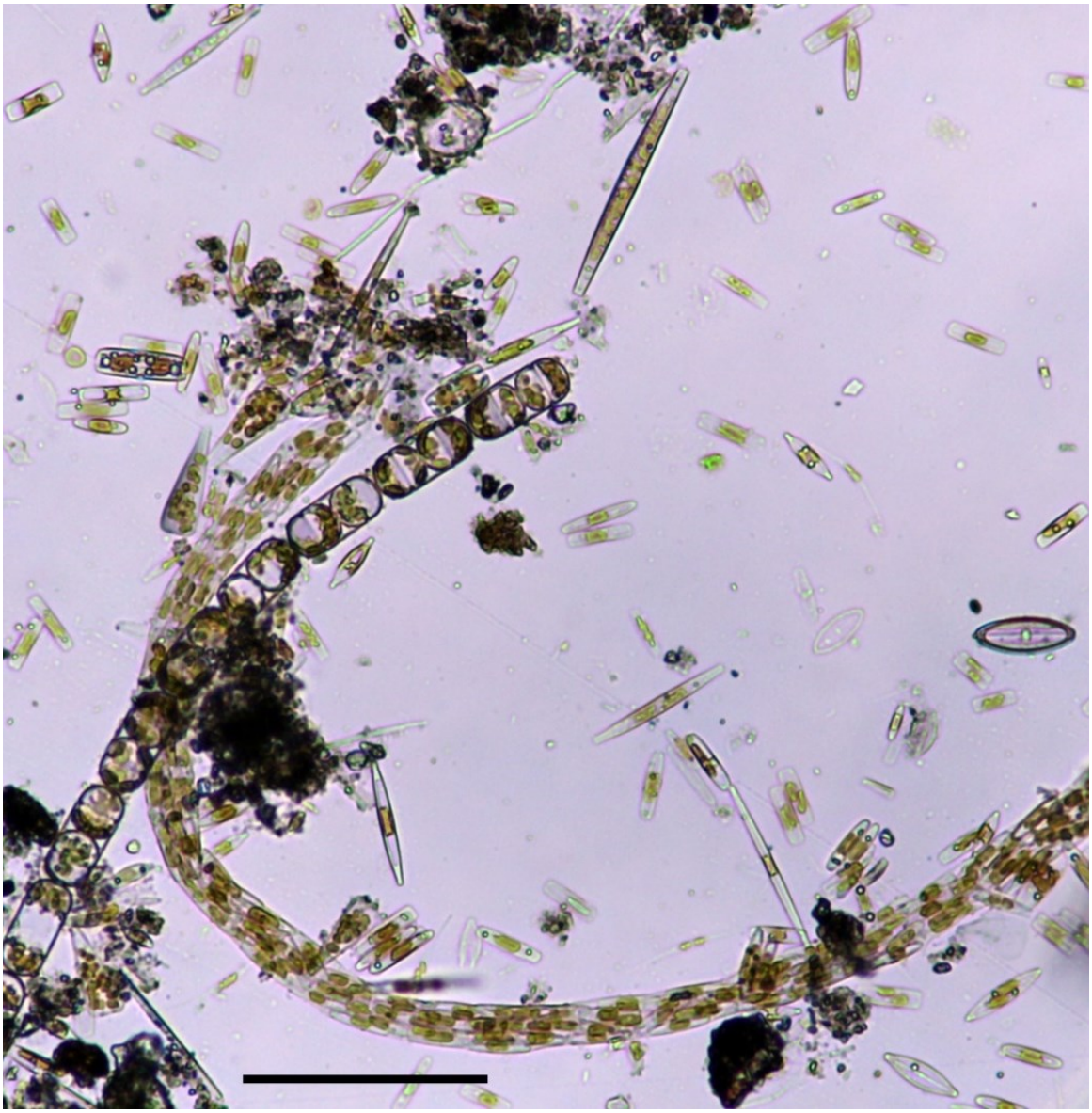
Asymmetric Biraphid
Amphora copulata
Amphora exigua
Amphora ovalis

Epithemioid
Rhopalodia gibba
Rhopalodia musculus

Nitzschioid
Nitzschia sigma
Nitzschia sp1
Nitzschia sp2
Nitzschia vitrea
Tryblionella acuminata
Tryblionella coarctata
Tryblionella levidensis
Tryblionella punctata

Surirelloid
Entomoneis paludosa
Surirella brightwellii
Surirella smithii
Surirella sp1

Plate 1 – Live Diatoms



Wet mount of the sample six days after collecting. Many of the cells appeared to be plasmolyzed but some were still moving. Among the diverse diatoms were a colony of *Melosira nummuloides* and a tube dwelling diatom, *Berkeleya rutilans*. 10x objective. Scale bar = 100 µm.

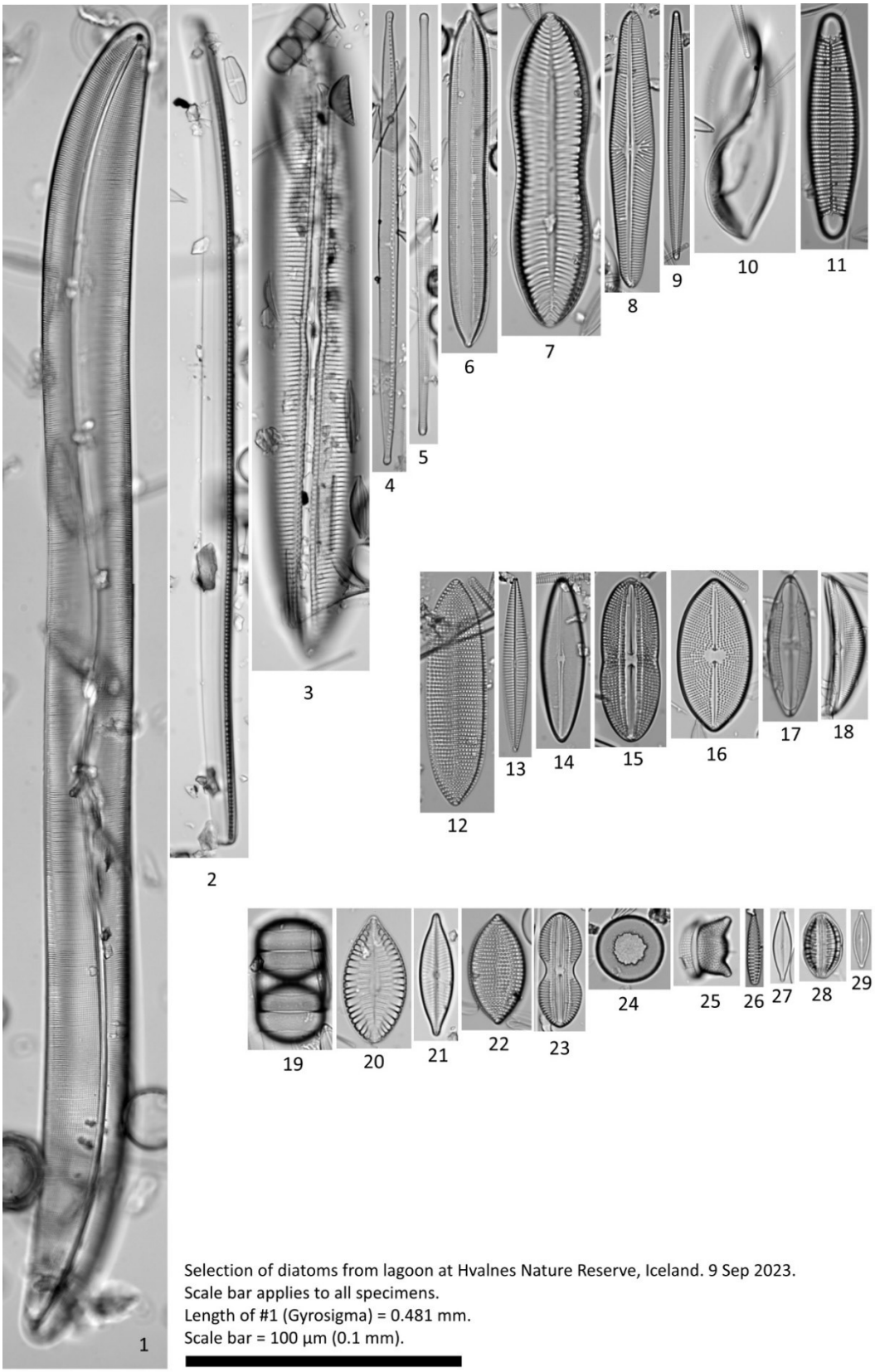
Plate 2 – Size Range

This is a selection of diatoms from the strew slide, Hvalnes-B, representing the range of sizes and perhaps 60 percent of the genera on the slide. Images were taken with a 60x dry objective. PhotoScape X Pro was used to splice long forms and to create this plate.

The following names are best guesses.

1 Gyrosigma balticum
2 Nitzschia sigma (one valve in girdle view)
3 Scoliopleura sp
4 Nitzschia sp
5 Ctenophora pulchella
6 Tryblionella sp
7 Surirella smithii
8 Navicula digitoradiata
9 Tabularia sp
10 Entomoneis sp
11 Rhabdonema sp (valve view)
12 Tryblionella punctata
13 Navicula sp
14 Parlibellus sp
15 Diploneis didyma
16 Petroneis marina
17 Mastogloia sp
18 Amphora sp
19 Melosira nummuloides
20 Surirella brightwellii
21 Navicula sp
22 Tryblionella punctata
23 Diploneis interrupta
24 Hyalodiscus sp
25 Odontella sp
26 Opephora sp
27 Navicula sp
28 Rhopalodia sp
29 Navicula sp

Plate 2 – Size Range



Selection of diatoms from lagoon at Hvalnes Nature Reserve, Iceland. 9 Sep 2023.
Scale bar applies to all specimens.
Length of #1 (Gyrosigma) = 0.481 mm.
Scale bar = 100 µm (0.1 mm).

Plate 3 – Radial Centric (Hyalodiscus, Melosira)

6	Hyalodiscus cf scoticus	100x. Scale bar 10 µm. External view. High focus on areolae around central area. See Sims 1996 pl 19 fig 5.
7	Hyalodiscus cf scoticus	100x. Scale bar 10 µm. External view. Low focus on outline of #9054. See Sims 1996 pl 19 fig 5.
8	Hyalodiscus cf scoticus	100x. Scale bar 10 µm. External view. High focus on areolae around central area. See Sims 1996 pl 19 fig 5.
1	Melosira nummuloides	100x. Scale bar = 10 µm. Internal view. Down focus on central area of valve. Dark ring is corona. Dark spots in center may be rimoportulae. See Round et al 1990 pg 154; Sims 1996 pl 129 fig 1, 2.
3	Melosira nummuloides	100x. Scale bar = 10 µm. Internal view. Up focus slightly lower than edge. Radial lines in valve wall suggest loculae. See Round et al. 1990 pg 154; Sims 1996 pl 129 fig 1, 2.
2	Melosira nummuloides	100x. Scale bar = 10 µm. Internal view. Down focus on central area of valve. Dark ring is corona. Dark spots in center may be rimoportulae. See Round et al 1990 pg 154; Sims 1996 pl 129 fig 1, 2.
4	Melosira nummuloides	100x. Scale bar = 10 µm. Girdle view of two sister frustules united by the parental cingula. Up focus on rows of pores on exterior. See Round et al 1990 pg 154; Sims 1996 pl 129 fig 1, 2.
5	Melosira nummuloides	100x. Scale bar = 10 µm. Girdle view of two sister frustules united by the parental cingula. Down focus on outline. Bristles of corona near center. Carina cross section forming angle with parental cingula. See Round et al 1990 pg 154; Sims 1996 pl 129 fig 1, 2.

Plate 3 – Radial Centric (Hyalodiscus, Melosira)

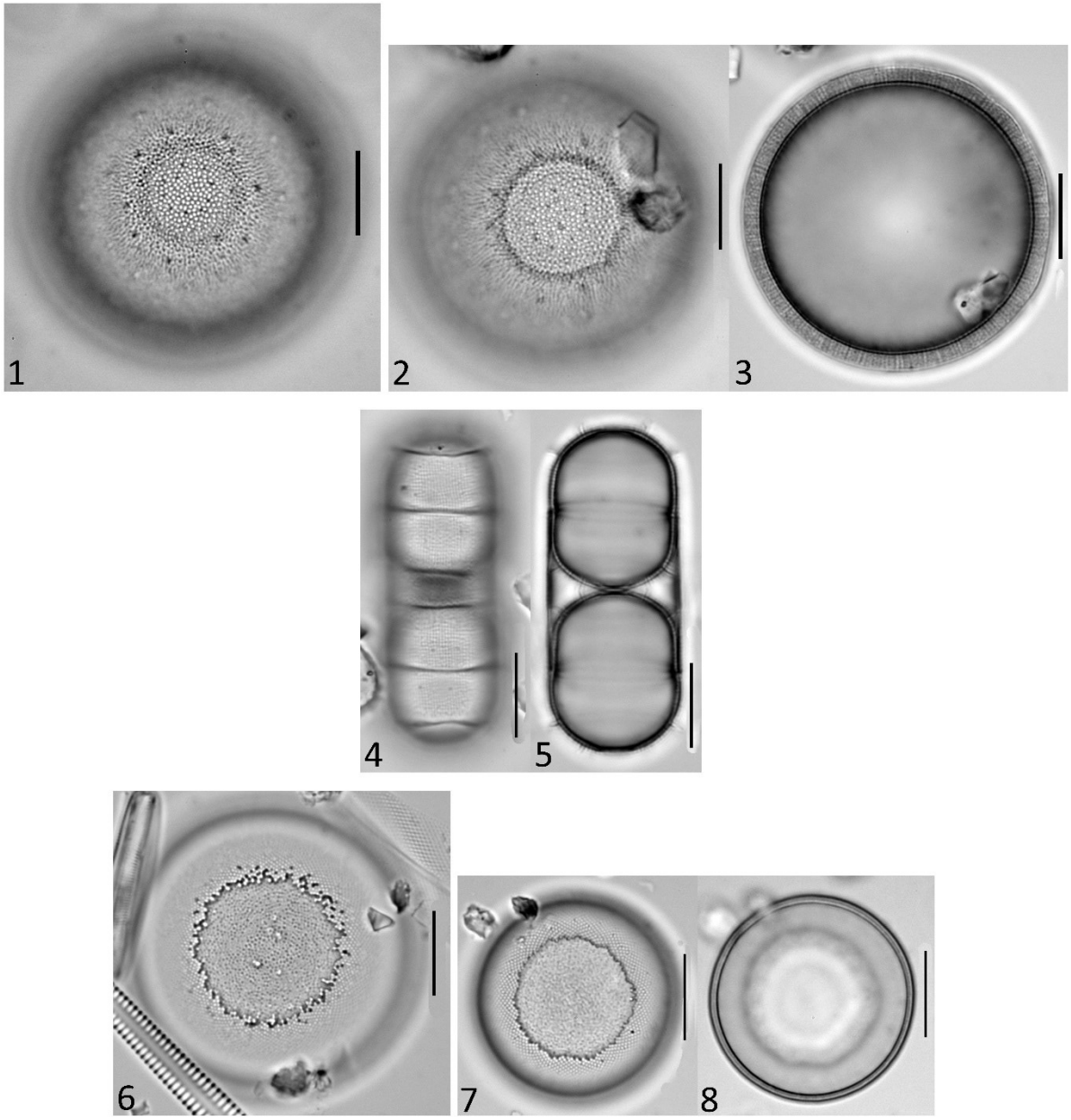


Plate 4 – Polar Centric (Dimeregramma, Odontella)

3	Dimeregramma minor	IMG_9218-1.JPG	100x. Scale bar = 10 µm. Internal view. Apical pore plates, ridges between striae, spines in black spot near margin. See Sims 1996 pl 77 fig 3; Round et al 1990 pg 242.
4	Dimeregramma minor	IMG_9328-1.JPG	100x. Scale bar = 10 µm. External view. Apical pore plates, ridges between striae, spines in black spot near margin. See Sims 1996 pl 77 fig 3; Round et al 1990 pg 242.
5	Odontella aurita	IMG_9211-1.JPG	100x. Scale bar 10 µm. Girdle view of whole frustule. Up focus on surface of cingulum. See Sims 1996 pl 195 fig 1.
6	Odontella aurita	IMG_9212-1.JPG	100x. Scale bar 10 µm. Girdle view of whole frustule. Down focus on outline of frustule. See Sims 1996 pl 195 fig 1.
1	Odontella aurita	IMG_9404-1.JPG	100x. Scale bar 10 µm. External valve view. Up focus on central dome with four rimoportulae visible. See Sims 1996 pl 195 fig 1.
2	Odontella aurita	IMG_9405-1.JPG	100x. Scale bar 10 µm. External valve view. Down focus on outline of apices. See Sims 1996 pl 195 fig 1.

Plate 4 – Polar Centric (Dimeregramma, Odontella)

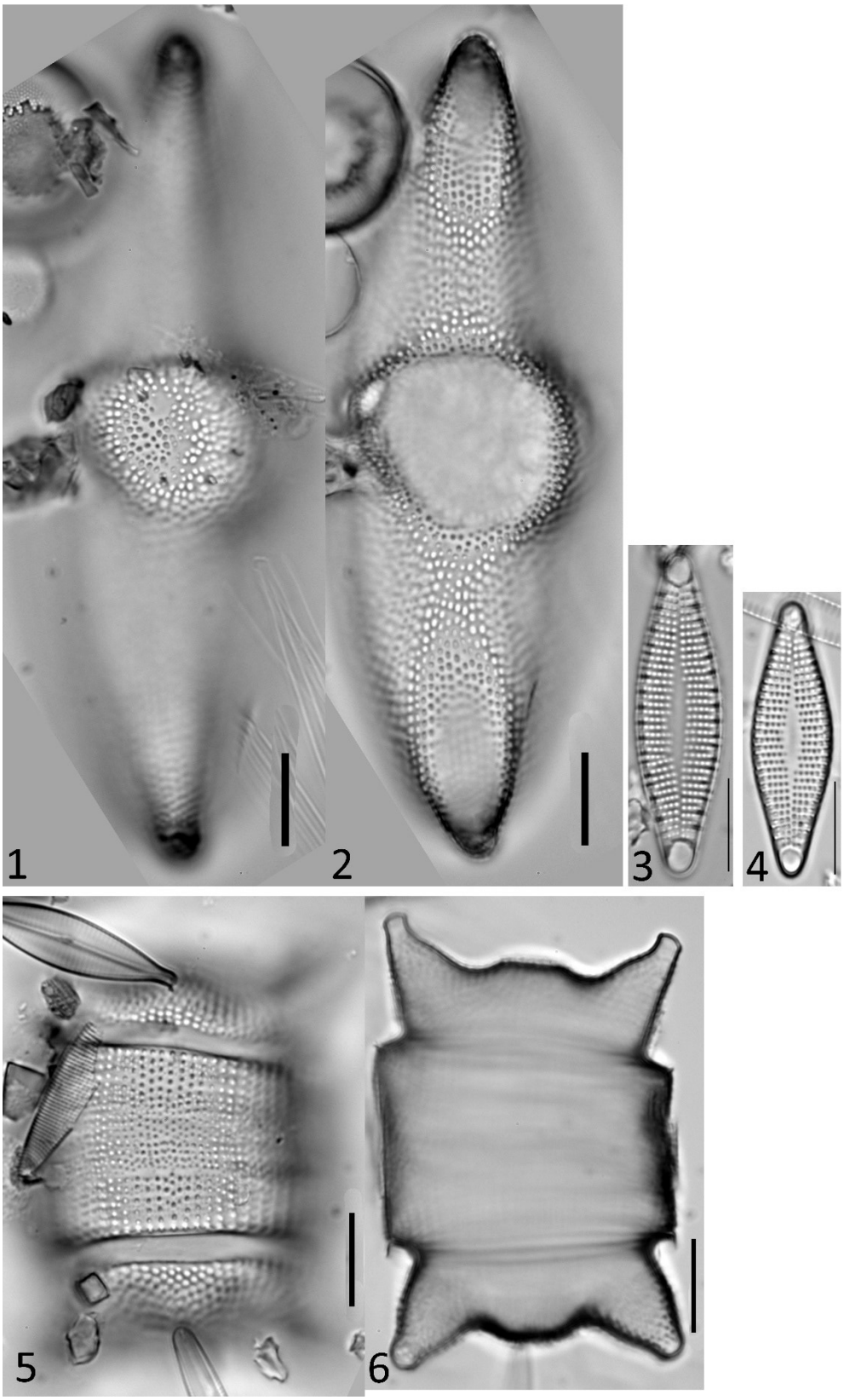


Plate 5 – Araphid (Opephora, Martyana)

Key to araphid genera in this sample with similar appearance.

1. Valves symmetric apically and transapically. Valves linear, linear-lanceolate, elliptical, capitate. Valves have marginal spines. See Round et al 1990 pg 346. Stauroforma is also symmetric on both axes and has spines. See DONA for this genus ... **Fragilaria**

1' Valves symmetric apically but asymmetric transapically. Valves linear-clavate, clavate, or if small, nearly oval,. Valves appear to lack marginal spines.

For *Martyana*, Round et al 1990 pgs 362-363 show large lineolate areolae, based on freshwater "*M. martyi*" with many areolae per stria. The similar, common clavate from Iceland named *Opephora marina* looks like this but has few areolae in the striae. Round talks about the confusion in the genus (pg 362, bottom).

2. Striae wide. Areolae may or may not be easily visible.

3. Striae with many fine areolae which might be interpreted as volae (Sims 1996 pl 197 figs 6-7; Snoeijs et al 1991 pg 166 for LM description of genus; Round et al 1990 pg 383 figs e,f for stria appearing to have only one areola occluded by a vola.) Not noticed on these slides ... **Opephora pacifica**

3' Striae with few, large areolae (Sims 1996 pl 197 figs 6-7). Compare to *Martyana martyii* in Round et al 1990 pg 362-363. Common on Iceland slides ... **O. marina**

2' Striae narrow, uniseriate. Areolae small, visible at 100x with OL (Snoeijs et al 1991 text pg 166, SEM figs 1-22, LM figs 23-27; Sims 1996 pl 197 fig 9; Dressler 2024). In this sample, the areolae are lineolate. The illustrations in the references show round areolae. The sample may contain a variety. Common on Iceland slides ... **Martyana schulzii**

4	Opephora marina	100x. Scale bar 10 µm. Striae have areolae with a slit shape. See Sims 1996 pl 197 fig 3 for descriptive illustration; Round et al 1990 pg 362 for areola shape, pg 382 for genus discussion.
3	Opephora marina	100x. Scale bar 10 µm. Striae have areolae with a slit shape. See Sims 1996 pl 197 fig 3 for descriptive illustration; Round et al 1990 pg 362 for areola shape, pg 382 for genus discussion.
1	Opephora marina	100x. Scale bar 10 µm. Striae have areolae with a slit shape. See Sims 1996 pl 197 fig 3 for descriptive illustration; Round et al 1990 pg 362 for areola shape, pg 382 for genus discussion.
2	Opephora marina	100x. Scale bar 10 µm. Striae have areolae with a slit shape. See Sims 1996 pl 197 fig 3 for descriptive illustration; Round et al 1990 pg 362 for areola shape, pg 382 for genus discussion.
8	Opephora marina	100x. Scale bar 10 µm. Striae have areolae with a slit shape. See Sims 1996 pl 197 fig 3 for descriptive illustration; Round et al 1990 pg 362 for areola shape, pg 382 for genus discussion.

5	Opephora marina	100x. Scale bar 10 µm. Striae have areolae with a slit shape. See Sims 1996 pl 197 fig 3 for descriptive illustration; Round et al 1990 pg 362 for areola shape, pg 382 for genus discussion.
6	Opephora marina	100x. Scale bar 10 µm. Striae have areolae with a slit shape. See Sims 1996 pl 197 fig 3 for descriptive illustration; Round et al 1990 pg 362 for areola shape, pg 382 for genus discussion.
7	Opephora marina	100x. Scale bar 10 µm. Striae have areolae with a slit shape. See Sims 1996 pl 197 fig 3 for descriptive illustration; Round et al 1990 pg 362 for areola shape, pg 382 for genus discussion.
12	Martyana schulzii	100x, OL, NA100. Scale bar 10µm. A size series. From brackish lagoon. Widespread in sandy sediments of eutrophic littoral and sublittoral waters. See Sims 1996 pl 197 fig 9; Witkowski et al. 2000 pg 53 and pl 24 figs 7-12; AlgaeBase for this species; Mirko Dressler pers comm Oct 2023 email.
9	Martyana schulzii	100x, OL, NA120. Scale bar 10µm. The oblique lighting displays the lineate areolae. From brackish lagoon. Widespread in sandy sediments of eutrophic littoral and sublittoral waters. See Sims 1996 pl 197 fig 9; Witkowski et al. 2000 pg 53 and pl 24 figs 7-12; AlgaeBase for this species; Mirko Dressler pers comm Oct 2023 email.
10	Martyana schulzii	100x, OL, NA120. Scale bar 10µm. The oblique lighting displays lineate areolae. BF view in #9480. From brackish lagoon. Widespread in sandy sediments of eutrophic littoral and sublittoral waters. See Sims 1996 pl 197 fig 9; Witkowski et al. 2000 pg 53 and pl 24 figs 7-12; AlgaeBase for this species; Mirko Dressler pers comm Oct 2023 email.
11	Martyana schulzii	100x, BF, NA075. Scale bar 10µm. COL view in #9479. From brackish lagoon. Widespread in sandy sediments of eutrophic littoral and sublittoral waters. See Sims 1996 pl 197 fig 9; Witkowski et al. 2000 pg 53 and pl 24 figs 7-12; AlgaeBase for this species; Mirko Dressler pers comm Oct 2023 email.

Plate 5 - Araphid (Opephora, Martyana)

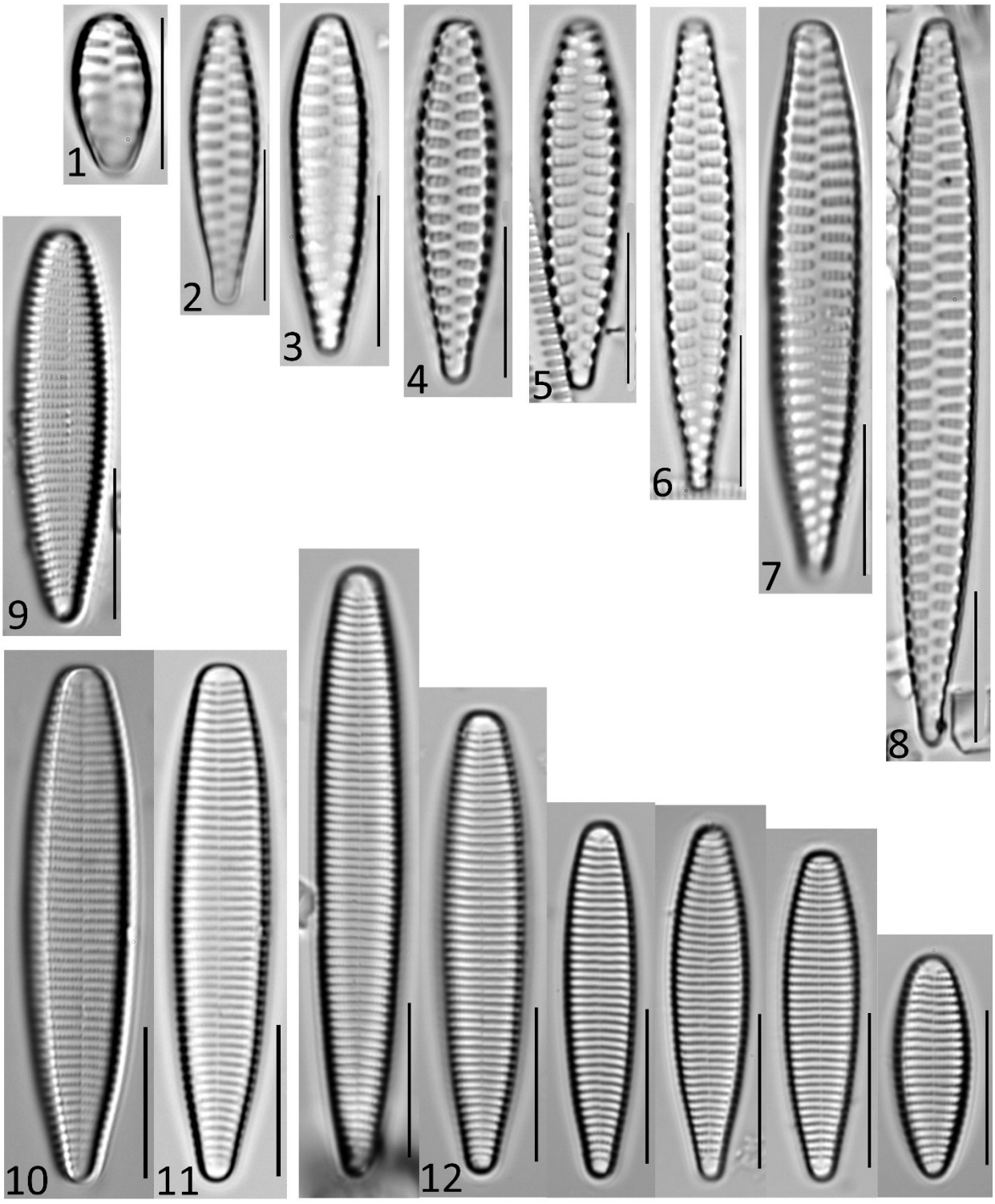


Plate 6 – Araphid (Ctenophora, Tabularia, Grammatophora)

3	Ctenophora pulchella	100x. Scale bar 10 µm. Stitched from two images. See Sims 1996 pl 57 fig 1; Round et al 1990 pg 372.
1	Ctenophora pulchella	100x. Scale bar 10 µm. Stitched from two images. See Sims 1996 pl 57 fig 1; Round et al 1990 pg 372.
2	Ctenophora pulchella	100x. Scale bar 10 µm. Stitched from two images. See Sims 1996 pl 57 fig 1; Round et al 1990 pg 372.
6	Tabularia fasciculata	100x. Scale bar 10 µm. See Sims 1996 pl 285 fig 1.
4	Tabularia fasciculata	100x. Scale bar 10 µm. Stitch of two images. See Sims 1996 pl 285 fig 1.
5	Tabularia fasciculata	60x COL NA080. Scale bar 10 µm. Oblique lighting displays a dark feature between the striae. See Sims 1996 pl 285 figs 1-2.
9	Grammatophora oceanica	100x. Scale bar 10 µm. Girdle view. Focus on mantle center. See Sims 1996 pl 111 fig 4.
7	Grammatophora oceanica	100x. Scale bar 10 µm. Valve view. Up focus on valve face. See Sims 1996 pl 111 fig 4.
8	Grammatophora oceanica	100x. Scale bar 10 µm. Valve view. Down focus on valvocopula. See Sims 1996 pl 111 fig 4.

Plate 6 – Araphid (Ctenophora, Tabularia, Grammatophora)

Plate 7 – Araphid-Eunotioid-Epithemioid

6	Araphid	Delphineis surirella	100x. Scale bar 10 µm. Two distal pores barely resolving. Small rimoportula at one apex appears to be visible. Separated from Rhaphoneis by the two small pores at sternum ends and lack of apical pore fields. See Round et al 1990 pg 410; Sims 1996 pl 74 fig 3.
5	Araphid	Delphineis surirella	100x. Scale bar 10 µm. Two small pores at each end of sternum visible. The off center rimoportulae at apices appear to be visible. Separated from Rhaphoneis by the two small pores at sternum ends and lack of apical pore fields. See Round et al 1990 pg 410; Sims 1996 pl 74 fig 3.
2	Araphid	Delphineis surirella	100x. Scale bar 10 µm. Valve in white spot. Separated from Rhaphoneis by the two small pores at sternum ends and lack of apical pore fields. Off-center apical rimoportula visible. See Round et al 1990 pg 410; Sims 1996 pl 74 fig 3.
3	Araphid	Delphineis surirella	100x. Scale bar 10 µm. Valve in #9183 in black spot. Separated from Rhaphoneis by the two small pores at sternum ends and lack of apical pore fields. Off-center apical rimoportula visible. See Round et al 1990 pg 410; Sims 1996 pl 74 fig 3.
1	Araphid	Delphineis surirella	100x. Scale bar 10 µm. Separated from Rhaphoneis by the two small pores at sternum ends and lack of apical pore fields. Off-center apical rimoportula visible. See Round et al 1990 pg 410; Sims 1996 pl 74 fig 3.
4	Araphid	Delphineis surirella	100x. Scale bar 10 µm. Good example of terminal pores and rimoportulae off center. Separated from Rhaphoneis by the two small pores at sternum ends and lack of apical pore fields. Off-center apical rimoportula visible. See Round et al 1990 pg 410; Sims 1996 pl 74 fig 3.
7	Araphid	Rhabdonema arcuatum	100x. Scale bar 10 µm. Up focus on valve face. See Sims 1996 pl 249 fig 4.
8	Araphid	Rhabdonema arcuatum	100x. Scale bar 10 µm. Down focus on outline. See Sims 1996 pl 249 fig 4.
9	Araphid	Rhabdonema minutum	100x. Scale bar 10 µm. Internal view. Down focus on sternum. See Sims 1996 pl 250 fig 1; Round et al 1990 pg 430.
10	Araphid	Rhabdonema minutum	100x. Scale bar 10 µm. Internal view. Up focus on apices. See Sims 1996 pl 250 fig 1; Round et al 1990 pg 430.
11	Araphid	Rhabdonema minutum	100x. Scale bar 10 µm. Name based on Sims 1996. Sternum narrow, apical pore fields distinct. See Sims 1996 pl 250 fig 1; Round et al 1990 pg 406.

12	Epithemioid	Rhopalodia gibba	100x. Scale bar 10 µm. See Sims 1996 pl 252 fig 9, pl 253 fig 1.
13	Epithemioid	Rhopalodia musculus	100x. Scale bar 10 µm. See Sims 1996 pl 252 fig 9, pl 253 fig 1.
15	Epithemioid	Rhopalodia musculus	100x. Scale bar 10 µm. Complete frustule. Up focus on valve faces, ventral sides adjacent. See Sims 1996 pl 252 fig 9, pl 253 fig 1.
14	Epithemioid	Rhopalodia musculus	100x. Scale bar 10 µm. See Sims 1996 pl 252 fig 9, pl 253 fig 1.
16	Eunotioid	Eunotia praerupta	100x. Scale bar 10 µm. Sternum and short striae on apices visible. Sims (1996) considers this as freshwater. Foged (1974) includes sites with pH 5.5 to 9.0 as well as a coastal lagoon. See Sims 1996 pl 98 fig 8; Foged 1994 pl V fig 7; Round et al 1990 pg 452.

Plate 7 – Araphid-Eunotioid-Epithemioid

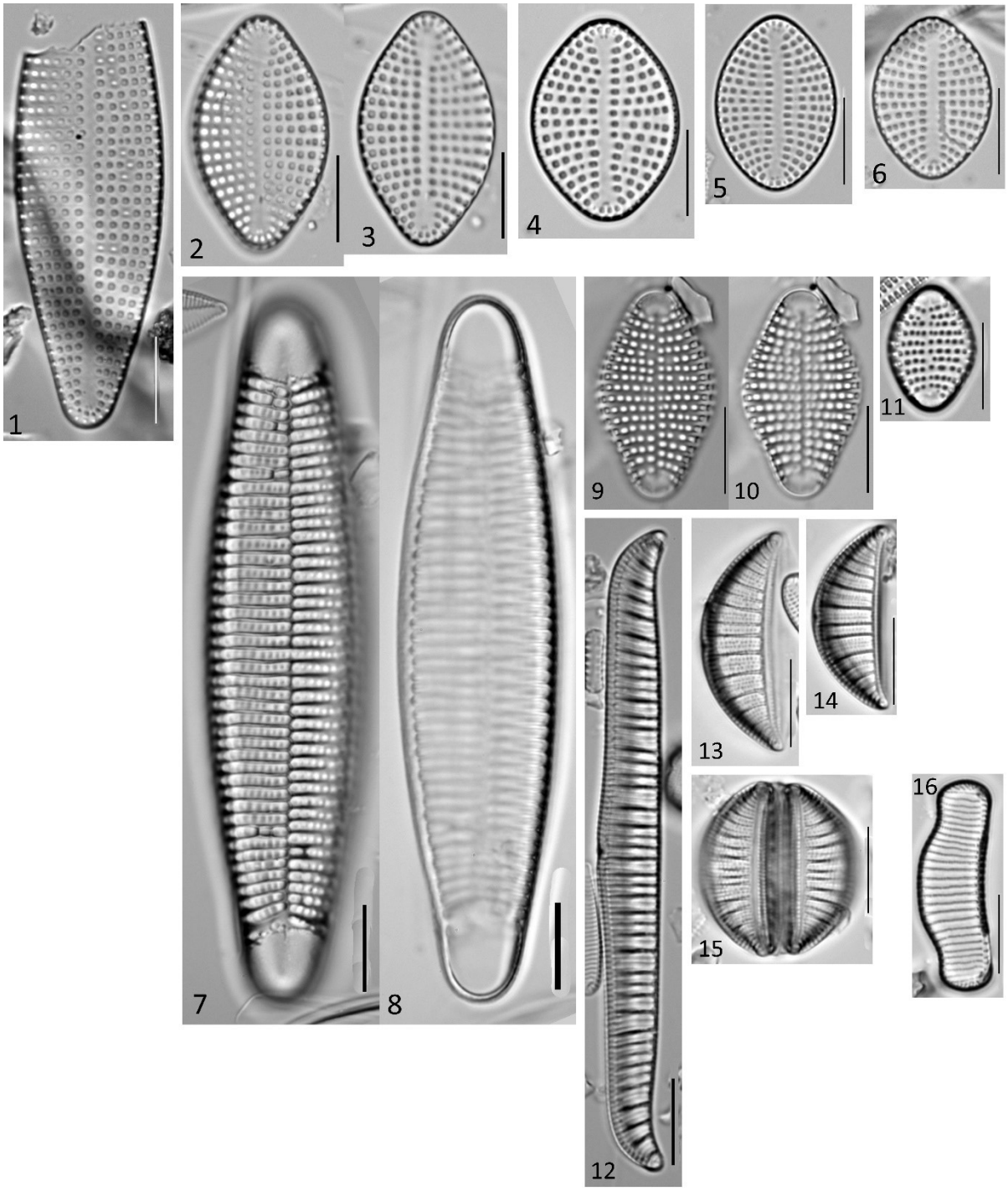


Plate 8 – Symmetric Biraphid (Climaconeis, Parlibellus, Berkeleya, Petroneis)

Key to Parlibellus Shown Here

Separated from *Navicula* by

- striae near center less dense than striae near poles
- areolae as poroids instead of lineolae
- wide central area tapering to a narrow raphe sternum toward the apices.

1. Striae continuing around end of valve. Not in this report. See Round et al 1990 and Sims 1996 … **P. delognei**

1' Striae not continuing around end of valve.

2. Valve rhombic, terminal fissures not visible, raphe curving slightly to same side of valve, possibly very short. See Sims 1996 pl 160 fig 7; Round et al 1990 pg 516 … **P. rhombicus**

2' Valve lanceolate, terminal fissures visible, raphe distinctly curving to same side of valve. See Round et al. 1990 pg 516; Sims 1996 pg 414 for species covered … **P. sp1**

4	Climaconeis undulata	100x. Scale bar 10 µm. Based name on the flat valve face, helictoglossae at the apices, proximal raphe ends simple, and apical striae continuous around apex. See Lobban et al. 2010 fig 21.
3	Climaconeis undulata	100x. Scale bar 10 µm. Based name on the flat valve face, helictoglossae at the apices, proximal raphe ends simple, and apical striae continuous around apex. See Lobban et al. 2010 fig 21.
1	Climaconeis undulata	40x, BF. Scale bar 10 µm. See Lobban et al. 2010 fig 21.
2	Climaconeis undulata	40x, BF. Scale bar 10 µm. See Lobban et al. 2010 fig 21.
9	Parlibellus rhombicus	100x. Scale bar 10 µm. Sims 1996 pl 160 fig 7.
10	Parlibellus rhombicus	100x. Scale bar 10 µm. Sims 1996 pl 160 fig 7.
11	Parlibellus rhombicus	100x. Scale bar 10 µm. Sims 1996 pl 160 fig 7.
7	Parlibellus sp1	100x. Scale bar 10 µm. See Round et al. 1990 pg 516; Sims 1996 pg 414 for species included.
8	Parlibellus sp1	100x. Scale bar 10 µm. See Round et al. 1990 pg 516; Sims 1996 pg 414 for species included.
5	Parlibellus sp1	100x. Scale bar 10 µm. See Round et al. 1990 pg 516; Sims 1996 pg 414 for species included.
6	Parlibellus sp1	100x. Scale bar 10 µm. See Round et al. 1990 pg 516; Sims 1996 pg 414 for species included.

12	Berkeleya rutilans	100x, OL, top and bottom oil. Scale bar 10 µm. See Round et al pg 518; Sims 1996 pl 34 fig 3; VanWezel (2023) groups.io/Diatom Forum image.
15	Berkeleya rutilans	100x, OL, top and bottom oil. Scale bar 10 µm. See Round l pg 518; Sims 1996 pl 34 fig 3; VanWezel (2023) groups.io/Diatom Forum image.
14	Berkeleya rutilans	100x, BF, top and bottom oil. Scale bar 10 µm. See Round et al pg 518; Sims 1996 pl 34 fig 3; VanWezel (2023) groups.io/Diatom Forum image.
16	Berkeleya rutilans	100x, OL, top and bottom oil. Scale bar 10 µm. See Round et al pg 518; Sims 1996 pl 34 fig 3; VanWezel (2023) groups.io/Diatom Forum image.
13	Berkeleya rutilans	100x, OL, top oil. Scale bar 10 µm. See Round et al pg 518; Sims 1996 pl 34 fig 3; VanWezel (2023) groups.io/Diatom Forum image.
17	Petroneis marina	100x, BF. Scale bar 10 µm. Focus on areolae along raphe sternum in black spot. See Sims 1996 pl 148 figs 9-10.

Plate 8 – Symmetric Biraphid (Climaconeis, Parlibellus, Berkeleya, Petroneis)

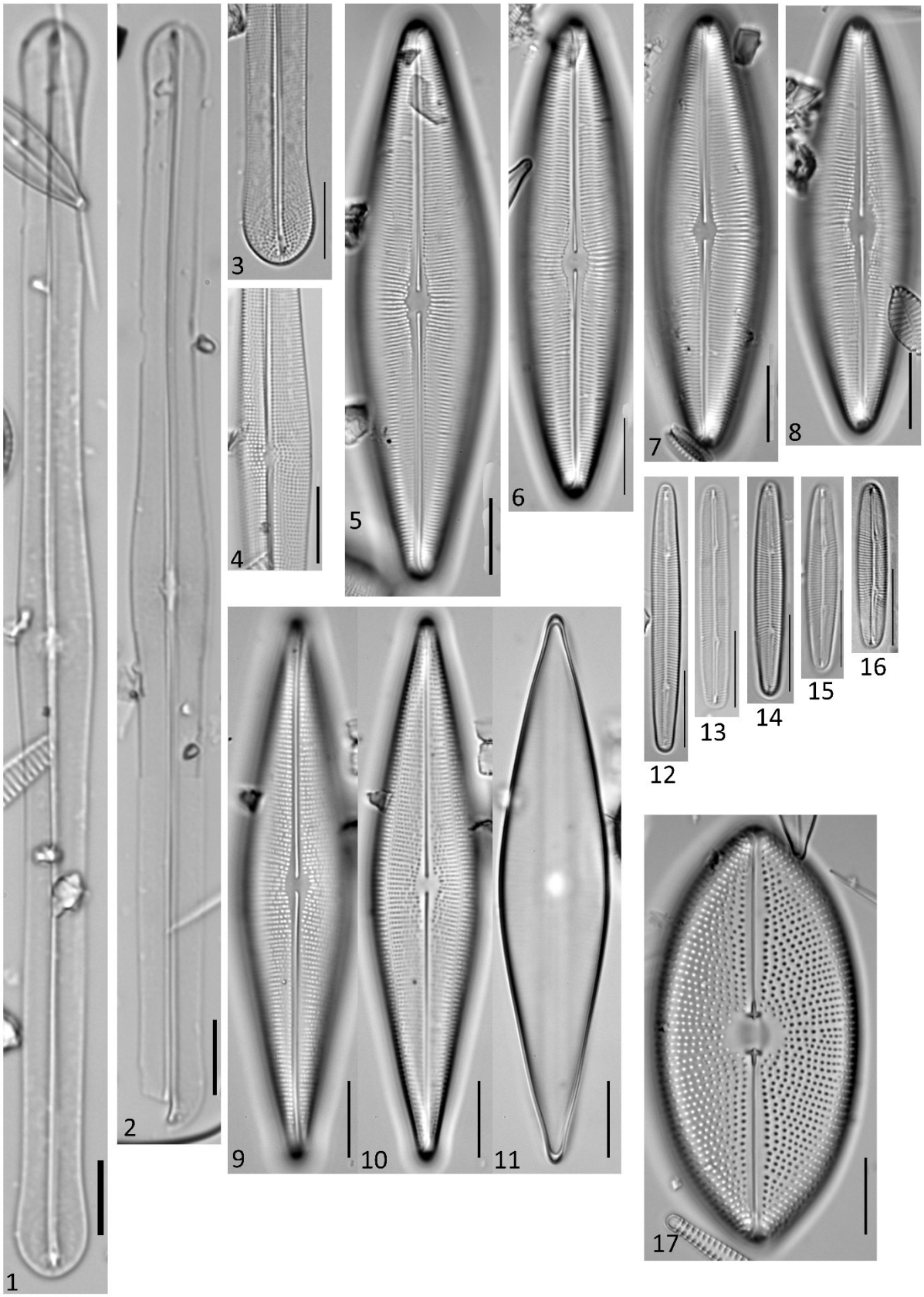


Plate 9 – Symmetric Biraphid (Diploneis)

7	Diploneis didyma	100x. Scale bar 10 µm. See Sims 1996 pl 80 fig1.
8	Diploneis didyma	100x. Scale bar 10 µm. See Sims 1996 pl 80 fig1.
6	Diploneis didyma	100x. Scale bar 10 µm. See Sims 1996 pl 80 fig1.
4	Diploneis interrupta	100x. Scale bar 10 µm. See Sims 1996 pl 83 fig 4; Pennesi et al. (2017) figs 10-16; Sullivan (2024) 2024-01-19 email.
5	Diploneis interrupta	100x. Scale bar 10 µm. See Sims 1996 pl 83 fig 4; Pennesi et al. (2017) figs 10-16; Sullivan (2024) 2024-01-19 email.
3	Diploneis interrupta	100x. Scale bar 10 µm. See Sims 1996 pl 83 fig 4; Pennesi et al. (2017) figs 10-16; Sullivan (2024) 2024-01-19 email.
2	Diploneis interrupta	100x. Scale bar 10 µm. See Sims 1996 pl 83 fig 4; Pennesi et al. (2017) figs 10-16; Sullivan (2024) 2024-01-19 email.
1	Diploneis interrupta	100x. Scale bar 10 µm. See Sims 1996 pl 83 fig 4; Pennesi et al. (2017) figs 10-16; Sullivan (2024) 2024-01-19 email.
13	Diploneis smithii	100x. Scalebar 10 µm. Internal view. See Sims 1996 pl 86 fig 6.
9	Diploneis smithii	100x. Scale bar 10 µm. White spot focus on axial canal. See Sims 1996 pl 86 fig 6.
10	Diploneis smithii	100x. Scale bar 10 µm. Black spot focus on axial canal. See Sims 1996 pl 86 fig 6.
11	Diploneis smithii	100x. Scalebar 10 µm. Up focus on valve face. See Sims 1996 pl 86 fig 6.
12	Diploneis smithii	100x. Scalebar 10 µm. Down focus on valve face. See Sims 1996 pl 86 fig 6.

Plate 9 - Symmetric Biraphid (Diploneis)

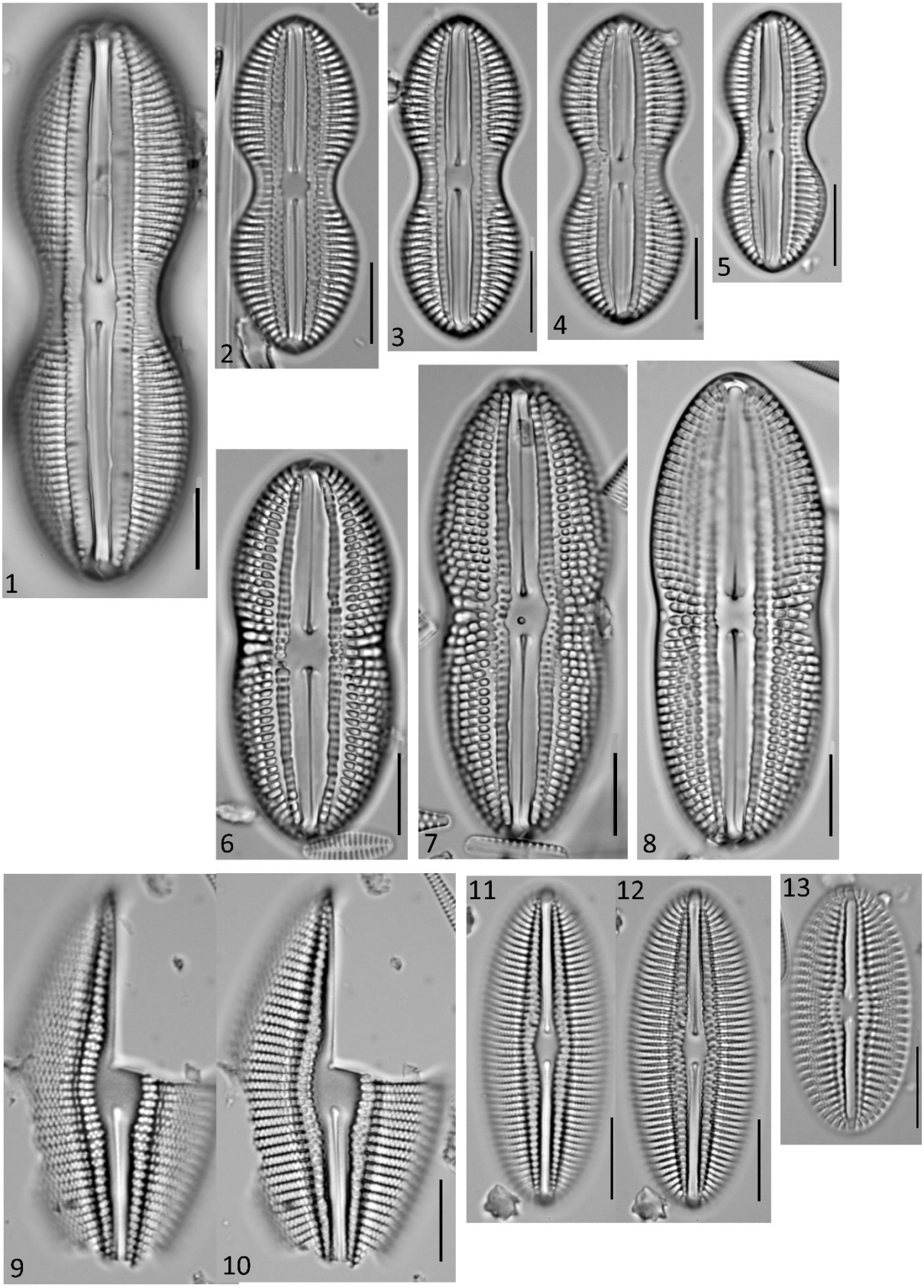


Plate 10 - Symmetric Biraphid (Fallacia)

Michael Sullivan (pers comm 2024-01-18 email) explained distinctions in LM between *Lyrella* and *Fallacia* and distinguished between the two species of *Fallacia* illustrated here. No *Lyrella* were noticed.

1. Valves large, very heavily silicified. Striae distinct with large round poroids … **Lyrella**

1' Valves usually smaller, less silicified, less coarsely areolate. In some species the margin of the conopeum is visible inside the valve margin … **Fallacia**

2. Valve narrowly elliptical. Striae 26 in 10 µm … **F. pygmaea**

2' Valve widely elliptical. Striae 19 in 10 µm … **F. forcipate**

1	Fallacia forcipata	100x. Scale bar 10 µm. See Sabbe et al 1999 figs 48-49; Sullivan 2024-01-19 email.
2	Fallacia forcipata	100x. Scale bar 10 µm. See Sabbe et al 1999 figs 48-49; Sullivan 2024-01-19 email.
3	Fallacia forcipata	100x. Scale bar 10 µm. See Sabbe et al 1999 figs 48-49; Sullivan 2024-01-19 email.
4	Fallacia forcipata	100x. Scale bar 10 µm. See Sabbe et al 1999 figs 48-49; Sullivan 2024-01-19 email.
5	Fallacia forcipata	100x. Scale bar 10 µm. See Sabbe et al 1999 figs 48-49; Sullivan 2024-01-19 email.
6	Fallacia forcipata	100x. Scale bar 10 µm. See Sabbe et al 1999 figs 48-49; Sullivan 2024-01-19 email.
7	Fallacia forcipata	100x. Scale bar 10 µm. See Sabbe et al 1999 figs 48-49; Sullivan 2024-01-19 email.
8	Fallacia forcipata	100x. Scale bar 10 µm. See Sabbe et al 1999 figs 48-49; Sullivan 2024-01-19 email.
13	Fallacia pygmaea	100x. Scale bar 10 µm. See Sabbe et al 1999 fig 50; Round et al 1990 pg 554; Sims 1996 pl 158 fig 2; Sullivan 2024-01-19 email.
11	Fallacia pygmaea	100x. Scale bar 10 µm. See Sabbe et al 1999 fig 50; Round et al 1990 pg 554; Sims 1996 pl 158 fig 2; Sullivan 2024-01-19 email.
12	Fallacia pygmaea	100x. Scale bar 10 µm. See Sabbe et al 1999 fig 50; Round et al 1990 pg 554; Sims 1996 pl 158 fig 2; Sullivan 2024-01-19 email.
9	Fallacia pygmaea	100x. Scale bar 10 µm. See Sabbe et al 1999 fig 50; Round et al 1990 pg 554; Sims 1996 pl 158 fig 2; Sullivan 2024-01-19 email.
10	Fallacia pygmaea	100x. Scale bar 10 µm. See Sabbe et al 1999 fig 50; Round et al 1990 pg 554; Sims 1996 pl 158 fig 2; Sullivan 2024-01-19 email.

Plate 10 - Symmetric Biraphid (Fallacia)

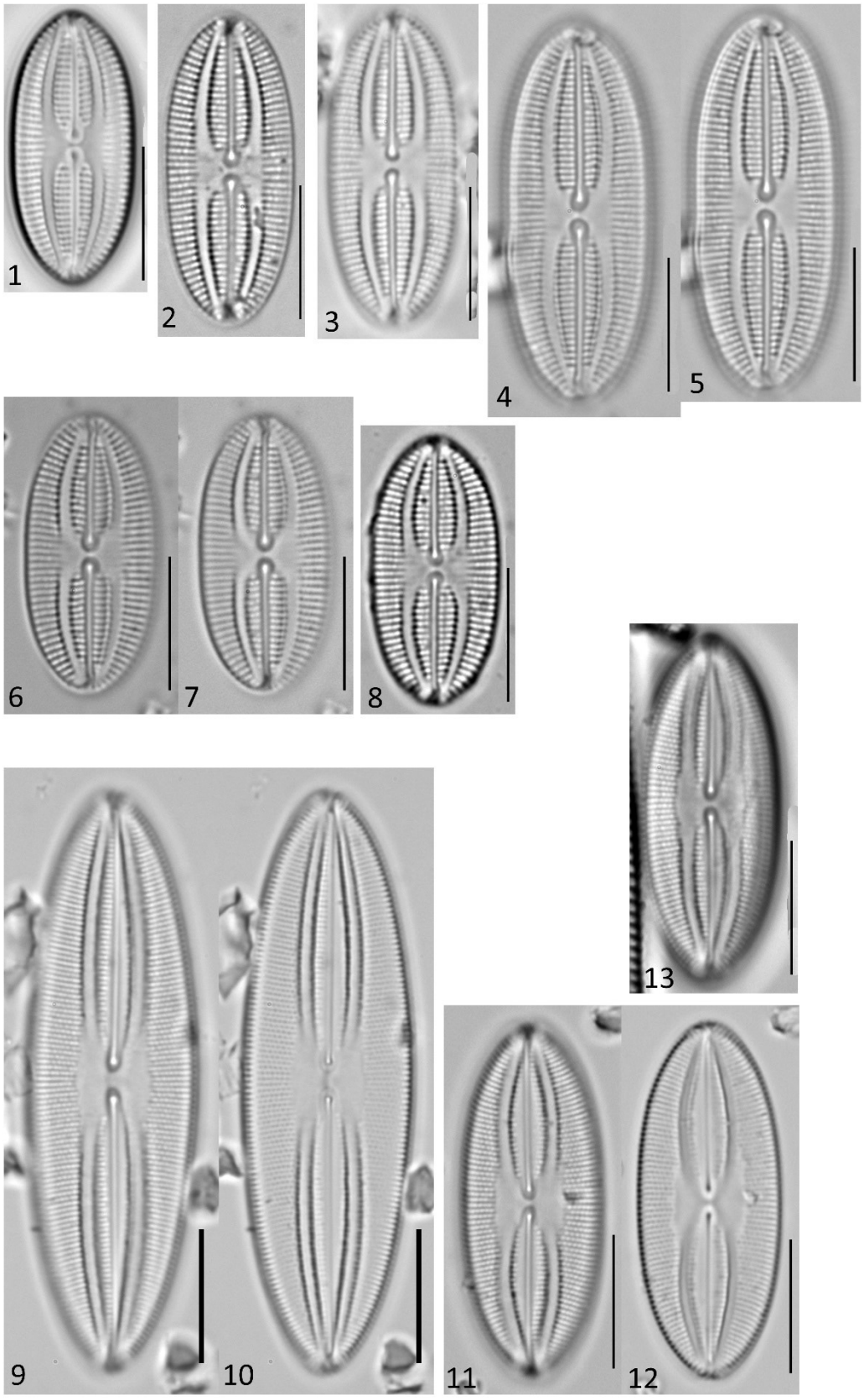


Plate 11 - Symmetric Biraphid (Mastogloia)

1	Mastogloia elliptica	100x. Scale bar 10 µm. Up focus F0 on central area. See Sims 1996 pls 124-125; Species in Spaulding et al (2023).
2	Mastogloia elliptica	100x. Scale bar 10 µm. Down focus F1. Ducts and external ports visible. See Sims 1996 pls 124-125; Species in Spaulding et al (2023).
3	Mastogloia elliptica	100x. Scale bar 10 µm. Down focus F2 on partecta. Ducts and ports visible. See Sims 1996 pls 124-125; Species in Spaulding et al (2023).
9	Mastogloia elliptica	100x. Scale bar 10 µm. See Sims 1996 pls 124-125; Species in Spaulding et al (2023).
10	Mastogloia elliptica	100x. Scale bar 10 µm. Ducts and external ports visible. See Sims 1996 pls 124-125; Species in Spaulding et al (2023).
7	Mastogloia elliptica	100x. Scale bar 10 µm. Down focus on outline. Matched best with #9449; #9220 was first image taken. See Sims 1996 pls 124-125; Species in Spaulding et al (2023).
8	Mastogloia elliptica	100x. Scale bar 10 µm. Internal view. Ducts and ports visible. See Sims 1996 pls 124-125; Species in Spaulding et al (2023).
5	Mastogloia elliptica	100x. Scale bar 10 µm. Down focus on partecta. External view. See #9347 for valve. Ducts and ports visible. See Sims 1996 pls 124-125; Species in Spaulding et al (2023).
4	Mastogloia elliptica	100x. Scale bar 10 µm. External view of valve face. See #9345 for partecta. See Sims 1996 pls 124-125; Species in Spaulding et al (2023).
6	Mastogloia elliptica	100x. Scale bar 10 µm. Top oil compare series. NA 100. Outline in #9221. See Sims 1996 pls 124-125; Species in Spaulding et al (2023).
13	Mastogloia pusilla	100x. Scale bar 10 µm. Internal. Up focus on valvocopula edge. See Sims 1996 pl 126 fig 3.
14	Mastogloia pusilla	100x. Scale bar 10 µm. Internal. Down focus on inside of valve face. See Sims 1996 pl 126 fig 3.
11	Mastogloia pusilla	100x. Scale bar 10 µm. Up focus on central area. See Sims 1996 pl 126 fig 3.
12	Mastogloia pusilla	100x. Scale bar 10 µm. Down focus on partecta. See Sims 1996 pl 126 fig 3.
17	Mastogloia pusilla	100x. Scale bar 10 µm. Up focus on valve face. See Sims 1996 pl 126 fig 3.
18	Mastogloia pusilla	100x. Scale bar 10 µm. Down focus on partecta. See Sims 1996 pl 126 fig 3.
15	Mastogloia pusilla	100x. Scale bar 10 µm. Internal. Up focus on partecta. Canals visible. See Sims 1996 pl 126 fig 3.
16	Mastogloia pusilla	100x. Scale bar 10 µm. Internal. Down focus on inside of valve face. See Sims 1996 pl 126 fig 3.

Plate 11 - Symmetric Biraphid (Mastogloia)

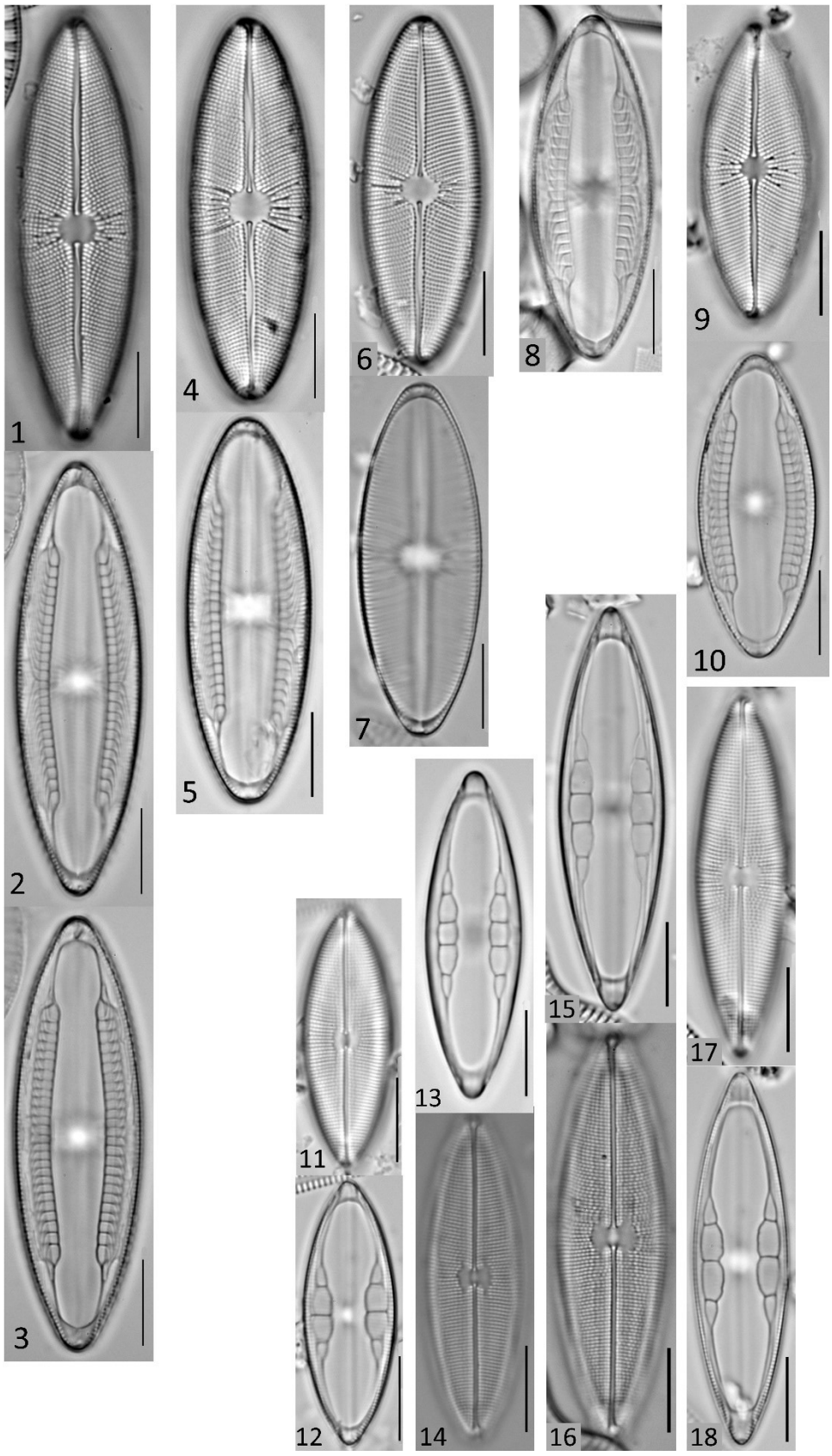


Plate 12 – Symmetric Biraphid (Gyrosigma, Metascolioneis)

1	Gyrosigma balticum	40x. Scale bar 10 µm. See Sims 1996 pl 112 fig 4.
2	Gyrosigma balticum	60x. Scale bar 10 µm. See Sims 1996 pl 112 fig 4.
3	Gyrosigma balticum	60x. Scale bar 10 µm. See Sims 1996 pl 112 fig 4.
5	Gyrosigma sp1	100x. Scale bar 10 µm. Detail of #9289.
4	Gyrosigma sp1	40x. Scale bar 10 µm. Detail in #9288.
6	Metascolioneis tumida	100x. Scale bar 10 µm. See Round et al 1990 pg 528; Sims 1996 pl 254 figs 1-3; Blanco & Wetzel 2016 pg 200 for name change.

Plate 12 – Symmetric Biraphid (Gyrosigma, Metascolioneis)

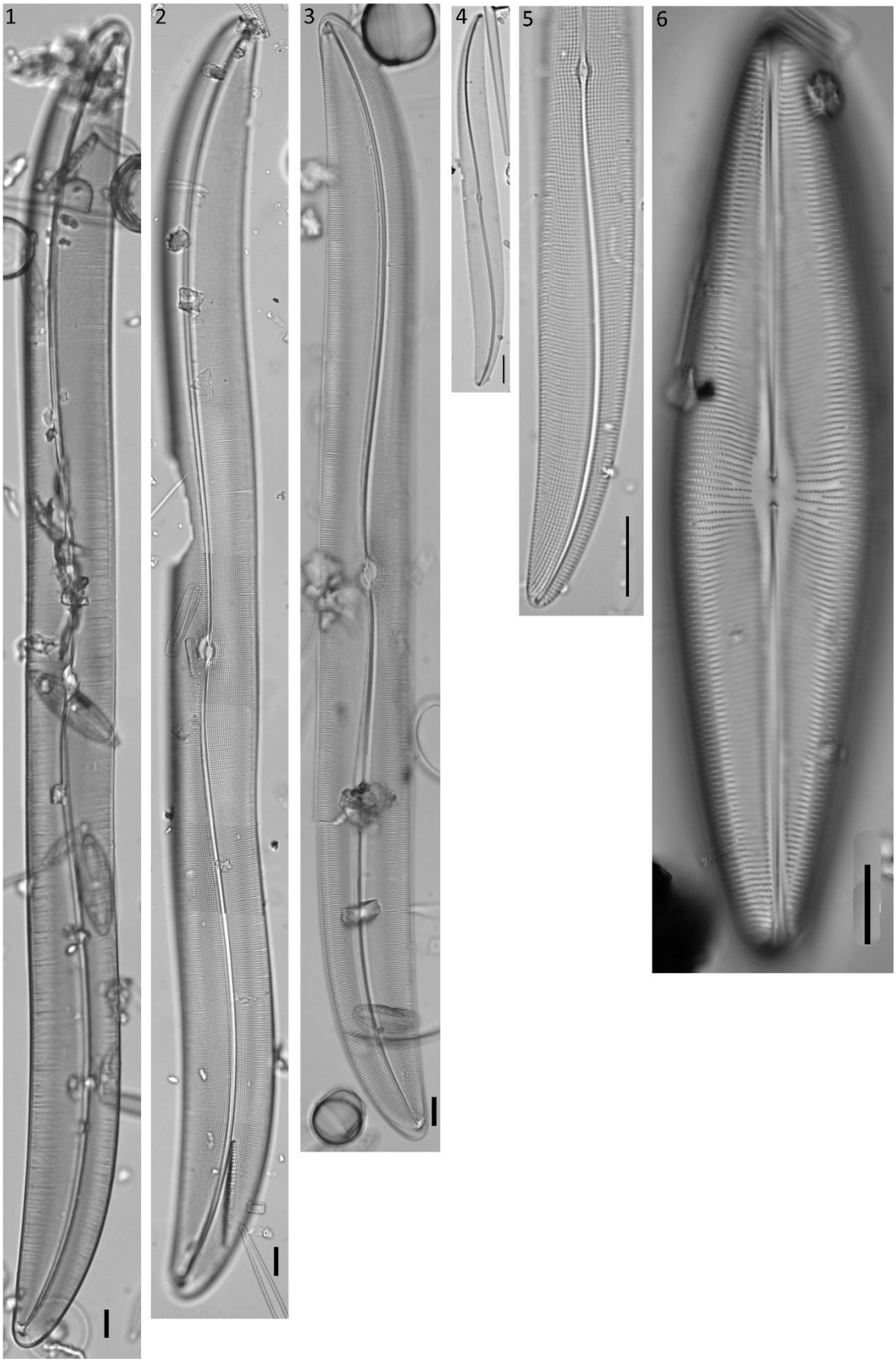


Plate 13 – Symmetric Biraphid (Navicula 1)

Key to *Navicula* Shown Here

1. Axial area widening to large rhombic area. Valve wide-lanceolate. Areolae not visible ... **N. palpebralis**

1' Axial area not widening to large rhombic area.

2. Ends not rostrate.

3. Ends rounded. Valve narrow elliptic. Central area with striae of variously alternating length like fingers. Areola visible with OL ... **N. digitoradiata**

3' Ends tapering to narrow point

4. Stria parallel

5. Central area with 3 shorter striae on each side of raphe ... **N. directa var subtilis**

5' Central area reduced and having one shorter stria. Striae wide, lineolae visible in BF … **N. sp6**

4' Striae near central area radiate.

6. Central area small with 1 shorter stria on each side of raphe ... **N. sp1**

6' Central area roughly circular.

7. Central striae of matching length on each side of raphe ... **N. sp2**

7' Central striae have uneven lengths on one side of raphe ... **N. sp3**

2' Ends rostrate

8. Valve linear. Lineolae visible ... **N. slesvicensis**

8' Valve lanceolate

9. Striae widely spaced, 3 to 5 shortened striae in central area, radiate at center and parallel at apices. Lineolae fairly large, widely spaced on the striae ... **N. hanseatica ssp hanseatica**

9' Striae more closely spaced, radiate at center and convergent at apices. Areolae appear as round dots, difficult to see in smaller specimens ... **N. sp5**

11	Navicula digitoradiata	100x. Scale bar 10 µm. See Sims 1996 fig 5.
12	Navicula digitoradiata	100x. Scale bar 10 µm. See Sims 1996 fig 5.
10	Navicula digitoradiata	100x. Scale bar 10 µm. See Sims 1996 fig 5.
13	Navicula digitoradiata	100x, OL, NA120. Scale bar 10 µm. Fragment showing lineolae. See Sims 1996 fig 5.
9	Navicula directa var subtilis	100x. Scale bar 10µm.See Sims 1996 pl 139 fig 2.
8	Navicula directa var subtilis	100x. Scale bar 10µm.See Sims 1996 pl 139 fig 2.

2	Navicula hanseatica ssp hanseatica	100x. Scale bar 10 µm. See Michael Sullivan (2023-11-26 email); protologue in Witkowski, A. et al. (1998) New and confused species in the genus Navicula. Cryptogamie, Algologie 19: 83-108; Bahls 2018 Western Canada pl 127 fig 5.
1	Navicula hanseatica ssp hanseatica	100x. Scale bar 10 µm. See Michael Sullivan (2023-11-26 email); protologue in Witkowski, A. et al. (1998) New and confused species in the genus Navicula. Cryptogamie, Algologie 19: 83-108; Bahls 2018 Western Canada pl 127 fig 5.
3	Navicula hanseatica ssp hanseatica	100x. Scale bar 10 µm. See Michael Sullivan (2023-11-26 email); protologue in Witkowski, A. et al. (1998) New and confused species in the genus Navicula. Cryptogamie, Algologie 19: 83-108; Bahls 2018 Western Canada pl 127 fig 5.
5	Navicula hanseatica ssp hanseatica	100x. Scale bar 10 µm. See Michael Sullivan (2023-11-26 email); protologue in Witkowski, A. et al. (1998) New and confused species in the genus Navicula. Cryptogamie, Algologie 19: 83-108; Bahls 2018 Western Canada pl 127 fig 5.
4	Navicula hanseatica ssp hanseatica	100x. Scale bar 10 µm. See Michael Sullivan (2023-11-26 email); protologue in Witkowski, A. et al. (1998) New and confused species in the genus Navicula. Cryptogamie, Algologie 19: 83-108; Bahls 2018 Western Canada pl 127 fig 5.
7	Navicula palpebralis	100x. Scale bar 10 µm. See Sims 1996 pl 152 fig 14.
6	Navicula palpebralis	100x. Scale bar 10 µm. See Sims 1996 pl 152 fig 14.

Plate 13 – Symmetric Biraphid (Navicula 1)

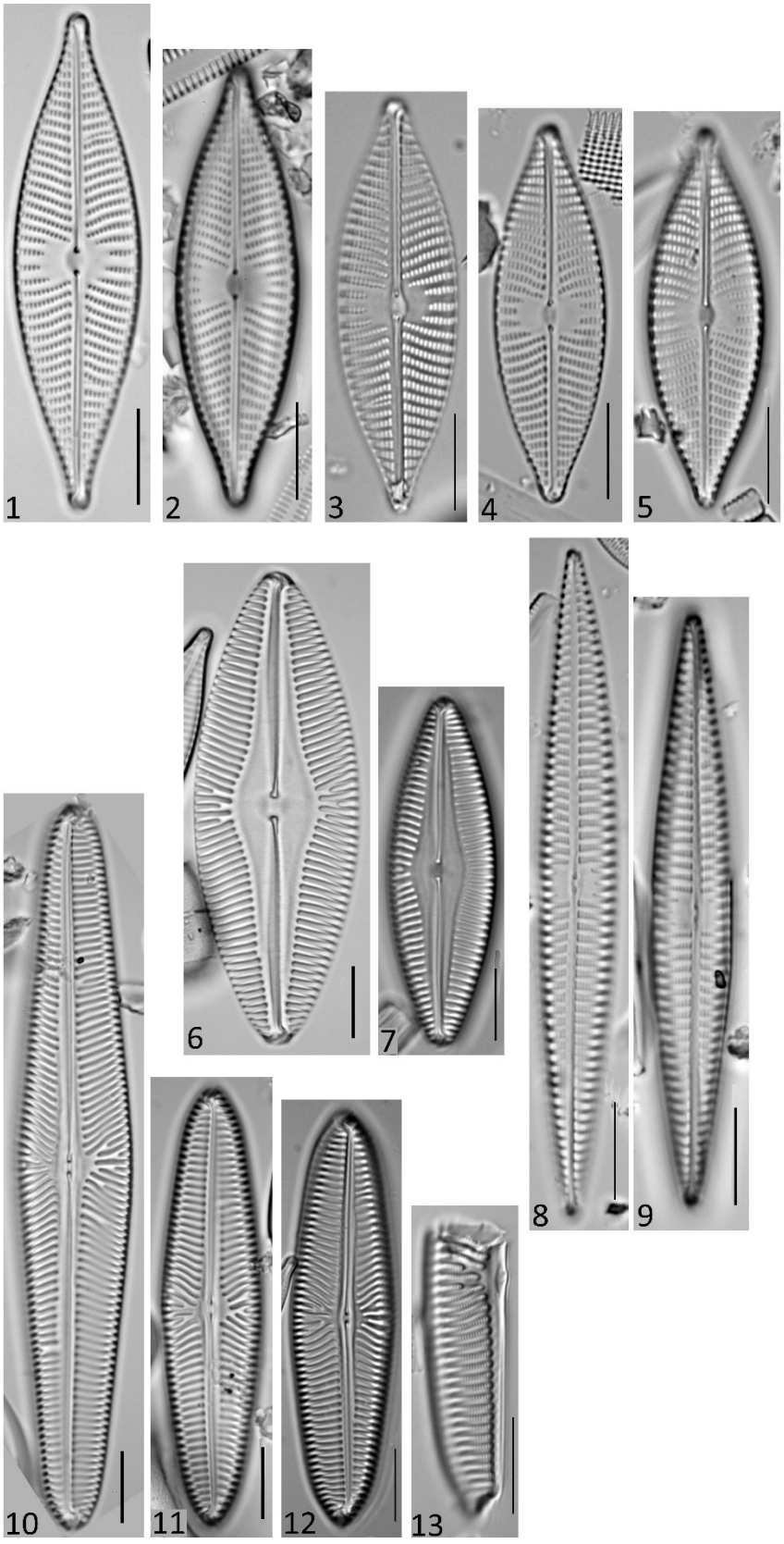


Plate 14 – Symmetric Biraphid (Navicula 2)

1	Navicula slesvicensis	100x. Scale bar 10 µm. Freshwater-marine species (AlgaeBase 2024). See Sims 1996 pl 163 fig 8; Foged 1974 pl XII fig 8 as viridula var slesvicensis; AlgaeBase.org for nomenclature.
6	Navicula sp1	100x. Scale bar 10 µm.
7	Navicula sp1	100x. Scale bar 10 µm.
5	Navicula sp1	100x. Scale bar 10 µm.
3	Navicula sp2	100x. Scale bar 10 µm.
4	Navicula sp3	100x. Scale bar 10 µm.
12	Navicula sp5	100x. Scale bar 10 µm.
13	Navicula sp5	100x. Scale bar 10 µm.
10	Navicula sp5	100x. Scale bar 10 µm.
9	Navicula sp5	100x. Scale bar 10 µm.
14	Navicula sp5	100x. Scale bar 10 µm.
8	Navicula sp5	100x. Scale bar 10 µm.
11	Navicula sp5	100x. Scale bar 10 µm.
2	Navicula sp6	100x. Scale bar 10 µm.

Plate 14 – Symmetric Biraphid (Navicula 1)

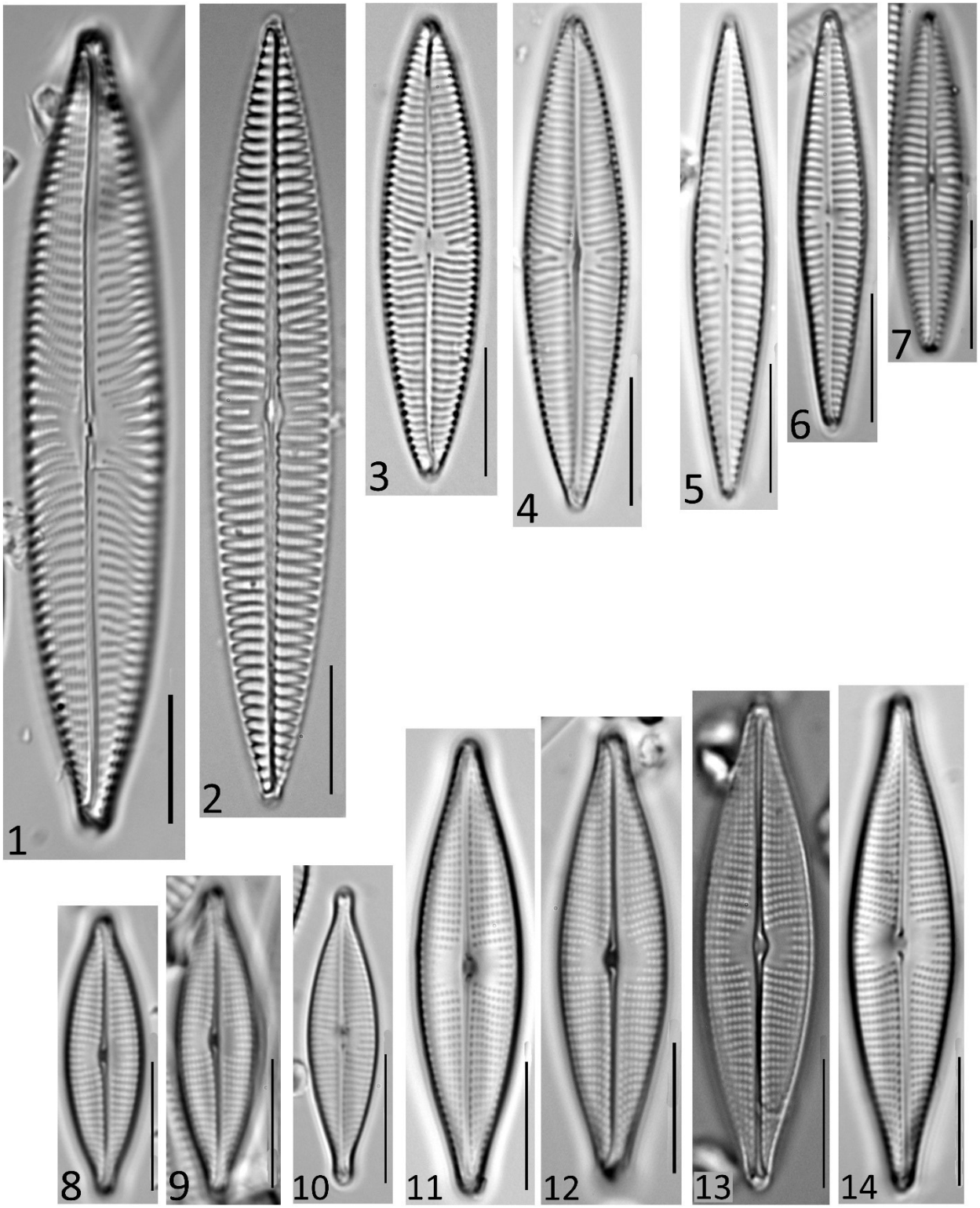


Plate 15 – Symmetric Biraphid (Scoliopleura)

Key to linear or lanceolate valves with raphe somewhat sigmoid.

1. Valve has longitudinal canal on either side of raphe sternum
   2. Proximal raphe ends turned to opposite sides. See Round et al 1990 pg 544 … **Scoliopleura**
   2' Proximal raphe ends straight, expanded. See Round et al 1990 pg 546 … **Scoliotropis**

1' Valve lacks longitudinal canals. Proximal raphe ends straight, simple. See Round et al 1990 pg 528; Blanco & Wetzel 2016 pg 200 for name change. … **Metascolioneis tumida**

2	Scoliopleura sp1	100x. Scale bar 10 µm. Full valve in #9454. See Sims 1996 pl 254 fig 5.
3	Scoliopleura sp1	100x. Scale bar 10 µm. See Sims 1996 pl 254 fig 5.
5	Scoliopleura sp1	100x. Scale bar 10 µm. A tilted valve. Focus on canal and curving mantle. See Sims 1996 pl 254 fig 5.
4	Scoliopleura sp1	100x. Scale bar 10 µm. A tilted valve. Down focus on proximal ends. See Sims 1996 pl 254 fig 5.
1	Scoliopleura sp1	60x. Scale bar 10 µm. Two image stitch. Detail in #9227. See Sims 1996 pl 254 fig 5.

Plate 15 – Symmetric Biraphid (Scoliopleura)

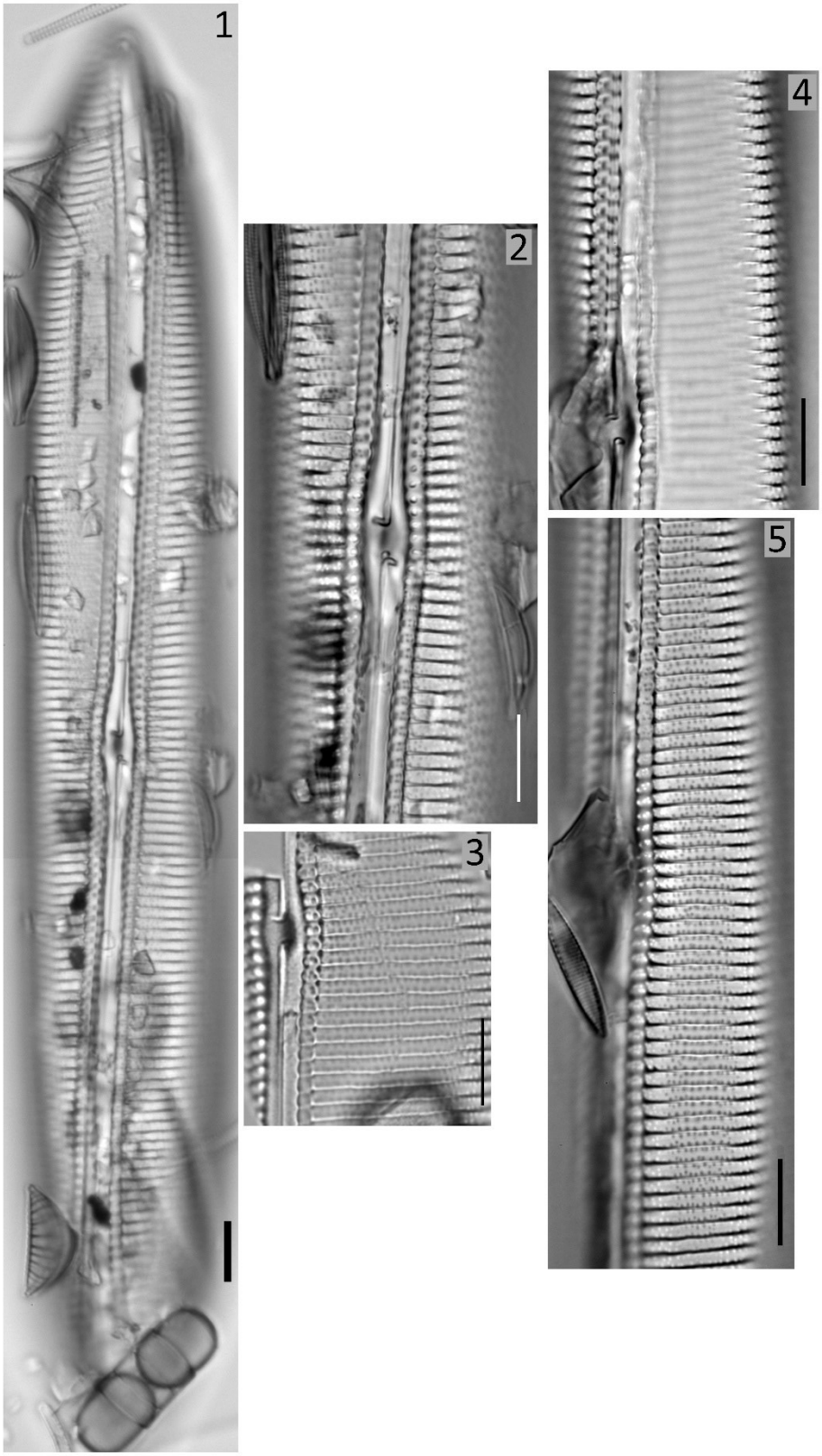


Plate 16 - Symmetric Biraphid (Sellaphora, Stauroneis, Staurophora, Caloneis)

Forms with transapical hyaline central areas. Characters from Round et al 1990.

1. Valve panduriform, ends rounded. Stauros narrow. Proximal raphe ends strongly expanded, often deflected toward one side. Plastids 2, one against each side of girdle … **Stauroneis**

1' Valve linear or lanceolate.

2. Valve rostrate. External proximal raphe ends bordered by lips and lying in a groove. Plastid 1, against one side of girdle … **Staurophora**

2' Valve ends broadly rounded, sometimes slightly rostrate. Areolae visible in LM … **Sellaphora**

2	Caloneis liber	100x. Scale bar = 10 µm. See Sims 1996 pl 43 fig 1.
1	Caloneis subsalina	100x. Scale bar = 10 µm. See Sims 1996 pl 46 fig 3.
5	Sellaphora pupula	100x. Scale bar 10 µm. See Round et al. 1990 pg 552; Sims 1996 pl 157 figs 7-13.
4	Sellaphora pupula	100x. Scale bar 10 µm. See Round et al. 1990 pg 552; Sims 1996 pl 157 figs 7-13.
3	Sellaphora pupula	100x. Scale bar 10 µm. See Round et al. 1990 pg 552; Sims 1996 pl 157 figs 7-13.
6	Stauroneis constricta	100x, OL. Scale bar 10 µm. Internal. Up focus on proximal raphe ends. See Sims (1996) pl 257 fig 2.
7	Stauroneis constricta	100x, OL. Scale bar 10 µm. Down focus on raphe sternum and striae. See Sims (1996) pl 257 fig 2.
8	Staurophora salina	100x. Scale bar 10 µm. External proximal raphe ends appear to by bordered by lips. See Round et al 1990 pg 482; Sims 1996 pl 260 pl 6-7.

Plate 16 - Symmetric Biraphid (Sellaphora, Stauroneis, Staurophora, Caloneis)

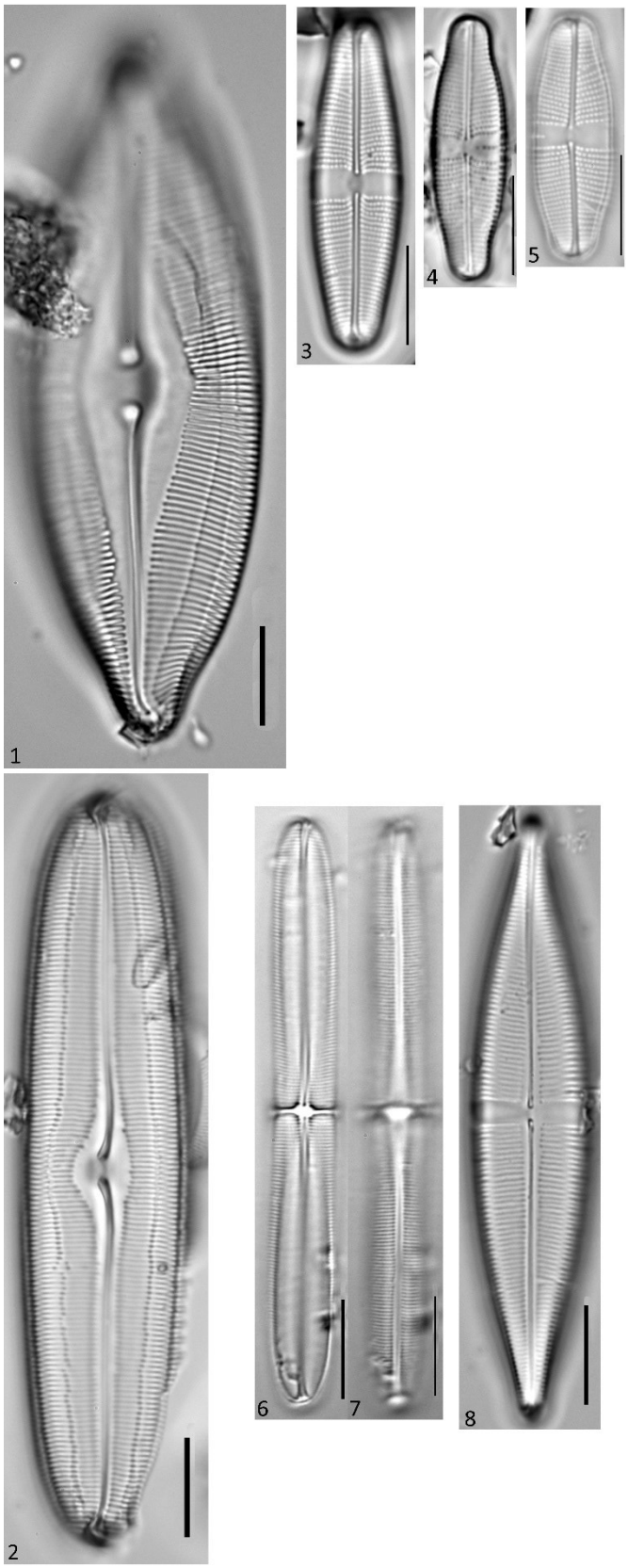


Plate 17 – Monoraphid (Achnanthes, Cocconeis)

1	Achnanthes brevipes	100x. Scale bar 10 µm. External view of raphous valve. Up focus on apices. See Sims 1996 pl 1 fig 12.
2	Achnanthes brevipes	100x. Scale bar 10 µm. External view of raphous valve. Down focus on proximal raphe ends. See Sims 1996 pl 1 fig 12.
3	Achnanthes brevipes	100x. Scale bar 10 µm. External view of raphous valve. Middle focus with apices (higher) in black spot and proximal raphe ends (lower) in white spot. See Sims 1996 pl 1 fig 12.
5	Achnanthes brevipes	100x. Scale bar 10 µm. External view of araphous valve. Down focus on little points at apices. Center is arched higher. See Sims 1996 pl 1 fig 12.
4	Achnanthes brevipes	60x COL NA080. Scale bar 10 µm. Araphous valve. See Sims 1996 pl 1 figs 5-11.
6	Achnanthes delicatula	100x. Scale bar 10 µm. Up focus on araphous valve. See Sims 1996 pl 2 fig 15.
7	Achnanthes delicatula	100x. Scale bar 10 µm. Down focus on raphous valve. See Sims 1996 pl 2 fig 15.
10	Achnanthes delicatula	100x. Scale bar 10 µm. Raphous valve. See Sims 1996 pl 2 fig 15.
11	Achnanthes delicatula	100x. Scale bar 10 µm. Araphous valve. See Sims 1996 pl 2 fig 15.
8	Achnanthes delicatula	100x. Scale bar 10 µm. Up focus on araphous valve. See Sims 1996 pl 2 fig 15.
9	Achnanthes delicatula	100x. Scale bar 10 µm. Down focus on raphous valve. See Sims 1996 pl 2 fig 15.
12	Achnanthes sp1	100x. Scale bar 10 µm. See Round et al 1990.
13	Cocconeis pinnata	100x. Scale bar 10 µm. External view. Up focus. See Sims 1996 pl 53 fig 3.
14	Cocconeis pinnata	100x. Scale bar 10 µm. External view. Middle focus. See Sims 1996 pl 53 fig 3.
15	Cocconeis pinnata	100x. Scale bar 10 µm. External view. Down focus. See Sims 1996 pl 53 fig 3.
17	Cocconeis scutellum	100x. Scale bar 10 µm. Rapheless valve. See Sims 1996 pl 55 fig 9.
18	Cocconeis scutellum	100x. Scale bar 10 µm. Rapheless valve. See Sims 1996 pl 55 fig 9.
16	Cocconeis scutellum	100x. Scale bar 10 µm. Rapheless valve. See Sims 1996 pl 55 fig 9.

Plate 17 - Monoraphid (Achnanthes, Cocconeis)

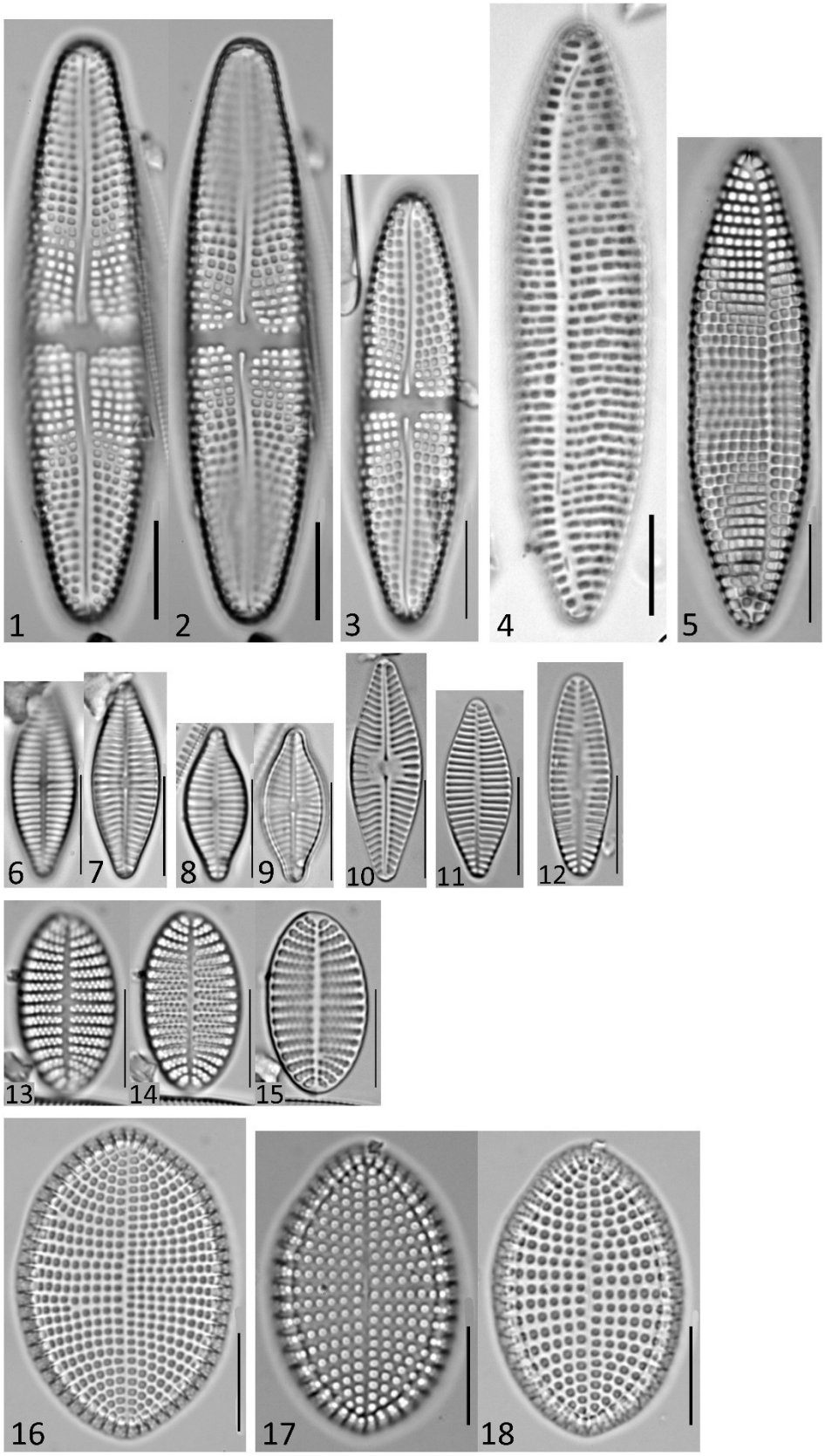


Plate 18 – Asymmetric Biraphid (Amphora)

Key to These Amphora

1. Cingula with large areolae on dorsal girdle bands appearing in LM as granules. See Sims 1996 pl 18 fig 5; Round et al 1990 pg 602 figs m,n ... **A. exigua**

1' Cingula without large areolae on dorsal girdle bands.

2. Axial line visible on dorsal side of raphe (may be edge of conopeum). See Round et al 1990 pg 601 figs a-f; Sims 1996 pl 21 fig 8 ... **A. ovalis**

2' Dorsal fascia distinct. See species on DONA; Round et al 1990 pg fig g; Sims 1996 pl 16 fig 10 ... **A. copulata**

8	Amphora copulata	100x. Scale bar 10 µm. Down focus on proximal ends. See Species in Spaulding et al (2023); Round et al 1990 pg fig g; Sims 1996 pl 16 fig 10.
6	Amphora copulata	100x. Scale bar 10 µm. Down focus on outline. See Species in Spaulding et al (2023); Round et al 1990 pg fig g; Sims 1996 pl 16 fig 10.
7	Amphora copulata	100x. Scale bar 10 µm. Middle focus on distal raphe ends. See Species in Spaulding et al (2023); Round et al 1990 pg fig g; Sims 1996 pl 16 fig 10.
9	Amphora copulata	100x. Scale bar 10 µm. Whole frustule, view of ventral side of valves. See Species in Spaulding et al (2023); Round et al 1990 pg 601 fig g; Sims 1996 pl 16 fig 10.
10	Amphora exigua	100x. Scale bar 10 µm. Whole frustule, ventral side uppermost. Up focus on proximal ends. Cingula with large areolae on dorsal girdle bands appearing in LM as granules. See Sims 1996 pl 18 fig 5; Round et al 1990 pg 602 figs m,n.
11	Amphora exigua	100x. Scale bar 10 µm. Whole frustule, ventral side uppermost. Middle focus on central outline. Cingula with large areolae on dorsal girdle bands appearing in LM as granules. See Sims 1996 pl 18 fig 5; Round et al 1990 pg 602 figs m,n.
12	Amphora exigua	100x. Scale bar 10 µm. Whole frustule, ventral side uppermost. Down focus on dorsal areolae. Cingula with large areolae on dorsal girdle bands appearing in LM as granules. See Sims 1996 pl 18 fig 5; Round et al 1990 pg 602 figs m,n.
4	Amphora ovalis	100x. Scale bar 10 µm. Internal. Up focus on outline. See Round et al 1990 pg 601 figs a-f; Sims 1996 pl 21 fig 8.
5	Amphora ovalis	100x. Scale bar 10 µm. Down focus on proximal raphe ends and apical line. See Round et al 1990 pg 601 figs a-f; Sims 1996 pl 21 fig 8.
1	Amphora ovalis	100x. Scale bar 10 µm. Down focus on proximal raphe ends. 100x. Internal. Up focus on outine. See Round et al 1990 pg 601 figs a-f; Sims 1996 pl 21 fig 8.
2	Amphora ovalis	100x. Scale bar 10 µm. Internal. Down focus on proximal raphe ends. See Round et al 1990 pg 601 figs a-f; Sims 1996 pl 21 fig 8.
3	Amphora ovalis	100x. Scale bar 10 µm. External. Low focus on striae. See Round et al 1990 pg 601 figs a-f; Sims 1996 pl 21 fig 8.

Plate 18 – Asymmetric Biraphid (Amphora)

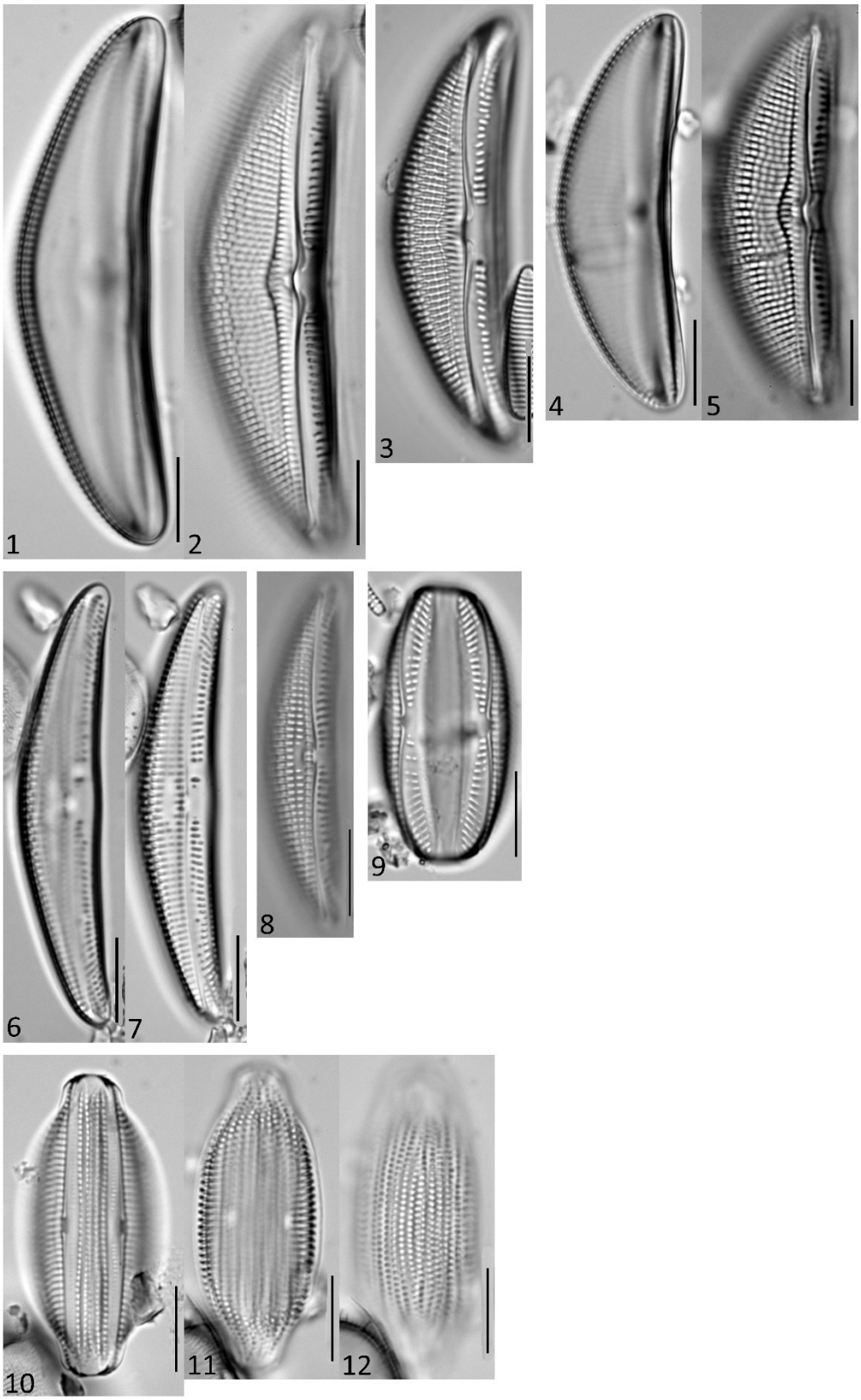


Plate 19 – Nitzschioid (Nitzschia)

Key to Nitzschia Species Included Here

1. Valve sigmoid in valve view, girdle view, or in both views … **N. sigma**
1' Valve not sigmoid.
   2. Valve lanceolate with rostrate apices … **N. vitrea**
   2' Valve acicular (with a needle shape).
      3. Raphe canal follows the valve outline for entire length. Central nodule not visible … **N. sp2**
      3'. Raphe canal follows the valve outline curving slightly onto the valve face at the central nodule. Small hyaline area on the valve face adjacent to the central nodule … **N. sp1**

10	Nitzschia sigma	100x. Scale bar 10 µm. Girdle view. Focus on apex. See Sims 1996 pl 190.
7	Nitzschia sigma	60x. Scale bar 10 µm. Girdle view. See Sims 1996 pl 190.
8	Nitzschia sigma	100x, OL, NA120. Scale bar 10 µm. Valve view. T+B oil. Focus on striae. See Sims 1996 pl 190 figs 1-6.
9	Nitzschia sigma	100x, BF, NA100. Scale bar 10 µm. Valve view. T+B oil. Focus on striae (35 in 10 µm). See Sims 1996 pl 190 figs 1-6.
6	Nitzschia sigma	60x COL NA080. Scale bar 10 µm. Valve view. See Sims 1996 pl 190 figs 1-6.
5	Nitzschia sp1	100x. Scale bar 10 µm. Raphe canal follows the valve outline, curving slightly onto the valve face at the central nodule. Small hyaline area on the valve face adjacent to the central nodule.
4	Nitzschia sp1	100x. Scale bar 10 µm. Stitch of #9244 to 9247. Raphe canal follows the valve outline, curving slightly onto the valve face at the central nodule. Small hyaline area on the valve face adjacent to the central nodule.
2	Nitzschia sp2	100x. Scale bar 10 µm. Valve view of apex. Detail of 9416-9418. Raphe canal follows the valve outline for entire length. Central nodule not visible.
3	Nitzschia sp2	100x. Scale bar 10 µm. Valve view near center. Detail of 9416-9418. Raphe canal follows the valve outline for entire length. Central nodule not visible.
1	Nitzschia sp2	60x. Scale bar 10 µm. Stitch of 9415 to 9418. Raphe canal follows the valve outline for entire length. Central nodule not visible.
11	Nitzschia vitrea	100x. Scale bar 10 µm. Valve lanceolate with rostrate apices. See Sims 1996 pl 193 fig 5.

Plate 19 – Nitzschioid (Nitzschia)

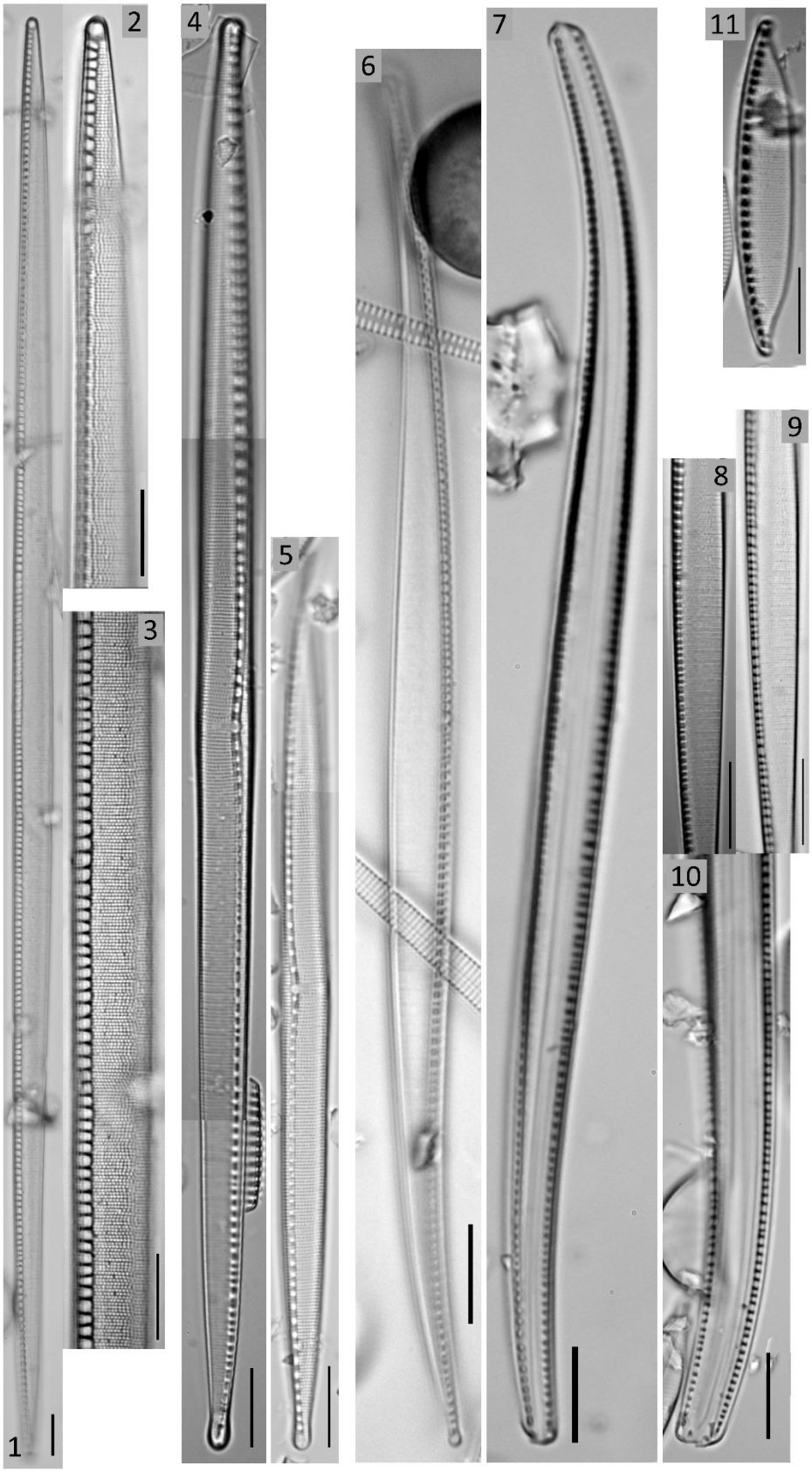


Plate 20 – Nitzschioid (Tryblionella 1)

Nitzschioid Forms With Undulate Valve Faces

1. Areolae large. Outline lanceolate to linear-lanceolate. Ends slightly apiculate to cuneate. (Sims 1996 pl 182 fig 4-5) *Tryblionella granulata* has less dense areolae and rounder apices (Spaulding et al 2023) ... **T. punctata**

1' Areolae small or not visible

2. Areolae small. Outline panduriform ... **T. coarctata**

2' Areolae not visible

3. Costae wide, irregularly spaced, continuous across valve (Sims 1996 pl 185 fig 12-13) ... **T. levidensis**

3' Costae narrow, evenly spaced (these are the striae). Valve with longitudinal hyaline area. Outline may be linear and lacking central nodule or panduriform and having a central nodule. (Sims 1996 pl 180 fig 4-6) … **T. acuminata**

3	Tryblionella acuminata	100x. Scale bar 10 µm. Striae narrow, evenly spaced, appearing as costae, interrupted by a sternum. Areolae not visible. Valve linear and lacking central nodule or panduriform and having a central nodule. See Sims 1996 pl 180 fig 4-6; Round et al 1990 pg 614.
4	Tryblionella acuminata	100x. Scale bar 10 µm. Striae narrow, evenly spaced, appearing as costae, interrupted by a sternum. Areolae not visible. Valve linear and lacking central nodule or panduriform and having a central nodule. See Sims 1996 pl 180 fig 4-6; Round et al 1990 pg 614.
2	Tryblionella acuminata	100x. Scale bar 10 µm. Striae narrow, evenly spaced, appearing as costae, interrupted by a sternum. Areolae not visible. Valve linear and lacking central nodule or panduriform and having a central nodule. See Sims 1996 pl 180 fig 4-6; Round et al 1990 pg 614.
6	Tryblionella acuminata	100x. Scale bar 10 µm. Striae narrow, evenly spaced, appearing as costae, interrupted by a sternum. Areolae not visible. Valve linear and lacking central nodule or panduriform and having a central nodule. See Sims 1996 pl 180 fig 4-6; Round et al 1990 pg 614.
1	Tryblionella acuminata	100x. Scale bar 10 µm. Striae narrow, evenly spaced, appearing as costae, interrupted by a sternum. Areolae not visible. Valve linear and lacking central nodule or panduriform and having a central nodule. See Sims 1996 pl 180 fig 4-6; Round et al 1990 pg 614.
5	Tryblionella acuminata	100x. Scale bar 10 µm. Striae narrow, evenly spaced, appearing as costae, interrupted by a sternum. Areolae not visible. Valve linear and lacking central nodule or panduriform and having a central nodule. See Sims 1996 pl 180 fig 4-6; Round et al 1990 pg 614.
8	Tryblionella coarctata	100x. Scale bar 10 µm. See Sims 1996 pl 182 fig 3.
7	Tryblionella coarctata	100x. Scale bar 10 µm. See Sims 1996 pl 182 fig 3.
9	Tryblionella coarctata	100x. Scale bar 10 µm. See Sims 1996 pl 182 fig 3.

Plate 20 – Nitzschioid (Tryblionella 1)

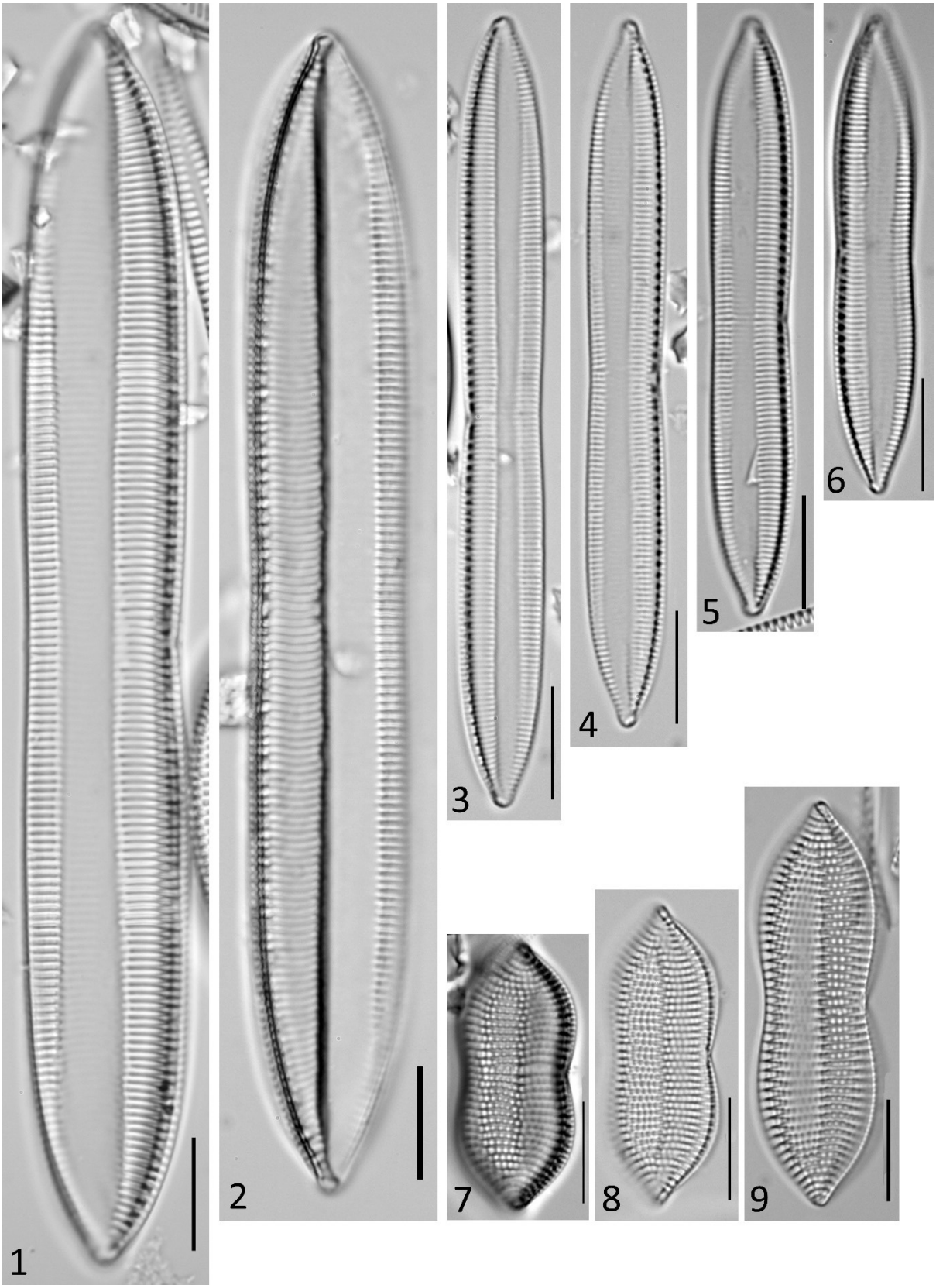


Plate 21 – Nitzschioid (Tryblionella 2)

13	Tryblionella levidensis	100x. Scale bar 10 µm. Focus on raphe. Costae wide, irregularly spaced, continuous across valve. Areolae not visible. See Sims 1996 pl 185 fig 12-13.
12	Tryblionella levidensis	100x. Scale bar 10 µm. Costae wide, irregularly spaced, continuous across valve. Areolae not visible. See Sims 1996 pl 185 fig 12-13.
7	Tryblionella punctata	100x. Scale bar 10 µm. Focus on fibulae on raphe side. Areolae large. Outline lanceolate to linear-lanceolate. Ends slightly apiculate to cuneate (Sims 1996 pl 182 fig 4-5). T. granulata has less dense areolae and rounder apices (Spaulding et al 2023).
8	Tryblionella punctata	100x. Scale bar 10 µm. Up focus on fold. Areolae large. Outline lanceolate to linear-lanceolate. Ends slightly apiculate to cuneate (Sims 1996 pl 182 fig 4-5). T. granulata has less dense areolae and rounder apices (Spaulding et al 2023).
9	Tryblionella punctata	100x. Scale bar 10 µm. Down focus on apices. Areolae large. Outline lanceolate to linear-lanceolate. Ends slightly apiculate to cuneate (Sims 1996 pl 182 fig 4-5). T. granulata has less dense areolae and rounder apices (Spaulding et al 2023).
4	Tryblionella punctata	100x. Scale bar 10 µm. Focus on raphe edge. Areolae large. Outline lanceolate to linear-lanceolate. Ends slightly apiculate to cuneate (Sims 1996 pl 182 fig 4-5). T. granulata has less dense areolae and rounder apices (Spaulding et al 2023).
1	Tryblionella punctata	100x. Scale bar 10 µm. Down focus on raphe. Areolae large. Outline lanceolate to linear-lanceolate. Ends slightly apiculate to cuneate (Sims 1996 pl 182 fig 4-5). T. granulata has less dense areolae and rounder apices (Spaulding et al 2023).
2	Tryblionella punctata	100x. Scale bar 10 µm. Up focus on raphe. Areolae large. Outline lanceolate to linear-lanceolate. Ends slightly apiculate to cuneate (Sims 1996 pl 182 fig 4-5). T. granulata has less dense areolae and rounder apices (Spaulding et al 2023).
3	Tryblionella punctata	100x. Scale bar 10 µm. Down focus on side opposite raphe. Areolae large. Outline lanceolate to linear-lanceolate. Ends slightly apiculate to cuneate (Sims 1996 pl 182 fig 4-5). T. granulata has less dense areolae and rounder apices (Spaulding et al 2023).
5	Tryblionella punctata	100x. Scale bar 10 µm. Up focus on raphe. Areolae large. Outline lanceolate to linear-lanceolate. Ends slightly apiculate to cuneate (Sims 1996 pl 182 fig 4-5). T. granulata has less dense areolae and rounder apices (Spaulding et al 2023).
6	Tryblionella punctata	100x. Scale bar 10 µm. Down focus on side opposite raphe. Areolae large. Outline lanceolate to linear-lanceolate. Ends slightly apiculate to cuneate (Sims 1996 pl 182 fig 4-5). T. granulata has less dense areolae and rounder apices (Spaulding et al 2023).
10	Tryblionella punctata	100x. Scale bar 10 µm. Down focus on raphe. Areolae large. Outline lanceolate to linear-lanceolate. Ends slightly apiculate to cuneate (Sims 1996 pl 182 fig 4-5). T. granulata has less dense areolae and rounder apices. Species in Spaulding et al (2023).
11	Tryblionella punctata	100x. Scale bar 10 µm. Up focus on upper curve. Areolae large. Outline lanceolate to linear-lanceolate. Ends slightly apiculate to cuneate (Sims 1996 pl 182 fig 4-5). T. granulata has less dense areolae and rounder apices (Spaulding et al 2023).

Plate 21 – Nitzschioid (Tryblionella 2)

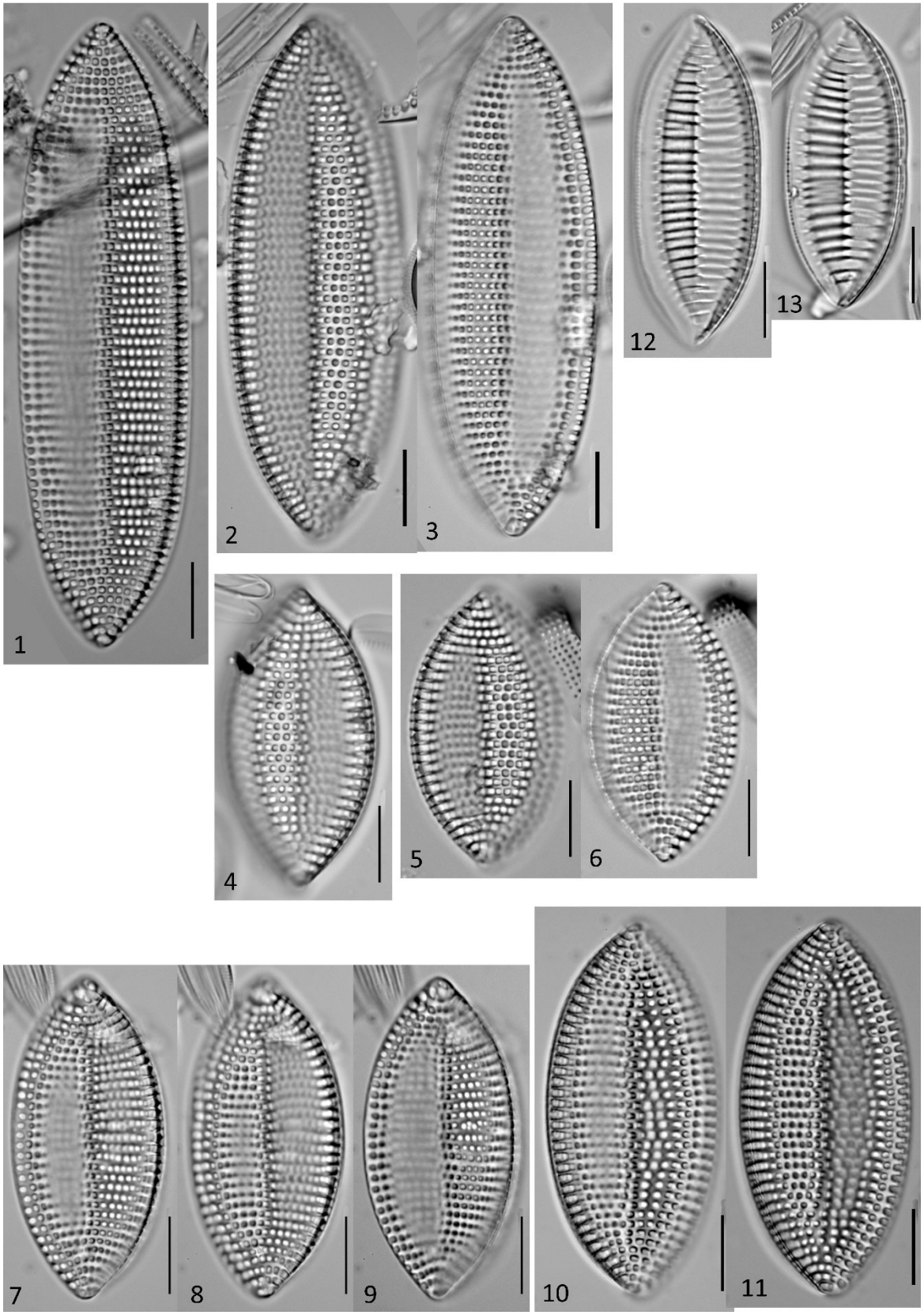


Plate 22 – Surirelloid (Entomoneis)

1	Entomoneis paludosa	100x. Scale bar 10 µm. See Sims 1996 pl 13 fig 2.
3	Entomoneis paludosa	100x. Scale bar 10 µm. See Sims 1996 pl 13 fig 2.
4	Entomoneis paludosa	100x. Scale bar 10 µm. Up focus on crest. See Sims 1996 pl 13 fig 2.
5	Entomoneis paludosa	100x. Scale bar 10 µm. Mid focus on proximal raphe ends. See Sims 1996 pl 13 fig 2.
6	Entomoneis paludosa	100x. Scale bar 10 µm. Down focus on valve margin. See Sims 1996 pl 13 fig 2.
2	Entomoneis paludosa	100x. Scale bar 10 µm. Focus on distal raphe ends. See Sims 1996 pl 13 fig 2.

Plate 22 – Surirelloid (Entomoneis)

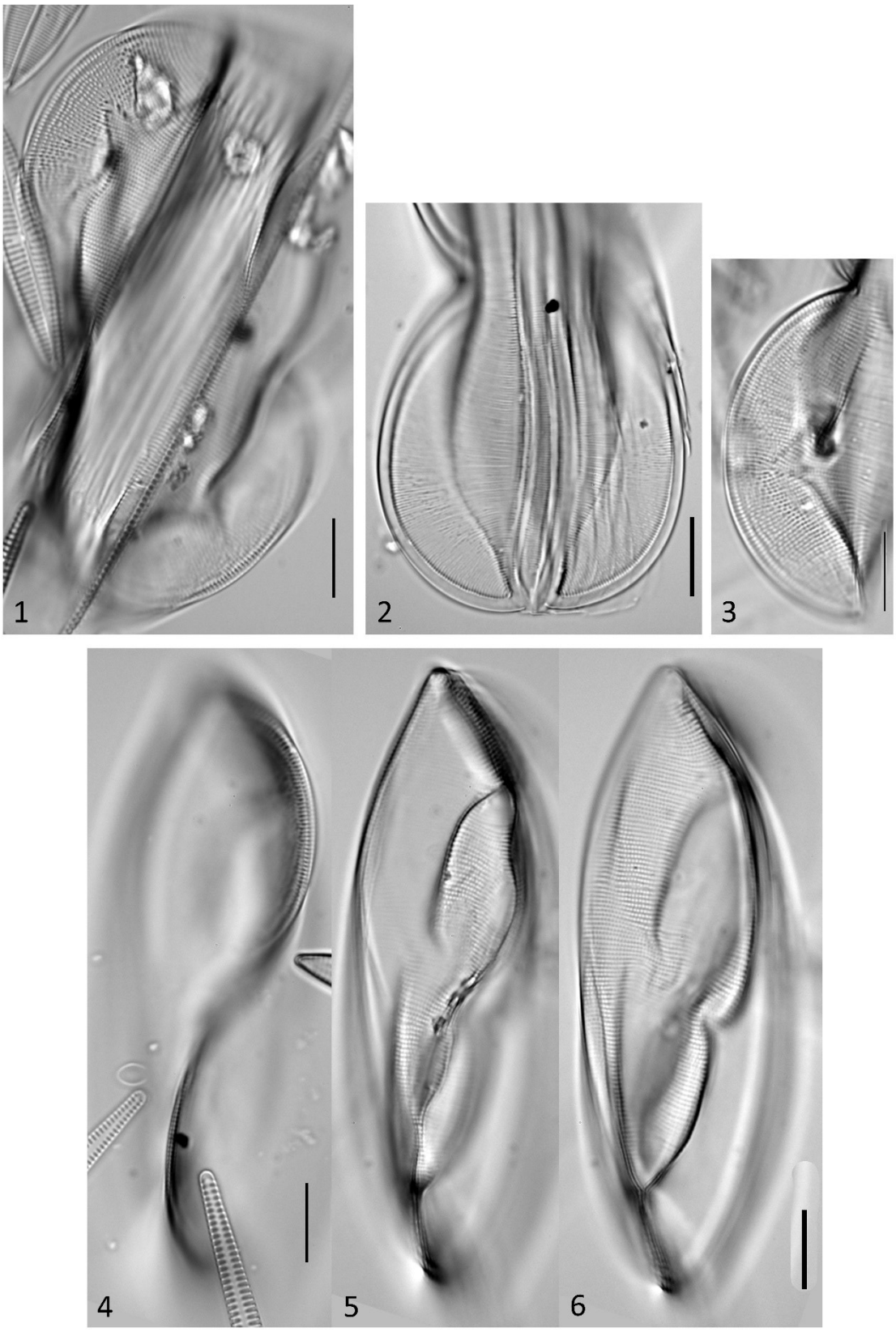
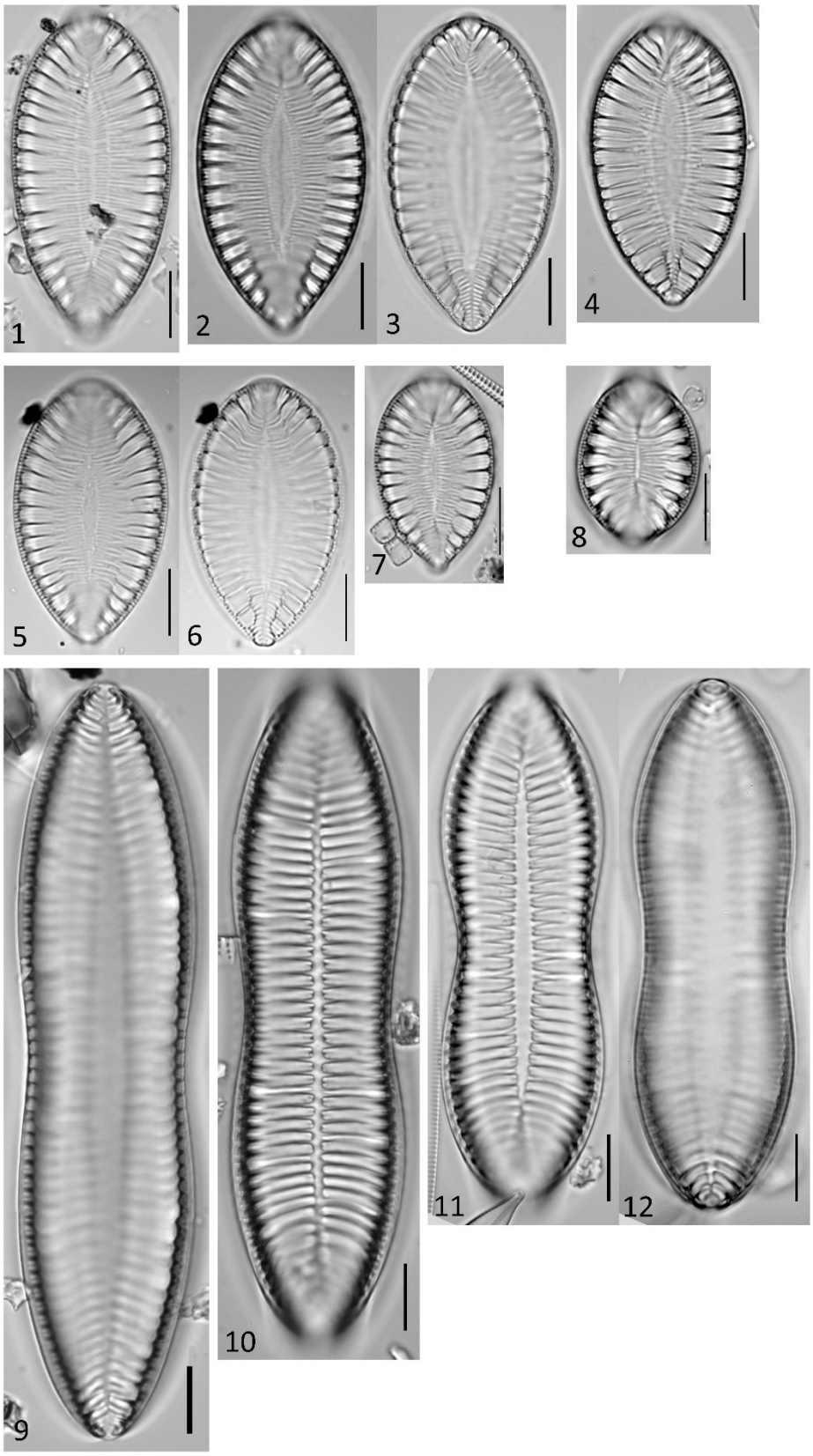


Plate 23 – Surirelloid (Surirella)

7	Surirella brightwellii	100x. Scale bar 10 µm. See Sims 1996 pl 268 fig 3.
5	Surirella brightwellii	100x, BF, oil T+B. Scale bar 10 µm. Up focus. See Sims 1996 pl 268 fig 3.
6	Surirella brightwellii	100x, BF, oil T+B. Scale bar 10 µm. Down focus on footpole. See Sims 1996 pl 268 fig 3.
1	Surirella brightwellii	100x, BF, oil T+B. Scale bar 10 µm. Outline linear ovate. See Sims 1996 pl 268 fig 3.
4	Surirella brightwellii	100x. Scale bar 10 µm. Larger clear center. See Sims 1996 pl 268 fig 3.
2	Surirella brightwellii	100x. Scale bar 10 µm. Up focus. See Sims 1996 pl 268 fig 3.
3	Surirella brightwellii	100x. Scale bar 10 µm. Down focus. See Sims 1996 pl 268 fig 3.
11	Surirella smithii	100x. Scale bar 10 µm. Mid focus on central outline. See Sims 1996 pl 278 fig 5.
12	Surirella smithii	100x. Scale bar 10 µm. Down focus on apices. See Sims 1996 pl 278 fig 5.
10	Surirella smithii	100x. Scale bar 10 µm. Up focus on central area. See Sims 1996 pl 278 fig 5.
9	Surirella smithii	100x. Scale bar 10 µm. Internal. Up focu on apices. See Sims 1996 pl 278 fig 5.
8	Surirella sp1	100x. Scale bar 10 µm.

Plate 23 – Surirelloid (Surirella)



Discussion

At the beginning of this trip, I wondered where to look for diatoms in Iceland. Now I realize that wet places in Iceland like most wet places in the world have abundant diatoms.

Examination of the two slides used for this report showed much diatom diversity, especially among the genus *Navicula.* One diatom illustrated here, *Surirella smithii*, I have also found in the Bay of Fundy on the western shore of the Atlantic but, so far, not along the eastern shores of North America (Kimmich 2022).

Another specimen, *Eunotia praerupta* (if the name is correct), is considered by Sims (1996) to live in freshwater. Foged (1974) collected it from sites with pH 5.5 to 9.0 as well as from a coastal lagoon. It was rare in abundance on the two slides studied for this report. Its presence raises questions about diatoms washing into the lagoon from surrounding mountain streams and about the saline tolerance of this species. The collection was made at the end of the lagoon farthest from the outlet to the ocean.

Acknowledgements

Michael Sullivan (US) helped identify *Diploneis interrupta* and two *Fallacia* speciens. Mirko Dressler (Germany) helped identify *Martyana schulzii*.

Mady Kimmich planned the trip to Iceland and travelled with me to this collecting site.

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